NASA SP-7011 (37)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during April 1967

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INTRODUCTION

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

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

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

a. NASA entries identified by their *STAR* accession numbers (N67-10000 series),
b. AIAA entries identified by their *IAA* accession numbers (A67-10000 series); and
c. LC entries identified by a number in the A67-80000 series.

Many of the abstracts included in this publication have been reproduced from those appearing in *STAR* and *IAA*. This procedure, adopted in the interests of economy and speed, has introduced some variation in size, style, and intensity of type.

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(continued)

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

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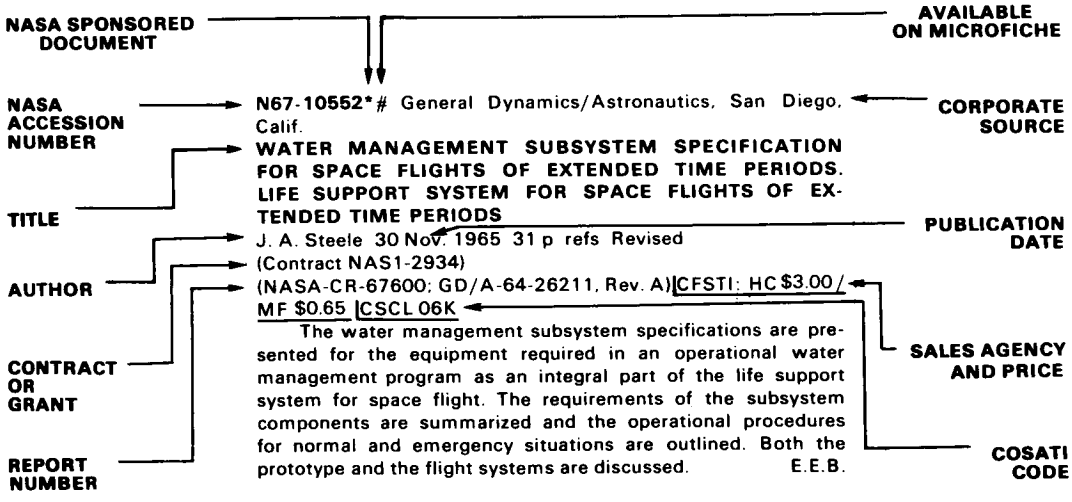

AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography MAY 1967

STAR ENTRIES

N67-16701* National Academy of Sciences–National Research Council, Washington, D.C.
IDEAS IN MODERN BIOLOGY
John A. Moore ed. (Barnard Coll., New York) Garden City, N. Y., Nat. Hist. Press, 1965 567 p refs Proc. of the 16th Intern. Congr. of Zoology, vol. 6, Held in Washington, 20–27 Aug. 1963
(Grant NsG-364)
(NASA-CR-81382) Available from Nat. Hist. Press, Garden City, N. Y.: $8.00 CSCL 06C

CONTENTS:

N67-16702* Harvard Univ., Cambridge, Mass. Biological Labs.
THE DUPLICATION AND RECOMBINATION OF GENES
Matthew S. Meselson *In* NAS–NRC Ideas in Mod. Biol. 1965 p 3–16 refs (See N67-16701 07-04) Available from Nat. Hist. Press, Garden City, N. Y.: $8.00

The mechanism of the genetic substance, deoxyribonucleic acid (DNA), is discussed in connection with genetic duplication processes. The circularity of DNA molecules in certain bacterial and mammalian viruses is surveyed, together with details on its discovery, *in vitro* synthesis, duplication mechanics, and autoradiographic investigation. Two completely different explanations are advanced on genetic recombination and the interactions between homologous DNA molecules that give rise to molecules having nucleotide sequences derived partly from one and partly from another of the partners to the interaction. Four different reactions are cited in the mechanism of recombination: breaking DNA strands, excising portions of strands, resynthesizing them, and joining them to other strands in phosphodiester linkage. R.Ll.

N67-16703* Illinois Univ., Urbana. Dept. of Microbiology.
GENE ACTION
S. Spiegelman *In* NAS–NRC Ideas in Mod. Biol. 1965 p 17–78 refs Sponsored by Public Health Serv. and NSF (See N67-16701 07-04) Available from Nat. Hist. Press, Garden City, N. Y.: $8.00

The genetic transcription method, and the factors controlling the generation of genetic messages are reviewed. In the experimental analyses conducted, two devices were found useful. The deoxyribonucleic acid-ribonucleic acid hybridization test was converted into a sensitive and powerful tool by the use of isotopic labeling and the RNAase resistance of hybrid structures. By this means it was possible to search for, and detect, sequences corresponding to as little as 0.01 percent of an *E. coli* genome. The other technique involved the two-label simultaneous chromatographic method, which permits the detection and identification of genetic messages generated by particular loci. Procedures making it possible to perform informative experiments were derived from these two

methods combined with certain other physical methods (equilibrium density-gradient centrifugation, liquid scintillation spectrometry). R.Ll.

N67-16704* Buenos Aires Univ. (Argentina). Inst. of General Anatomy and Embryology.
A GENERAL VIEW OF CELL STRUCTURE AND FUNCTION
E. de Robertis *In* NAS-NRC Ideas in Mod Biol. 1965 p 81–93 refs (See N67-16701 07-04) Available from Nat. Hist. Press, Garden City, N. Y.: $8.00

Three examples are mentioned in which cell structure was correlated with cell physiology. Studies were made of the macromolecular organization and the bearing on the problem of replication of the deoxyribonucleic acid (DNA) molecule. Comparisons were made of cell structure and cell function in nuclear and cytoplasmic ribonucleic acid (RNA) systems, in cytoplasmic membranes, and in relation to neurons and synaptic junctions. A similar correlation is made in one of the most specialized cytoplasmic components of nerve cells. R.Ll.

N67-16705* Harvard Univ., Cambridge, Mass. Biological Labs.
ILLUSTRATIONS OF CELL FINE STRUCTURE
Keith R. Porter *In* NAS-NRC Ideas in Mod. Biol. 1965 p 95–123 (See N67-16701 07-04) Available from Nat. Hist. Press, Garden City, N. Y.: $8.00

To illustrate the fine cell structure found in the majority of animals, several high-resolution electron micrographs are reproduced. Prominent formed elements of the cytoplasm can be discerned, and the cell nucleus, one of the best known organnelles of the cell, as well as mitochondria are readily identified in other views. Also depicted are: changes in the reticulum of exocrine pancreas cells of a guinea pig, associated with zymogen synthesis; a primary oocyte of the mosquito *Aedes aegypti*; numerous profiles of the endoplasmic reticulum (ER) and a dense population of ribosomes, both attached to the membranes and free in the cytoplasmic matrix; nine triplet arrangements of microtubules; the region of contrast between two epithelial cells from the mucosa of the bat's stomach; the active transport of specific ions between environment and cytoplast; and some features of the caudal sheath found in spermatids of the laboratory mouse. R.Ll.

N67-16706* Massachusetts Inst. of Tech., Cambridge. Div of Biochemistry.
THE SYNTHESIS OF MACROMOLECULES
Vernon M. Ingram *In* NAS-NRC Ideas in Mod. Biol. 1965 p 125–171 refs (See N67-16701 07-04) Available from Nat. Hist. Press, Garden City, N. Y.: $8.00

Recent discoveries bearing on the mechanism for bisoynthesis of deoxyribonucleic acid (DNA), ribonucleic acid (RNA), and protein molecules are described. Technical data are presented on such topics as: the biochemical mechanism of DNA biosynthesis and its replication; chemical composition of synthesized DNA, its physical properties, and nucleotide sequences; radioactivity measurements in experiments with *mycobacterium phlei* DNA as primer; the biosynthesis and configuration of RNA in solution; solubility and RNA-dependent RNA polymerase; the general scheme, mechanism, and requirements of protein synthesis; structure of ribosomes in *E. coli*; structure of polyribosomes (polysomes); the assembly of a peptide chain; and polyribonucleotides and the genetic code. A summary of RNA code words is included. R.Ll.

N67-16707* Johns Hopkins Univ., Baltimore, Md. Dept. of Physiological Chemistry.
THE TRANSFER OF ENERGY WITHIN CELLS
Albert L. Lehninger *In* NAS-NRC Ideas in Mod. Biol. 1965 p 173–202 refs (See N67-16701 07-04) Available from Nat. Hist. Press, Garden City, N. Y.: $8.00

Certain theoretical, biochemical, and ultrastructural considerations are presented on the basic features of energy transfer in biological cells. Emphasis is on the energy transfer mechanisms involved in respiration and oxidative phosphorylation in the mitochondrion. The more general aspects of the cellular energy cycle, and the major endergonic processes dependent on adenosine triphosphate (ATP) (biosynthesis, active transport, and contractile processes) are outlined. Summarized conclusions indicate that the respiratory assembly of enzymes in the mitochondrial membrane does the scalar work of ATP formation, the vectorial osmotic work of active transport, and also the tensorial mechanical work of contraction. R.Ll.

N67-16708* Bryn Mawr Coll., Pa. Dept. of Biology.
QUESTIONS POSED BY CLASSICAL DESCRIPTIVE AND EXPERIMENTAL EMBRYOLOGY
Jane M. Oppenheimer *In* NAS-NRC Ideas in Mod. Biol. 1965 p 205–227 refs (See N67-16701 07-04) Available from Nat. Hist. Press, Garden City, N. Y.: $8.00

Historical contributions made by classical embryology toward a solution of the problem of how an egg and embryo develop into an adult organism are discussed. Topics mentioned include: functional adaptation; the relative significance of dependent versus independent differentiation; experiments testing the effects on development of stimuli from the external surroundings; the doctrine of self-differentiation, and interaction of developing embryonic parts; tissue affinity, aggregation and disaggregation of cells; significance of the division of chromatin; relationship of quantity to quality; separation of blastomeres of echinoderm eggs; cellular differentiation; nature of the mathematical and physical characteristics of a cleaving egg; time-sequences in ontogenetic processes; and causes and effects in terms of nucleus and cytoplasm. Also, to ascertain the physiological relationships between cell structure and cell processes, studies were conducted on centrosome, nucleus and cytoplasm. R.Ll.

N67-16709* Johns Hopkins Univ., Baltimore, Md. Dept. of Biology.
MECHANISMS OF CELLULAR DIFFERENTIATION
Clement L. Markert *In* NAS-NRC Ideas in Mod. Biol. 1965 p 229–258 refs Sponsored by AEC, NSF, and Am. Cancer Soc. (See N67-16701 07-04) Available from Nat. Hist. Press, Garden City, N. Y.: $8.00

Popular biological and physiological views on the course of gene function are reviewed. Cell differentiation is here defined as a phenomenon in developmental biology viewed as the product of the reciprocal interaction of genome and environment, leading to differential gene function. Evidence from a variety of sources (experimental embryology, genetics, and biochemistry) support the conclusion that differential gene function characterizes the diverse cells of metazoans. It is stated that during repeated cell division, or under extreme environmental provocation, the differentiated state of the chromosome may be changed so as to express new patterns of gene function. R.Ll.

N67-16710* University Coll., London (England). Dept. of Zoology.
CELLULAR INTERACTIONS IN DEVELOPMENT
M. Abercrombie *In* NAS-NRC Ideas in Mod. Biol. 1965 p 259–280 refs (See N67-16701 07-04) Available from Nat. Hist. Press, Garden City, N. Y.: $8.00

Consideration is given to embryonic cell response to signals, cellular differentiation, and movements. A generalization is made that most of the interactions that control the various components of cell movement involve contact between the cells, and that adhesion is commonly the significant aspect of the contact. The changing patterns of signals within an embryo, eliciting an ever shifting array of responses many of which are themselves new signals, is found to be of infinite variety. Examples are presented of cell movement that chiefly illustrate how it may be started and how it may be appropriately stopped. R.Ll.

N67-16711* Commonwealth Scientific and Industrial Research Organization, Sydney (Australia).
THE EFFECTS OF GENETIC CHANGE AT DIFFERENT LEVELS
J. M. Rendel *In* NAS-NRC Ideas in Mod. Biol. 1965 p 283-295 refs (See N67-16701 07-04) Available from Nat. Hist. Press, Garden City, N. Y.: $8.00

The evolutionary selection process outlined involves the action of natural selection on existing genes. It takes place at the first level of gene change and is assumed to play a part at every other level as well. A crude outline classifies two additional types of genetic changes that can be expected to have taken place in evolution. The consequences of genetic redundancy, the introduction of new genetic material, the deoxyribonucleic acid (DNA) content of some nuclei in picograms are also briefly mentioned. R.Ll.

N67-16712* Chicago Univ., Ill. Dept. of Zoology.
SELECTION IN AND OF POPULATIONS
R. C. Lewontin *In* NAS-NRC Ideas in Mod. Biol. 1965 p 297-311 refs (See N67-16701 07-04) Available from Nat. Hist. Press, Garden N. Y.: $8.00 City.

Principles determining evolution processes, and genetic selection in and out of populations are summarized. These processes are: proliferation by which the number of independently evolving units increases, phyletic evolution by which the kind and frequency of characters and character complexes change over time, and extinction with its irrevocable loss of taxonomic and organic diversity. Within populations the result of natural selection is to change the frequency of genotypes to maximize the intrapopulation fitness. Between populations it is the probability of population survival that is maximized and the net result is a compromise between these forces, the degree to which one or the other is important depending on the autecology of the species. R.Ll.

N67-16713* Harvard Univ., Cambridge, Mass. Museum of Comparative Zoology.
EVOLUTION AT THE SPECIES LEVEL
Ernst Mayr *In* NAS-NRC Ideas in Mod. Biol. 1965 p 313-325 refs (See N67-16701 07-04) Available from Nat. Hist. Press, Garden City, N. Y.: $8.00

Consideration is given to the species border which is the point of compromise between the need for adaptation to local conditions and the limitations set by the species-wide components of the genotype. Genetic cohesion and the multiplication of species interactions are covered, along with variation within natural populations and major mutations in species multiplication. The rapid speciation process that occurs when a founder population becomes established beyond the periphery of the species range, thus undergoing a genetic revolution, is the focal point discussed. The highly unequal rates of speciation are noted. R.Ll.

N67-16715*# Illinois Univ., Urbana. Dept. of Physiology and Biophysics.
LEVELS OF BIOLOGICAL ORGANIZATION AND THEIR PHYSIOLOGICAL SIGNIFICANCE
C. Ladd Prosser *In* NAS-NRC Ideas in Mod. Biol. 1965 p 357-390 refs (See N67-16701 07-04) Available from Nat. Hist. Press, Garden City, N. Y.: $8.00

Physiological properties during chemical and organic evolution are considered in relation to levels of biological organization. Theory is postulated on the theory of emergence of qualitatively different properties in integrated whole organisms; information theory as a formal description of the relation between parts and wholes; randomness detected in genetic change, in individuals in a population, and in the central nervous system. Several examples are listed to explain the evolutionary meaning of emergence. R.Ll.

N67-16716* Western Reserve Univ., Cleveland, Ohio. Dept. of Biology.
COMPARATIVE MORPHOLOGY AND PHYSIOLOGY OF EXCRETION
Bodil Schmidt-Nielsen *In* NAS-NRC Ideas in Mod. Biol. 1965 p 391-425 refs (See N67-16701 07-04) Available from Nat. Hist. Press, Garden City, N. Y.: $8.00

The kidney or its analogous structure in the various phyla is investigated together with the function of the other numerous excretory organs as they pertain to the kidney function. The cellular structure and function of the amoeba is considered as the most primitive kind of kidney and an example of the contractile vacuole. Emphasis is on the functional aspects determining the osmolality of the tabular fluid and the final urine. Examples are provided for the excretory tubule of fresh-water animals, and the short, undifferentiated tubules of marine forms. Also reported are investigations on the osmotic concentration in the rectal fluid of fly larvae, and the concentrating mechanism of the mammalian kidney. Numerous informative charts and diagrams are included. R.Ll.

N67-16717* Cambridge Univ. (England). Dept. of Zoology.
PHYLOGENETIC RELATIONS OF THE MAJOR GROUPS OF ANIMALS
G. S. Carter *In* NAS-NRC Ideas in Mod. Biol. 1965 p 427-445 refs (See N67-16701 07-04) Available from Nat. Hist. Press, Garden City, N. Y.: $8.00

Theory is advanced on the technique of determining how the major groups of animals are related to each other in the evolutionary process. Zoological concepts and views on the phylogeny of the animal kingdom are reviewed, and paleontological evidence showing the course of evolution is summarized. Homomorphosis and the problem of phyla interrelationships are also covered briefly. R.Ll.

N67-16718*# California Univ., Los Angeles. Dept. of Zoology.
PHYSIOLOGICAL BASES OF BEHAVIOR
Theodore Holmes Bullock *In* NAS-NRC Ideas in Mod. Biol. 1965 p 449-482 refs (See N67-16701 07-04) Available from Nat. Hist. Press, Garden City, N. Y.: $8.00

Contemporary efforts to bridge the gap between physiology and behavior are surveyed. Issues concerned with the peripheral mechanisms underlying behavior are investigated by the physiology of sense organs from peripheral receptors and effectors, through lower-level integrative mechanisms, up to higher integrations. As an example of the advancement in knowledge concerning capacities of receptors, (thermoreceptors, photoreceptors, mechanoreceptors, or chemoreceptors) the discovery of the electroreceptor is cited; another example is that of the inner ear of the frog. Integrative mechanisms both at the level of small number of cells, as well as at high levels are also analytically reported. R.Ll.

N67-16719*# Cambridge Univ. (England). Sub-Dept. of Animal Behavior.
THE ONTOGENY OF BEHAVIOR
W. H. Thorpe *In* NAS-NRC Ideas in Mod. Biol. 1965 p 483-518 refs (See N67-16701 07-04) Available from Nat. Hist. Press, Garden City, N. Y.: $8.00

Analytical details concerning the main ideas and advances of behavorial ontogeny and the learning processes are evaluated. Theoretical concepts are advanced on such topics as: habituation, the simplest type of learning, in the process of adjusting innate behavior patterns to environmental situations; the conditioned reflex and the classical interoceptive conditioning; trial-and-error learning involving the motor-conditioned reflex; the principle of expectancy and reward in animal learning; and sensitive periods and imprinting techniques during experiments on the song-learning of the chaffinch (Fringilla Coelebs). R.Ll.

N67-16720* Oxford Univ. (England). Dept. of Zoology.
BEHAVIOR AND NATURAL SELECTION
N. Tinbergen *In* NAS–NRC Ideas in Mod. Biol. 1965 p 519–542 refs (See N67-16701 07-04) Available from Nat. Hist. Press, Garden City, N. Y.: $8.00

Genetic-environmental interactions in the behavioral control and development of animals are evaluated in respect to the animal's ability to survive and reproduce itself. One investigative method cited involves singling out a particular environmental pressure, a challenge to survival, and investigating how an animal meets this challenge. Another technique of the methodology is to start from an observable property of an animal of which the function is unknown, and examine in what respect it contributes to survival, and how it does so. The hypothesis is advanced that accepting the theory of natural selection should not afford an excuse not to investigate concrete survival mechanisms. R.Ll.

N67-16775*# Republic Aviation Corp., Farmingdale, N. Y.
THE INFLUENCE OF DIET ON THE NORMAL FECAL FLORA OF THE CHIMPANZEE Final Report, Feb. 1964–Feb. 1965
Lorraine S. Gall Holloman AFB, N. Mex., Aeromed. Res. Lab., Nov. 1965 228 p refs Prepared Jointly with Wisconsin Univ.
(NASA Order R-25; Contract AF 29(600)-4555)
(NASA-CR-81320; ARL-TR-65-21; RAC-1787-5FR) CFSTI: HC $3.00/MF $0.65 CSCL 06C

A study was undertaken to determine the effect of diet on the aerobic and anaerobic fecal flora of twelve chimpanzees. The aerobic bacteria isolated were more markedly influenced by the individual animal than by diet. This was particularly true of gram negative rods, such as proteus, pseudomonas, untypable cultures, and possibly klebsiella and certain typable beta hemolytic streptococci. Two types of bacteria, salmonella and peculiar beta-hemolytic gram positive bacillus, were diet-oriented and may have been carried in on or were favored by the diets. An overall simplification of the aerobic flora occurred after the twelve chimpanzees had been isolated from other chimpanzees for a prolonged period of time. The distribution of anaerobic bacteria in the feces both strict and facultative anaerobes was influenced markedly by the diet fed and to a lesser extent by the individual animal. The predominance of anaerobes over aerobes and the proportion of strict vs facultative anaerobes were influenced by the composition of the diet fed, and to a lesser extent the proportion of strict vs facultative anaerobes was influenced by the individual animal. The length of time which the diet was fed also played an important role in the proportion of strict vs facultative anaerobes. Author

N67-16781*# Pennsylvania State Univ., University Park.
THE MOLECULAR ASPECTS OF BIOLOGICAL DEVELOPMENT
R. A. Deering and Muriel Trask, ed. Feb. 1967 213 p refs Workshop held University Park, Pa., 19–21 Jul. 1965
(Grant NsG-324)
(NASA-CR-673) CFSTI: HC $3.00/MF $0.65 CSCL 06C

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2. EARLY BIOCHEMICAL EVENTS FOLLOWING FERTILIZATION OF SEA URCHIN EGGS D. Epel p 17–33 refs (See N67-16783 07-04)

3. RIBOSOMAL RIBONUCLEIC ACID SYNTHESIS IN RANA PIPIENS EMBRYOS D. E. Kohne (Purdue Univ.) p 35–46 refs (See N67-16784 07-04)

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5. PROLIFERATION AND DIFFERENTIATION OF STEM CELLS OF THE BLOOD-FORMING SYSTEM OF THE MOUSE J. E. Till (Toronto Univ.) p 69–75 refs (See N67-16786 07-04)

6. THE STRUCTURE OF ISOZYME SYSTEMS AND THEIR ROLE IN DEVELOPMENT E. J. Massaro (Yale Univ.) p 77–91 refs (See N67-16787 07-04)

7. ANTIGEN SYNTHESIS DURING REORGANIZATION IN THE CELLULAR SLIME MOLDS J. H. Gregg (Fla. Univ.) p 93–107 refs (See N67-16788 07-04)

8. CONTROL OF ENZYME ACTIVITIES IN D. DISCOIDEUM DURING DEVELOPMENT B. Wright (Mass. Gen. Hosp.) p 109–122 refs (See N67-16789 07-04)

9. CELL INTERACTIONS IN SLIME MOLD (ACRASINA) DEVELOPMENT A. J. Kahn (Syracuse Univ.) p 123–129 refs (See N67-16790 07-04)

10. HISTONES IN RELATION TO CONTROL IN LIVING SYSTEMS R. Chalkley (Calif. Inst. of Tech.) p 131–147 refs (See N67-16791 07-04)

11. DYNAMICS OF THE POINT OF NO RETURN DURING DIFFERENTIATION IN BLASTOCLADIELLA EMERSON II E. C. Cantino (Mich. State Univ.) p 149–164 refs (See N67-16792 07-04)

12. NUCLEIC ACID SYNTHESIS DURING DIFFERENTIATION OF BLASTOCLADIELLA EMERSON II J. S. Lovett (Purdue Univ.) p 165–181 refs (See N67-16793 07-04)

13. THE MOLECULAR ASPECT OF NUCLEIC ACID INTERACTIONS P. O. P. Ts'o (Johns Hopkins Univ.) p 183–194 refs (See N67-16794 07-04)

14. THE PROBLEMS AND PROMISES OF RESEARCH ON THE MOLECULAR ASPECTS OF DEVELOPMENT (WORKSHOP SUMMARY) P. O. P. Ts'o (Johns Hopkins Univ.) p 195–201 (See N67-16795 07-04)

N67-16782*# Massachusetts Inst. of Tech., Cambridge. Biology Dept.
RNA PROTEIN SYNTHESIS IN DEVELOPING SEA URCHIN EGGS
Paul R. Gross *In* Pa. State Univ. The Mol. Aspects of Biol. Develop. Feb. 1967 p 1–16 refs (See N67-16781 07-04) CFSTI: HC $3.00/MF $0.65

Some important results obtained from a study of biochemical events, in particular those involved with macromolecule synthesis, that follow immediately after fertilization of sea urchin eggs are discussed. A postulation is made that systems exist for controlling protein synthesis at the level of translaton of RNA messages. Protein synthesis, an inevitable accompaniment of early development, may be uncoupled from the highly nuclease-sensitive RNA. Since under uncoupling conditions new RNA messages are not made, old ones must supply the information for translation which suggests that these messages are stable. Therefore, RNA messages directing early protein synthesis must be present in the egg before fertilization. From this it is concluded that some system of control must exist in the cytoplasm to turn on the reading of stored messages, since the co-factors necessary for protein synthesis are already available in the unfertilized egg. Experiments that led to this position are discussed and concern the pattern of early RNA synthesis, the search for stored maternal messages, and a study of the proteins themselves. R.N.A.

N67-16783*# Pennsylvania Univ., Philadelphia.
EARLY BIOCHEMICAL EVENTS FOLLOWING FERTILIZATION OF SEA URCHIN EGGS
David Epel *In* Pa. State Univ. The Mol. Aspects of Biol. Develop. Feb. 1967 p 17–33 refs (See N67-16781 CFSTI: HC $3.00/MF $0.65
(Grants PHS-G-5-TI-GM-2G77; NSF GB-4206)

A study was made of the temporal sequence and mechanism of the fertilization reactions in sea urchin eggs by monitoring light scattering structural changes, fertilization acid excretion, and activation of DPN kinase and respiration. The data indicate that changes in light scattering and acid excretion begin simultaneously, followed almost immediately by activation of DPN kinase. Respiratory activity increases last. An analysis of these changes suggests that the light scattering and acid changes reflect the

breakdown of the cortical granules. DPN kinase activation might be through the free Ca^{+2} release known to occur after fertilization since this enzyme is both Ca^{+2} and Mg^{+2} activated. The respiratory activation mechanism is unclear but the data suggest substrate mobilization, possibly through control of glycogen phosphorylase. R.N.A.

N67-16784*# Purdue Univ., Lafayette, Ind. Biology Dept.
RIBOSOMAL RIBONUCLEIC ACID SYNTHESIS IN RANA PIPIENS EMBRYOS
David E. Kohne *In* Pa. State Univ. The Mol. Aspects of Biol. Develop. Feb. 1967 p 35–46 refs (See N67-16781 07-04) CFSTI: HC$3.00/MF$0.65

A study was made to determine gross aspects of the regulatory processes which control the synthesis of ribosomal-RNA during embryogenesis in *Rana pipiens*. Three experimental embryological systems were employed in this work. Hybrid embryos were used to study the effect of a qualitative change in the genome of *Rana pipiens* on ribosomal-RNA synthesis during development, haploid embryos were used to ascertain the effect on ribosomal-RNA synthesis during development of a quantitative change in the frog genome, and embryos reared in a medium lacking magnesium were studied to determine the effect of magnesium deprivation on ribosomal-RNA synthesis during development. Results for each of these three cases are discussed in detail. R.N.A.

N67-16785*# Connecticut Univ., Storrs. Dept. of Zoology.
MOLECULAR ASPECTS OF LENS CELL DIFFERENTIATION
John Papaconstantinou *In* Pa. State Univ. The Mol. Aspects of Biol. Develop. Feb. 1967 p 47–67 refs (See N67-16781 07-04) CFSTI: HC$3.00/MF$0.65

A system is discussed in which the regulation of synthesis of specific proteins is associated with a specific stage of cellular differentiation, i.e., the differentiaton of the lens epithelial cell to the fiber cell. Changes in RNA and DNA are also described which are associated with fiber cell formation and possibly with the regulation of protein synthesis. The epithelial cells are shown to have basophilic staining properties whereas the fiber cell has acidophilic staining properties. This change in staining properties may be due to the synthesis of gamma-crystallins. There is also a conversion from a rough endoplasmic reticulum in the epithelial cell to a smooth endoplasmic reticulum in the fiber cell. The breakdown and decrease in the ribosomes may be directly related to the appearance of the endoplasmic reticulum. Increases in the nucleus and nucleoli sizes and the ribosomal population at the time of cellular elongation may indicate the initiation of an overall synthesis of materials required for the morphological changes of the cell. An increase in the synthesis of nucleic acids may account for the morphological changes in the nuclei and nucleoli. The fiber cell's nucleus gradually disappears as it ages. This is due to its incapacity to incorporate precursors into its DNA and also a loss of DNA. R.N.A.

N67-16786*# Toronto Univ. (Ontario). Dept. of Medical Biophysics.
PROLIFERATION AND DIFFERENTIATION OF STEM CELLS OF THE BLOOD-FORMING SYSTEM OF THE MOUSE
James E. Till *In* Pa. State Univ. The Mol. Aspects of Biol. Develop. Feb. 1967 p 69–75 refs (See N67-16781 07-04) CFSTI: HC$3.00/MF$0.65

Mutations W, Sl, and f were studied in mice of genotypes W/W^v, Sl/Sl^d, and f/f in an effort to determine the molecular basis for the mutations which are known to produce anemia, and to determine on the basis of the spleen-colony technique what regulates the proliferation and differentiation patterns of the stem cells. Focused upon are the intrinsic and extrinsic genetic changes which could be regulated by a single gene and their relationship to the ability of the stem cell to proliferate so as to maintain its own numbers (self-renewal), and differentiate to give rise to cells of the red cell series, granulocyte series, and the megakaryocytes. S.C.W.

N67-16787*# Yale Univ., New Haven, Conn. Dept. of Biology.
THE STRUCTURE OF ISOZYME SYSTEMS AND THEIR ROLE IN DEVELOPMENT
Edward J. Massaro *In* Pa. State Univ. The Mol. Aspects of Biol. Develop. Feb. 1967 p 77–91 refs (See N67-16781 07-04) CFSTI: HC$3.00/MF$0.65

An analysis of species and tissue specific patterns of lactate dehydrogenase (LDH) isozyme systems and their role during the course of vertebrate and mammalian embryonic development is presented. S.C.W.

N67-16788*# Florida Univ., Gainesville. Dept. of Zoology.
ANTIGEN SYNTHESIS DURING REORGANIZATION IN THE CELLULAR SLIME MOLDS
James H. Gregg *In* Pa. State Univ. The Mol. Aspects of Biol. Develop. Feb. 1967 p 93–107 refs (See N67-16781 CFSTI: HC$3.00/MF$0.65

A discussion of the mechanism (antigen synthesis) involved in the differentiation of cells into spores (70%) and stalk cells (30%) during the development of two species of slime molds, *Dictyostelium mucoroides* and *Dictyostelium discoideum*, is presented. Focused upon are the merits of immunological methods (fluorescent antibody) and histochemical techniques used to study cell differentiation in these two slime molds. S.C.W.

N67-16789*# Massachusetts General Hospital, Boston. John Collins Warren Lab.
CONTROL OF ENZYME ACTIVITIES IN D. DISCOIDEUM DURING DEVELOPMENT
Barbara Wright *In* Pa. State Univ. The Mol. Aspects of Biol. Develop. Feb. 1967 p 109–122 refs (See N67-16781 07-04) CFSTI: HC$3.00/MF$0.65

Possible mechanisms for changing the activity of an enzyme are discussed, and the point is made that activity at the enzyme and substrate level must necessarily be correlated in time with the accumulation of the product characteristic of the differentiated cell. The life cycle of D. *discoideum* is summarized, and details are given on experiments conducted with cells starving on 2% agar throughout the differentiation cycle. Among the findings discussed are: (1) the existence in vivo of many limiting factors for the synthesis of materials important to differentiation, which may be the rule rather than the exception; and (2) the striking correlation in the activity of an enzyme and the accumulation of the product of the activity of this enzyme. It was concluded that no single event could possibly trigger cell wall synthesis since a complex array of primer, substrates, activators, and enzymes are not only limiting but must interact to bring about the accumulation of cell wall material. M.G.J.

N67-16790*# Syracuse Univ., N. Y. Dept. of Zoology.
CELL INTERACTIONS IN SLIME MOLD (ACRASINA) DEVELOPMENT
A. J. Kahn *In* Pa. State Univ. The Mol. Aspects of Biol. Develop. Feb. 1967 p 123–129 refs (See N67-16781 07-04) CFSTI: HC$3.00/MF$0.65

Attention is focused upon the early stages in the life cycle of cellular slime molds, beginning with spores and terminating with the formation of the pseudoplasmodium (aggregate). Details are given on experiments conducted to determine if spacing of aggregates occurs in Polysphondylium *pallidum* and, if it does occur, is it due to a spacing substance present in the gaseous phase of the environment. Emphasis is placed on the relation between nearest neighbor distance and the density of aggregation centers; the correlation between center density and distribution; the influence of environmental and biological factors on the rate of center formation; the inter-relationships between these factors, the rate of

center formation, and the distribution and density of centers; and the effects of the rate of center formation on center density and distribution. It is concluded: (1) Nonrandom distribution of spaced or clustered centers occurs. (2) Center distribution is probably not due to a spacing substance present in the gaseous phase. (3) The rate of center formation and the number of cells available for aggregation is involved in establishing center density and distribution. M.G.J.

N67-16791*# California Inst. of Tech., Pasadena. Div. of Biology.
HISTONES IN RELATION TO CONTROL IN LIVING SYSTEMS
Roger Chalkley *In* Pa. State Univ. The Mol. Aspects of Biol. Develop. Feb. 1967 p 131–147 refs (See N67-16781 07-04)
CFSTI: HC $3.00/MF $0.65

A broad outline is presented on several studies concerned with the molecular aspects of control mechanisms in differentiated tissues. A general scheme for the isolation of chromatin is discussed, and the chemical compositions of some isolated chromatins are tabulated. Experiments were also conducted to see if the isolated chromosomal material could act as a template for DNA-dependent RNA synthesis, and to compare the template activity of the chromatin with that of DNA which had not been isolated from an identical preparation of chromatin. Other investigations centered on the problems of histone metabolism; the in vitro analysis of RNA synthesis; studies related to the release of dormacy in the potato tuber, to the increase of enzyme activity of the liver induced by hydrocortisone, and to the effects of estradiol in preparing the endometrial layer of the uterus for implantation following fertilization; and a dynamic model for induction and regression. M.G.J.

N67-16792*# Michigan State Univ., East Lansing. Dept. of Botany.
DYNAMICS OF THE POINT OF NO RETURN DURING DIFFERENTIATION IN BLASTOCLADIELLA EMERSONII
Edward C. Cantino *In* Pa. State Univ. The Mol. Aspects of Biol. Develop. Feb. 1967 p 149–164 refs (See N67-16781 07-04)
CFSTI: HC $3.00/MF $0.65

Data on the background of B. *emersonii* are reviewed, and the two major developmental pathways taken by the species are identified as (1) an ordinary colorless (OC) cell which is uppermost in the top pathway; and (2) a resistant sporangial (RS) cell which is uppermost in the lower pathway. As it was found that in the presence of exogenous bicarbonate, essentially all spores developed along the RS pathway, and in its absence along the OC between exponential growth of the RS cell and its subsequent differentiation is also considered, and the morphological point of no return during RS development in B. *emersonii* is depicted. Also considered is the source and intracellular localization of the reducing power necessary for driving the reductive carboxylation of ketoglutarate to isocitrate. Hypotheses are proposed regarding the effect of bicarbonate on glucose-60 glucose-6-phosphate dehydrogenase, and the effect of morphological reversal on the specific activity of free glucose in an RS cell. M.G.J.

N67-16793*# Purdue Univ., Lafayette, Ind. Dept. of Biological Sciences.
NUCLEIC ACID SYNTHESIS DURING DIFFERENTIATION OF BLASTOCLADIELLA EMERSONII
James S. Lovett *In* Pa. State Univ. The Mol. Aspects of Biol. Develop. Feb. 1967 p 165–181 refs (See N67-16781 07-04)
CFSTI: HC $3.00/MF $0.65

The formation of zoospores and their germination are described, with interest centered on the control mechanisms for the cellular regulation of differentiation, and on nuclei acids and the spore nuclear cap. Several observations concerning the structure and function of the nuclear cap are examined. These seem to indicate that the reappearance of the ribosomes in the cytoplasm at germination could result from synthesis of new ribosomes at the expense of the cap ribonucleoprotein, or from migration of the pre-existing ribosomes. Experimental data on zoospore formation, and RNA synthesis in particular, suggest that new ribosomal RNA—and apparently transfer RNA—synthesis is not necessary for spore formation. Results also show that the pattern of synthesis and early differentiation of the spores, to the stage where they form a tiny, uninucleate plant with a fairly long, branched rhizoid, occurs whether the spores are in the growth medium or not. M.G.J.

N67-16794*# Johns Hopkins Univ., Baltimore, Md. Dept. of Radiological Sciences.
THE MOLECULAR ASPECT OF NUCLEIC ACID INTERACTIONS
Paul O. P. Ts'O *In* Pa. State Univ. The Mol. aspects of Biol. Develop. Feb., 1967 p 183–194 refs (See N67-16781 07-04)
CFSTI: HC $3.00/MF $0.65

Details are given on thermodynamic and spectroscopic methods used in studying the properties of monomers in solution. The data obtained on the extensive stacking interaction of the bases of nucleic acid in aqueous solution are applied to investigations of polymer–monomer interactions. Also described are the important parameters and the basic information about the forces responsible for the secondary structure of nucleic acids, which resulted from these experiments. M.G.J.

N67-16795*# Johns Hopkins Univ., Baltimore, Md. Dept. of Radiological Sciences.
THE PROBLEMS AND PROMISES OF RESEARCH ON THE MOLECULAR ASPECTS OF DEVELOPMENT Workshop Summary
Paul O. P. Ts'o *In* Pa. State Univ. The Mol. Aspects of Biol. Develop. Feb. 1967 p 195–201 (See N67-16781 07-04)
CFSTI: HC $3.00/MF $0.65

Problems and progress in the field of developmental biology are reviewed, and some general consensuses and conclusions are presented. Particular consideration is given to unicellular organisms and to a unicellular model; a more precise agreement as to what constitutes differentiation; and the concept of the decision-making process within cells. The nuclear–cytoplasm relationship is redefined, with this relationship identified as the most important cellular factor to be considered. The need for better communications, and the basic problems of developmental biology in terms of biochemical hardware and mechanism are discussed in relation to the progress foreseen for the next decade. M.G.J.

N67-16893# Honeywell, Inc., St. Paul, Minn. Research Dept.
THE EFFECTS OF HIGH-INTENSITY RADIANT STIMULATION OF VARYING WAVELENGTHS AND DURATIONS ON RETINAL SENSITIVITY Annual Progress Report, 1 Jul. 1965–1 Jul. 1966
H. G. Sperling, N. A. Sidley, W. B. Dockens, and C. L. Jolliffe
30 Sep. 1966 20 p refs
(Contract DA-49-193-MD-2457)
(Doc.-1549-TDR3; APR-3; AD-642318) CFSTI: HC $3.00/MF $0.65

The report presents data on the spectral sensitivity of the eye for a baseline condition of 3000 trolands of planckian-radiator (white) light, and a comparison with the eye's sensitivity when 10,000 trolands of a narrow-band radiation from the blue, green or red parts of the spectrum are added to the white light. The results show a quantitatively greater reduction of sensitivity over the spectral region of the added spectral light, which qualitatively appears to take the form of nearly or completely eliminating the peak found in that region of the spectrum under the white-light condition. There is less effect on the adjacent parts of the function. These results begin to suggest spectral mechanisms which have considerably narrower ranges of spectral sensitivity than are shown in rod and isolated-cone photopigment spectral bleaching data. The questions which these results raise with regard to currently

proposed general explanations of color and brightness vision are discussed. Author (TAB)

N67-16899# Mitre Corp., Bedford, Mass.
STUDIES OF DISPLAY SYMBOL LEGIBILITY. PART X: THE RELATIVE LEGIBILITY OF LEROY AND LINCOLN/MITRE ALPHANUMERIC SYMBOLS
Diana J. Showman Aug. 1966 31 p refs
(Contract AF 19(628)-5165)
(MTR-204; ESD-TR-66-115; AD-640170) CFSTI: HC $3.00/MF $0.65

The legibility of standard Leroy alphanumeric symbols was compared with a new font, the Lincoln/MITRE (L/M) font. Legibility was tested by having human subjects attempt to identify the symbols when seen one at a time for a brief exposure period. The results showed the L/M font to be more legible than the standard Leroy. It is recommended that the two fonts be compared in a similar test on a TV monitor; this study is presently being conducted. Author (TAB)

N67-16937# Colorado Univ., Boulder.
PERSONALITY DIFFERENCES IN DISSONANCE RESOLUTION
O. J. Harvey and Robert Ware Oct. 1966 16 p refs
(Contract Nonr-1147(07))
(TR-18; AD-641511) CFSTI: HC $3.00/MF $0.65

Following the induction of either a positive or negative impression of an object person (OP) through descriptions of his past behavior, concrete and abstract Ss were presented descriptions of OPs present behavior that run counter to their past and wrote a two paragraph explanation of the perceived consistency-inconsistency. Concrete Ss, significantly more than abstract individuals, (1) perceived inconsistencies between OPs past and present behavior, (2) were negatively aroused by the inconsistency, (3) sought to neutralize the inconsistencies by attributing them to temporal change in OPs, (4) gave few explanations of the inconsistencies, (5) gave poorly integrated accounts of the inconsistencies, and (6) used stereotypic labels in their explanations. In addition, concrete Ss were significantly less tentative in their conclusions about the OPs and significantly more likely to view OPs possession of desirable and undesirable characteristics as mutually exclusive. Author (TAB)

N67-16939# System Development Corp., Santa Monica, Calif.
SELECTIVE CHANGES IN THE PRESENTATION OF RANDOM SHAPES AS A DETERMINANT OF JUDGED COMPLEXITY
Charles P. Allen 1 Jul. 1966 58 p refs
(SP-2566/000/00; AD-640650) CFSTI: HC $3.00/MF $0.65

The paper reports on a study conducted to determine the effects on judged complexity which result from selected changes in the number and range of complexity levels associated with a series of randomly derived stimulus shapes. Human subjects were required to judge the complexity of a series of tachistoscopically presented stimulus shapes, where judgements followed the presentation of a sample or anchor stimulus. The results show that judged complexity can be significantly effected by (1) a change in the number of complexity levels presented; (2) the complexity of the initial stimuli presented in a series of stimulus presentations (findings indicated an inverse correlation between the constructed complexity of sample stimuli and the judged complexity of subsequent stimuli); and (3) the constructed complexity of the stimulus being judged. Results also indicated that complexity level interaction may function as an identifiable factor which effects complexity judgements. Finally, the results suggest that variables shown to contribute to judgements of complexity constitute an aggregate, where each member of the aggregate must incorporate appropriate weighting factors in order to improve the reliability of predictions concerning complexity judgements. Author (TAB)

N67-16957# Air Force Missile Development Center, Holloman AFB, N. Mex. Mechanical Section.
ENVIRONMENTAL SYSTEM DEVELOPMENT FOR RAPID DECOMPRESSION OF CHIMPANZEES TO PRESSURES LESS THAN TWO TORR
Tommy L. Dobson *In* AEDC Proc. of the 13th Ann. AF Sci. and Eng. Symp., Vol. I 1966 16 p (See N67-16941 07-34) CFSTI: HC $3.00/MF $0.65

Eighteen tests have been performed, in which were chimpanzees decompressed from 179 torr (35,000 feet) to less than two torr (135,000 feet) in one second using a 100 percent oxygen atmosphere. This research is being performed so that mission rules, safety procedures, and necessary engineering designs may be incorporated into manned spacecraft to assure maximum chances of mission success for astronauts. Existing chambers, equipment, and instrumentation were used as much as possible. New test methods and safety procedures were developed. Several problems were encountered in the development of this unique test capability, and these problems and their solutions are described. Future test requirements will include decompression pressures below one torr and helium-oxygen atmosphere. A short description of the results of the present test program is included. Author

N67-16975# Aerospace Medical Div. Personnel Research Lab. (6570th), Lackland AFB, Tex.
USING THE ELECTRONIC COMPUTER TO DEFINE AND IMPLEMENT POLICY
Raymond E. Christal *In* AEDC Proc. of the 13th Ann. AF Sci. and Eng. Symp., Vol. II 1966 20 p refs (See N67-16962 07-34) CFSTI: HC $3.00/MF $0.65

Using an electronic computer, the fixed-X regression model can be applied to determine how relevant variables must be weighted in order to reproduce a sample of judgments rendered by an individual or committee. Equations thus far developed are highly valid, and have held up on cross-application. Similarities and differences in policies can be detected by clustering judges in terms of the homogeneity of their regression equations. In a recent study, a Hq USAF board of senior officers reviewed descriptions of 3575 representative officer positions and made decisions concerning the appropriate grade level to be associated with each. In an effort to identify the factors considered by these board members in making their judgments, over a hundred variables were hypothesized and evaluated. A nine-predictor equation was developed which accurately reproduced the board's actions. Other applications of the model are also discussed. Author

N67-16981# Air Force Systems Command, Wright-Patterson AFB, Ohio. Systems Engineering Group.
MACHINES THAT COMMUNICATE AND DESIGNERS WHO DON'T
J. Albert Southern *In* AEDC Proc. of the 13th Ann. AF Sci. and Eng. Symp., Vol. II 1966 20 p refs (See N67-16962 07-34) CFSTI: HC $3.00/MF $0.65

The area of system design and human factors engineering consists of the language words or symbols that are frequently made a part of the machines, tools, or components of the system, plus the language elements that make up the charts, blueprints, and manuals prepared for use by the human operators who become a critical link in the functioning of the system is discussed. Examples, illustrations, and data are cited to show that changes in the words used in man–machine systems may produce great improvements in system performance. The viewpoint is presented that this critical area exists because it has been taken for granted for decades and is rarely recognized as an engineering function in system development. Critical points of communications links and kinks are discussed and practical techniques for resolving many of the problems are presented. Author

N67-16992# Air Force Eastern Test Range, Patrick AFB, Fla. Directorate for Range Engineering.

BIOASTRONAUTICS LABORATORY RESEARCH TOOL

Wayne L. O'Hern *In* AEDC Proc. of the 13th Ann. AF Sci. and Eng. Symp., Vol. III [1966] 33 p refs (See N67-16986 07-34) CFSTI: HC$3.00/MF$0.65

The Bioastronautics Laboratory Research Tool is a tool for developing techniques to monitor, analyze, and display the medical status of astronauts on orbit to the supporting medical personnel. Biomedical telemetry data is received in near-real time by a CDC 3100 computer system. Basic computer programs have been written to record, process, and analyze the data for specific contents and for trend analysis. Data output can be presented on paper or magnetic tape, printed readout, status boards, or cathode ray tube displays. Development of more sophisticated analytical and display programs will be possible with the Bioastronautics Laboratory Research Tool. Author

N67-16993# Air Force Eastern Test Range, Patrick AFB, Fla. Gemini Launch Vehicle Div.

THE GEMINI LAUNCH VEHICLE PILOT SAFETY PROGRAM

John A. Schira, Jr. *In* AEDC Proc. of the 13th Ann. AF Sci. and Eng. Symp., Vol. III [1966] 23 p refs (See N67-16986 07-34) CFSTI: HC$3.00/MF$0.65

This report describes in detail the disciplines of the Gemini Launch Vehicle Pilot Safety Program which are applied during checkout and launch of the booster vehicle. These disciplines include: test procedure review and approval, screening of all closed discrepancy reports, recorder and telemetry data review, screening of replacement components via data package approval, and approval authority over contractor corrective action activities. The organization and duties of the 6555th Aerospace Test Wing Pilot Safety personnel are described and recommendations are made for the application of reliability assurance disciplines to the checkout and launch phase of other Air Force programs. Author

N67-16995# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

AN EVALUATION OF THE ACCELEROCARDIOGRAPH AS AN INSTRUMENT FOR MEASUREMENT OF PHYSIOLOGICAL PARAMETERS

Harold G. Vielhauer *In* AEDC Proc. of the 13th Ann. AF Sci. and Eng. Symp., Vol. III [1966] 31 p refs (See N67-16986 07-34) CFSTI: HC$3.00/MF$0.65

This study concerns the use of an accelerometer as the transducer (Accelerocardiograph) for the measurement of accelerometric precordial vibrations. Experiments were conducted on five dogs to determine the effects of transducer positioning on the configurations of the Accelerocardiogram (ACG); the relationship of common electrical and mechanical events of the heart and correlation studies between blood pressure and amplitude of the ACG. The data revealed that the ACG is an instrument that produces data which can be quantified and is virtually unaffected by position of the transducer on the chest wall. It was also demonstrated that a relationship existed between the ACG and the ECG and that the first wave form (C–H) of the ACG could be used as an index for an indirect measurement of blood pressure. Author

N67-17017# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.

PERFORMANCE OF RHESUS MONKEYS DURING CONTINUOUS LOW-LEVEL GAMMA RADIATION: AN EXPLORATORY STUDY Interim Report

Robert G. Braun, Donald N. Farrer, William Zappini, and Guy H. Crook, II Oct. 1966 29 p refs
(ARL-TR-66-18; AD-641331)

Six rhesus monkeys, two males and four females weighing 4.8 to 5.3 kg. were trained to perform four operant tasks (Continuous Avoidance, Response Time Following an Auditory Cue, Response Time Following a Visual Cue and a Fixed Ratio Task). Baseline performance was obtained in the laboratory during a 30-day simulated exposure situation. The exposure phase involved a 10-day pre-exposure baseline, 10 days of continuous exposure to 2r per hour gamma radiation, and a 10-day post-exposure follow-up assessment of performance. A 30-day follow-up was also conducted 60 days following the exposure phase. No performance diminutions were discovered on the aversively motivated tasks, but a performance diminution in the food rewarded fixed ratio task occurred during the radiation exposure. All the animals recovered shortly after the exposure and still appeared normal 8 months later. Author (TAB)

N67-17018# Kansas State Univ., Manhattan. Dept. of Psychology.

SENSITIVITY AND SPECTRAL RESPONSE PROPERTIES OF HUMAN VISION AT LOW LUMINANCES Technical Report, Oct. 1966

John Lott Brown 14 Oct. 1966 31 p refs Presented at Sem. on Electro-Opt. Aids to Night Vision, Arlington, Va., May 1966
(Contract Nonr-3634(04))
(TR-2; AD-640555) CFSTI: HC$3.00/MF$0.65

The sensitivity of human vision is considered in relation to level of adaptation, luminance and spectral distribution of available light and the visual tasks to be performed. The relevance of these considerations to aided and unaided vision at low luminances is discussed. Author (TAB)

N67-17036# School of Aerospace Medicine, Brooks AFB, Tex.

DESIGN AND DEVELOPMENT OF AN AUTOMATIC INDIRECT BLOOD PRESSURE MONITORING DEVICE, FEBRUARY–DECEMBER 1964

James E. Allred and Jack B. Johnson Sep. 1966 14 p ref
(SAM-TR-66-80; AD-641017) CFSTI: HC$3.00/MF$0.65

The design of an automatic electronic blood pressure recording device is described. This device, which applied pressure only slightly higher than the systolic pressure of the subject, is programed to record the Korotkoff sounds while the occlusion cuff is being inflated. The system may be programed to monitor blood pressure at any predetermined rate from intervals of one minute to several minutes, or it may be initiated manually. Proper design of circuitry for maximum signal-to-noise ratio required a knowledge of the frequency range of the complex Korotkoff sound waveform. This information was obtained by recording the K sounds from four subjects and analyzing the waveforms for energy content vs. frequency. These data are also presented. Author (TAB)

N67-17081# Deutsche Versuchsanstalt fur Luft- und Raumfahrt, Munich (West Germany).

PAPERS OF DVL-INSTITUTE FOR AEROMEDICINE AT VIth INTERNATIONAL AND XIIth EUROPEAN CONGRESS OF AVIATION AND SPACE MEDICINE IN ROME AND AT THE XIIIth INTERNATIONAL CONGRESS OF AVIATION AND SPACE MEDICINE 1964 IN DUBLIN [VORTRAGE AUS DEM INSTITUT FUR FLUGMEDIZIN GEHALTEN AUF DEM. VI. INTERNATIONALEN UND XII. EUROPAISCHEN KONGREB FUR LUFT-UND RAUMFAHRTMEDIZIN IN ROM 1963 UND DEM. XIII: INTERNATIONALEN KONGREB FUR LUFT- UND RAUMFAHRTMEDIZIN IN DUBLIN 1964]

W. Briegleb Sep. 1965 45 p refs In GERMAN; ENGLISH summary
(DLR-FB-65-40) CFSTI: HC$3.00/MF$0.65

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7. THE INFLUENCE OF WEIGHTLESSNESS ON CELL FUNCTION W. Briegleb p 37–42 refs (See N67-17088 07-04)

N67-17082# Deutsche Versuchsanstalt fur Luft- und Raumfahrt, Munich (West Germany).

THERAPY AGAINST DECOMPRESSION SICKNESS [DIE BEHANDLUNG DER DRUCKFALLKHEIT]

H. Hartmann *In its* Papers of DVL-Inst. for Aeromed. at VIth Intern. and XIIth European Congr. of Aviation and Space Med. in Rome and at the XIIIth Intern. Congr. of Aviation and Space Med. 1964 in Dublin Sep. 1965 p 7 10 (See N67-17081 07-04) CFSTI: HC $3.00/MF $0.65

Presented and discussed are the recompression tables to be used by underwater divers, or other personnel exposed to pressurized atmospheres, in case of decompression sickness. Given are exact repressurization values for the different degrees of bends—for pain symptons only as well as for the more serious symptoms of unconsciousness, cramps, weakness of limbs, air emboly, disturbed vision, dizziness and vomiting, severe breathing difficulties, and suffocation spasms. Injections of heparin to dissolve microthromboses, together with intravenous fluid feedings are recommended to prevent lung and brain edema in the more severe cases. Transl. by G.G.

N67-17083# Deutsche Versuchsanstalt fur Luft- und Raumfahrt, Munich (West Germany).

ADAPTATION TO AN UNSPECIFIC STRESS [ANDERUNG VON ENZYMAKTIVITATEN IM SERUM ALS AUSDRUCK UNSPEZIFISCHER ANPASSUNG]

H. M. Wegmann, H. Bruener, D. Jovy, and K. E. Klein *In its* Papers of DVL-Inst. for Aeromed. at VIth Intern. and XIIth European Congr. of Aviation and Space Med. in Rome and at the XIIIth Intern. Congr. of Aviation and Space Med. 1964 in Dublin Sep. 1965 p 11–17 refs (See N67-17081 07-04) CFSTI: HC $3.00/MF $0.65

For 12 weeks duration, human male subjects underwent daily 60 minutes exposure to an oxygen deficient atmosphere in order to observe their changes in blood serum enzyme activity during adaptation to stress. Outputs of their lactate dehydrogenase (LDH), maleate dehydrogenase (MDH), aldolase, and glucose 6-phosphate dehydrogenase, as well as the number of eosinophile blood cells and free 17-hydroxy corticosteroid in blood plasma were analyzed and showed that: (1) acute hypoxia increased all enzyme activities in the blood; and (2) their equilibrium values and their maximal reactions during acclimatization resembled adrenocortical reactions. Transl. by G.G.

N67-17084# Deutsche Versuchsanstalt fur Luft- und Raumfahrt, Munich (West Germany).

THE MECHANISM OF THE SEROUS STRESS REACTION [PHYSIOLOGISCHE ADAPTATION DURCH FERMENTINDUKTION]

G. Schaefer and K. H. Weiner *In its* Papers of DVL-Inst. for Aeromed. at VIth Intern. and XIIth European Congr. of Aviation and Space Med. in Rome and at the XIIth Intern. Congr. of Aviation and Space Med. 1964 in Dublin Sep. 1965 p 18–19 (See N67-17081 07-04) CFSTI: HC $3.00/MF $0.65

Physiological adaptation of body functions to stress situations rests on adrenocortical induced changes in body enzyme concentrations. Hypoxia of fasting rats increased liver glycogen production within 24 hours. The same effect was obtained by giving hungry animals doses of cortisol; this triggered increased output concentrations of those ferments that were elementary for glycose formation from albumin. Transl. by G.G.

N67-17085# Deutsche Versuchsanstalt fur Luft- und Raumfahrt, Munich (West Germany).

THE BIOCHEMICAL PRIMARY EFFECTS IN RADIATION DAMAGE [CHEMISCHER STRAHLENSCHUTZ BEI FLUGEN IN GROBEN HOHEN UND IN DER BEMANNTEN RAUMFAHRT]

G. Schaefer and K. H. Weiner *In its* Papers of DVL-Inst. for Aeromed. at VIth Intern. and XIIth European Congr. of Aviation and Space Med. in Rome and at the XIIIth Intern. Congr. of Aviation and Space Med. 1964 in Dublin Sep. 1965 p 20–23 (See N67-17081 07-04) CFSTI: HC $3.00/MF $0.65

Various sulfhydryl containing compounds were surveyed for their preventive properties against radiation damage in animal systems, and cysteamin and β-aminoethyl-iso-thiuronium (AET) were found biologically effective because of their available free SH-groups. The toxicity of these compounds, however, limits application to prophylaxis or short duration radiation exposure. Very good protective effects in humans were obtained by doses of the vitamin B_6 given during the development stage of radiation induced sickness. Transl. by G.G.

N67-17086# Deutsche Versuchsanstalt für Luft- und Raumfahrt, Munich (West Germany).

CLINICAL PICTURE OF THE SHIFTED DIURNAL RHYTHM DURING JET FLIGHTS [ERMUDUNGSUNTERSUCHUNGEN AUF TRANSATANTIKFLUGEN (VORLAUFIGE MITTEILUNG)]

H. Bruener, K. E. Klein, S. Ruff, and H. M. Wegmann *In its* Papers of DVL-Inst. for Aeromed. at VIth Intern. and XIIth European Congr. of Aviation and Space Med. 1964 in Dublin Sep. 1965 p 24–29 refs (See N67-17081 07-04) CFSTI: HC $3.00/MF $0.65

Physiological and physical parameter measurements on flying personnel of transoceanic jets were evaluated to obtain an index on circulatory shifts. Observed were pulse, systolic blood pressure and amplitude at start and landing. General decreased blood circulation values were clearly related to flight conditions and durations, and manifested themselves outwardly in fatigue symptoms. Transl. by G.G.

N67-17087# Deutsche Versuchsanstalt für Luft- und Raumfahrt, Munich (West Germany).

EXPLOSION AND DECOMPRESSION INJURIES [BIOLOGISCHE ERGEBNISSE DER DETONATIONS UND DRUCKFALLFORSCHUNG]

O. Wuensche *In its* Papers of DVL-Inst. for Aeromed. at VIth Intern. and XIIth European Congr. of Aviation and Space Med. in Rome and at the XIIIth Intern. Congr. of Aviation and Space Med. 1964 in Dublin Sep. 1965 p 30–36 (See N67-17081 07-04) CFSTI: HC $3.00/MF $0.65

A sudden atmospheric pressure decrease damages human organs substantially by inducing lung lesions and hypoxemia, slowing of the heart–blood circulation, fat embolism and insufficiency of the hear chambers. The relationship between maximal pressure, exposure time, and decompression velocity is of deciding biological importance on the number of surviving animals; the number of decreased animals increases with prolonged exposure time to decompression and increased decompression pressure differences. Shock-free depressurization effects produced intra- and extravenous gas bubbles through alveolar air diffusion into the blood system. Transl. by G.G.

N67-17088# Deutsche Versuchsanstalt für Luft- und Raumfahrt, Munich (West Germany).
THE INFLUENCE OF WEIGHTLESSNESS ON CELL FUNCTION [EIN BEITRAG ZUR FRAGE PHYSIOLOGISCHER SCHWERELOSIGKEIT]
W. Briegleb *In its* Papers of DVL-Inst. for Aeromed. at VIth Intern. and XIIth European Congr. of Aviation and Space Med. in Rome and at the XIIIth Intern. Congr. of Aviation and Space Med. 1964 in Dublin Sep. 1965 p 37–42 refs (See N67-17081 07-04) CFSTI: HC $3.00/MF $0.65

Macroscopic or microscopic changes in algae cells, exposed to simulated weightlessness conditions in thermally controlled, slow horizontal-rotating apparatus, were analyzed for their geotropic reaction. Light orientating conditions on algae cultures, rotating at 140 and 350 turns per minute for 4 weeks, did not produce any changes in their growth habit and direction. Transl. by G.G.

N67-17198# Zurich Univ. (Switzerland). Dept. of Anatomy.
PULMONARY PATHOLOGY OF OXYGEN TOXICITY. PART I: ELECTRON MICROSCOPIC AND MORPHOMETRIC STUDY OF RAT LUNGS EXPOSED TO 98.5% O_2 AT ATMOSPHERIC PRESSURE
Ewald R. Weibel and Gonzague S. Kistler 31 Jan. 1965 43 p refs
(Contract AF 61(052)-784)
(ASR-1; AD-642418) CFSTI: HC $3.00/MF $0.65

Rats were exposed to pure oxygen at 1 atm. The lungs were investigated by electron microscopy using morphometric methods. First damage occurred during the second day and progressed. Capillary blood volume decreased; air-blood barrier increased in thickness. The degree of impairment of pulmonary function was calculated. Author (TAB)

N67-17220# Sao Paulo Univ. (Brazil). Biochemistry Lab.
THE CONTROL OF NUCLEIC ACID SYNTHESIS IN THE SALIVARY GLANDS OF RHYNCHOSCIARA ANGELAE Final Report, Aug. 1965–Jul. 1966
Francisco J. S. Lara Aug. 1966 25 p refs
(Grant DA-AR0-49-092-65-G84)
(AD-640929) CFSTI: HC $3.00/MF $0.65

Methods were developed for extraction of RNA from salivary glands of Rhynchosciara, yielding high quality preparation as judged by hydrodynamic properties. By this method and pulse labeling the synthesis of RNA in the glands throughout larval development was studied. The principal class of RNA synthesized before the appearance of the large puffs is a 35S RNA. This RNA is subsequently transformed into ribosomal RNA. After appearance of the large puffs one observes almost complete inhibition of synthesis of ribosomal precursor. This correlation indicates the material produced in puffs is important in control of synthesis of RNA. Author (TAB)

N67-17235# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SELECTION OF A RATIONAL DIAGRAM FOR A COOLING SYSTEM IN SPACE
O. N. Favorskiy 27 Jun. 1966 18 p Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Energ. i Transp. (Moscow), no. 1, 1966 p 143–150
(FTD-MT-66-30; TT-66-62498; AD-640727) CFSTI: HC $3.00/MF $0.65

Expressions are given for determination of basic parameters that characterize space cooling systems: specific area of radiator and specific power. Optimum parameters of diagrams are shown and a comparison is given of diagrams for optimum parameters using specific examples. Author (TAB)

N67-17243# School of Aerospace Medicine, Brooks AFB, Tex.
THE STEREOSCOPIC ANGLE AND ITS RELATIONSHIP TO THE STANDARD AIR FORCE TESTS FOR DEPTH PERCEPTION, 1 NOVEMBER 1965–15 APRIL 1966
Constantine A. Ricciardi, Benjamin Kislin, and Alton J. Rahe Aug. 1966 27 p refs
(SAM-TR-66-70; AD-640932) CFSTI: HC $3.00/MF $0.65

The three standard Air Force depth perception tests for pilot and observer qualification are the Vision Test Apparatus--Near and Distant (VTA-ND), Verhoeff Stereopter (DPA-V), and Howard-Dolman apparatus (H-D). The stereoscopic angle for the VTA-ND is 25 seconds of arc, 32 seconds for the DPA-V, and 11 seconds for the H-D. An enlarged Verhoeff (SAM-V) was utilized at equivalent calculated distances to compare with the three instruments under their individual parallactic angle conditions. Data analysis showed the following: (1) Employment of the standard criteria for flying qualification resulted in the Verhoeff passing the greatest number, followed by the VTA-ND, and the H-D. Neither the Verhoeff nor H-D results statistically differed from those of the VTA-ND. (2) The SAM-V generally passed fewer subjects than the corresponding standard tests. The results found with the standard Air Force tests are not a full measure of depth discrimination capability. A test concept is described which would incorporate a dynamic component into depth judgments. Author (TAB)

N67-17248# Army Natick Labs., Mass. Pioneering Research Div.
HUMAN FACTORS REQUIREMENTS FOR THE DESIGN OF HELICOPTER AIRCREWMEN'S SEAT AND GROIN PROTECTIVE UNITS
Richard L. Burse Sep. 1966 15 p refs
(EPR-11; TR-67-28-PR; AD-640891) CFSTI: HC $3.00/MF $0.65

The most important human factors requirements for the design of rigidly armored seat and groin protective units for the seated helicopter aircrewmen are discussed. Included are requirements for preventing interference with mission performance, reducing fatigue and providing a compatible, safe and somewhat comfortable working environment for the fully-equipped aircrewman. Quantitative design criteria for dimensions, contours, cushioning and location of the seat and groin protective units are specified. Author (TAB)

N67-17255*# School of Aerospace Medicine, Brooks AFB, Tex.
A SIMPLE PORTABLE SOMOMICROMETER, MARCH–JULY 1966
Merrill B. Kardon, Hugh F. Stegall, and Hubert L. Stone Nov. 1966 17 p refs
(Grant T-37761-G)
(NASA-CR-81559; SAM-TR-66-96; AD-641571) CFSTI: HC $3.00/MF $0.65 CSCL 06L

The design and construction of a relatively simple and inexpensive ultrasonic dimension gage (sonomicrometer) are described in detail. Two piezoelectric crystals are installed surgically across the organ to be studied, and the transit time for a burst of ultrasound to pass from one crystal to the other is measured. The device is easily calibrated when sound velocity in the medium is known. By use of integrated circuits throughout, it may be duplicated for less than $55. Possible applications other than continuous measurements of organ size are discussed. Author (TAB)

N67-17271 Chicago Univ., Ill. Inst. for Computer Research.
THE PRODUCTION AND STABILIZATION OF REAL-TIME TASK SCHEDULES
G. K. Manacher *In its* ICR Quart. Rept., No. 9, 1 May 1966 31 p refs (See N67-17261 07-34) CFSTI: HC $3.00/MF $0.65

A model for multiprocessor control is considered in which jobs are broken into various pieces called tasks. Tasks are executed by

single processing units. The structure controlling the assignment of tasks to processors is the task list, which orders all tasks according to servicing priority. When a processor becomes free, it simply picks up the highest priority task that is executable at that moment. The job and its component tasks are imagined to be interacting with an environment consisting of a set of rigid timing constraints. Such constraints are of two types, called start-times and deadlines. The interaction is specified by requiring that certain distinguished tasks conform directly to one or more of these constraints. Tasks conforming to a start-time cannot begin until the start-time has passed, and tasks conforming to a deadline cannot proceed beyond the deadline. In the model all tasks have known maximum run-times, but in any particular job execution, task run-times are unknown.
Author

N67-17292* AiResearch Mfg. Co., Los Angeles, Calif.
GEMINI EXTRAVEHICULAR SUIT PRESSURIZATION VENTILATION TEST SERIES
W. G. Nelson, ed. 19 Jun. 1964 120 p refs Revised
(Contract NAS9-2412)
(NASA-CR-65559; SS-3135, Rev. 1) CSCL 06M

Tests carried out to determine the oxygen flow requirements for CO_2 washout, ventilating flow requirements for cooling, and pressure drop characteristics of the Gemini extravehicular suit are described. Details are given on the test facility, subject evaluation and test procedure, data reduction and error analysis, the test results, and the effect of these results on the extravehicular life support system. The following conclusions were reached: (1) Achievement of a heat balance as moderate gas flow rates is possible below total heat loads of approximately 1230 Btu/hr. (2) The design metabolic and external heat loads of 1650 and 2250 Btu/hr can be accommodated at the design suit flows only by storage of heat in the astronaut. (3) The estimated maximum heat removal capability at the design suit flows of 15.0 and 18.7 cfm is 1168 and 1271 Btu/hr. (4) Carbon dioxide washout is sufficient for anticipated vent gas flow rates and metabolic rates. (5) The suit pressure drop characteristics are valid as previously specified. Recommendations are also included.
L.E.W.

N67-17318# Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
PREDICTION OF EXPOSURES FROM AN ELEVATED SOURCE
C. E. Elderkin and W. T. Hinds *In its* Phys. Sci., Vol. I May 1966 p 14–20 refs (See N67-17312 07-13) CFSTI: HC $3.00/MF $0.65

A pair of equations are presented for use in the prediction of exposures from an elevated particulate source in which the plume width and height parameters are related to travel time. Three methods of estimating ground level exposures are discussed, depending on the time and instrumentation available. The data and interpretations leading to the development of these techniques are briefly considered, and the restrictions placed on the techniques are pointed out.
A.G.O.

N67-17395*# National Aeronautics and Space Administration, Washington, D. C.
MODELS OF ALLOSTERIC ENZYMES AND THEIR ANALYSIS BY THE GRAPH THEORY METHOD [MODELI ALLOSTERICHESKIKH FERMENTOV I IKH ANALIZ METODOM TEORII GRAFOV]
M. V. Vol'kenshteyn and B. N. Gol'dshteyn Jan. 1967 12 p refs Transl. into ENGLISH from Biokhimiya (Moscow), v. 31, no. 4, Jul.–Aug. 1966 p 679–686
(NASA-TT-F-10651) CFSTI: HC $3.00/MF $0.65 CSCL 06A

Using the very simple example of a dimer protein, possible equilibrium cooperative models intended for description of the properties of allosteric enzymes were considered. Together with indirect cooperation, the "direct" cooperation arising as a result of direct interaction of active centers was investigated. Computations were made for the influence of an allosteric inhibitor and a competitive activator on the activity of an enzyme. The results of the computations made by the graph theory method proposed in an earlier study are in qualitative agreement with the data for aspartate transcarbamylase. The proposed models are described by containing fewer than constants the model of Monod et al.
Author

N67-17427# Oak Ridge National Lab., Tenn.
THE PRESENT STATUS OF NEUTRON MONITORING FOR PERSONNEL PROTECTION
J. A. Auxier [1966] 27 p refs Presented at the Symp. on Neutron Monitoring for Radiol. Protect., Vienna
(Contract W-7405-ENG-26)
(ORNL-P-2467; SM-76-67; CONF-660807-4) CFSTI: HC $3.00/MF $0.65

Developments in neutron dosimetry during the past twenty years are reviewed including: scintillation systems; cylindrical or spherical moderators with thermal neutron detectors located on the axes or at the centers; proportional counters; solid-state detectors; thermoluminescent and photoluminescent systems; liquid ionization chambers: and the use of heavy ion tracks in insulating solids. It is speculated that the most significant change in the field of radiological monitoring will be the substitution of solid-state devices for the film and nuclear emulsions in personal dosimeters, and it is forseen that solid-state detectors and operational analyzers will be used for measurements of absorbed dose, LET, and other parameters.
NSA

N67-17483# Liege Univ. (Belgium). Laboratoires de Radiobiologies.
CHEMICAL RADIOPROTECTIVE AGENTS [RADIOPROTECTEURS CHIMIQUES] Final Report, 1 Apr. 1964–31 Dec. 1965
Brussels, EURATOM, 1966 30 p refs In FRENCH
(Contract EURATOM-046-64-3 BIOB)
(EUR-2992-f)

Results are summarized from studies on the pharmacology and biochemical effects of certain radioprotective agents on the entire animal and on selected tissues of mice and rats. The radioprotective compounds studied included cysteine, cystamine, cysteamine, cyanide, diethyldithiocarbamate, 5-hydroxytryptamine, and hypothermia. A thorough study was made on the reactions of mouse skin to x radiation and the effects of cysteine and cysteamine on skin radiosensitivity. The effects of the protective agents on growth of Ehrlich tumor, humoral immunity, and reactions to skin grafting were also studied. Cysteamine did not protect the mouse against continuous exposure to a 137Cs γ source. The fresh water algae *Nitella flexilis* was found to be a suitable organism for use in certain radiobiological research.
NSA

N67-17509*# National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.
AMINO ACID COMPOSITION OF A FACULTATIVE HYDROGEN BACTERIUM
Ho Lee Young, Paul X. Callahan, and Harold P. Klein Washington, NASA, Feb. 1967 5 p refs
(NASA-TM-X-1335) CFSTI: HC $3.00/MF $0.65 CSCL 06M

Cells of *Pseudomonas (Hydrogenomonas) saccharophila* have been analyzed for their amino acid composition. Seventeen amino acids of the cellular proteins were quantitatively determined. The free amino acid pool accounted for less than 3% of the total amino acids of the cells.
Author

N67-17514*# National Aeronautics and Space Administration, Washington, D. C.

AMINO ACID INCORPORATION INTO PROTEIN BY RABBIT SPLEEN AND LYMPHNODE MICROSOMES [VKLYUCHENIYE AMINOKISLOT V BELKI MIKROSOMAMI SELEZENKI I LIMFOUZLOV KROLIKA]

R. S. Nezlin Oct. 1966 7 p refs Transl. into ENGLISH from Biokhimiya (Moscow), v. 31, no. 3 1966 p 516–520

(NASA-TT-F-10354) CFSTI: HC $3.00/MF $0.65 CSCL 06C

Incorporation of labeled amino acids into proteins was studied in the spleen and lymph nodes of normal and immune rabbits. The pH 5 fraction from spleen and lymph nodes resulted in very low incorporation. The pH 5 fraction from rabbit liver was therefore used. The properties of the protein synthesized were studied. Immunological methods failed to demonstrate the presence of γ-globulin. Author

N67-17516*# National Aeronautics and Space Administration, Washington, D. C.

SOME CHARACTERISTICS OF METABOLISM AND CONDITIONED REFLEX ACTIVITY OF ANIMALS DURING PROLONGED STAY IN A HELIUM–OXYGEN MEDIUM [O NEKOTORYKH OSOBENNOSTYAKH GAZOOBMENA I USLOVNOREFLEKTORNOY DEYATEL'NOSTI ZHIVOTNYKH PRI DLITEL'NOM PROBYVANII V GELIO-KISLORODNOV SREDE]

G. V. Troshikhin Dec. 1966 6 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 169, no. 6, 1966 p 1480–1482

(NASA-TT-F-10617) CFSTI: HC $3.00/MF $0.65 CSCL 06F

Experiments were conducted with SS57, sexually-mature mice in air-tight chambers with controlled temperature and controlled helium–oxygen content (21 and 79%, resp.). When the temperature was 21–23°, the metabolism of the mice in the helium–oxygen atmosphere increased by 50% above the initial level during the first three days. The O_2-consumption decreased later but was always 10–15% above the controls (air atmosphere). Body temperature was decreased by 0.5–1.0° in the experimental animals. Both O_2-consumption and body temperature normalized when the animals were changed to the plain air atmosphere. Conditioned reflexes set in much more slowly in the experimental animals (as tested by the formation of a defensive conditioned reflex to white light). The mechanisms postulated are based on the heat conductivity of helium being 6 times that of nitrogen. Author

N67-17546# General Electric Co., Schenectady, N. Y. Knolls Atomic Power Lab.

ANTICONTAMINATION CLOTHING: NO BUTTONS, ZIPPERS, OR TAPING REQUIRED

J. T. FitzGibbon Jun. 1966 9 p Presented at the 11th Ann. Meeting of the Health Phys. Soc., Houston, 27–30 Jun. 1966

(Contract W-31-109-ENG-52)

(CONF-660621-1) CFSTI: HC $3.00/MF $0.65

Anticontamination protective clothing was developed for use by personnel performing maintenance on nuclear reactor plants. The clothing is designed to protect the worker's head, neck, and ears, body, and extremities from radioactive contamination; eliminate clothing closure devices such as buttons, snaps, and zippers which could become separated from the garment and fall irretrievably into open reactor plant systems and components; and eliminate the profuse use of pressure sensitive tapes customarily applied to the garment to seal flyfronts, pockets, and other openings, and secure gloves and shoe covers to the garment. Author (NSA)

N67-17551# Princeton-Pennsylvania Accelerator, Princeton, N. J.

USE OF THE MULTISPHERE NEUTRON DETECTOR FOR DOSIMETRY OF MIXED RADIATION FIELDS

Miguel Awschalom 5 Aug. 1966 47 p refs Presented at the Symp. on Neutron Monitoring Radiological Protect., Vienna, 29 Aug.–2 Sep. 1966

(Contract AT(30-1)-2137)

(PPAD-596-E; CONF-660807-6) CFSTI: HC $3.00/MF $0.65

The energy response of the spherical neutron detectors with 6LiI crystals has been described by Bonner and Hankins. These detectors have been used at the PPA in complete sets together with a muscle tissue equivalent chamber in an attempt to improve the accuracy of mixed radiation dosimetry. The multisphere method is used in conjunction with a computer to estimate the neutron field parameters. Two of these parameters are the dose and dose equivalent delivered by the neutrons. Although the method of spectrum unfolding is discussed and the results of unfolding monochromatic and some continuous spectra are presented, the energy spectrum is used only to calculate total dose and total dose equivalent, using data published by various authors. The results are evaluated from the point of view of dose estimates. All estimates of dose equivalent per detector count are shown for 20, 25, and 30 cm spheres. Finally, a word about the relative merits of iron and lead as shielding materials for high energy neutron shielding and collimation, is given in the light of neutron spectra obtained bombarding Al, Fe, Pb and depleted U-238 with BeV neutrons. Author (NSA)

N67-17601*# Naval Air Engineering Center, Philadelphia, Pa.

A REPORT OF THE PHYSIOLOGICAL, PSYCHOLOGICAL, AND BACTERIOLOGICAL ASPECTS OF 20 DAYS IN FULL PRESSURE SUITS, 20 DAYS AT 27,000 FEET ON 100% OXYGEN, AND 34 DAYS OF CONFINEMENT, PARTS I, II, III

Kenneth R. Coburn Washington, NASA, Feb. 1967 272 p refs

(Grant T-25750-G; Contract NAS9-4172)

(NASA-CR-708; NAEC-ACEL-535, Pt. I; NAEC-ACEL-535, Pt. II; NAEC-ACEL-535, Pt. III) CFSTI: HC $3.00/MF $0.65 CSCL 06S

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N67-17602*# Naval Air Engineering Center, Philadelphia, Pa.
GENERAL INTRODUCTION AND METHODS
Kenneth R. Coburn *In its* Physiol., Psychological, and Bacteriol. Aspects of 20 Days in Full Pressure Suits Feb. 1967 p 1–11 refs (See N67-17601 07-05) CFSTI: HC $3.00/MF $0.65

Overall aids and general methods are discussed for a program to determine at what point on a hypothetical pO_2 versus time curve oxygen would begin to limit rather than optimally sustain human physiological processes. Six aviators who had volunteered for astronautics duty were confined for a period of 34 days, with 20 days (days 8–27) at an altitude of 27,000 ft on 100% oxygen environment obtained from a liquid derived system. Prior to the oxygen environment experiment, the six aviators as well as two control subjects were given intensive training; and baseline physiological and psychological data were obtained on all eight men. During the latter half of the experiment, both test and control subjects donned pressurized suits; for the experimental group, days 15 through 27 were spent at the simulated high altitude and days 28 through 34 were at sea level. M.W.R.

N67-17603*# Naval Air Engineering Center, Philadelphia, Pa.
GENERAL DISCUSSION OF RESULTS AND CONCLUSIONS
Kenneth R. Coburn *In its* Physiol., Psychological, and Bacteriol. Aspects of 20 Days in Full Pressure Suits Feb. 1967 p 13–16 ref (See N67-17601 07-05) CFSTI: HC $3.00/MF $0.65

Aside from the inverse relationship between retinal blood vessel caliber and pO_2, no positive findings are reported for six men confined to a 100% oxygen environment for 20 days. The wide variation in creatinine levels is attributed to technical difficulties, probably in urine collection. Variations were not any more marked in one subject who deliberately, although surreptitiously, lost 15 lb than in the other subjects who showed no significant weight changes. General buildup of microorganisms on the subjects posed no special problem; but since *Shigella Poly B, Bethesda Ballerup*, a coagulase-positive phage typeable staphlococcus, was isolated during the experiment, the need to eliminate all potentially pathogenic organisms from each member of a space crew is stressed. During debriefing, the most common complaint from the subjects was the ratio of temperature/humidity; and it is noted that the four different suits used had no common thermal characteristics. Flaking of skin is mentioned because it occurred in quantities sufficient to impair gas flow through the filters and to litter the living compartment floor. M.W.R.

N67-17604*# Naval Air Engineering Center, Philadelphia, Pa.
RETINAL VASCULAR RESPONSE TO OXYGEN AT INCREASED PARTIAL PRESSURES
Talvaris Turaids and Kenneth R. Coburn *In its* Physiol., Psychological, and Bacteriol. Aspects of 20 Days in Full Pressure Suits Feb. 1967 p 17–23 refs (See N67-17601 07-05) CFSTI: HC $3.00/MF $0.65

Retinal photographs taken after subjects had been breathing 100% oxygen at sea level for 5 to 30 min show a decrease of approximately 17% in caliber of arteries and 20% in veins. A 6 to 8% decrease in the diameter of retinal veins and arteries observed 5 to 30 min after ascent to 27,000 ft while breathing pure oxygen remains essentially the same after 19 days at this altitude. Smaller vessels decrease proportionately more than larger ones; and it appears that the increase in blood oxygen transport during hyperbaric oxygenation more than compensates for the reduction in retinal blood flow due to vasoconstriction. It is suggested that vasoconstriction in response to increased partial pressures may not be limited to the retina. M.W.R.

N67-17605*# Naval Air Engineering Center, Philadelphia, Pa.
RENAL FUNCTION AND WATER BALANCE
Talvaris Turaids *In its* Physiol., Psychological, and Bacteriol. Aspects of 20 Days in Full Pressure Suits Feb. 1967 p 25–33 refs (See N67-17601 07-05) CFSTI: HC $3.00/MF $0.65

Daily water intake and urine output are tabulated for the eight subjects who participated in the pure oxygen environment experiment; and serum and urinary creatinine and creatinine clearance are given for nine of the days during the experiment and the day after its completion. Average water usage, excluding that used for personal hygiene, was 1732 ml per man day; and the average water available to the body from all sources, including preformed water in the food and water of oxidation, was 2048 ml per man day. Water excreted from the kidneys and in feces averaged 1110 ml. If it is assumed that the subjects were in a state of normal water balance, there would be an insensible water loss of 938 ml per man day; and this is in good agreement with sea level loss which is estimated at about 900 ml. Because the creatinine data vary excessively from day to day, the collection means and the accuracy of the data are questioned. M.W.R.

N67-17606*# Naval Air Engineering Center, Philadelphia, Pa.
BLOOD STUDIES
Gary L. Kellett and Kenneth R. Coburn *In its* Physiol., Psychological, and Bacteriol. Aspects of 20 Days in Full Pressure Suits Feb. 1967 p 35–57 refs (See N67-17601 07-05) CFSTI: HC $3.00/MF $0.65

Mention is made of the large number of mercury-containing instruments broken inside the chamber during the pure oxygen environment experiment. Since stippled red cells were noted in the blood of the subjects, a toxic agent such as mercury vapor may have been involved. The average hematrocrit of the subjects varied no more than 2.5%; and red blood cell count corresponded closely to the averaged hematocrit, with essentially no changes before and after oxygen exposure and between test subjects and controls. Hemoglobin concentration showed an initial climb that was roughly parallel for subjects and controls during the first week of confinement; and a drop noted during the onset of the oxygen environment was followed by a moderate rise during the week following return to sea level conditions. While values for the experimental subjects are below those for the controls, all of the values are considered to be within normal limits. M.W.R.

N67-17607*# Naval Medical Research Inst., Bethesda, Md.
BIOCHEMICAL EFFECTS OF PROLONGED EXPOSURE TO AN ATMOSPHERE OF 100% OXYGEN AT A SIMULATED ALTITUDE OF 27,000 FEET
Lawrence J. Jenkins, Jr. and Robert Van Reen *In* Naval Air Eng. Center Physiol., Psychological, and Bacteriol. Aspects of 20 Days in Full Pressure Suits Feb. 1967 p 59–71 refs (See N67-17601 07-05) CFSTI: HC $3.00/MF $0.65

Biochemical data indicate that a 100% oxygen environment at a simulated altitude of 27,000 feet causes no injury to healthy humans. Activities of serum isocitrate dehydrogenase as well as erythrocytic glucose-6-phosphate dehydrogenase remained constant throughout the 20-day exposure and did not deviate from either baseline or control levels. No deviations are noted for serum haptoglobin as evidenced by its ability to bind hemoglobin, or in its relative distribution of serum lipoproteins between alpha and beta fractions. All of the subjects in this study had normal hemoglobin types. M.W.R.

N67-17608*# Naval Air Engineering Center, Philadelphia, Pa.
PULMONARY FUNCTION AND X-RAY
Donald W. Dery, Talvaris Turaids, and Kenneth R. Coburn *In its* Physiol., Psychological, and Bacteriol. Aspects of 20 Days in Full Pressure Suits Feb. 1967 p 73–84 refs (See N67-17601 07-05) CFSTI: HC$3.00/MF$0.65

Healthy young men exhibit no significant alterations in pulmonary function from exposure to 100% oxygen at 258 mm Hg pressure for 20 days according to measurements of tidal volume, expiratory reserve volume, inspiratory capacity, vital capacity, functional residual capacity, and carbon monoxide diffusing capacity. While tidal volumes appear to be high, they were taken during activities involved in food preparation and body hygiene maintenance. The loss noted in vital capacity is so slight that present techniques and instrumentation cannot verify if it is due to anatomic or functional change. Carbon monoxide diffusing capacity values are high normal and within the limits of experimental error; and no difference is seen between pre- and post-altitude values. Chest X-rays taken on the 26th day showed no changes from those taken two weeks prior to the study; and a harmless osteoma on a rib of one of the test subjects remained unchanged. M.W.R.

N67-17609*# Naval Air Engineering Center, Philadelphia, Pa.
SOME PSYCHOLOGICAL MEASURES ON SIX MEN CONFINED 34 DAYS IN A SEALED CABIN
Thomas D. Hanna *In its* Physiol., Psychological, and Bacteriol. Aspects of 20 Days in Full Pressure Suits Feb. 1967 p 85–114 refs (See N67-17601 07-05) CFSTI: HC$3.00/MF$0.65

Individual and group performance appear to be affected slightly by 34 days of confinement, independent of the oxygen concentration, the simulated altitude, or the use of the full pressure suit by 6 healthy subjects. Errors do not increase and correct responses do not decrease; and, although there are individual differences, the total number of daily errors is fairly constant. Fewer errors are exhibited on day than on night shifts, but it is speculated that this may be due to the subjects involved rather than the time of the experiment. The increase in difference between estimates and correct responses with time is noted; and this finding, defined as the level of aspiration, is evidenced in both individual and group performance. The accumulated data demonstrate no marked deterioration in group cohesiveness, individual performance, level of aspiration, goal seeking behavior, or leadership. M.W.R.

N67-17610*# Naval Air Engineering Center, Philadelphia, Pa.
CHANGES IN THE FREQUENCY DISTRIBUTION OF MUSCLE ACTION POTENTIALS FOLLOWING THE ACQUISITION OF A SIMPLE MOTOR SKILL (MIRROR TRACING)
Sherwin J. Klein and Malcolm M. Cohen *In its* Physiol., Psychological, and Bacteriol. Aspects of 20 Days in Full Pressure Suits Feb. 1967 p 115–126 refs (See N67-17601 07-05) CFSTI: HC$3.00/MF$0.65

Observed changes in frequency distribution of muscle action potentials suggest that precision of performance in a motor task is associated with the frequency-intensity characteristics of the emitted muscle action potentials. The acquisition of a motor skill may be associated with increased activity of higher frequency action potential components of the performing muscles. For five days prior to the 34-day confinement, the subjects attempted to trace the outlines of five different geometric forms with an electrified stylus. Each of the forms was traced for a 3-min period while the subject viewed both the form and the tracing hand in a mirror. Muscle action potentials were recorded during this period, but not during the 34-day experiment when the tracing task continued. Additional tracings were made for five days following confinement, and again potentials were recorded. Progressively fewer errors per trial were made with increasing practice, although a slight rise in total number of errors is evidenced in the post-confinement period. M.W.R.

N67-17611*# Naval Air Engineering Center, Philadelphia, Pa.
CURVATURE AFTER-EFFECTS AS A FUNCTION OF THE MAGNITUDE OF CURVATURE OF THE INSPECTED MATERIAL
Malcolm M. Cohen *In its* Physiol., Psychological, and Bacteriol. Aspects of 20 Days in Full Pressure Suits Feb. 1967 p 127–138 refs (See N67-17601 07-05) CFSTI: HC$3.00/MF$0.65

A specially-constructed apparatus was used to present test subjects with lines of different degrees of curvature; and the apparent curvatures of lines were measured both before and after each exposure by means of a nulling procedure. The six subjects were exposed to the lines through a prism set at each of seven dioptric powers, with a period of at least one day between each exposure for each subject; and the subjects were required to make their own adjustments to designate apparent straightness before and after exposures. The magnitude of the curvature after-effect is a monotonic increasing function of the magnitude of curvature of the inspected material. Previous results had indicated that the magnitude of the after-effect was independent of the magnitude of curvature of the inspected materials, and the difference observed in the magnitude of curvature after-effect as a function of altitude is considered perplexing. M.W.R.

N67-17612*# Naval Air Engineering Center, Philadelphia, Pa.
THE EFFECTS OF STRESS PRODUCED BY CONFINEMENT IN SMALL GROUPS
James A. Aagard *In its* Physiol., Psychological, and Bacteriol. Aspects of 20 Days in Full Pressure Suits Feb. 1967 p 139–210 refs (See N67-17601 07-05) CFSTI: HC$3.00/MF$0.65

Effects of a one-month confinement on verbal learning, group cohesiveness, motivation, and time estimation were investigated. To study verbal learning and affective change, paired associates of nonsense syllables were presented to subjects, who were later required to recall the words associated with each syllable. While it was expected that affective words would be recalled better than neutral words and that there would be a decrease in tissue resistance when they were spoken; none of these results were confirmed, although certain potentially affective words did acquire some effect as a result of confinement stresses. Group cohesiveness did not change significantly; the subjects did overestimate their group cohesiveness, but they were accurate in their perception of changes in interpersonal relationships. Hand Dynamometer results revealed an overall increase in peak force emission level; daily questionnaires indicated that the subjects had some insight into the symptoms produced during the study; and there was no significant correlation between manifest anxiety and underestimation of time intervals. M.W.R.

N67-17613*# Republic Aviation Corp., Farmingdale, N. Y.
EFFECT OF DIET AND ATMOSPHERE ON INTESTINAL AND SKIN FLORA Summary Report
Lorraine S. Gall and Phyllis E. Rielly *In* Naval Air Eng. Center Physiol., Psychological, and Bacteriol. Aspects of 20 Days in Full Pressure Suits Feb. 1967 p 211–236 refs (See N67-17601 07-05) CFSTI: HC$3.00/MF$0.65

Types and summarized of microorganisms present and frequency of their occurences in six body areas of six men subjected to certain simulated space flight conditions were compared to that of two control subjects. The conditions imposed during the experiment did not appear to create microbiological hazards; and, although a buildup of bacteria did occur on body areas and in the chamber, this buildup levelled off and was generally not considered to be pathogenic. After the subjects had eaten the experimental diet for several days, the predominating fecal flora were heavy gas-formers that might produce increased flatulence. Bacterial buildup in the wash water and on the neck of the urine bottle was caused by generally undesirable types of bacteria, and the pressure suits had many residual microorganisms of the type associated with the human body. Details of sampling collecting and culturing are included. M.W.R.

N67-17614*# Naval Air Engineering Center, Philadelphia, Pa.
NUTRITION AND BALANCE
Gary L. Kellett *In its* Physiol., Psychological, and Bacteriol. Aspects of 20 Days in Full Pressure Suits Feb. 1967 p 237–249 refs (See N67-17601 07-05) CFSTI: HC$3.00/MF$0.65

The NASA supplied freeze-dehydrated diet was found to be acceptable for a period of at least 34 days; and biochemical analysis of excretory products along with the balance studies exhibited variations considered to be within acceptable limits. Ease in food preparation is noted; and preparation procedures were left up to the individual subjects, who developed a system whereby one man did the weighing and the other added the water and mixed the dehydrated material. The majority of the subjects were highly satisfied with the tastiness and general esthetic qualities of the food; and the general consensus was that taste improved as subjects became used to the food. M.W.R.

N67-17615*# Naval Air Engineering Center, Philadelphia, Pa.
FULL PRESSURE SUITS AND PERSONAL HYGIENE
Gary L. Kellett, Talvaris Turaids, and Kenneth R. Coburn *In its* Physiol., Psychological, and Bacteriol. Aspects of 20 Days in Full Pressure Suits Feb. 1967 p 251–254 (See N67-17601 07-05) CFSTI: HC$3.00/MF$0.65

Apollo, Mark IV and V, and Mercury X pressurized suits seem to be acceptably comfortable for a 20-day period. While all of the suits were constantly ventilated at 60°F and had individual adjustments to regulate flow up to 12 liters/minute, they lacked adequate ventilation with the helmets and gloves off. This probably caused athlete's foot on one subject, pustules on another, and tinea cruris in a third; but these skin reactions cleared rapidly with minimal treatment. Shedding of superficial skin layers may result from lack of body hygiene, and probably would have occurred without the use of the full pressure suits. Subjects felt they remained relatively comfortable as long as they could wash their faces and brush their teeth. They preferred wash cloths to chemically treated hygiene pads, even though the cloths became dirty and malodorous after a few days of use. Growing of beards posed no problem; rather they were considered a morale booster, since they could be compared for length and bushiness each day. M.W.R.

N67-17630*# National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY—A CONTINUING BIBLIOGRAPHY WITH INDEXES, DECEMBER 1966
Jan. 1967 158 p refs
(NASA-SP-7011(32)) CFSTI: HC$3.00/MF$0.65 CSCL 06S

Biological, physiological, psychological, and environmental effects of simulated or actual flight in the earth's atmosphere or in interplanetary space are covered in the continuing bibliography entitled *Aerospace Medicine and Biology*. Annotated references are included for all the unclassified reports and journal articles in these subject categories that were introduced into the NASA information system during December 1966. M.W.R.

N67-17652# School of Aerospace Medicine, Brooks AFB, Tex.
A SECOND STUDY OF FACTORS AFFECTING AIRCREW MORALE, JANUARY–JUNE 1966
Bryce O. Hartman, George K. Cantrell, and Lewis S. Sims, Jr. Nov. 1966 19 p ref
(SAM-TR-66-91; AD-643820) CFSTI: HC$3.00/MF$0.65

A questionnaire concerning aircrew morale and job-satisfaction was completed by 283 officers and 138 enlisted aircrewmen in three Military Airlift Command Navy squadrons. The stability and predictability of off-duty time, with emphasis on scheduled time off-duty and elimination of wasted time on-duty, were an area of major concern to the Navy aircrewmen. Officers and enlisted men expressed essentially the same attitudes. Responses were generally more moderate than in an earlier study with Air Force aircrewmen. Satisfactions derived from flying apparently attenuated negative feelings to a considerable extent. TAB

N67-17658# Philco Corp., Willow Grove, Pa.
A STUDY AND INVESTIGATION OF THE QUANTIFICATION OF PERSONNEL IN MAINTENANCE Interim Report, Mar.–Jul. 1966
B. E. Crumrine, T. H. Levine, C. F. Martinetz, A. Shultz, and U. Shvern Griffiss AFB, N. Y., RADC, Oct. 1966 156 p refs
(Contract AF 30(602)4129)
(RADC-TR-66-442; AD-643544) CFSTI: HC$3.00/MF$0.65

A study design is presented for application to airmen technicians performing electronic maintenance to determine those variables which may serve as indicators of technician proficiency. A literature review was conducted and variables indicating some promise of predictive value of quality of electronic maintenance performance were selected for further refinement. A method for the quantification of human maintenance performance in electronic systems is provided. A mathematical plan for the development of a human performance figure of merit and determination of degree, and significance of relationship between the variables and the figure of merit is included. Author (TAB)

N67-17667# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE STATUS AND PERSPECTIVES OF DEVELOPING INVESTIGATIONS IN BIOLOGICAL CYBERNETICS AT THE ACADEMY OF SCIENCES UKR–SSR
27 Jun. 1966 8 p Transl. into ENGLISH from Dopovidi Akad. Nauk Uk. RSR (Kiev), no. 3, 1965 p 389–390
(FTD-HT-66-192; AD-643705) CFSTI: HC$3.00/MF$0.65

Translation of Russian article: The status and perspectives of developing investigations in biological cybernetics at the Academy of Sciences UKR–SSR. TAB

N67-17675# School of Aerospace Medicine, Brooks AFB, Tex.
LONG-TERM EFFECTS OF AN OXYGEN ENVIRONMENT ON A RAT COLONY AT 210 MM. Hg ABSOLUTE Final Report, Nov. 1964–Nov. 1966
William E. Pepelko Oct. 1966 13 p refs
(SAM-TR-66-90; AD-642748) CFSTI: HC$3.00/MF$0.65

Twelve female, albino rats (Charles River CD*) were exposed for a period of 11 months to an environment containing near 100% oxygen at a total pressure of 210 mm. Hg absolute. Growth rates, length of pregnancy, size of litters, and number in each litter weaned did not differ significantly from ground-level controls. Offspring of altitude females either remained at altitude or were brought to ground level at 21 days of age. All F1-generation animals were sacrificed at 60 days of age. Growth rates of altitude animals and altitude animals brought down at 21 days of age did not differ significantly from those of ground-level controls, nor did eosinophil and reticulocyte counts, hemoglobin, hematocrit, or white and red cell counts with one exception: Control males exhibited a higher red cell count than males born at altitude, but brought down at 21 days of age. It was concluded that the environmental conditions resulted in no important physiologic changes to the animals even over long periods of time and that readaptation to ground-level conditions occurred with no apparent difficulty. Author (TAB)

N67-17679# College de France, Paris. Institut Marey.
NERVOUS PROCESSES UNDERLYING BEHAVIOR AND LEARNING Final Scientific Report, 1 May 1965–30 Apr. 1966
A. E. Fessard 30 Apr. 1966 18 p refs
(Grant AF-EOAR-65-34)
(AFOSR-66-2356; AD-640861) CFSTI: HC $3.00/MF $0.65

An analytical study of communication structures and basic mechanisms which will provide a better understanding of how the brain controls well-defined performances of animal behavior. Material is categorized under the headings: animal behavior, cerebral physiology, and cellular processes. TAB

N67-17717# School of Aerospace Medicine, Brooks AFB, Tex.
RECOVERY OF CLOSTRIDIA FROM HUMAN FECES. DEVELOPMENT OF A METHOD, SEPTEMBER 1965–JANUARY 1966
Charles Eller Sep. 1966 14 p refs
(SAM-TR-66-81; AD-643819) CFSTI: HC $3.00/MF $0.65

A method allowing consistent recovery of clostridia from human feces is presented. During development of this procedure, clostridia were isolated in 105 of 161 specimens. Maximal dilution at which isolations were obtained varied from .001 to 10 to the minus 9th power, with a median of .00001. Diet was without effect. The final procedure employed heated dilutions of .01, .001, and .0001 with blood agar and sulfite-polymyxin-sulfadiazine (SPS) agar. Unheated dilutions were .00001, .000001, and 10 to the minus 7th power with blood agar and .0001, .00001, and .000001 with SPS agar. Clostridia were isolated from 20 to 21 samples. On the basis of morphology, 312 clostridial isolates were divided into seven groups. The most frequent type consisted of slender rods with terminal spores. By streaking heated suspensions to blood agar, C. perfringens was recovered from 20 of the 161 samples. Media used by others are discussed, and the usual fecal clostridia are listed. Author (TAB)

N67-17723# Royal Aircraft Establishment, Farnborough (England).
INVESTIGATIONS ON THE PHYSIOLOGICAL MOVEMENTS OF AMOEBA CHAOS CHAOS L. PART II: THE ACTION OF SALYRGAN, CYSTEINE AND ADENOSINE TRIPHOSPHATE [BEWEGUNGSPHYSIOLOGISCHE UNTERSUCHUNGEN AN DER AMOEBA CHAOS CHAOS L. II: DIE WIRKUNG VON SALYRGAN, CYSTEIN UND A.T.P.]
Werner Kappner May 1966 36 p refs Transl. into ENGLISH from Protoplasma (Vienna), v. 13, no. 4, 1961 p 504–529
(RAE-LIB-TRANS-1164) CFSTI: HC $3.00/MF $0.65

The study showed that salyrgan inhibits the contraction of the amoeba's membrane, promotes the relaxation of the membrane and the liquefaction of the plasmagel, causes the cytoplasm crystals to cluster together, and increases the number of empty vacuoles. Cysteine was found to suspend the action of salyrgan and to promote the amoeba's ability to contract and the tendency for its fibers and strands to fold together. ATP brings about contraction and has a plasticizer effect. The reaction which sets in with ATP was found to be dependent on the physiological state of the amoebae at the time. R.N.A.

N67-17732# California Univ., Livermore. Lawrence Radiation Lab.
MODELING THE CHROMOSOME
Roger G. Hart 3 Jan. 1966 18 p refs
(Contract W-7405-ENG-48)
(UCRL-14625, Rev. 1) CFSTI: HC $3.00/MF $0.65

An attempt was made to model the chromosome with respect to its structure and its function insofar as both are known. To this end, a hypothetical scheme was developed for the replication of chromosomal DNA in agreement with the results of tracer studies and with known capabilities of DNA polymerases. In keeping with the replication scheme, each double-helical DNA molecule is postulated to be bent into a loop with its ends held together by the association of two linking proteins covalently bonded to the DNA. A third linking protein is bonded to the DNA molecule near its middle. The chromosome is envisioned as a long sequence of such DNA loops, with the two end-linking proteins of each loop associated with the middle-linking protein of the next loop in the series. Other aspects of the chromosome considered in this model are: control of messenger synthesis, which is attributed to gating proteins situated on the DNA at the sites where transcriptions begin, and to a coordinated histone-shifting mechanism that masks or unmasks the DNA templates; prophase contraction, which is explained as a supercoiling of the DNA loops, again caused by a systematic shift of histones; and crossing over, which results from misplacement of end-linking proteins during synapsis. Some genetic consequences of a loop-sequence chromosome model have already been considered by Stahl, whose work is cited. Author (NSA)

N67-17737# California Univ., Livermore. Lawrence Radiation Lab.
ION BINDING PROPERTIES OF HUMAN SERUM LIPOPROTEINS
William Lewis Robison (Ph.D.—Calif. Univ., Berkeley) 6 Jan. 1966 68 p refs
(Contract W-7405-ENG-48)
(UCRL-14631) CFSTI: HC $3.00/MF $0.65

Certain anion and cation binding properties of the serum lipoproteins HDL_3 and LDL (S_f 3-9) were studied. The protein moiety of the HDL_3 was also studied for comparative purposes. The binding studies were accomplished by using the equilibrium dialysis technique. Both the HDL and LDL showed a considerable capacity for binding the selected anion methyl orange. The binding per mole exceeded that of serum albumin, which had previously been thought to be the only serum protein with such a capacity. Even among nonserum proteins which were studied this was an uncommon property. The LDL had a greater binding capacity than the HDL_3 when considered on a molar basis, when considered in terms of total protein, and when considered in terms of total protein plus phospholipide available. The LDL showed a multiple-site type of binding curve now observable with the HDL_3 over the concentration range studied. The protein moiety of the HDL did bind the anion methyl orange but at a much reduced strength and capacity. This was interpreted to indicate additional stability imparted to the binding process by the lipides through nonpolar forces. The serum lipoproteins representing certain types of lipoprotein complex showed a very low capacity for binding the cations Ca and Mg. The association constants are of the order of 10^3 or about the same as other protein systems such as albumin. This is much below that reported for some membranes which are lipide–protein in character, and possible reasons for the differences are discussed. NSA

N67-17748# Connecticut Univ., Storrs. Dept. of Statistics.
ROBUSTNESS OF THE STUDENT-PROCEDURE: A SURVEY
Lawrence O. Hatch and Harry O. Posten Aug. 1966 70 p refs
(Contract Nonr-3292(03))
(RR-24; AD-643494) CFSTI: HC $3.00/MF $0.65

The paper surveys the approaches and results of various investigations of the effects of deviations from assumptions when the Student-procedure is used to test hypotheses on means (i.e., t-tests). It is an attempt to provide a complete summary of the literature including both theoretical and empirical studies. At the same time, it also provides a study of the general techniques used to investigate the robustness of other statistical procedures since these techniques are similar to those used for the Student-procedure. Author (TAB)

N67-17750# Naval Training Device Center, Port Washington, N. Y.
USE OF THE OPERATIONAL FLIGHT TRAINER
Alexander Goldman, Harold A. Voss, Gerald J. Fox, and Clifford P. Seitz [1966] 73 p ref
(NAVTRADEVCEN-1734-00-1; AD-643498) CFSTI: HC $3.00/MF $0.65

In order to improve design from an instructional standpoint, an analysis was made of instructor activity in operational flight trainers. A steering committee consisting of engineers, training specialists, maintenance and requirements personnel recommended that the study concentrate on the F9F-5 and P2V-5 operational flight trainers as typical. These trainers were studied both in the training command and in fleet training in terms of current utilization and in terms of a maximum utilization program. This latter was defined as a training regime composed of a set of problems using the full training potential of the device. This was seen as having important design implications if using the trainer at its full potential saturates the instructor. TAB

N67-17756# Army Biological Labs., Fort Detrick, Md.
INFLUENCE OF THE IONS OF TRIVALENT IRON ON THE PHYSICAL–CHEMICAL PROPERTIES OF SOLUTIONS OF NATIVE DESOXYRIBONUCLEIC ACID
A. N. Ilina, V. D. Zhdanova, Yu. Sh. Moshkovskiy, and S. Ya. Mirlina Jan. 1966 13 p refs Transl. into ENGLISH from Biofizika (Moscow), v. 10, no. 6, 1965 p 929–934 *Its* Transl. No. 1745
(AD-642071; TT-67-60031) CFSTI: HC $3.00/MF $0.65

An investigation was made on the influence of the addition of Fe(3+) on the viscosity, dispersion curves of optical rotatior and the absorption spectra of solutions of native DNA. It was shown that with the formation of a complex of DNA with Fe(3+) a lessening takes place in the values of the quoted viscosity in a wide range of concentrations of DNA. In the presence of Fe(3+ ions an increase is observed in the value of the specific rotation and a decrease in the absorption coefficient of solutions of DNA, and also an increase of the melting temperature in comparison with the melting temperature of pure DNA. The experimental data obtained agree with the model of a macromolecule of DNA, having a certain number of points at which there is the possibility for the rotation of parts of the molecule which are stable rods. The addition of Fe(3+) ions leads to an increase in the rigidity of the DNA macromolecule, by reducing the number of places around which a bending of the macromolecule takes place. Author (TAB)

N67-17761*# Miami Univ., Carol Gables, Fla. Research and Teaching Center of Toxicology.
FLUORINE TOXICITY STUDIES AT THE UNIVERSITY OF MIAMI Semiannual Progress Report
M. L. Keplinger 30 Nov. 1965 11 p
(Grant NGR-10-007-012)
(NASA-CR-69992) CFSTI: HC $3.00/MF $0.65 CSCL 06F

Air in an exposure chamber of stainless steel was analyzed for fluorine concentration by use of gas-liquid chromatography. Wet methods for measurement of fluorine and fluoride were also used. As expected, signs of intoxication from high concentrations of fluorine in air were marked irritation of the mucous membranes of the eyes and respiratory tract. The skin of the animals showed very little irritation at the concentrations used. The LC_{50} (concentration calculated to kill 50% of the animals) was determined for exposure in rats, mice, guinea pigs, and rabbits. A table of the values shows very little difference between the LC_{50}'s of the different species. At lower concentrations there were fewer signs of intoxication. Dyspnea, lethargy, red nose, and swollen eyes were observed at concentrations equivalent to 50% of the LC_{50}'s. Complete blood counts on the animals did not show significant changes, however the clotting time appeared to be slower than normal. S.P.

N67-17765*# Florida State Univ., Tallahassee. Dept. of Statistics.
ESTIMATION FOR A SIMPLE EXPONENTIAL MODEL
Janace A. Speckman (Natl. Bur. of Std.) and Richard G. Cornell 24 Feb. 1966 28 p refs Submitted for Publication
(Grant NGR-10-004-029)
(NASA-CR-70495; TR-3) CFSTI: HC $3.00/MF $0.65 CSCL 06C

Methods of estimating the parameter in a simple exponential model, which often arises in epidemiological studies and biological assay, are presented. The method of maximum likelihood is known to have desirable large sample properties and behave well in the limited Monte Carlo study. The simple method of partial totals is suggested as a possible alternative to maximum likelihood for small samples for equally spaced doses. The Fisher and Spearman methods, which are also computationally easy, are proposed as alternative methods regardless of the sample size for exponentially spaced dosages, that is, for dosages whose logarithms are equally spaced. S.P.

N67-17767*# Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
EFFECT OF WATER PROPERTIES IN THIXOTROPIC CLAY SYSTEMS ON BIOLOGICAL ACTIVITY Annual Report, 1965
Philip F. Low [1966] 11 p
(Grant NGR-15-007-004)
(NASA-CR-70970) CFSTI: HC $3.00/MF $0.65 CSCL 06C

Results are reported for various microcalorimeter experiments, studies to measure the relative partial molar free energy of water in clay sols and gels, and investigations to determine the minimum clay concentration at which gelation occurs in a clay-water suspension. In order to study the effect of changes in water properties in a clay system on biological activity, a culture was introduced into two suspensions having the same clay content. Results of experiments with heats of germination on individual systems suggest that water properties are different in clay sols then in clay gels, and that biological activity is influenced by this difference. S.P.

N67-17860# Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.
A QUANTITATIVE IMPEDANCE PNEUMOGRAPH
George E. Bergey, William C. Sipple, William A. Hamilton, and Russell D. Squires 10 Nov. 1966 33 p refs
(NADC-MR-6622; AD-643687) CFSTI: HC $3.00/MF $0.65

The report describes an impedance pneumograph capable of measuring quantitatively respiratory volumes. Features of this system include the use of a higher frequency (300 KhZ) excitation voltage than is normally used in impedance pneumography and the use of pasteless electrodes which are insulated from the subject by a layer of polyethylene, thus forming a capacitive coupling of the electrodes to the subject and eliminating the problems associated with skin-to-electrode impedance changes, a near perfect empiric correlation was found to exist between the transthoracic impedance measured by this device and pulmonary volume. Author (TAB)

N67-17880*# California Univ., Berkeley. Space Sciences Lab.
SPECIFIC NATURE OF HYDROLYSIS OF INSULIN AND TOBACCO MOSAIC VIRUS PROTEIN BY THERMOLYSIN
H. Matsubara, R. Sasaki, A. Singer, and T. H. Jukes [1965] 26 p refs Submitted for Publication
(Grant NsG-479)
(NASA-CR-70649) CFSTI: HC $3.00/MF $0.65 CSCL 06A

Oxidized bovine insulin and tobacco mosaic virus protein were used as substrates in an investigation of the specificity of thermolysin, a thermostable protease. Thermolysin hydrolysed the peptide bonds involving the amino-groups of leucine and phenylalanine residues of insulin under the conditions used, and preferentially those of leucine, isoleucine, valine and phenylalanine residues of tobacco mosaic virus, protein. It was concluded that

thermolysin hydrolyses preferentially the peptide bonds involving the amino-groups of hydrophobic amino acid residues with bulky side chains. Author

N67-17887# Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.

RADIATION DOSIMETRY FOR RADIATION PROTECTION

W. C. Roesch 9 Aug. 1966 18 p Presented at Conf. on Principles of Radiation Protect., Oak Ridge, Tenn.

(Contract AT(45-1)-1830)

(BNWL-SA-816; CONF-660815-1) CFSTI: HC $3.00/MF $0.65

Development of concepts used in describing radiation fields and their interactions with matter are described. Modification of the basic concepts of radiation dosimetry to fit the primary goals of radiation protection are discussed. It is suggested that some physical quantity other than adsorbed dose might give a closer correlation with biological effects than does dose. Hence, other methods of correlating dose with biological effects were evaluated, including: the use of momentum to supplement or replace energy in correlating biological effects; relating the probabilities of biological effects to the mean LET; and measurement of individual absorbed energies with a proportional counter made of tissue-equivalent materials and applying the theory of irradiated media of uniform composition but varying density to establish that the deposition of energy in the counter is the same as that in a solid biological entity of the same shape but smaller in size of the ratio of the gas density in the counter to the density of the solid. NSA

N67-17913# School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.

F-4C FLIGHT SIMULATOR FLASHBLINDNESS EXPERIMENT

James E. Hamilton Aug. 1966 17 p refs

(SAM-TR-66-72; AD-642749) CFSTI: HC $3.00/MF $0.65

A study was made to determine visual recovery time from flashblindness in the F-4C aircraft simulator. When 1,080 lux (100 ft.-c.) panel illumination was used immediately after the pilot was exposed to a flash of light in the forward cockpit, visual recovery time was significantly reduced. Visual recovery time was significantly less in the F-4C simulator than that found by previous studies in the F-106 and the C-131 simulators, even though the same light source and recovery task were used. The effect of flashblindness on aircraft control in the F-4C was similar to that found in the F-106 and the C-131 studies. Even though recovery time is significantly shorter than that found in the F-106 simulator under the conditions of this test, there is evidence that flashblindness may still be a problem because of its effect on aircraft control in the F-4C aircraft simulator. Author (TAB)

N67-17914# Air Force Systems Command, Wright-Patterson AFB, Ohio.

AN EVALUATION OF MAN'S CAPABILITY TO PERFORM SUPPORT FUNCTIONS IN SPACE

Chester B. May and A. E. Holmes (Martin Co., Baltimore) Oct. 1966 13 p refs Presented at the 17th Intern. Astronautical Congr., Madrid, 10–15 Oct. 1966 Prepared Jointly with Martin Co.

(AFAPL-CONF-67-4; AD-641287) CFSTI: HC $3.00/MF $0.65

As future space missions extend man's stay time in space past thirty days, support activities such as maintenance, assembly and resupply will become necessary. Development of this support technology must be integrated with development of advanced spacecraft systems. Analytical techniques and data on human performance limitations and support equipment capabilities are being developed so that support posture for a given mission can be optimized with the system development. Although programs have been conducted since 1960 in the investigation of specific areas such as special tools or accessory equipment, including orbital experiments for evaluation, much more development is needed before a true in-space support capability can be said to exist. Author (TAB)

N67-17926 Royal Aircraft Establishment, Farnborough (England).

INVESTIGATIONS ON THE PHYSIOLOGICAL MOVEMENTS OF AMOEBA CHAOS CHAOS L. PART I: THE INFLUENCE OF THE pH OF THE MEDIUM ON THE PHYSIOLOGICAL MOVEMENTS OF AMOEBA CHAOS CHAOS L [BEWEGUNGSPHYSIOLOGISCHE UNTERSUCHUNGEN AN DER AMOEBA CHAOS CHAOS L. 1. DER EINFLUSS DES pH DES MEDIUM AUF DAS BEWEGUNGS-PHYSIOLOGISCHE VERHALTEN VON CHAOS CHAOS L]

Werner Kappner May 1966 41 p refs Transl. into ENGLISH from Protoplasma (Austria), v. 13, no. 4, 1961 p 81–105

(RAE-LIB-TRANS-1163) CFSTI: $3.00

Varying pH values were determined in an investigation of the causes of Amoeba Chaos chaos L physiological movements. It was found that with decreasing pH the number of simultaneously existing pseudopodia also decrease, as shown by a shift to the left of the distribution curves, indicating pseudopodia numbers. The formation of pseudopodia follows definite known laws, and the numerical possibility of its formation is limited with falling pH. It was also seen that the formation of pseudopodia is preceded by a damming up of the cytoplasm resulting from a contraction wave. The contraction wave movement begins at the anterior end as a lateral deflection to the longitudinal direction. R.LI.

N67-17929# Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Inst.

EVALUATION OF THE PHYSIOLOGICAL PROTECTIVE EFFICIENCY OF A NEW PROTOTYPE DISPOSABLE PASSENGER OXYGEN MASK

Ernest B. McFadden Apr. 1966 27 p refs

(AM-66-7) CFSTI: HC $3.00/MF $0.65

A prototype of a new design disposable passenger mask applicable for emergency use in jet transports at altitudes to 40,000 feet was evaluated. Six subjects instrumented to obtain a variety of physiological information were exposed to a chamber flight profile designed around the National Aerospace Standard 1179. The two alternative methods of determining mask performance suggested in this document and based on gas analysis and blood oxygen saturation were used simultaneously in this study. In order to stimulate the respiration to the 30-liters/minute volume levels specified in applicable regulations, the subject exercised on a bicycle ergometer through the chamber flight up to and including 40,000 feet. Airbreathing baselines were established at 10,000 and 14,000 feet with the subject resting. The 14,000-foot baseline determination was repeated at 14,000 feet exercising at the same work load level as used in the high-altitude tests. The mask maintained all subjects in a satisfactory physiological condition at all altitudes up to and including 40,000 feet for the duration of exposure used in these tests. Author

N67-17930# Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Inst.

CLINICAL AVIATION MEDICINE RESEARCH: COMPARISON OF SIMULTANEOUS MEASUREMENTS OF INTRA-AORTIC AND AUSCULTATORY BLOOD PRESSURES WITH PRESSURE-FLOW DYNAMICS DURING REST AND EXERCISE

Francis J. Nagle, John Naughton, and Bruno B. Balke Oct. 1966 14 p refs

(Grant PHS-G-HE-06286-04)

(AM-66-36) CFSTI: HC $3.00/MF $0.65

Two healthy men, 40 and 57 years of age, underwent right-sided cardiac catheterization and retrograde supra-aortic catheterization

(1) to compare direct intra-aortic blood pressures with those recorded simultaneously by auscultation of the brachial artery; and (2) to study the pattern of pressure and flow dynamics during bicycle work at moderate strenuous and maximal intensities. In most instances systolic pressures measured by auscultation were in close agreement with the directly recorded measurements. The indirectly measured diastolic pressures were consistently higher than the directly recorded values in one subject and they were consistently lower than the directly measured diastolic pressures for the other subject. Neither the muffling nor the cessation of sound could be closely identified with minimal intra-aortic pressures. Systolic and mean pressures, minute flow, stroke volume and a-v oxygen difference increased with greater work intensities. Author

N67-17931# Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Research Inst.

EVALUATION OF THE SIERRA, HANGING, QUICK-DON, CREW, PRESSURE-BREATHING, OXYGEN MASK

Ernest B. McFadden and Michael T. Lategola Jun. 1966 32 p refs

(AM-66-20) CFSTI: HC$3.00/MF$0.65

A new design, hanging, quick-don crew pressure breathing oxygen mask applicable to jet-transport operations was tested and evaluated in three phases, consisting of (1) exposing five masked subjects to a stepwise altitude-chamber flight profile with a maximum altitude of 43,000 feet; (2) rapidly decompressing five masked subjects from 8,000 to 40,000 feet in 45 to 50 seconds; and (3) similarly decompressing these subjects and donning the mask during the decompression. Donning was accomplished in 2.5 to 6.3 seconds after the donning signal, at altitudes varying between 28,000 to 31,000 feet. When used with a pressure-breathing regulator incorporating the military pressure-breathing schedule, the mask maintained subjects in a satisfactory physiological condition at 43,000 feet. When worn prior to and during a rapid decompression, the mask provided adequate protection. When donned during the rapid-decompression profile, there was a significant transient decrease in blood saturation without loss of consciousness followed by a rapid recovery of blood saturation. Author

N67-17932# Federal Aviation Agency, Washington, D. C. Aeromedical Applications Div.

RECENT FINDINGS ON THE IMPAIRMENT OF AIRMANSHIP BY ALCOHOL

Stanley R. Mohler Sep. 1966 12 p refs

(AM-66-29) CFSTI: HC$3.00/MF$0.65

A significant number of fatal general aviation accidents have definitely been associated with the effects of consumed alcohol. These effects can markedly impair the judgment and proficiency of airmen. Aspects of this subject are explored in depth. Author

N67-17933# Federal Aviation Agency, Washington, D. C. Aeromedical Applications Div.

OXYGEN IN GENERAL AVIATION

Stanley R. Mohler Sep. 1966 8 p

(AM-66-28) CFSTI: HC$3.00/MF$0.65

General aviation pilots are increasingly ascending to altitudes exceeding ten thousand feet. As one becomes exposed to heights above twelve thousand feet, blood oxygen saturation diminishes in accordance with a predictable schedule. Recommended measures for the provision of adequate supplemental oxygen are described. Author

N67-17934# Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Inst.

PROBLEMS IN AERIAL APPLICATION: A COMPARISON OF THE ACUTE EFFECTS OF ENDRIN AND CARBON TETRACHLORIDE ON THE LIVERS OF RATS AND OF THE RESIDUAL EFFECTS ONE MONTH AFTER POISONING

George Clark Jul. 1966 11 p refs

(AM-66-34) CFSTI: HC$3.00/MF$0.65

Since the liver damage induced by carbon tetrachloride poisoning has been extensively studied, it was thought that a comparison of the effects on the liver of carbon tetrachloride and of endrin would serve to partially elucidate this problem. Rats poisoned with either endrin or carbon tetrachloride were studied in the acute stage and after a one month recovery period. With endrin, fat was deposited perilobularly in relatively fine droplets. RNA was diffused perilobularly and was in clumps elsewhere and the density of the Weil strain was increased in acutely poisonec rats. By contrast, the fat was centrolobular in CCl_4 poisoned animals, there was little change in RNA except for its absence in necrotic cells and the density of the Weil stain was only slightly greater than in the controls. In the one month recovery period, all changes seen in the acute animals virtually disappeared and histologically the livers were almost normal. Author

N67-17941# Netherlands Research Center TNO for Shipbuilding and Navigation, Delft.

HUMAN REACTION TO SHIPBOARD VIBRATION, A STUDY OF EXISTING LITERATURE [TRILLINGSHINDER AAN BOORD VAN SCHEPEN. EEN LITERATUURSTUDIE]

W. Ten Cate Aug. 1966 23 p refs In DUTCH

(TDCK-46426) CFSTI: HC$3.00/MF$0.65

A literature survey on the effects of shipboard vibrations on humans is reported. Data indicates that human tolerance of vibrations depends on frequency, direction of the vibrations, and other factors. Results of experiments performed by a number of investigators are reviewed and publications on the limits of acceptable vibrations are cited. S.C.W.

N67-17950# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE PRESENCE OF TWO LIGHT-DEPENDENT ENZYMATIC PROCESSES ACCOMPANYING FLUORESCENCE DECAY IN WHEAT LEAVES DURING PHOTOSYNTHESIS

Pei-Chien Chow, See-Ching Lin, Zhung-Chee Chu, Ko-Fa Shien, and Pei-Sung Tang 15 Jun. 1966 12 p refs Transl. into ENGLISH from Chih Wu Hsueh Pao (Peking), v. 12, no. 1, 1964 p 82-87

(FTD-TT-65-1091; TT-66-62342; AD-639459) CFSTI: HC $3.00/MF$0.65

The leaves of wheat sprouts (Agricultural University variety 183) were used as the object of experimentation, and the variation of the time curve of chlorophyll fluorescence during the initial period of illumination was determined. Under the influence of various temperatures, fluorescence decay was found to be hastened by increasing temperatures within a definite range; in addition, there was the phenomenon of a later fluorescence intensity increase known as the second rise. The occurrence of the second rise has a definite relation to temperature; fluorescence decay disappears after a 10-minute treatment at a temperature of 45° C; after decay, leaves can recover fluorescence intensity in darkness, the degree of restoration being directly proportional to the period of time in darkness. The following results were obtained from the inhibitor experiments: sodium azide, potassium cyanide and DNP have little effect on the first rise, but an inhibitory effect on the second rise; malonate greatly affects the decrease of the first rise, but altogether lacks inhibitive effect on the second rise; succinate and fumarate have a restoring effect on the inhibition by malonate. It is possible that the decrease of the first rise has a definnte relation to the tricarboxylic

acid cycle, whereas the second rise may have something to do with the cellular pigmentation system and phosphorylation. Author (TAB)

N67-17964*# School of Aerospace Medicine, Brooks AFB, Tex.
ECOLOGIC RELATIONSHIPS BETWEEN BACTERIA AND ALGAE IN MASS CULTURE
C. H. Ward and J. E. Moyer [1966] 29 p refs Presented at the Conf. on Bioregenerative Systems, Washington, 15–16 Nov. 1966; Sponsored by Am. Inst. of Biol. Sci. and NASA
(NASA Order R-99)
(NASA-CR-81668) CFSTI: HC $3.00/MF $0.65 CSCL 06M

Mass cultures of algae grown without strict maintenance of axenic conditions readily become contaminated with heterotrophic bacteria. Contaminant populations from 10^6 to 10^9 viable cells per ml of algal culture are frequently encountered. Only a limited number of bacterial forms occur in large numbers in mass cultures of *Chlorella*. Soil, air, and putrefactive bacteria generally do not survive in algal cultures; however, two species of an enteric pathogen grow well for prolonged periods. Several bacteria significantly decrease the growth of *Chlorella*, but their effects are non-additive and apparently non-parasitic in nature. Filtrates of axenic algal cultures support prolific growth of contaminant bacteria. Dialyzable organic materials excreted by algae during growth serve as the major source of nutrients for bacterial growth. Chromatographic analyses of axenic algal filtrates reveal a variety of organic acids, amino acids, and compounds of higher molecular weight. Author

N67-18005*# Naval School of Aviation Medicine, Pensacola, Fla. Aerospace Medical Center.
KINEMATICS NOMENCLATURE FOR PHYSIOLOGICAL ACCELERATIONS: WITH SPECIAL REFERENCE TO VESTIBULAR APPLICATIONS
W. Carroll Hixson, Jorma I. Niven, and Manning J. Correia 8 Aug. 1966 97 p refs Joint report with NASA *Its* Monograph 14
(NASA Order R-93)
(NASA-CR-81715) CFSTI: HC $3.00/MF $0.65 CSCL 06S

A mathematical nomenclautre in the language of kinematics has been formulated to provide precise, man-referenced identifications of the real accelerations comprising the basic vestibular stimuli and of certain selected vestibular response measures. The system is based on establishing anatomical landmarks in the form of three mutually orthogonal cardinal head axes and planes to which the magnitude and direction characteristics of both the acceleration stimuli and the vestibular responses can be referenced. Notation is provided to describe separately the resultant linear acceleration and the resultant angular acceleration arising in any force environment in terms of their components acting along and about, respectively, the three cardinal axes. The notation and application format of the nomenclature has application in the general acceleration physiology field as well as the vestibular area. Author

N67-18036*# California Univ., San Diego. Dept. of Chemistry.
A FEASIBILITY STUDY ON MINIATURIZING AN AUTOMATIC AMINO ACID ANALYZER FOR USE ON APOLLO MISSION AND MARS VOYAGER MISSION PROGRESS REPORT, JUN.–DEC. 1966
Stanley L. Miller, Joseph Kraut, and Karl M. Dus Dec. 1966 7 p
(Grant NGR-05-009-032)
(NASA-CR-81680) CFSTI: HC $3.00/MF $0.65 CSCL 06A

A flow diagram of a semi-micro amino acid analyzer is presented, and details are given on the redesign and development of several essential component parts. These include miniature rotary valves, the hydrolysis chamber, the reaction coil heating chamber, and the flow cell with a long light path. Attention is also being directed to the selection and arrangement of components for the spectrophotometric unit in order to achieve the greatest compactness and sensitivity. In considering the chemical aspects, a preliminary search was conducted for reagents which might prove superior to ninhydrin either because of high sensitivity or greater selectivity. Two such reactions, trinitrophenylation and dansylation, are considered promising. M.G.J.

N67-18069# Institute for Perception RVO–TNO, Soesterberg (Netherlands).
CORTICAL CONTROL OF EYE MOVEMENTS
P. L. Latour 1966 102 p refs
(TDCK-46512; IZF-1966-12) CFSTI: HC $3.00/MF $0.65

Studies of the absolute threshold and the contrast threshold in vision were conducted to gain knowledge about the performance of the eye under different conditions of illumination. The starting point of work was the apparent contradiction between two phenomena relevant to eye movements. In the first place it has been reported that stabilization of the image on the retina produces a deterioration of vision. Secondly, reports state that the threshold is raised during a 'flick', the rapid eye movement made to compensate for a slow drift of the eye. Rather than using measurements made during involuntary movement, the influence of voluntary movements was studied using a measuring and recording technique. It was found that the visual threshold increases during an eye movement and that this increase anticipates the eye movement. This indicated the existence of a mechanism which triggers the eye movement, meaning, in other words, that the moment of the start of eye movement is under cortical control. S.P.

N67-18072# Institute for Perception RVO–TNO, Soesterberg (Netherlands).
THE EFFECT OF SUCCESSIVE EXPOSURES UPON DYNAMIC VISUAL ACUITY
L. F. W. de Klerk, J. P. van de Geer, and C. A. J. Vlek [1966] 20 p refs
(TDCK-46508; IZF-1966-10) CFSTI: HC $3.00/MF $0.65

This study concerns the effect of manner of presentation of moving Landolt rings upon dynamic visual acuity. Two types of presentation are used: one single exposure and two successive exposures. The total exposure time has been kept equal for both conditions. From the results of the experiments it appears that for an angular target velocity of 70°/sec two successive exposures, separated by a time interval of .2 sec, lead to better performance than one single exposure of double duration. These results were explained in terms of the sampled data theory. Recordings of eye movements do reveal that there is a rather good correlation between dynamic visual acuity and accuracy of ocular pursuit. However, the sampling hypothesis did not receive much support from the analysis of eye movements. Some factors are discussed which may account for this lack of confirmation. Author

N67-18081* Public Health Service, Phoenix, Ariz. Technology Branch.
MICROBIAL CONTAMINATION IN CONVENTIONAL AND LAMINAR FLOW CLEAN ROOMS
Martin S. Favero [1966] 11 p refs Presented at the 5th Ann. Tech. Meeting and Exhibit, Am. Assoc. for Contamination Control, Houston, Tex., 29 Mar.–1 Apr. 1966
(NASA Order R-137)
(NASA-CR-81751) CFSTI: $3.00 CSCL 06M

The accumulation of microorganisms on stainless steel strip surfaces exposed to the environments of various industrial clean rooms was investigated. Culture plates from the air, surface, and stainless steel strip samplings were picked and subcultured. The cultures were gram-stained, subjected to pertinent biochemical tests and identified. The objective of the study was to determine quantitatively and qualitatively the predominant types of microbial

contaminaton found in conventional industrial clean rooms and in clean rooms which employ laminar air flow to control particulate contamination. Floor plan diagrams of the clean room areas used for the study are depicted. Tables of data on the levels of microbial contamination accumulation for the various rooms are given, and plots showing the effect of personnel density and activity on the level of airborne microbial contamination in the clean rooms, are depicted. L.S.

N67-18085*# California Univ., San Diego. Visibility Lab.
VISUAL PERFORMANCE ON THE MOON
John H. Taylor Jan. 1967 13 p refs Presented at the 17th Congr. of the Intern. Astronautical Federation, Madrid, 13 Oct. 1966
(Grant NGR-05-009-059)
(NASA-CR-81756; SIO-Ref.-67-3) CFSTI: HC $3.00/MF $0.65 CSCL 05E

This paper discusses the optical and photometric properties of the lunar surface environment and their implications for human visual performance. The need for specialized training of selenonauts is pointed out, and some suggested studies for the Lunar International Laboratory are given. Author

N67-18126*# George Washington Univ., Washington, D. C.
BIBLIOGRAPHY ON CLEAN ROOMS
Donald E. Wright Nov. 1966 64 p refs
(Contract NSR-09-010-027)
(NASA-CR-81783) CFSTI: HC $3.00/MF $0.65 CSCL 06M

Contamination control technical details are provided through bibliographic information. Emphasis is on clean room operations for surgical instrumentation and electronics applications. Author and permuted title indexes are included. R.LI.

N67-18127# Sandia Corp., Albuquerque, N. Mex. Planetary Quarantine Dept.
[SCOPE OF WORK FOR SCIENTIFIC AND TECHNICAL ASSISTANCE FOR THE PLANETARY QUARANTINE MISSION] Quarterly Report, Period Ending Dec. 31, 1966
Dec. 1966 17 p
(NASA Orders R-09-019-040; H-13245A; W-12324)
(NASA-CR-81784; QR-3) CFSTI: HC $3.00/MF $0.65 CSCL 06M

In planetary travel contamination studies, the further investigation of a spacecraft sterilization model to decontaminate assayed microbial populations is reported. Equations and chemical reactions are briefly mentioned for technical analyses made during the reporting period. Other mission planning activities outlined include literature searching, and the cataloging of available information. R.LI.

N67-18128 Illinois Univ., Chicago.
[NITROGEN CHEMISTRY SIGNIFICANT TO PRIMORDIAL SYSTEMS] Semiannual Report, 1 Jul.–31 Dec. 1966
Joseph H. Boyer 20 Jan. 1967 7 p
(Grant NGR-14-021-004)
(NASA-CR-81785; SAR-2) CFSTI: HC $3.00/MF $0.65 CSCL 06A

Deoxygenation of benzoyl cyanide by a phosphine derivative and preparation of phenylnitrosoacetylene are reported in connection with the determining a resonance interaction or an equilibrium between cyanocarbenes and other research dealing with nitrogen chemistry and primordial systems is alkylnitrenes. Centered on the isometric alpha- and beta-phenylvinyl nitrenes, and is designed to elucidate the reaction that may require an intramolecular migration of a group or atom from an sp^2 carbon to an adjacent nitrene nitrogen. Two possible pathways for vinyl nitrenium cations to react with water are reported, and nitrenes are studied in which the nitrene nitrogen is attached to oxygen. In a study of o, o'-diazidobiphenyl, it is noted photolysis apparently leads to a monotrene rather than a nitrene. Preparation of diene isocyanates and their possible ring closure by valence isomerization is being investigated, as are methods for the preparation of nitroso azomethine derivatives. M.W.R.

N67-18129*# Syracuse Univ., N. Y. Biological Research Labs.
STUDIES ON TRACE ELEMENTS IN THE SPORULATION OF BACTERIA AND THE GERMINATION OF BACTERIAL SPORES Informal Semiannual Report, 1 Jun.–31 Dec. 1966
Ralph A. Slepecky 31 Dec. 1966 3 p refs
(Grant NsG-693)
(NASA-CR-81786) CFSTI: HC $3.00/MF $0.65 CSCL 06M

During bacterial spore germination investigations, previous studies on the Mn requirement, based on the additions of Mn to Mn deficient cells at various times of the growth cycle, were extended during this reporting period by measuring the Mn levels of the various cell stages. Current measurements of the Mn levels are made by the atomic absorption spectrophotometer (AAS). R.LI.

N67-18130* Naval School of Aviation Medicine, Pensacola, Fla.
THE PROBLEM OF MAN'S GRAVITOINERTIAL FORCE ENVIRONMENT IN SPACE FLIGHT Quarterly Progress Report, 1 Oct.–31 Dec. 1966
Ashton Graybiel 31 Dec. 1966 5 p refs
(NASA Order R-93)
(NASA-CR-81787; PR-15) CFSTI: $3.00 CSCL 06S

Results of a motion sickness study conducted in a slow rotation room are presented. A table which shows a ranking of antimotion sickness drugs as determined by their effectiveness in altering susceptibility to symptoms is included. C.T.C.

N67-18131*# California Inst. of Tech., Pasadena. W. M. Keck Lab. of Environmental Health Engineering.
INVESTIGATION OF BIOCHEMICAL STABILIZATION OF AQUEOUS SOLUTIONS OF ORGANIC COMPOUNDS BY UNSATURATED FLOW THROUGH POROUS MEDIA Semiannual Status Report
J. E. McKee 15 Nov. 1966 6 p
(Grant NGR-05-002-036)
(NASA-CR-81671; SASR-3) CFSTI: HC $3.00/MF $0.65 CSCL 06A

In order to develop cultures of bacteria capable of stabilizing ammonia to nitrates, 14 columns of 0.56-mm sand and 2 columns of 0.12-mm sand were ripened with settled municipal sewage. The finer sand was found unsuitable, but 10 of the 14 columns were placed on a urine feed with concentrations of 5 to 100% urine concentration. The columns at all dilutions have been almost 100% effective in destroying both urine and creatinine, but the end product has been ammonium rather than the nitrates expected. The pH values of the urine feed has varied from 5.9 to 6.3, while the value for the percolate has ranged from 8.5 to 9.3. Since urea is seldom presented in the percolate and the pH value has risen, it is evident that the conversion of urea to ammonium and bicarbonate ions is essentially completed in the columns. There has been no evidence of oxidation of Kjeldahl nitrogen to nitrates or nitrites in even the most undiluted columns; therefore, insufficient oxygen is not the only reason for ineffective nitrification. M.W.R.

N67-18138* California Univ., San Francisco. Biomechanics Lab.
RELATIVE ROLES OF GRAVITATIONAL AND INERTIAL WORK IN THE ENERGY COST AND CHARACTER OF HUMAN LOCOMOTION Semiannual Progress Report, 1 Jul. 1966–1 Jan. 1967
Henry J. Ralston 1 Jan. 1967 5 p
(Grant NsG-722)
(NASA-CR-81774) CFSTI: $3.00 CSCL 06P

Scientific advancements are reported on an analysis of human locomotion on the treadmill, and on the effects of loading the trunk of a human subject on the energy cost, character, and efficiency of locomotion. Graphed data indicate energy expenditure of each segment of the body, determined from stabilized oxygen consumption. Similar data are depicted for the same subject walking at uniform speed but carrying a 10 kg. load. Observations indicate that the principal factor in the change in energy cost of walking, subject to loading conditions, is the gravitational work performed. However, even under conditions of earth gravity the effects of loading the trunk to a limit approaching the subject's tolerance have a relatively small effect on the overall mechanical work performed and consequently upon the energy cost of doing the work. R.Ll.

N67-18139*# Public Health Service, Phoenix, Ariz. Technology Branch.
[RESEARCH ON MICROBIOLOGICAL STERILIZATION PROBLEMS] Quarterly Report, Oct.–Dec. 1966
18 Jan. 1967 23 p
(NASA Order R-137)
(NASA-CR-81775; Rept.-16) CFSTI: HC $3.00/MF $0.65 CSCL 06M

The following work is reported: (1) development of a standard model system for evaluating the recovery of viable microorganisms from the interior of plastic, and experiments to determine the number of spores destroyed by the grinding technique as well as the number remaining in the plastic after grinding; (2) enumeration of microbial contaminants on surfaces, with tests to determine the effect of temperature on the recovery of *B. subtilis* var. *niger* spores from surfaces by ultrasonication; (3) evaluation of the efficiency and precision of the swab-rinse technique for assessing the levels of surface contaminants on lunar spacecraft; (4) studies on the recovery of sublethally injured microorganisms, in which tubes and stainless steel strips were inoculated with a suspension of *B. subtilis* var. *niger* spores and exposed to ethylene oxide followed by incubation; and (5) monitoring of microbial contamination at Cape Kennedy in hangars, in the Surveyor sterilization and assembly laboratory, the fuel loading room, in the Lunar Orbiter camera room, and in the Biosatellite clean room. Results are presented in tables. K.W.

N67-18163*# California Univ., Los Angeles. Brain Research Inst.
NEUROPHYSIOLOGICAL AND BEHAVIORAL STUDIES OF CHIMPANZEES Semiannual Report, 1 Jul.–31 Dec. 1966
J. D. French and W. R. Adey 6 Jan. 1967 7 p refs
(Grant NsG-502)
(NASA-CR-81667) CFSTI: HC $3.00/MF $0.65 CSCL 06C

Considerable progress has been made on the chimpanzee program in the last six months. Computer control of the Matching to Successive Symbol Device (MSD) described in detail in previous reports is now being established in the new Space Science Center, and training of the chimpanzees on the device has begun. Author

N67-18165*# Harvard Univ., Boston, Mass. Thorndike Memorial Lab.
A STUDY OF PHYSIOLOGICAL MECHANISMS AND INTER-RELATIONS BETWEEN SYSTEMIC AND REGIONAL BLOOD VOLUME, BLOOD FLOW AND ELECTROLYTE BALANCE Interim Progress Report, Jul. 1–Dec. 31, 1966
Walter H. Abelmann and Laurence E. Earley 31 Dec. 1966 7 p refs
(Grant NsG-595)
(NASA-CR-81661) CFSTI: HC $3.00/MF $0.65 CSCL 06P

Progress is reported in the following studies: (1) *Renal Hemodynamics and Sodium Excretion*—laboratory investigations in dogs demonstrated that tubular readsorption of sodium relates to the effectiveness with which renal perfusion pressure is transmitted along the intrarenal circulation; (2) *The Effect of Atrial Fibrillation upon Excretion of a Sodium Load*—patients with coronary or primary myocardial disease and atrial fibrillations showed normalization of sodium after restitution of normal sinus rhythm irrespective of the heart rate; and electrically induced artrial fibrillation and defibrillation in open-chested dogs gave evidence of sodium excretion alterations in atrial rhythm; (3) *Determinants of the Circulatory Response to Upright Tilt*—patients with heart failure tended to maintain blood pressure in response to upright tilt. G.G.

N67-18186# Library of Congress, Washington, D. C. Aerospace Technology Div.
AUTONOMIC AND CARDIOVASCULAR DISORDERS DURING CHRONIC EXPOSURE TO SUPER-HIGH FREQUENCY ELECTROMAGNETIC FIELDS Surveys of Foreign Scientific and Technical Literature
Sheila Penners 6 Oct. 1966 9 p refs
(ATD-T-66-124)

A 10-year study was made of 100 persons (73 men and 27 women from 21 to 40 years of age) exposed for long periods of time to the harmful effects of microwaves with radiation intensities up to several mw/cm^2. In 39 subjects the initial effects of exposure took the form of mild asthenia and autonomic vascular shifts. In 61 persons with moderately severe and severe symptoms of irradiation, the angiodystonic syndrome with hypertensive and angiospastic reactions was observed against a background of increasing cerebral asthenia. These subjects showed extremely unstable autonomic and vascular reactions dominated by hyperactivity and unstable pulse and arterial pressure; 16 subjects showed tachycardia (pulse rate 90 beats/min and more) and 19 showed bradycardia (pulse rate up to 60 beats/min) which was, however, unstable. It was found that functional changes in the nervous system decrease with treatment and the cessation of work around sources of radio frequency radiation. C.T.C.

N67-18190# Joint Publications Research Service, Washington, D. C.
OLFACTORY SENSE AND ITS SIMULATION BY MODELING
R. M. Mazitova, V. N. Okhotskaya, and B. I. Puchkin 7 Dec. 1966 14 p refs Transl. into ENGLISH from the book "Obonyaniye i Yego Modelirovaniye" Novosibirsk, Nauka Publishing House, 1965 p 106-114; 119
(JPRS-38994; TT-66-35417) CFSTI: $3.00

Consideration is given to the functional modeling of olfactory processes for their reproduction at the engineering level. It is pointed out that the usefulness of the models discussed is determined not by their absolute correctness or correspondence to the olfactory analyzer, but whether they can offer a more rational approach to the study of olfaction, or help in the elicitation of the true nature of olfaction. Devices are described which make it possible to evaluate the quality and intensity of odors, and also obtain some idea as to the nature of odors. A.G.O.

N67-18203* Arkansas Univ., Little Rock. Medical Center.
SOME BIOMEDICAL APPLICATIONS OF A NON-LINEAR CURVE FIT METHOD
James W. Tyson, James H. Meade, Jr., Glenn V. Dalrymple, and Horace N. Marvin [1965] 22 p refs
(Grants NGR-04-001-014; NIH FR-200208-02; NIH FRS350-05)
(NASA-CR-81799) CFSTI: $3.00 CSCL 06C

A nonlinear curve fit method is applied to the estimation of parameters of three complex equations to illustrate its value to the biomedical investigator. The objective method does not require transformations or graphs, and can be successfully used for complex nonlinear equations. The first equation is used in hematology and pertains to the disappearance of the radioisotope Cr^{51} from the blood. The second equation from radiobiology involves irradiation of cells and their subsequent loss of ability to perform sustained and repeated mitosis. The third equation comes from biochemistry and is also termed the Michaelis–Menton equation. It gives the velocity of reaction (moles reacted/unit time) as a function of substrate concentration (moles/unit volume). The three equations are examples of equations that must be fitted by some numerical method, equations that are commonly fitted by graphical means, and equations that require transformations for linearization. It is shown that these equations can be fitted by the same basic method and use of a small digital computer system for the calculations. S.P.

N67-18251*# California Univ., Berkeley. Space Sciences Lab.
AZOTOBACTER VINELANDII RNA POLYMERASE. II: EFFECT OF RIBONUCLEASE ON POLYMERASE ACTIVITY
Joseph S. Krakow [1965] 29 p refs Submitted for Publication
(Grant NsG-479)
(NASA-CR-69991) CFSTI: HC $3.00/MF $0.65 CSCL 06A

Experimental results are presented which support the contention that RNA polymerase is inhibited by RNA produced during RNA synthesis reactions. By using appropriately labeled substrates it was possible to assay polymerase activity by release of $32pp_i$ under conditions where accumulation of RNA production was prevented. The RNA synthesized in the presence of pancreatic RNase and TI RNase was degraded to oligonucleotide fragments which had at best a limited ability to inhibit polymerase, so that the release of $32pp_i$ approached linearity. These findings indicate that the RNA synthesized during the course of the DNA directed reaction inhibits RNA polymerase but provide no details as to the means by which it occurs. A.G.O.

N67-18293# Dynatech Corp., Cambridge, Mass.
A STUDY OF WATER AND CARBON DIOXIDE PRECIPITATION TECHNIQUE USING THERMAL RADIATION PRINCIPLES Technical Report, 1 Jul. 1965–20 Jun. 1966
Jacques M. Bonneville Wright-Patterson AFB, Ohio, AMRL, Aug. 1966 76 p refs
(Contract AF 33(615)-2950)
(AMRL-TR-66-118; AD-643326) CFSTI: HC $3.00/MF $0.65

Various freeze-out techniques, conceived for controlling carbon dioxide and water vapor in a manned space enclosure in earth orbit, were investigated, analyzed and evaluated. Carbon dioxide elimination presents a much greater problem than does water vapor elimination. The system selected has the following main characteristics: a separate air loop for each vapor; simultaneous sublimation and precipitation in each loop; the freeze-out plate, sublimator, radiator, and second stage heat exchanges in the carbon dioxide loop, are integral and outside the cabin; in an equatorial orbit, the radiator is sun-shielded by a fixed-attitude, open-ended cover. Author (TAB)

N67-18334*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PYROLYSIS FLUORESCENCE. I: DETECTION AND ESTIMATION OF ORGANIC MATTER
P. J. Geiger, J. H. Behar, and J. H. Rho *In its* Space Programs Sum. No. 37–42, Vol. IV 31 Dec. 1966 p 147–153 refs (See N67-18301 08-34) CFSTI: HC $3.00/MF $0.65

The production and quantitation of fluorescent material from selected pure substances and natural materials are described. These include microorganisms, humic acid, and selected soils, without regard to the qualitative nature of the fluorescent materials themselves. Data on the fluorescence of a group of pyrolyzed pure and natural organic substances show that the observed peaks had essentially similar maxima, and that sensitivity could be estimated from peak heights. Figures are included to depict the fluorescence yield of pyrolyzed substances based on the number of mg of starting material; and variations of fluorescence yield with (1) temperature of pyrolysis for natural and artificial soils, (2) temperature of pyrolysis for representative materials, (3) quantity of cells pyrolized, and (4) quantity of organic matter in pyrolyzed natural soils. The results suggest that a highly sensitive, simple quantitative method is available for determining soil organic matter. M.G.J.

N67-18335*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
FLUOROMETRIC DETERMINATION OF NUCLEIC ACIDS. II: ASSAY OF PURINES AND PURINE NUCLEOTIDES OF BIOLOGICAL SAMPLES BY CHEMICAL HYDROLYSIS
J. H. Rho *In its* Space Programs Sum. No. 37–42, Vol. IV 31 Dec. 1966 p 153–157 refs (See N67-18301 08-34) CFSTI: HC $3.00/MF $0.65

A method for the fluorescence measurement of guanine in nucleic acid hydrolyzates was modified for the microdetermination of adenine and guanine, and its application to the quantitative determination of microbial populations is considered. Also presented is a fluorometric method for quantitative microdetermination of purine ribonucleotides in ribonucleic acid hydrolyzates and in natural soil samples. Among the finding reported are: (1) The fluorometric determination of ribonucleotides produced by alkaline hydrolysis of biological samples appears to be a good method for estimating the RNA contant of a given population and, hence, the number of microorganisms. The method does not require any prior separation of purine ribonucleotides from other constituents of the hydrolyzates. (2) In determining total nucleic acids by acid hydrolysis, lower fluorescence yields in the hydrolyzates of nucleic acids are noted, as compared with those in alkaline solution. Since both adenine and guanine fluorescence in acid, the sum of adenine and guanine can be determined by this method; in alkaline solution, only guanine is determined. M.G.J.

N67-18398*# Northrop Space Labs., Hawthorne, Calif.
DEVELOPMENT OF AN INTERNAL RESTRAINT SYSTEM FOR AN INTEGRATED RESTRAINT-PRESSURE SUIT SYSTEM Report, 7 Jun. 1965–28 Jun. 1966
R. S. Mazy, T. E. Mattingly, J. W. Felder, Jr., and C. F. Lombard Washington, NASA, Feb. 1967 49 p refs
(Contract NAS2-2868)
(NASA-CR-718; NSL-66-116) CFSTI: HC $3.00/MF $0.65 CSCL 06K

The fabrication of a working laboratory model of an internal restraint system for use in an integrated pressure suit system is presented. The system provides acceleration protection and thermal control by means of fluid-filled bladders. The thermal transport system is designed to remove at least 2,500 Btu/hr metabolic heat from the occupant. Results of studies conducted to determine the physical loads imposed on the restraint system under acceleration fields of $\pm 30\ G_x$; $+20\ G_z$; $-10\ G_z$ and $\pm 15\ G_y$ are included. Author

N67-18403# Advisory Group for Aeronautical Research and Development, Paris (France).
SOME EFFECTS OF RAISED INTRAPULMONARY PRESSURE IN MAN
J. Ernsting (Ph.D. Thesis—London Univ.) Maidenhead, England, Technivision Ltd., Oct. 1966 352 p refs
(AGARDograph-106) CFSTI: HC$3.00

The nature of the disturbances induced by raising the intrapulmonary pressure by between 30 and 140 mmHg has been investigated. Pressure breathing at these pressures distends the lungs and induces a marked alveolar hyperventilation. The application of counterpressure to the trunk reduces these effects and is essential at positive pressures greater than 40 mmHg. The use of an oronasal mask for pressure breathing allows distension of the mouth and pharynx, increased activity of the carotid baroreceptors and haemorrhages in the conjunctivae and tympanic membrane. Counterpressure to the head and neck is required at positive pressures above 65 mmHg. Raising the intrapulmonary pressure reduces the effective blood volume and collapse occurs when the reduction exceeds 700 to 800 ml. The magnitude of the reduction of effective blood volume may be decreased by applying counterpressure to the limbs but the cardiovascular disburbances induced by pressure breathing limit the time for which this manoeuvre may be used at high altitude. Provided the duration of an exposure is less than four minutes, pressure breathing with limited counterpressure will provide protection against hypoxia at altitudes of up to 70,000 ft. Author

N67-18416* Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF A MATHEMATICAL MODEL OF THE HUMAN OPERATOR'S DECISION-MAKING FUNCTIONS Final Report
J. T. Tou, R. E. Thomas, and R. J. Cress 31 Oct. 1966 233 p refs
(Contract NAS12-37)
(NASA-CR-80009) CFSTI: HC$3.00 CSCL 05H

Attempts are made to formulate a mathematical model describing the human operator's decision-making functions in a control system. The model simulates the evolution of control strategies selected by a human operator and the prediction of verbal heuristics used by such an operator. The proposed model consists of four modes of control: heuristic, gradient, terminal, and probing modes. The operator is assumed to be engaged in the on-line control of a dynamic system described by an ordinary linear differential equation subject to initial and final boundary conditions. The task consists of moving the system from the initial state to the terminal state and minimizing a quadratic performance criterion using information concerning state variables and cost variables which is obtained from meter readings available at discrete time during the control operation. The approach used was to allow 14 subjects to solve 23 first-order control problems (Mark I model) and allow 14 additional subjects to solve 12 second-order control problems (Mark II model). Results from the computer simulation and those from tests of subjects are analyzed. S.P.

N67-18542*# University of Southern Calif., Los Angeles. Dept. of Electrical Engineering.
THE ELECTRICAL CHARACTERISTICS OF SURFACE ELECTRODES FOR ELECTROCARDIOGRAPHY Final Report
Robert S. MacMillan, Robert N. Sato, Christopher Jacobs, and Richard J. DiMarco Dec. 1966 24 p refs
(Grant NGR-05-018-052)
(NASA-CR-82007; USCEE-184) CFSTI: HC $3.00/MF $0.65 CSCL 06B

The properties of surface electrodes, used for monitoring physiological processes of human subjects in the dynamic environment, were investigated. Application methods of the electrodes and the mechanisms of conduction are discussed. The electrical characteristics of electrodes were measured over a frequency range of 5 to 20,000 Hertz, and the electrode voltage ratios are tabulated over a range from 0 to 40 hours. Variations in skin preparation were found to affect the mean values of the electrode voltage ratios by as much as 5 dB. An equivalent circuit is shown, and it is believed that the circuit can be used to represent surface electrodes under a wide variety of conditions. N.E.N.

N67-18544* Naval Medical Research Inst., Bethesda, Md. Tissue Preservation Research Div.
STUDIES ON THE FREEZING RESISTANCE OF INTERTIDAL MOLLUSCS
Robert J. Williams [1966] 11 p Presented at the Ann. Meeting of Soc. for Cryobiology, Boston, Aug. 1966
(NASA Order R-63)
(NASA-CR-82005) CFSTI: $3.00 CSCL 06C

Studies on the whole mollusk and on tissue of common mollusk species inhabiting the temperate and subarctic coast line are reported. The *Mytilus edulis* was found able to survive at a body temperature of -10° C for extended periods of time, and the *Venus mercenaria* at a temperature only of -6° C. Both could survive exposure at lower temperatures for short periods of time, until their body temperature was reduced. Morphological changes in lethally and nonlethally frozen tissue were studied with the electron microscope, and no abnormalities were evident. Time-temperature relationships of injury from tissue freezing with and without cryoprotective agents are also described, and only DMSO was found to show promise as an agent. N.E.N.

N67-18572# Institute for Research, State College, Pa. Div. of Psychobiology.
DRUG EFFECTS UPON COGNITIVE PERFORMANCE UNDER STRESS
Paul M. Hurst and Marianna F. Weidner Aug. 1966 165 p refs
(Contract Nonr-4423(00))
(ONR-H-66-3; AD-643022) CFSTI: HC$3.00/MF$0.65

Three experiments were conducted to test an hypothesis concerning drug enhancement of performance under task-induced stress. Cognitive abilities subjected to examination were highly paced short-term memory and simple arithmetic skill. Changes in mood state, judgment of performance and perception of time passage completed the behavioral characteristics assessed. Author (TAB)

N67-18656*# Yeshiva Univ., New York.
THE EFFECTS OF SENSORY DEPRIVATION ON SENSORY, PERCEPTUAL, MOTOR, COGNITIVE, AND PHYSIOLOGICAL FUNCTIONS.
Sidney Weinstein, Milton Richlin, Marvin Weisinger, and Larry Fisher Washington, NASA, Mar. 1967 95 p refs
(Grant NsG-489)
(NASA-CR-727) CFSTI: HC$3.00/MF$0.65 CSCL 06S

Investigated were human sensory, perceptual, and physiological mechanisms under sensory deprivation by observing a broad spectrum of behaviors from the cognitive to the sensory and motor, along with measures of physiological and metabolic functions. Deprivation took a variety of forms: in two studies the subjects were deprived of tactual sensation alone, and in the third study they were deprived of visual, auditory, and tactual sensations. Subjects were individually isolated for up to 72 hours. Results showed that except for absolute pressure sensitivity on the palm, sensory thresholds were unaffected by deprivation. G.G.

N67-18701# Southwest Research Inst., San Antonio, Tex. Dept. of Physical and Biological Science.

A STUDY OF CALCIUM, PHOSPHORUS AND NITROGEN MOBILIZATION RESULTING FROM CONDITIONS OF INACTIVITY Final Report

Arthur L. Gross, Kenneth T. Roberson, Louis H. Krough, Jr., and John W. Miesse 30 Jun. 1966 114 p refs

(Contract AF 41(609)-2749) CFSTI: HC $3.00/MF $0.65

CONTENTS:

N67-18702# Southwest Research Inst., San Antonio, Tex. Dept. of Physical and Biological Science.

COMPARATIVELY RAPID ANALYTICAL PROCEDURE FOR ANALYSIS OF CALCIUM, NITROGEN AND PHOSPHORUS IN BODY FLUIDS, FECES AND FOOD SAMPLES

Kenneth T. Roberson, Arthur L. Gross, Louis H. Krough, Jr., and John W. Miesse *In its* Study of Calcium, Phosphorus and Nitrogen Mobilization Resulting from Conditions of Inactivity 30 Jun. 1966 2 p (See N67-18701 08-04) CFSTI: HC $3.00/MF $0.65

Consideration is given to the daily calcium, nitrogen, and phosphorus balance of monkeys in various conditions of inactivity. The analytical method developed allowed the determination of these materials from a single perchloric acid digestion. It is noted that this procedure has proven to be very reliable and simple for the determination of large numbers of samples. A.G.O.

N67-18703# Southwest Research Inst., San Antonio, Tex. Dept. of Physical and Biological Science.

CALCIUM, NITROGEN AND PHOSPHORUS MOBILIZATION RESULTING FROM INACTIVITY

Arthur L. Gross, Louis H. Krough, Jr., John W. Miesse, and Kenneth T. Roberson *In its* Study of Calcium, Phosphorus and Nitrogen Mobilization Resulting from Conditions of Inactivity 30 Jun. 1966 82 p (See N67-18701 08-04) CFSTI: HC $3.00/MF $0.65

Immobilization effects were studied by following calcium, phosphorus, and nitrogen balances in monkeys that were inactivated for periods as long as eight weeks. Methods of immobilization used were surgical denervation, tranquilization, and plaster casts. The results of the balance studies indicate that there is no apparent loss of calcium but that there is a marked increase in the urinary excretion of phosphorus with a concomitant decrease in fecal excretion of phosphorus resulting in no net loss. Animals immobilized by means of plaster casts and denervation exhibited a marked negative nitrogen balance. A.G.O.

N67-18723*# California Univ., Los Angeles. Brain Research Inst.

COMPUTER ANALYSIS OF EEG DATA FOR NORMATIVE LIBRARY Final Report, Sep. 24, 1963-Jan. 31, 1966

J. D. French, W. R. Adey, and D. O. Walter 15 Apr. 1966 191 p refs

(Contract NAS9-1970)

(NASA-CR-65578) CFSTI: HC $3.00/MF $0.65 CSCL 06B

Intensity of activity, mean frequency, equivalent band-width, and coherence values in four frequency ranges ("δ,θ, α, β") were calculated for four channels of EEG recorded from each of four normal adult human males, in five experimental situations, including periods of rest and of attention. Stepwise discriminant analysis was applied to the calculated values for all subjects, simultaneously, to develop formulas for automatic categorization of records into the situation in which they were recorded. After selecting only four parameters, the program correctly categorized 49% of the records; the erroneous categorizations were mainly into related situations. When the records from each subject were separately analyzed, a higher proportion of records was correctly categorized; the parameters chosen were only partially overlapping with those chosen for the simultaneous discrimination. Thus an objective method of identifying parameters of the EEG which are important in distinguishing subjects' responses to differing situations has shown its value for developing criteria applicable to many individuals; it has also shown that individuals differ substantially in the list of parameters most distinguishing for their own records. Author

N67-18728*# Franklin Inst., Philadelphia, Pa. Systems Science Div.

MAN-COMPUTER ROLES IN SPACE NAVIGATION AND GUIDANCE, PHASE I

(Eugene Farber, Lloyd P. Crumley, and Lou Spiegel (GE) 18 Jan. 1967 114 p refs Revised

(Contract NAS12-128)

(NASA-CR-80011; TM-1-179R) CFSTI: HC $3.00/MF $0.65 CSCL 05H

The role of man in performing guidance and navigation while utilizing navigation systems of various degrees of complexity in future manned space flights was investigated. Selected mission constraints were used to calculate the required trajectories and guidance requirements. Navigational observations and measurements, and computations of obtained data were then combined in a first approximation to the required performance of a human operator. Analysis of the sensitivity data of the orbits and trajectories to guidance errors during the phase of the mission yielded the cost, and therefore, the relative importance of errors in different mission phases. A final determination and description of various types of automatic and manual navigation sensors formed there the basis for an aided-manual approach, and to a semiautomatic approach to space navigation and guidance man-machine requirements. G.G.

N67-18922*# National Aeronautics and Space Administration, Washington, D. C.

HISTOLOGICAL CHANGES IN THE INNER EAR OF ANIMALS EXPOSED TO X-IRRADIATION [GISTOLOGICHESKIYE IZMENENIYA VO VNUTRENNEM UKHE ZHIVOTNYKH PODVERGNUTYKH RENTGENOVSKOMU OBLUCHENIYU]

N. I. Ivanov Nov. 1966 9 p refs Transl. into ENGLISH from Vestn. Otorinolaringol. (Moscow), v. 18, 1957 p 78-83

(NASA-TT-F-10497) CFSTI: HC $3.00/MF $0.65 CSCL 06R

Following X-irradiation (either general or local exposure) of rabbits and guinea pigs in the region of the ear, the animals were kept under observation for some time and then killed. The X-ray doses used (total local dose: 2×1000 R, R, total general dose: 300 or 600 R) induced traumatic effects as well as pathologic changes in the middle and inner ears of these animals. The organ of Corti was the most sensitive to X-ray. Reaction to the traumatic effect could clearly be noted as labyrinthitis. Author

N67-18931*# National Aeronautics and Space Administration, Washington, D. C.

EVOLUTION OF THE CATALYTIC FUNCTION OF THE GLUTAMATE OXIDASE SYSTEM [EVOLYUTSIYA KATALITICHESKOY FUNKTSII GLUTAMATOKSIDAZNOY SISTEMY]

L. P. Zubok, and Z. S. Kagan Jan. 1967 7 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR, Ser. Biokhimiya (Moscow), v. 166, no. 4, 1966 p 982–985
(NASA-TT-F-10679) CFSTI: HC$3.00/MF$0.65 CSCL 06A

Measurements were made of the activation energy for oxidation of glutamic acid by the enzyme systems of Rickettsia prowazekii, by E. Coli, by healthy mouse tissues, and by the tissues of mice infected with Rickettsia prowazekii. The results are discussed in terms of the evolution of the enzyme systems. Author

N67-18932*# National Aeronautics and Space Administration, Washington, D. C.
THE EFFECT OF DENATURATION OF PROTEINS ON THEIR COACERVATION WITH DYES [VLIYANIYE DENATURATSII BELKOV NA KONTSENTRATSIYU IKH S KRASITELYAMI]
N. L. Fel'dman Jan. 1967 6 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR, Ser. Fiziologiya (Moscow), v. 74, no. 6, 1950 p 1139–1142
(NASA-TT-F-10681) CFSTI: HC$3.00/MF$0.65 CSCL 06A

Frog serum and horse serum as well as serum albumen and egg albumen are used to study the effect of denaturation on the coacervation capacity of proteins so as to determine if cessation of granule formation results from denaturation charges in damaged cells which prevent coacervation. Among factors inducing denaturation the author studied acetone, temperature, ultraviolet rays and urea. It was found that urea in no way effects coacervation. Denaturation changes prohibit protein from entering into a coacervation reaction with dyes or other substances. Therefore, granule formation in an injured cell may cease due to denaturation of protoplasm proteins resulting from disruption in the metabolism. Author

N67-18936*# National Aeronautics and Space Administration, Washington, D. C.
THE PHOTOSENSITIZING ACTIVITY OF CHLOROPHYLL IN COACERVATES [FOTOSENSIBILIZIRUYUSHCHAYA AKTIVNOST' KHLOROFILLA V KOATSERVATAKH]
K. B. Serebrovskaya, V. B. Yevstigneyev, V. A. Gavrilova, and A. I. Oparin Feb. 1967 11 p refs Transl. into ENGLISH from Biofizika (Moscow), v. 7, no. 1, 1962 p 34–41
(NASA-TT-F-10711) CFSTI: HC$3.00/MF$0.65 CSCL 06A

Coacervates containing chlorophyll are derived from serum albumin and potassium oleate in 50% alcohol. Experiments with coacervates having a definite chlorophyll content showed that the photosensitizing activity in the coacervate, chlorophyll containing drops is significantly higher than in the surrounding liquid, which also contains chlorophyll. This paper presents some considerations to explain this phenomenon. Author

N67-18938*# National Aeronautics and Space Administration, Washington, D. C.
RESISTANCEOF CERTAIN STRAINS OF MICROORGANISMS TO ULTRAVIOLET RAYS [USTOYCHIVOST NEKOTDRYKH SHTAMMOV MIKROORGANIZMOV K DEYSTVIYU UL'TRA-FIOLETOVYKH LUCHEY]
A. I. Zhukova and V. Kh. Kozlova Feb. 1967 7 p refs Transl. into ENGLISH from Mikrobiologiya (Moscow), v. 35, no. 2, 1966 p 320–306
(NASA-TT-F-10720) CFSTI: HC$3.00/MF$0.65 CSCL 06M

The critical uv dose for 28 strains of microorganisms was evaluated. The aim was to select species suitable for experiments under Martian conditions. The most resistant to uv appear to be nonpigmented spore forming bacteria and nonsporeforming yeast possessing pigments of intensive colorations (black, red). Microbial activity in the surface layers of the Martian soil seems to be quite probable judging from the data obtained. Author

N67-18939*# National Aeronautics and Space Administration, Washington, D. C.
CHANGES IN NERVE CELLS AS A RESULT OF THE ACTION OF IONIZING RADIATION [IZMENENIYA V NEYRONAKH PRI VOZDEYSTVII IONIZIRUYUSHCHEGO IZLUCHENIYA]
A. D. Smirnov Jan. 1967 7 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR, Ser. Biofiz. (Moscow), v. 131, no. 5, 1960 p 1171–1173
(NASA-TT-F-10723) CFSTI: HC$3.00/MF$0.65 CSCL 06R

The author conducted a histomorphological analysis of various central nervous system structures from roentgen-irradiated (500r) dogs. Three figures show histological changes in various neural tissues caused by irradiation. The mechanisms of these changes are discussed. The conclusion drawn from this study was that histomorphological changes in the nervous system reflect its sensitivity to ionizing radiation. Injury to neurons of the vasomotor reflex arc should be considered relative to the general pathogenesis of radiation sickness and the hemorrhagic syndrome as reflecting disruption of vascular wall trophics. Author

N67-18940*# National Aeronautics and Space Administration, Washington, D. C.
BIOCHEMICAL EFFECTS OF STATIC ELECTRICITY DURING GORDON'S EVA [BIOCHEMISCHE WIRKUNGEN DER STATISCHEN ELEKTRIZITAT INNERHALB DES WELTRAUMSPAZIERGANGES HERRN GORDONS]
Stefan Molnar Jan. 1967 7 p Transl. into ENGLISH from German
(NASA-TT-F-10725) CFSTI: HC$3.00/MF$0.65 CSCL 06A

The author reports his experiences with static electricity in his practice and details his theory attributing Gordon's enervation in his space walk to accumulated frictional static electricity. This electricity can impede cell respiration and produce a neuroallergic shock effect due to damaged cells. Author

N67-18941*# National Aeronautics and Space Administration, Washington, D. C.
A STUDY OF HISTONE ACTION ON SYNTHESIS OF ANTIBODIES AND OTHER CELLURLAR PROTEINS *IN VITRO* [IZUCHENIYE DEYSTVIYA GISTONOV NA SINTEZ ANTITEL I DRUGIKH KLETOCHNYKH BELKOV *IN VITRO*]
Ye. V. Sidorova Feb. 1967 14 p refs Transl. into ENGLISH from Biokhimiya (USSR), v. 31, 1966 p 789–798
(NASA-TT-F-10727) CFSTI: HC$3.00/MF$0.65 CSCL 06A

The influence of different histones on the synthesis of antibodies and other proteins in rabbit's spleen cell culture during the secondary response *in vitro* has been investigated. The synthesis of antibody and non-specific γ-globulin was determined by measuring the specific increase of C^{14}-activity on immunosorbents; the synthesis of other water-soluble proteins–as C^{14}-incorporation into TCA-precipitate. It was shown that histones (20–30 γ/ml) inhibited the synthesis of antibodies of non-specific γ-globulins and of other proteins to 20–50%. The synthesis of antibody and of non-specific γ-globulin was inhibited at the same degree, but the formation inhibition of water-soluble protein was much less expressed. Different histone fractions possessed different inhibiting activity. The action of all histone fractions was proportional to its concentration. Author

N67-18953*# Texas Inst. for Rehabilitation and Research, Houston.
A STUDY OF THE POSSIBLE PREVENTIVE EFFECTS OF MUSCULAR EXERCISES AND INTERMITTENT VENOUS OCCLUSION ON THE CARDIOVASCULAR DECONDITIONING OBSERVED AFTER 10 DAYS BED RECUMBENCY: EXPERIMENTAL DESIGN

David Cardus, Willis C. Beasley, and Fred B. Vogt Washington, NASA, Feb. 1967 173 p refs
(Contract NAS9-1461)
(NASA-CR-692) CFSTI: HC $3.00/MF $0.65 CSCL 06S

An experimental program designed to study the efficacy of exercise and/or intermittent leg cuff inflation in preventing cardiovascular deconditioning is described. Consideration is given to the experimental subjects participating in the study, the planning and conditions of the experiments, the methods and techniques of physiological and psychological testing, and the general procedure of data handling. A.G.O.

N67-19001# Oak Ridge National Lab., Tenn.
THE BIOCOENETIC PROCESS IN AN ESTUARINE PHYTOPLANKTON COMMUNITY
B. C. Patten Oct. 1966 106 p refs
(Contract W-7405-ENG-26)
(ORNL-3946) CFSTI: HC $3.00/MF $0.65

An ecological theory of adaptation at the community level of organization is developed. By adaptation is meant the establishment of optimum relationships between structure and function for community life under existing or expected conditions of environment. An analog computer model of a hypothetical food chain is explored to elucidate how structure–function relationships in coupled systems are determined by the communication net, or pattern of coupling between the parts. Since optimization necessarily implies input of information from the environment which details, in effect, how far off the present state of the system is from an optimum state, there is implicit in the adaptation process a kind of community cognition. To give emphasis to this aspect etymologically, the process of community adaptation is referred to as biocoenesis. An annual cycle of structure–function relationships in phytoplankton of the York River, Virginia, is described, with particular emphasis on aspects which relate to system adaptability. Author (NSA)

N67-19007*# Space/Defense Corp., Birmingham, Mich.
NO TITLE Technical Status Report, Nov. 4, 1966–Feb. 4, 1967
Donald L. Foster 17 Feb. 1967 9 p
(Contract NASw-870)
(NASA-CR-82467; TR67-104) CFSTI: HC $3.00/MF $0.65 CSCL 06B

Four single-cell units, and one multi-cell respirometer were fabricated for subsequent adaptation to space flight qualified hardware for the conduct of biorhythmicity studies using the potato tuber. The systems are the single-cell (SPUDNIK Mark I) and the multi-cell (SPUDNIK Mark II). Also described is a new technique for preparation of the potato specimens, resulting in improved capability for maintaining a viable specimen. To alleviate problems of mycotic growths, the newly plugged potato specimen was coated with parrafin, and inserted into the breadboard unit. After two months in the respirometer system, the new technique is considered promising. R.LI.

N67-19048*# Pittsburgh Univ., Pa. Graduate School of Public Health.
NO TITLE Quarterly Progress Report, 1 Oct.–31 Dec. 1966
Niel Wald 20 Feb. 1967 11 p
(Contract NASr-169)
(NASA-CR-82522; QPR-12) CFSTI: HC $3.00/MF $0.65 CSCL 06B

The status of a project to extend the usefulness of cytogenetic methodology as a research technique and as a biomedical monitoring procedure is presented. Efforts are focused on the utilization of automatic electronic scanning and computer analysis of chromosomes. Design of an automatic microscope is described, and the preparation of a computer for its function as the control system for the automatic microscope and the flying spot scanner is related. S.P.

N67-19049*# Naval Medical Research Inst., Bethesda, Md. Tissue Preservation Research Lab.
NO TITLE Final Report
[1966] 6 p
(NASA Order R-63)
(NASA-CR-82523) CFSTI: HC $3.00/MF $0.65 CSCL 06F

Research was conducted on the relationship between cell injury and ice crystal growth as well as between injury and dehydration, in order to understand the mechanism by which freezing injuries can be prevented by cryoprotective agents. The intertidal mollusk (*Mytilus edulis*) was selected as an experimental subject since they are the largest and most highly developed organisms which show a natural resistance to freezing injury. The consensus, after examination by electron microscopy, thermal analysis, and calorimetric methods, was that injury following flow freezing with extracellular ice is almost always the result of dehydration, not mechanical injury from crystallization. Only in the special case of ultra-rapid freezing with intracellular ice does there appear to be a mechanical element, probably often superimposed on a dehydration injury. R.LI.

N67-19086* Public Health Service, Cincinnati, Ohio.
ECOLOGY AND THERMAL INACTIVATION OF MICROBES IN AND ON INTERPLANETARY SPACE VEHICLE COMPONENTS Quarterly Progress Report, 1 Oct.–31 Dec. 1966
Robert Angelotti Jan. 1967 12 p refs
(NASA Order R-36-015-001)
(NASA-CR-82514) CFSTI: $3.00 CSCL 06M

Methods have been developed for incorporating and recovering *B. subtilis* var. *niger* spores in epoxy resin and preliminary data indicate that D value in comparison to Lucite may be twice as great in this type of plastic. A system has been developed for measuring the thermal resistance of spores on stainless steel mated surfaces and preliminary data indicate that D values will be much less for spores so located than for spores encapsulated in Lucite. Measurements of the thermal resistance of spores adjusted to various levels of water activity prior to encapsulation in Lucite indicate that water activity may be significant consideration in establishing dry heat sterilization processes. Author

N67-19088 Royal Aircraft Establishment, Farnborough (England).
THE PROBLEM OF THE PENETRABILITY OF BIRDS WINGS (EXPERIMENTAL STUDIES OF BIRD FLIGHT) [K VOPROSU O PRONITSAEMOSTI KRYLA PTITS]
G. S. Shestakova Dec. 1965 26 p refs Transl. into ENGLISH from Tr. Inst. Morfol. Zhivotn., Akad. Nauk SSSR (Moscow), v. 9, 1953 p 14–30
(RAE-LIB-TRANS-1143) CFSTI: $3.00

Over 200 experiments were conducted on a variety of hand reared birds to determine the effects of various wing phenomena on the flight of birds. The method used was to restrict a particular aspect of the wing mechanism and to observe the effect on the bird's flight. The experiments consisted of eliminating slots between flight feathers, eliminating slots between primary feathers, eliminating slots between secondary feathers, cutting away the alula or bastard wing, enlarging slots between flight feathers, cutting away some of the covert feathers, and artificial shortening of parts of the wing. The study concluded that a bird wing does not always act as an unbroken carrying surface. It has a slotted structure in which there is fissuring of the sing apex and there are slots between secondary feathers. The slotted structure of the wing is a mechanism for increasing lift and is only used in certain flight modes. The bastard wing is part of the slot mechanism and is

used to increase lift. In many birds there is a penetrability in the cambered part of the wing in the root region of the secondary feathers which may be linked to aquintocubitalism. Author

N67-19090* Indiana Univ., Bloomington. Dept. of Anatomy and Physiology.
THE DISTRIBUTION OF BLOOD LACTATE AND PYRUVATE DURING WORK AND RECOVERY, PART V Final Scientific Report
J. L. Newton and S. Robinson 31 Dec. 1966 16 p refs
(Grant NsG-408)
(NASA-CR-82508) CFSTI: $3.00 CSCL 06S

The distribution of blood lactate and pyruvate were studied in men walking on the treadmill (VO_2 1.9 1/min) for 14 minutes, and in other experiments running to exhaustion in 5 minutes. Blood samples were drawn from the femoral and antecubital veins and from the radial artery at frequent intervals during work and recovery. During the exhausting runs femoral and arterial blood lactates rose rapidly to values 1 1/2 times corresponding values in the antecubital vein where the increase was much slower; arterial and femoral blood pyruvates rose much more slowly and were only slightly higher than those in the antecubital vein. The blood lactate concentrations at these three locations did not reach equal values until 5 to 20 minutes after work. These differences in concentrations at the three locations indicate the degree of error involved in estimating total body lactate from blood samples drawn at any one, or even simultaneously from all 3 of these locations during work and early recovery. Mechanisms of the variations are discussed. Author

N67-19092*# California Univ., Los Angeles. Space Biology Lab.
ELECTROENCEPHALOGRAPHIC BASELINES IN ASTRONAUT CANDIDATES ESTIMATED BY COMPUTATION AND PATTERN RECOGNITION TECHNIQUES
D. O. Walter, R. T. Kado, J. M. Rhodes, and and W. R. Adey [1966] 28 p refs Submitted for Publication
(Grant NsG-505)
(NASA-CR-82506) CFSTI: HC $3.00/MF $0.65 CSCL 06N

Methods used in acquisition and analysis of electrophysiological data from astronaut candidates are described. The data were analyzed to establish baselines covering a wide range of wakeful and sleep states. Physiological stimuli and perceptual and learning tasks were given to all subjects. Spectral analyses were performed by digital methods on scalp EEG channels. From the primary spectral density parameters, averages and variances were calculated for each scalp location. Despite wide individual differences between subjects, the group mean and/or pattern of variance in spectral densities for each test condition showed a characteristic pattern. The patterns were consistent with neurophysiological observations on organization of cortico-subcortical interrelations and cerebal systems. Recent evidence relating the scalp EEG to intracellular wave phenomena in cortical neurons is reviewed. Automated pattern recognition methods were applied to the primary outputs of spectral analysis. Results indicate an accuracy exceeding 90% in computed assignment of wakeful states, based on 10 to 20 second epochs of data from 4 EEG channels, and evaluation of 78 variables. Author

N67-19099*# Naval Medical Research Inst., Bethesda, Md.
THE RELATIONSHIP BETWEEN DEHYDRATION AND FREEZING INJURY IN THE HUMAN ERYTHROCYTE
Harold T. Meryman [1966] 27 p refs Presented at the Low Temp. Sci. Conf., Sapporo, Japan, Aug. 1966
(NASA Order R-63)
(NASA-CR-82487) CFSTI: HC $3.00/MF $0.65 CSCL 06C

Studies were conducted which demonstrated that dehydration is the primary cause of freezing injury in human erythrocytes. A model is presented whereby the varying effects of slow and rapid freezing, penetrating and non-penetrating cryoprotective agents, and intracellular crystallization can be explained on the basis of their effects on hydration. Evidence is also given that the hemolysis of erythrocytes with freezing does not appear to be related to the total residual liquid phase as would be expected if solute concentration or the simple filling of interstitial spaces were the primary factor in survival following freezing. The concept of water essential to protein stability is found to be incompatible with the protective effect of cryoprotective agents unless they are presumed to substitute or stabilize for water in cases the effectiveness of a cryoprotective agent will depend on its ability to make this substitution rather than simple "antifreeze" properties. R. N.A.

N67-19102*# New England Medical Center Hospitals, Boston, Mass.
BIOMAGNETISM AND FERRITIN Final Report
Peter W. Neurath and Ellen G. Sloane 30 Jan. 1967 7 p
(Grant NGR-22-021-002)
(NASA-CR-82653) CFSTI: HC $3.00/MF $0.65 CSCL 06C

Continued studies focusing on the determination of the iron content in embryos of *Rana pipiens* are reported. A micro method for determining the iron content of frog embryos and sections of frog embryos using bathophenanthroline was developed. The method will allow the determination of as little as 0.1 g of iron, 1/10th the total of the average iron content of an egg. A survey of the distribution of iron in the frog embryos, Shumway stages 3 and 20, the sections of these consisting of approximately one-half of the egg was initiated. Results confirm that embryos on the average contain about 1 microgram of iron. No conclusions were drawn as to the variation in the results from embryo to embryo and from one-half of an embryo to another. Further tests with the electron probe of ferritin containing rat intestine sections did not indicate the ability of this method to see ferritin. S.C.W.

N67-19103*# Pennsylvania State Univ., University Park. Physiology-Biophysics Labs.
A CYTOPHOTOMETRIC ANALYSIS OF ANTERIOR PITUITARY CHANGES IN RATS EXPOSED TO REDUCED PRESSURE
Kenneth Rockwell (Ph.D. Thesis) and Adam Anthony Mar. 1967 98 p refs
(Grants NGR-39-009-015(2); NIH GM-05112)
(NASA-CR-82668) CFSTI: HC $3.00/MF $0.65 CSCL 06F

Reported is a study designed to describe the adaptive cytochemical responses of the hormone producing cells of the rat anterior pituitary following exposure of varying duration to simulated high altitude. All data were obtained by application of differential cell count and analytical cytophotometric techniques. Data from differential cell counts of stained tissue sections showed that all chromophil cell types increased in relative number within 49 hours or less of the onset of altitude exposure. Chromophobe cells decreased in relative number in a Sihilar manner. Since no mitotic figures were observed, it was concluded that altitude induced changes in relative anterior pituitary chromophil cell numbers did not represent true hyperplasia. Cytophotometric characterization of anterior pituitary chromophic cells of each type was shown to be possible using a Leitz microspectrophotometer. The similarities in absorption spectra obtained from the stained cytoplasm of individual cells of each type in both control and altitude exposed rats demonstrated that hypoxia did not cause cytochemical alterations of any kind in the hormone products stored by respective chromophils. Quantitative evaluation of the cytophotometric data indicated that the relative intensty of cytoplasmic staining increased in acidophil cells, and gonadotropic and thyrotropic basophils during altitude acclimation. It was concluded that such increases in dye-binding capacity resulted from increased intracellular hormone storage. S.C.W.

N67-19107*# Florida State Univ., Tallahassee. Dept. of Statistics.
ESTIMATION OF THE PARAMETERS IN EXPONENTIAL DECONTAMINATION MODELS
Richard G. Cornell 1 Feb. 1967 15 p refs
(Grant NGR-10-004-029)
(NASA-CR-82663; TR-8) CFSTI: HC $3.00/MF $0.65 CSCL 06M

Reported are results of a study concerned with the estimation of parameters in decontamination models based upon the assumption that the probability, p_t, that a single microorganism is alive at time t in a given environment is of the form $p_t = \mu^t$. Analyzed are methods of estimation for models derived from the proposed assumption. The discussion of decontamination probability models and estimation procedures emphasizes the need for further research on the statistical aspects of microbial assay. The presentation of models includes discussion of possible alternative models and alludes to the fact that the statistical literature already contains considerable work on such models. Reference is also made to the need for estimation techniques. A summary of research underway or planned for the future on the statistical aspects of microbial assay is included. S.C.W.

N67-19149*# Naval School of Aviation Medicine, Pensacola, Fla.
MEASUREMENTS OF THE ASTRONAUTS' RADIATION EXPOSURE WITH NUCLEAR EMULSION ON MERCURY MISSIONS MA-8 and MA-9
Hermann J. Schaefer and Jeremiah J. Sullivan 25 May 1964 17 p refs
(NASA-CR-82574; Rept.-27) CFSTI: HC $3.00/MF $0.65 CSCL 06R

Findings are presented from a post-flight record of radiation exposure of the astronauts during missions Ma-8 and MA-9. Closer attention to the radiation exposure was called for because these two missions took place within one year after the high altitude nuclear explosion known as the Starfish Test. Another problem concerned the additional exposure in the South Atlantic Anomaly, a region where the Inner Van Allen Belt dips down more deeply than at any other longitude due to certain irregularities in the earth's magnetic field structure. Emulsions flown on MA-8 and MA-9 showed a background from electrons and gamma rays not significantly different from that of the sea level controls, indicating that the inherent shielding of the capsule was sufficient for complete absorption of electrons from the artificial radiation belt. This important result shows that the primary cosmic ray beam produces, in one and a half tons of compact material of the Mercury capsule, only an insignificant amount of electrons and gamma rays. A.G.O.

N67-19151*# Louisville Univ., Ky.
COMMUNICATION BY ELECTRICAL STIMULATION OF THE SKIN Semiannual Progress Report, May–31 Oct. 1966
Emerson Foulke 14 Jan. 1967 6 p refs
(Grant NGR-18-002-007)
(NASA-CR-82572) CFSTI: HC $3.00/MF $0.65 CSCL 06B

Progress is reported in a study to develop an electrocutaneous code for the communication of the English language at a useful rate. It was found that the best response alphabet consisted of the elements in the Katakana syllabary with native Japanese serving as the subjects. Emphasis was placed on modification of existing apparatus, determination of signal parameters, composition of the final code, and code learning. Among the conclusions are that locations used in composing the signals of the final code should be restricted to the fingertips, and that ac pulses should be used as stimuli. C.T.C.

N67-19156*# IIT Research Inst., Chicago, Ill.
LIFE IN EXTRATERRESTRIAL ENVIRONMENTS Quarterly Status Report, Nov. 15, 1966–Feb. 15, 1967
Charles A. Hagen 15 Feb. 1967 18 p
(Contract NASr-22)
(NASA-CR-82484; IITRI-L6023-8) CFSTI: HC $3.00/MF $0.65 CSCL 06M

Results are presented from simulated Martian environment experiments conducted with *Staphylococcus aureus*. The effects of various barometric pressures and carbon dioxide growth were studied over a 56 day period. Growth of *S. aureus* was rapid and abundant in Earth atmospheres at barometric pressures of 10, 25, and 40 mb. Carbon dioxide concentrations of 37, 67, and 100% at pressures of 40, 25, and 10 mb respectively, did not adversely affect the growth, although the population maxima were slightly lower than the Earth atmosphere maxima. An 8-hr daily freeze lowered the minimum water requirement for growth of *S. aureus* below that required for growth at constant 35°C. A.G.O.

N67-19202# Royal Aircraft Establishment, Farnborough (England).
THE STRUCTURE OF THE WING SURFACE AND ITS SIGNIFICANCE IN THE AERODYNAMICS OF BIRDS [STRUKTURA POVERKHNOSTI KRYLA I EE ZNACHENIE DLYA AERODINAMIKI]
G. S. Shestakova Dec. 1965 41 p refs Transl. into ENGLISH from Tr. Inst. Morfol. Zhivotn. Akad. Nauk SSSR (USSR), v. 9, 1953 p 32–58
(RAE-LIB-TRANS-1142) CFSTI: HC $3.00/MF $0.65

This article describes the structure of a bird's wing, with particular attention being paid to the way in which the feathers overlap each other. Each type of feather in the wing surface is considered and its relationship with its neighbor indicated. The shape and cross-section of each feather group is illustrated. The micro-structure of feathers is detailed and the variation on different sections of feathers is pointed out. The distribution of direction of the barbs over the entire wing surface is illustrated, and a hypothesis is introduced relating the direction of the barbs with the deflection of the airstream over the wing. The hypothesis is also advanced that the additional roughness on the underside of the wing surface reduces the velocity of the air passing below the wing and thus increases the differential velocity between the upper and lower surfaces which should increase the lift obtained. Aerodynamic problems of feathered flight are also considered. Author

N67-19207# Portugal. Nuclear Energy Commission, Sacavem.
INTERFERENCE OF RADIATIONS IN THE CUPRO-OXIDASIC ACTIVITY [INTERFERENCIA DAS RADIACOES NA ACTIVIDADE CUPRO-OXIDASICA DO SORO HUMANO]
J. P. Galvao, E. M. Magalhaes, F. P. Teixeira, and M. H. Matos 1966 11 p refs Presented at the 1st Congr. of the Brasileiro de Radiologia, Luso, Rio de Janeiro, 12–18 Sep. 1965 In PORTUGUESE
(Doc.-LFEN-57A) CFSTI: HC $3.00/MF $0.65

Several researchers observed that the ultraviolet radiation action on human serum causes a decrease of its oxidasic activity in the presence of paraphenylene diamine, *in vitro*. To study this activity of possible interest to the field of radiobiology, *in vitro* human serum was subjected to X-ray and gamma radiations. Transl. by R.LI.

N67-19208 Institute for Perception RVO–TNO, Soesterberg (Netherlands).
SOME ASPECTS OF REACTION PROCESSES
A. F. Sanders [1966] 30 p refs
(IZF-1966-8; TDCK-46511) CFSTI: HC $3.00

Research on reaction processes is discussed. Data indicate that reactions are based upon a number of successive internal

responses. One of the first may be labelled the elementary code, which is afterwards translated in response terms. If the response directly corresponds with the elementary code, the situation has an extremely high S–R compatibility and CRT becomes independent from the number of alternative signals. The translation stage of the reaction is thought to be dependent on information and appears to be also the most critical stage in handling information. Some experiments are reported showing that two successive responses to one signal, a compatible and an incompatible, do not interfere with each other while two incompatible responses do. It is therefore surmised that a compatible response seems to be a station which is naturally passed when the S–R combination is incompatible. Data on information condensation, expectation, and the statistical decision theory of reaction time are also included. Author

N67-19216*# Illinois Univ., Urbana.
THE PHYSICAL AND CHEMICAL PROPERTIES OF HUMAN SWEAT AND FACTORS AFFECTING THE WATER BALANCE IN CONFINED SPACES Semi-Annual Status Report, No. 3, 1 Jul.–31 Dec. 1966
Robert E. Johnson and Frederick Sargent, II 31 Dec. 1966 61 p refs
(Grant NGR-14-005-050)
(NASA-CR-82590; SASR-3) CFSTI: HC $3.00/MF $0.65 CSCL 06S

Reported are results of a study on the relationship between the rate of sweating and the chemical composition of sweat in humans, and results of a comparative study of the chemical composition of sweat collected in impermeable bags on the arms and sweat simultaneously produced naturally without the interposition of an impermeable capsule. The following regularities were observed during studies of the relation between rate of sweating and chemical concentration in glove sweat: rises in osmolarity, Na, Cl, and pH with increased rate of sweating. Lactate, Mg, Ca, NH_3, and total N all diminished. Urea and creatinine did not change regularly, and the sweat was always hypotonic to blood plasma. Correlations between total body sweat and glove sweat were good. Dermal losses of water, Na, K, NH_3, Cl, lactate, urea, total N, and total osmols were of the same order of magnitude for total body and glove sweat when expressed on the basis per square meter of skin and hour. It is concluded that, glove sweat can be used to predict total body sweat with respect to the substances measured except for Mg and Ca. An improved method for measuring oxygen consumption and carbon dioxide production in man is described. S.C.W.

N67-19223# Keio Univ., Tokyo (Japan). School of Medicine.
MECHANISMS SUBSERVING COLOR CODING IN THE VERTEBRATE RETINA Final Report, Oct. 1965–Oct. 1966
Tsuneo Tomita Dec. 1966 28 p refs *Its* Rept.-4
(Grant DA-CRD-AG-S92-544-65-G31)
(J-228-4; AD-644493) CFSTI: HC $3.00/MF $0.65

Intracellular recording from single cones in the carp (Cyprinus carpio) is an attempt to clarify the mechanism of color information processing in vertebrate photoreceptors. As the only means to permit the intracellular recording, the retina detached from the pigment epithelium is jolted at a high acceleration against a vertically held, slowly advancing micropipette. The new model of jolting device is described. Whenever a potential identified as a single cone potential is found, the visible spectrum adjusted to equal quantum flux is scanned by means of a photostimulator especially built for this experiment and the single cone spectral response curve is obtained. Statistical analysis of 142 records selected out of hundreds, based solely on the greatest signal-to-noise ratio, reveals three groups of cones; the red cones (74%) with the average peaking wavelength at 611 millimicrons, green cones (10%) at 529 millimicrons, and blue cones (16%) at 462 millimicrons. These peaking wavelengths are in close accord with those of single cone absorption spectra measured by Marks and MacNichol in the goldfish by a microspectrophotometer. It is strongly suggested that Young's trichromatic theory applies at the photoreceptor level in the vertebrate. Author (TAB)

N67-19230# Library of Congress, Washington, D. C. Aerospace Technology Div.
HEMODYNAMIC INDICES DURING THE ACTION OF SUPER-HIGH FREQUENCY ELECTROMAGNETIC FIELDS Surveys of Foreign Scientific and Technical Literature
A. M. Monayenkova and M. N. Sadchikova 5 Oct. 1966 8 p refs Transl. into ENGLISH from Gigena Truda i Prof. Zabolevaniya (Moscow), no. 7, 1966 p 18–21
(ATD-T-66-123; TT-67-60346; AD-644533) CFSTI: HC $3.00/MF $0.65

Analysis of the data yielded by clinical and physiological studies of the cardiovascular system did not permit establishment of a firm correlation between hemodynamic disorders and pathological deviations due to SHF exposure. However, subchanges in hemodynamic indices were found to occur much more frequently. Author (TAB)

N67-19231# Naval Radiological Defense Lab., San Francisco, Calif.
APPARENT ABSENCE OF RECOVERY IN ENDOGENOUS COLONY-FORMING CELLS AFTER IRRADIATION UNDER HYPOXIC CONDITIONS
Theodore L. Phillips and Gerald H. Hanks 24 Oct. 1966 35 p refs
(USNRDL-TR-1086; AD-644117) CFSTI: HC $3.00/MF $0.65

Groups of LAF sub 1 adult mice were subjected to both graded and divided doses of radiation under hypoxic conditions and in air. The endogenous spleen colony-forming unit technique was used to measure the effect of the irradiation on survival of the colony-forming cells. Dose-response curves indicated a D sub 0 of 122 rads in air and 273 rads under hypoxic conditions, an oxygen enhancement ratio of 2.2. Using 2 doses each of 315 rads in air and of 630 rads under hypoxia, survival ratios were obtained for times between 3 and 36 hours. Animals irradiated in air show peaks in the survival ratio at 9 and at 27 hours. The initial peak is probably the result of early repair within the cell and the second peak that of onset of regeneration. The survival ratio of the animals irradiated under hypoxic conditions was not increased but rather fell slightly at times following the initial point. The results suggest that the degree of early cellular repair is markedly decreased and the onset of proliferation is delayed when radiation injury occurs under conditions of hypoxia. Author (TAB)

N67-19258# Institute for Perception RVO–TNO, Soesterberg (Netherlands).
MONOCULAR AND BINOCULAR AFTEREFFECTS OF CHROMATIC ADAPTATION
R. L. de Valois and J. Walraven 1966 12 p refs Sponsored in part by NSF
(IZF-1966-9; TDCK-46510) CFSTI: HC $3.00/MF $0.65

Supersatured greens seen after long-wavelength adaptation depends upon contrast from the continuing after discharge of bleached "red" receptors in the surrounding area, rather than upon inactivation from bleaching of "red" receptors in the test spot area. When test spot and bleach field coincide spatially, supersatured greens are not seen. When the test field is presented in the other eye at a corresponding place, the green looks unsaturated. Here, however, no influence of the size of the bleaching field is found. This means that the color contrast effect does not occur binocularly. Color contrast must therefore be a retinal phenomenon. Author

IAA ENTRIES

A67-19106
SOME DYNAMIC CHARACTERISTICS OF THE SPACE FLIGHT PERFORMANCE OF THE OPERATOR ON BOARD THE VOSKHOD-2.
P. I. Beliaev, A. A. Leonov, V. A. Popov, L. S. Khachatur'iants, and V. K. Filosofov.
(Kosmicheskie Issledovaniia, vol. 4, Jan.-Feb. 1966, p. 137-143.)
Cosmic Research, vol. 4, Jan.-Feb. 1966, p. 123-128. 12 refs.
Translation.

A67-19107
ENDOGENOUS CARBON MONOXIDE FORMATION AND ITS IMPORTANCE IN A CLOSED ECOLOGICAL SYSTEM.
L. A. Tiunov and V. V. Kustov.
(Kosmicheskie Issledovaniia, vol. 4, Jan.-Feb. 1966, p. 144-150.)
Cosmic Research, vol. 4, Jan.-Feb. 1966, p. 129-134. 67 refs.
Translation.

A67-19108
RESULTS OF MEDICAL EXAMINATION OF THE CREW OF THE COSMIC SHIP VOSKHOD BEFORE AND AFTER ITS FLIGHT.
P. V. Buianov, V. V. Kovalev, V. G. Terent'ev, E. A. Fedorov, and G. F. Khlebnikov.
(Kosmicheskie Issledovaniia, vol. 4, Jan.-Feb. 1966, p. 151-155.)
Cosmic Research, vol. 4, Jan.-Feb. 1966, p. 135-138. Translation.

A67-19109
EFFECT OF THE FACTORS OF COSMIC FLIGHT OF THE SATELLITE SHIP VOSKHOD ON THE MICROSPORE TRADESCANTIA PALUDOSA.
N. L. Delone, B. B. Egorov, and V. V. Antipov.
(Kosmicheskie Issledovaniia, vol. 4, Jan.-Feb. 1966, p. 156-161.)
Cosmic Research, vol. 4, Jan.-Feb. 1966, p. 139-143. Translation.

A67-19114
SIMULATION OF THE BIOLOGICAL EFFECT OF A DEPTH DOSE OF MONOENERGETIC PROTON FLUX.
V. S. Morozov, V. S. Shashkov, and B. I. Davydov.
(Kosmicheskie Issledovaniia, vol. 4, Jan.-Feb. 1966, p. 172-174.)
Cosmic Research, vol. 4, Jan.-Feb. 1966, p. 156-158. 6 refs.
Translation.

A67-19346 #
THEORETICAL AND EXPERIMENTAL INVESTIGATION OF THE PARTICIPATION OF MUSCLES IN THE STATIC AND DYNAMIC ACTIVITY OF THE UPPER LIMBS [TEORETYCZNE I DOŚWIADCZALNE BADANIA WSPÓŁUDZIAŁÓW UKŁADU MIĘŚNI KOŃCZYNY GÓRNEJ W WARUNKACH STATYCZNYCH I DYNAMICZNYCH].
Adam Morecki, Juliusz Ekiel, Kazimierz Fidelus, and Kazimierz Nazarczuk.
Archiwum Budowy Maszyn, vol. 13, no. 3, 1966, p. 329-355.
6 refs. In Polish.

Investigation of the muscle system participating in the bending and straightening out of the elbow joint. The static and dynamic performance of the arm is examined as a function of position, speed of motion, and loading conditions. It is shown how, by recording the mechanical parameters and total electromyography of the system of participating muscles with the aid of special equipment and a specially devised test stand, it proved possible to process by graphical-analytical methods the relations occurring in the functioning of the arm.
V. P.

A67-19468 *
EFFECTS OF ROENTGEN RADIATION ON GLYCOGEN METABOLISM OF THE RAT BRAIN.
Jaime Miguel, Paul R. Lundgren, and Jane O. Jenkins (NASA, Ames Research Center, Moffett Field, Calif.).
Acta Radiologica - Therapy, Physics, Biology, vol. 5, 1966, p. 123-132. 20 refs.

Investigation of the effects of roentgen radiation on dose and time relationships of glycogen accumulation in the rat brain. Glycogen increase was already noticed at the completion of exposure to 3000 R. The glycogen level was maximal at the 12-to-30-hr interval, and then it returned to near normal values. Moreover, the glycogen was observed to increase linearly in relation to the radiation dose from 0 to approximately 6500 R. Further increases in dose resulted only in a slight rise in the glycogen level above the value obtained at 6500 R. Roentgen irradiation of the rat head with 3000 R in environments of 99.5% O_2 at 1 and 4 atm did not reveal any oxygen effect when cerebral glycogen accumulation was used as a parameter.
M.M.

A67-19477
THEORY OF AN INERT GAS METHOD FOR REGIONAL PULMONARY BLOOD FLOW IN BRONCHOSPIROMETRY.
A. W. T. Edwards (New South Wales, University, School of Physiology, Sydney, Australia).
Respiration Physiology, vol. 2, Dec. 1966, p. 22-35. 11 refs.

This paper describes the theory of a method in which regional pulmonary blood flow is labelled continuously in one lung compartment by a physiologically inert gas and is measured from the dilution of the gas in systemic arterial blood. This method is virtually independent of pulmonary O_2 and CO_2 concentrations. Potential complicating factors are the effect of venous admixture, and the tendency for the gas to accumulate in the other compartment. Venous admixture has no effect in steady states and exerts a mild damping effect in unsteady states. Accumulation in the opposite compartment is determined by the solubility of the gas and $\dot{V}A/\dot{Q}c$ in that compartment. With inert gases of low solubility, and normal $\dot{V}A/\dot{Q}c$, accumulation is negligible and labelling in confined to one compartment. In such circumstances the ratio Pa/(regional PA) for the labelling gas ("a/A dilution") is a direct index of $\dot{Q}c$ (regional)/$\dot{Q}c$ (total). More soluble inert gases cannot be tolerated in either compartment as they interfere directly or indirectly with the stability of PA (labelling gas).
(Author)

A67-19478
PERCEPTION OF ADDED AIRFLOW RESISTANCE IN HUMANS.
R. L. Wiley and F. W. Zechman, Jr. (Kentucky, University, College of Medicine, Dept. of Physiology and Biophysics, Lexington, Ky.).
Respiration Physiology, vol. 2, Dec. 1966, p. 73-87. 11 refs.
Contract No. AF 33(615)-3311; Grant No. HE 08932-02.

Detection of added airflow resistance was measured in various conditions with human subjects and thresholds for perception of resistances compared. Thresholds for perception were markedly different in some conditions of the experiments when expressed in terms of the absolute amount of resistance added. However, when thresholds were expressed in terms of the ratio of added resistance to initial resting resistance, perception thresholds were shown to be constant for the various conditions of measurement. The constant relationship of added resistance to initial resistance at threshold perception for the various conditions of this study suggested the applicability of Weber's Law to perception of added airflow resistance. This would mean thresholds for perception of added airflow resistance show a similar relationship to thresholds for perception of other sensory modalities.
(Author)

A67-19479
REGULATION OF VENTILATION DURING REBREATHING AT IMPOSED RESPIRATORY FREQUENCIES.
D. J. C. Read, H. Simon, G. Brandi, and E. J. M. Campbell (Hammersmith Hospital, London, England).
Respiration Physiology, vol. 2, Dec. 1966, p. 88-98. 12 refs.

The ventilatory response to a standardized CO_2-stimulus was studied at spontaneous and consciously regulated respiratory frequencies. The CO_2-stimulus was developed progressively by rebreathing from a small bag. By initiating rebreathing at the P_{CO_2} of the mixed venous blood the CO_2-stimulus was made independent of the tidal volume, respiratory frequency and alveolar ventilation. Despite adjustments in the tidal volume response, the total ventilation, calculated "alveolar" ventilation and minute work of the inspiratory muscles were increased at a higher frequency and were reduced at a lower frequency. The respiratory control systems which have been proposed for regulation of "alveolar' ventilation or work fail to explain the findings. The tidal volume adjustment cannot be attributed to secondary disturbances of either mean arterial P_{CO_2} or of arterial P_{CO_2} oscillations. (Author)

A67-19480
FORCES DEFORMING THE RIB CAGE.
E. Agostoni, P. Mognoni, G. Torri, and G. Miserocchi (Milano, Università, Istituto di Fisiologia Umana, Milan, Italy).
Respiration Physiology, vol. 2, Dec. 1966, p. 105-117. 7 refs.
Research supported by the Italian National Research Council; Contract No. AF 61(052)-867.

The relaxed rib cage has been squeezed along the lateral diameter at different lung volumes with closed airways. The force applied, the decrease of the lateral diameter, the increase of the dorsoventral one, the esophageal and gastric pressures have been measured. During a 10 kg squeeze the increase of the esophageal pressure is negligible notwithstanding the decrease of the rib cage cross section and the lack of muscle contraction. The diaphragm is lowered, probably through the lowering of the ribs. A marked decrease of the rib cage size without a parallel change of the esophageal pressure occurs also when shifting from sitting to standing at functional residual capacity. The work done by the equipment to reduce the lateral diameter as much as during expiratory efforts is about 1/3 of the compressive work done by the muscles during maximum static efforts performed at functional residual capacity and at 60% of the vital capacity. During the breathing cycle the deformation work may become appreciable when the flow-resistances are high. (Author)

A67-19532
THE BIOLOGICAL INFLUENCE OF SUPERSONIC FLIGHT - RADIATIONS [INFLUENCE BIOLOGIQUE DU VOL SUPERSONIQUE - LES RADIATIONS].
Maurice Cartier.
Technique et Science Aéronautiques et Spatiales, July-Aug. 1966, p. 461-466. In French.

Consideration of the behavior of the human organism at 25,000-m altitude with reference to the effect of radiation, observing that radiation storms may require alteration of flight plans. The mechanisms of cosmic and solar storms are briefly described. Protective measures consist of early detection of events by a satellite network and, in the case of major solar flares, abrupt descent to a lower altitude. Attention is given to the possibility of protection by means of pills. F.R.L.

A67-19618 *
CURRENT RESULTS OF THE ELECTRONIC PART STERILIZATION PROGRAM.
John Visser (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.).
Industrial Quality Control, vol. 23, Feb. 1967, p. 382-390.

Description of the concentrated component part sterilization test program instituted in May 1963 for the sterilization of parts. The program makes use of ethylene tetraoxide gas (ETO) for surface decontamination. The sterilization effects on electronic parts such as capacitors, resistors, trimpots, varactor diodes, digital monolithic microcircuits, transistors, transformers, inductors, and diodes are discussed. M.F.

A67-19726 *
SIGNAL DETECTION THEORY AND PSYCHOPHYSICS.
D. M. Green (California, University, La Jolla, Calif.) and J. A. Swets (Bolt, Beranek, and Newman, Inc., Information Sciences Div., Cambridge, Mass.).
Research supported by NASA.
New York, John Wiley and Sons, Inc., 1966. 455 p. $12.95.

The general theory of signal detectability and the application of the theory in psychophysical experiments is described in this book. The role of the decision process in detection is considered; the elements of statistical decision theory that are basic to detection theory are given, and it is shown how the procedures that they suggest yield independent measures of the observer's decision criterion and sensitivity. The direct contribution of the theory to an understanding of sensory processes in detection is emphasized. Concepts of ideal observers are introduced; the most sensitive performance attainable is defined as a function of the SNR for a variety of different signals. The integration of sensory information over time and space and detection tasks that have more realism than those normally used in the laboratory are discussed. Detection research on the problem of frequency analysis and the application of detection theory to speech communication are reviewed. Exploratory applications of the theory in such fields as animal psychophysics, sensory physiology, reaction time, attention, and recognition memory are covered. B.B.

A67-19846 *
FLUORESCENCE INDUCTION STUDIES IN ISOLATED CHLOROPLASTS. I.
S. Malkin and B. Kok (Martin Marietta Corp., Martin Co., Research Institute for Advanced Studies, Baltimore, Md.).
Biochimica et Biophysica Acta, vol. 126, 1966, p. 413-432. 34 refs.
National Institutes of Health Grant No. PH 43-63-36; Contract No. NASw-747.

Quantitative analysis of the fluorescence induction in isolated chloroplasts. The rise of the fluorescence yield with time is ascribed to the photoreduction of a primary oxidant "Q" of photosystem II. The analysis yields a method of determining the amount of light actually utilized in the process. S.Z.

A67-19847 *
LONG-WAVE ABSORPTION AND EMISSION BANDS IN CHLOROPLAST FRAGMENTS.
Bessel Kok and Hans J. Rurainski (Martin Marietta Corp., Martin Co., Research Institute for Advanced Studies, Baltimore, Md.).
Biochimica et Biophysica Acta, vol. 126, 1966, p. 584-587. 14 refs.
National Institutes of Health Grant No. PH 43-63-36; Contract No. NASw-747.

Confirmation and expansion of work already done in separating digitonin-treated chloroplasts by differential centrifugation into fractions showing distinct pigment and photochemical differences. Primary emphasis is on the long-wave absorption and fluorescence emission bands of these fragments. S.Z.

A67-19856 #
IN-VIVO INACTIVATION OF FACTOR VIII (ANTIHEMOPHILIC GLOBULIN) BY HYDRAZINE - ITS RELATION TO THE FIBRINOLYTIC MECHANISM.
Jarrell D. Bairrington (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Physiological Chemistry Section, Brooks AFB, Tex.).
Aerospace Medicine, vol. 38, Jan. 1967, p. 5-9. 18 refs.

The in-vivo effects of a 0.6 LD/50 dose of hydrazine on the prothrombin-activating mechanism and the fibrinolytic mechanism were studied in ether-anesthetized rats. The studies were evaluated by means of the prothrombin time, thromboplastin generation test, Factor VIII and IX assays, Factor XIII (clot urea solubility) and quantitative measurements of free and total profibrinolysin, and the Euglobulin inhibitor. Factor VIII (antihemophilic globulin) activity was found to be decreased to the level of hemophilia. Euglobulin inhibitor was also decreased. Decrease of Factor VIII activity was correlated with fibrinolytic activation which was due to decrease of the euglobulin inhibitor. The possible usefulness of these findings

for a diagnostic test for hydrazine intoxication in those working with these propellants and the mechanism of the decrease of Factor VIII and euglobulin inhibitor are discussed. (Author)

A67-19857
METABOLIC EFFECTS OF PROLONGED BED REST - THEIR MODIFICATION BY SIMULATED ALTITUDE.
Theodore N. Lynch (Louisville University, School of Medicine, Louisville, Ky.), Robert L. Jensen, Paul M. Stevens, Robert L. Johnson, and Lawrence E. Lamb (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Internal Medicine Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 38, Jan. 1967, p. 10-20. 32 refs.

Metabolic studies were performed on 44 healthy men before and during bed rest at ground level or at simulated altitudes of 10,000 or 12,000 feet. Simple bed rest brought loss of calcium, phosphorous, nitrogen, sodium, and chloride with little change in potassium. The addition of 12,000 feet simulated altitude significantly reduced the loss of urinary calcium phosphorous, nitrogen, sodium and chloride and total nitrogen. The 10,000 foot simulated altitude was associated with urinary calcium losses quantitatively intermediate between the ground level and 12,000 foot groups and increased total sodium and potassium losses. The possibility that reduced bone resorption represents one aspect of acclimatization to simulated altitude is discussed. (Author)

A67-19858 *
PLASMA VOLUME AND EXTRACELLULAR FLUID VOLUME CHANGE ASSOCIATED WITH 10 DAYS BED RECUMBENCY.
Fred B. Vogt and Philip C. Johnson (Texas Institute for Rehabilitation and Research, Texas Medical Center; Baylor University, College of Medicine, Dept. of Medicine; Methodist Hospital, Houston, Tex.).
Aerospace Medicine, vol. 38, Jan. 1967, p. 21-25. 22 refs.
National Institutes of Health Grant No. FR-00254; Contract No. NAS 9-1461.

Eleven healthy adult males were studied before, during, and after three periods of 10 days recumbency. Intermittently inflated cuffs were applied to the lower extremities or periodic exercises were performed by the subjects during two of the three periods of recumbency. A significant decrease in plasma volume occurred in the first several days of recumbency. Extracellular fluid volume decrease was progressive over the recumbency period. The use of intermittent cuff inflation on the lower extremities or periodic exercises did not influence the plasma volume and extracellular fluid volume change seen in association with 10 days bed recumbency. (Author)

A67-19859
CARDIOVASCULAR FINDINGS IN AIR TRAFFIC CONTROLLERS.
John D. Dougherty (Harvard University, Harvard School of Public Health, Daniel and Florence Guggenheim Center for Aerospace Health and Safety, Boston, Mass.).
Aerospace Medicine, vol. 38, Jan. 1967, p. 26-30. 12 refs.

A special study was made of journeyman radar controllers age-matched with noncontrollers. The prevalence rates for hypertension showed a reversal with the journeyman controller manifesting higher rates than non-ATCS and higher rates than his fellow-ATCS. This trend was not significant. The journeyman radar controllers ECGs showed a prevalence of abnormality two times that of the age-matched non-ATCS. While the journeymen had significantly more ECG abnormality than the non-ATCS, no preemployment ECGs are available to clearly define the relationship of the abnormality to air traffic control work. Hypotheses to explain the differences and methods to test the differences are noted. (Author)

A67-19860
ENZYME-ISOENZYME MEASURE OF RADIATION EXPOSURE.
E. J. Hawrylewicz and W. H. Blair (Illinois Institute of Technology, Research Institute, Life Sciences Research Div., Chicago, Ill.).
Aerospace Medicine, vol. 38, Jan. 1967, p. 30-34. 7 refs.
Contract No. AF 41(609)-2021.

Forty rhesus monkeys were divided into groups of 10 and received the following continuous gamma radiation exposures: 0 rads/wk, 1 rad/wk, 10 rads/wk, and 100 rads/wk. The serum activity of the enzyme lactic dehydrogenase and its isoenzyme patterns were determined at the following time intervals: 0, 3 days, and 2, 4, 8, 16, 20, 24, and 30 weeks. Tissue samples were removed at various time intervals and LDH isoenzyme patterns determined. After 16 weeks of exposure at 100 rads/wk, a highly significant depression of serum LDH activity occurred. An LDH isoenzyme shift to the aerobic bands 1 and 2, and a concomitant decrease in the anaerobic bands 4 and 5 also occurred. The serum isoenzyme-band shifts reflect the marked alterations observed in the irradiated-tissue LDH isoenzyme patterns. (Author)

A67-19861
EFFECT OF $-7G_x$ ACCELERATION ON RENAL EXCRETION OF SOLUTES IN RABBITS.
Lee A. Bricker (Pittsburgh, University, School of Medicine, Pittsburgh, Pa.), Wayne A. Johnson, Chesley R. Davies, and Robert A. Dottore (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Aerospace Medical Sciences Div., Biodynamics Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 38, Jan. 1967, p. 35-38. 18 refs.

The effects of one hour of uninterrupted $-7G_x$ acceleration on rate of urine flow and urinary excretion of sodium, potassium, and total solute were studied in rabbits. Urine flow rate during exposure to acceleration fell to an average of 56% of control values; urinary excretion of sodium fell concurrently to 45% of control, and potassium to 67%. There was no significant change in total solute excretion. The declines observed were abrupt, as were the returns to control levels after acceleration. The data suggest that hemodynamic rather than hormonal influences were primarily responsible for these changes. Gross or microscopic hematuria observed in the sediments of most acceleration urine specimens disappeared or abated during the recovery phase. Occasional red cell casts indicated that the hematuria was due, at least in part, to an intrarenal lesion. (Author)

A67-19862
ROLE OF AN INCREASED HEMATOCRIT IN ALTITUDE ACCLIMATIZATION.
Elvin E. Smith and Jack W. Crowell (Mississippi, University, Medical Center, Dept. of Physiology and Biophysics, Jackson, Miss.).
Aerospace Medicine, vol. 38, Jan. 1967, p. 39-43. 24 refs.
Research supported by the Mississippi Heart Association; National Institutes of Health Grant No. HE-09160; Contract No. DA-49-193-MD-2219.

Acclimatization to high altitude was accomplished in twelve dogs by daily exposures of twelve hours duration to a simulated altitude of 25,000 ft. These animals were then exposed to an acutely induced altitude of 50,000 ft. for a six-hour period. Only those animals with hematocrit ratios of from 45 to 47 survived the entire six-hour period. Animals with hematocrit ratios on either side of this range failed to survive the test period. In a previous study of this nature, utilizing normal, unacclimatized dogs, the optimal hematocrit ratio was found to be 40. Thus, this study shows that the optimal hematocrit ratio shifts from 40 to 46 with altitude acclimatization. Since the optimal hematocrit ratio is a function of both the oxygen-carrying capacity of the blood and the blood flow, a change in one of these parameters must have occurred, as evidenced by the shift in the optimal hematocrit ratio with altitude acclimatization. A mathematical analysis is presented to show that changes in the flow-hematocrit ratio relationship rather than changes in the oxygen-carrying capacity of the blood are responsible for the shift in the optimal hematocrit ratio. (Author)

A67-19863 *
TILT TABLE RESPONSE AND BLOOD VOLUME CHANGES ASSOCIATED WITH FOURTEEN DAYS OF RECUMBENCY.
Fred B. Vogt (Texas Woman's University, Denton; Baylor University, College of Medicine, Dept. of Rehabilitation; Texas Institute for Rehabilitation and Research, Houston, Tex.), Pauline Berry Mack (Texas Woman's University, Nelda Childers Stark Laboratory for Human Nutrition Research, Denton, Tex.), Philip C. Johnson, and Leo Wade, Jr. (Baylor University, College of Medicine, Dept. of Medicine; Methodist Hospital, Houston, Tex.).
Aerospace Medicine, vol. 38, Jan. 1967, p. 43-48. 5 refs.
National Institutes of Health Grant No. FR-00254; Grant No. NsG-440; Contract No. NAS 9-1461.

Four healthy adult males were studied during a 14-day bed-rest experiment. Repeated tilt-table tests, using an English saddle-type support, were conducted before and after the period of recumbency. Particular attention was directed during the post-recumbency period to the determination of the pattern of the subjects tilt-table response in recovering from the deconditioning. Each subject was tilted five times in the 3-day recovery period following recumbency. Radioisotope blood volume determinations were made prior to the study, during the study, and during the recovery phase. The results indicate that definite cardiovascular deconditioning occurred after 14 days of bed-rest, and that significant recovery is attained with 3 days of ambulation. The study demonstrated that blood volume decreases in the first several days of bed-rest, without a further statistically significant change during the remainder of the 14-day period of bed-rest. Also discussed are the discrepancies in determining plasma volume by counting plasma directly, and by determining plasma volume from calculations using total blood volume (obtained by counting whole blood) and its associated hematocrit reading. (Author)

A67-19864
SUGGESTIONS FOR A COMPARATIVE NEUROSCIENCES RESEARCH PROGRAM.
Herbert H. Reynolds and Clyde H. Kratochvil (USAF, Systems Command, Aerospace Medical Div., Aeromedical Research Laboratory, Holloman AFB, N. Mex.).
Aerospace Medicine, vol. 38, Jan. 1967, p. 49, 50. 10 refs.

Review of a theoretical approach and suggestions for a comprehensive comparative research program in neurosciences. Phyletic, ontogenetic, and subject-matter investigative dimensions are briefly discussed. The implications of neurosciences research for military bioastronautics are mentioned. S.Z.

A67-19865
RATIONAL APPROACH TO COLOR VISION TESTING.
R. Graeme Cameron (Swissair, Kloten, Switzerland).
Aerospace Medicine, vol. 38, Jan. 1967, p. 51-59.

The validity of certain suggested methods for elucidating color-vision testing criteria is illustrated by a careful analysis of detailed results from pseudo-isochromatic plate, anomaloscope and signal-lantern testing of the 266 defectives discovered in serial examinations of 5141 pilot candidates. A brief review of the relevant literature is undertaken, and a comparison is made with the percentages of the six diagnostic groups of these 266 defectives. The author's figure of 5.17% defectives appears to indicate that about 2 1/2% of defectives (particularly the dichromats) were self-eliminated, and his rejection rate of 3.9% of all candidates is regarded as an average figure. Finally a plea is made for uniformity of definition, of methodology and particularly of terminology. (Author)

A67-19866 *
CIRCULATORY RESPONSE TO UPRIGHT TILT IN PATIENTS WITH HEART DISEASE.
Walter H. Abelmann and Khaja Fareeduddin (Boston City Hospital, Thorndike Memorial Laboratory, and Second and Fourth Medical Services; Harvard University, Harvard Medical School, Dept. of Medicine, Boston, Mass.).
Aerospace Medicine, vol. 38, Jan. 1967, p. 60-65. 25 refs.
U.S. Public Health Service Grant No. FR-76; National Institutes of Health Grants No. HE-00442; No. HE-5244; Grant No. NsG-595.

The cardiovascular responses of 37 patients with heart disease to prolonged passive upright tilt were studied on 46 occasions and compared to the responses of 10 normal subjects. Patients with heart disease tolerated the tilt remarkably well. Twenty-four patients with heart disease showed an abnormal response to upright tilt, consisting of a smaller than normal increase in heart rate and diastolic blood pressure and of less narrowing of the pulse pressure. This response was termed "heart failure response" and was most consistently seen in patients with primary myocardial disease but occurred in hypertensive heart disease, and in all types of valvular disease studied. It did not correlate with cardiac rhythm, degree of clinical heart failure or digitalis status. It is postulated that increased blood volume, increased vasomotor tone, and adaptation to low cardiac output may play a role in the pathogenesis of increased orthostatic tolerance seen in patients with heart disease. (Author)

A67-19867
BIOLOGICAL SATELLITE RESEARCH.
N. Gurovsky.
Aerospace Medicine, vol. 38, Jan. 1967, p. 72, 73.

Note on the orbiting of the Cosmos-110 satellite, by means of which Soviet scientists started medicobiological studies of regions of intense radiation in the earth's inner radiation belt. The questions of what is the purpose of biological satellites and what is their role in preparing new manned flights into space are answered. S.Z.

A67-19888 #
PILOT-AIRCRAFT COMPATIBILITY IN THE LANDING APPROACH.
James P. Loomis (Battelle Memorial Institute, Columbus, Ohio).
Battelle Technical Review, vol. 16, Feb. 1967, p. 9-13. 10 refs.

Discussion of the matching of aircraft to pilots, considering the abilities and limitations of the pilots with regard to landing approach performance. It is concluded that there appears to be a future need for cockpit instrumentation and related equipment for providing predictive information instead of the quasi-static information provided by current instrument displays. B.B.

A67-20000 #
PROBLEMS IN INTER-SPECIES COMMUNICATION.
John C. Lilly (Communication Research Institute, Miami, Fla.).
American Astronautical Society, Annual Meeting, 12th, Anaheim, Calif., May 23-25, 1966, Paper 66-77. 9 p.
U.S. Public Health Service Grant No. NB-03097; National Institute of Mental Health Grant No. K6-MH-18,700; Grant No. AF AFOSR 65-65.

Plea for the design and construction of a theory of the human communicator, faced with a nonhuman communicator, such as a dolphin, with a brain and mind presumed to be of a high quality. A description is given of a program to devise models of the human part of the interspecies system which will illustrate the basic assumptions needed to promote interest and research in this area. S.Z.

A67-20061 #
IN-FLIGHT MEASUREMENT OF HUMAN RESPONSE CHARACTERISTICS.
Fred D. Newell (Cornell Aeronautical Laboratory, Inc., Flight Research Dept., Buffalo, N.Y.) and Paul E. Pietrzak (USAF, Systems Command, Research and Technology Div., Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio).
American Institute of Aeronautics and Astronautics, Flight Test, Simulation and Support Conference, Cocoa Beach, Fla., Feb. 6-8, 1967, Paper 67-240. 14 p. 19 refs.
Members, $0.75; nonmembers, $1.50.

This paper deals with flight programs in which data have been obtained and analyzed to define the transfer characteristics of the human pilot. The first part of the paper is a general review of previous programs and data that are documented in the literature. Some of the techniques of these past programs are described. However, more in-flight data are needed, than has been obtained in the past, to more fully define the pilot in the actual flight situation. To initiate obtaining more flight data a program has recently been

done in which the Air Force variable stability T-33 was used as both a ground-based simulator and an in-flight simulator. The second part of the paper discusses this current program in which pilot transfer characteristics have been obtained for the compensatory roll tracking task. Data are presented which describe the pilot in both the ground simulator and actual flight situations. (Author)

A67-20063 #
MAN-MACHINE SIMULATIONS FOR THE APOLLO NAVIGATION, GUIDANCE, AND CONTROL SYSTEM.
J. L. Nevins, E. A. Woodin, and R. W. Metzinger (Massachusetts Institute of Technology, Dept. of Aeronautics and Astronautics, Instrumentation Laboratory, Cambridge, Mass.).
American Institute of Aeronautics and Astronautics, Flight Test, Simulation and Support Conference, Cocoa Beach, Fla., Feb. 6-8, 1967, Paper 67-242. 18 p. 16 refs.
Members, $0.75; nonmembers, $1.50.

Description of the man-machine problem and the simulation required in the Apollo program. A general description of the Apollo guidance and navigation system is given. A definition of the man-machine interfaces and philosophy of design are discussed. The man-machine simulations and highlights of their design are surveyed.
S.Z.

A67-20170 *
DIFFERENTIAL GAMES AND MANUAL CONTROL.
Sheldon Baron (NASA, Electronics Research Center, Cambridge, Mass.).
IEEE Transactions on Human Factors in Electronics, vol. HFE-7, Dec. 1966, p. 133-137. 5 refs.

Variational methods are used to solve a particular pursuit-evasion differential game. The problem involves the determination of optimal strategies for both the pursuer and evader. The performance measure is the miss distance at some fixed terminal time. Both pursuer and evader have limited control energy. The performance of a trained research pilot, for both single- and two-axis control tasks is compared with that of the optimal pursuer. State vector display and "quickened" display are discussed. The results suggest that differential game problems could be quite useful in the study of manual control.
(Author)

A67-20171 *
A "CRITICAL" TRACKING TASK FOR MANUAL CONTROL RESEARCH.
H. R. Jex, J. D. McDonnell, and A. V. Phatak (Systems Technology, Inc., Hawthorne, Calif.).
IEEE Transactions on Human Factors in Electronics, vol. HFE-7, Dec. 1966, p. 138-145. 21 refs.
Contracts No. NAS 2-2288; No. AF 33(615)-2826.

A "critical" tracking task is developed in which a human operator is required to stabilize an increasingly unstable first-order controlled element up to the critical point of loss of control. Servo theory and operator describing function measurements are used to validate the basic assumptions, and an automatically paced critical task mechanization is described. The results show that the task does constrain the operator's behavior as intended, and that the critical instability depends primarily on the operator's effective time delay while tracking. A number of applications for the critical task are reviewed, including secondary workload research, control and measurement of operator and controlled element gain, and display research.
(Author)

A67-20172 *
A QUEUEING MODEL OF MANY-INSTRUMENT VISUAL SAMPLING.
Jaime R. Carbonell (Bolt, Beranek, and Newman, Inc., Information Sciences Div., Cambridge, Mass.).
(Institute of Electrical and Electronics Engineers, Symposium on Human Factors in Electronics, 7th, Minneapolis, Minn., May 5, 6, 1966, Paper.)
IEEE Transactions on Human Factors in Electronics, vol. HFE-7, Dec. 1966, p. 157-164. 14 refs.
Contract No. NAS 1-5059.

We discuss the task of a pilot (namely of a high-performance jet plane) sampling the information given to him by the instruments on his panel. We present a model that attempts to explain and match the behavior of pilots under actual flight conditions. This model is based on the concept of the different instruments competing for the attention of the pilot. Some may be unimportant under a given flight condition, but many should be looked at, the urgency of doing so being measured by the risk incurred if the corresponding value is beyond a certain threshold. Costs are assigned to each instrument; at each sampling instant the decision as to what instrument to look at is based on comparing for the different instruments the combined effect of both the probability of exceeding the threshold and a cost of exceeding that threshold. Effectively, the instruments queue for the pilot's attention; the instrument with the highest priority at each instant is then served (looked at).
(Author)

A67-20173
AN INCLUSIVE CLASSIFIED BIBLIOGRAPHY PERTAINING TO MODELING THE HUMAN OPERATOR AS AN ELEMENT IN AN AUTOMATIC CONTROL SYSTEM.
R. G. Costello (Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.) and T. J. Higgins (Wisconsin, University, Dept. of Electrical Engineering, Madison, Wis.).
(Institute of Electrical and Electronics Engineers, Symposium on Human Factors in Electronics, 7th, Minneapolis, Minn., May 5, 6, 1966, Paper.)
IEEE Transactions on Human Factors in Electronics, vol. HFE-7, Dec. 1966, p. 174-181.

Bibliography of some 200 entries, selected from a total collection of almost 500 references pertaining to the human operator. These references are concerned specifically with modeling the human operator as an element in an automatic control system.
M.F.

A67-20229 #
HUMAN ERROR? FACTORS AND FALLIBILITY.
H. R. Willis (Lockheed Aircraft Corp., Lockheed-Georgia Co., Marietta, Ga.).
Lockheed Georgia Quarterly, vol. 4, Feb. 1967, p. 3-6.

Discussion of some of the causes of human error. The extent of human error is considered, and the effects of mental and physical fatigue, microsleep, and flicker fusion frequency are investigated.
B.B.

A67-20271 *
SPACE SUITS.
Matthew I. Radnofsky (NASA, Office of Manned Missions, Washington, D.C.).
International Science and Technology, Feb. 1967, p. 32-39.

Discussion of the design of space suits so as to facilitate mobility as well as to provide protection against a hostile environment. With astronauts expected to be out exploring the moon, suits must be built with joints that move easily enough to permit climbing around on rugged terrain. This requires keeping the suit volume constant at all times, thereby ensuring that minimum work is done on the enclosed gas. The traditional approach is via the so-called soft suit, which is constructed mainly of rubberized fabric. A variety of bellows and inflatable bladder arrangements have been devised to prevent it from ballooning at the joints. Problems still remain, and in an attempt to overcome them designers have turned to hard suits of metal and plastic and to various hybrid types.
M.F.

A67-20367 *
ANTEROVENTRAL COCHLEAR NUCLEUS - WAVE FORMS OF EXTRACELLULARLY RECORDED SPIKE POTENTIALS.
Russell R. Pfeiffer (Massachusetts Institute of Technology, Research Laboratory of Electronics, Cambridge; Massachusetts Eye and Ear Infirmary, Eaton-Peabody Laboratory, Boston, Mass.).
Science, vol. 154, Nov. 4, 1966, p. 667, 668. 15 refs.
National Institutes of Health Grants No. MH-04737-06; No. NB-01344; NSF Grant No. GK-835; Contract No. DA-36-039-AMC-03200(E); Grant No. NsG-496.

Analysis of wave forms of spike potentials from neurons in the anteroventral cochlear nucleus indicates that the spikes are composed of three components. Two appear to be postsynaptic events, and one appears to be presynaptic and to be related to the calyces of Held found in that part of the nucleus. (Author)

A67-20483 *

EFFERENT INHIBITION OF AUDITORY-NERVE RESPONSES - DEPENDENCE ON ACOUSTIC-STIMULUS PARAMETERS.

Michael L. Wiederhold and William T. Peake (Massachusetts Institute of Technology, Research Laboratory of Electronics and Dept. of Electrical Engineering, Cambridge; Massachusetts Eye and Ear Infirmary, Eaton-Peabody Laboratory, Boston, Mass.).

Acoustical Society of America, Journal, vol. 40, Dec. 1966, p. 1427-1430. 14 refs.

Research supported by the Joint Services Electronics Program, the Department of Health, Education, and Welfare, the National Institute of Neurological Diseases and Blindness, NSF, and NASA.

Experimental investigation of the electrical stimulation of the crossed olivocochlear bundle (OCB) in anesthesized cats which reduces auditory-nerve responses (N_1) if the acoustic stimuli are at low sound-pressure levels but does not produce detectable changes in neural responses for click stimuli more than 60 to 70 db above the visual-detection level for N_1. When the sound-pressure levels of high-frequency (10,000 Hz) and low-frequency (400 Hz) transient acoustic stimuli were matched according to a physiological criterion, the neural response to the high-frequency stimulus was reduced more by OCB stimulation than the response to the low-frequency stimulus. These results suggest certain characteristics for the mechanisms which influence the activity of single auditory-nerve fibers. M.M.

A67-20484

SPEECH INTELLIGIBILITY FOR SPACE VEHICLES, USING NITROGEN OR HELIUM AS THE INERT GAS.

Julian P. Cooke and Sarah E. Beard (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).

Acoustical Society of America, Journal, vol. 40, Dec. 1966, p. 1450-1453. 17 refs.

USAF-sponsored research.

A laboratory investigation was carried out to help evaluate verbal-communication intelligibility in a man-rated altitude simulator when either helium or nitrogen was added to the oxygen atmosphere. Some eight operators and 37 male subjects were tested with a total of 16,500 random word events at pressures of 5 psia, using 70:30 mixture of O_2:He or O_2:N_2 mixtures and also 100% oxygen at 3.5 psia. An increased lack of intelligibility has been known to occur as gas densities have been reduced. Differences in test scores following the substitution of helium in place of nitrogen at the pressures and mixtures employed resulted in no increased loss of intelligibility other than that associated with the reduced gas density, although some modification of speech can be detected by listeners. (Author)

A67-20601 *

GREEN'S THEOREM AND POTENTIALS IN A VOLUME CONDUCTOR.

David B. Geselowitz (Massachusetts Institute of Technology, Research Laboratory of Electronics, Center for Communication Sciences, Cambridge, Mass.).

IEEE Transactions on Bio-Medical Engineering, vol. BME-14, Jan. 1967, p. 54, 55.

National Institutes of Health Grant No. MH-04737-06; NSF Grant No. GK-835; Contract No. DA-36-039-AMC-0300(E); Grant No. NsG-496.

Note discussing a boundary value problem which is based on Green's theorem and which is of interest to electrocardiography. An equation is derived to relate the Gelernter-Swihart method of solving this problem to Green's theorem. The equation is believed to be basic in the Gelernter-Swihart method. V.Z.

A67-20602 *

EXPERIMENTAL MODELS FOR CURRENT CONDUCTION IN AN ANISOTROPIC MEDIUM.

Paul W. Nicholson (Middlesex Hospital Medical School, Dept. of Physics, London, England).

IEEE Transactions on Bio-Medical Engineering, vol. BME-14, Jan. 1967, p. 55, 56.

Grant No. NsG-502.

Note on electrical current conduction by biological tissues. A method is outlined for determining the current and the potential distribution in the field between two arbitrarily shaped electrodes in an electrically anisotropic medium with directionally nonuniform conductivity. This concept is devised for simulation of electrical processes in biological tissues. Although the method described is applicable when any number of nonconducting or perfectly conducting regions are present, it does require, in the case of partially conducting regions, that these be homogeneous and have similar conductivity characteristics. V.Z.

A67-20609

SOCIETY OF AUTOMOTIVE ENGINEERS, STAPP CAR CRASH CONFERENCE, 10TH, HOLLOMAN AFB, N. MEX., NOVEMBER 8, 9, 1966, PROCEEDINGS.

Conference sponsored by the University of California, the University of Minnesota, and the Wayne State University.

New York, Society of Automotive Engineers, Inc., 1967. 210 p. $8.00.

CONTENTS:

A67-20611 #

MEASUREMENT OF DETAILED INERTIAL PROPERTIES AND DIMENSIONS OF A 50TH PERCENTILE ANTHROPOMETRIC DUMMY.

K. N. Naab (Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.).

IN: SOCIETY OF AUTOMOTIVE ENGINEERS, STAPP CAR CRASH CONFERENCE, 10TH, HOLLOMAN AFB, N. MEX., NOVEMBER 8, 9, 1966, PROCEEDINGS. [A67-20609 08-05]

Conference sponsored by the University of California, the University of Minnesota, and the Wayne State University.

New York, Society of Automotive Engineers, Inc., 1967, p. 109-116.

U.S. Public Health Service Contracts No. PH-108-65-174; No. PH-108-66-98.

The dimensions and inertial properties of the segments of an Alderson, 50th-percentile anthropometric dummy were measured. The dummy, model F-50-AU, was disassembled into 10 main segments, and measurements made of weights, lengths, center-of-gravity positions, and moments-of-inertia for each segment. Lengths were measured directly with a scale, and weights were determined on a scale balance. A "balance test" was performed on each segment to determine its center-of-gravity position. Moment-of-inertia data were measured by means of a torsional pendulum

apparatus. A comparison is given of these data with measured data of a Swedish dummy, Type DV, and available human cadaver data. Segment properties of the Alderson dummy compare closely with those of the cadaver study. The torso-plus-head moment-of-inertia, however, appears to be approximately 31% smaller than measured data from a cadaver. Comparison of Alderson segment data with the Swedish measurements show the two dummies to be similar except in the torso region. Again, the Alderson torso is lighter and has less moment-of-inertia than the Swedish dummy. Accuracy of the measured moments-of-inertia of Alderson dummy segments on the torsional pendulum are from 1 to 2%. (Author)

A67-20612 #

IMPACT PROTECTION BY ISOVOLUMETRIC CONTAINMENT OF THE TORSO.

C. F. Lombard and S. H. Advani (Northrop Corp., Northrop Space Laboratories, Hawthorne, Calif.).

IN: SOCIETY OF AUTOMOTIVE ENGINEERS, STAPP CAR CRASH CONFERNECE, 10TH, HOLLOMAN AFB, N. MEX., NOVEMBER 8, 9, 1966, PROCEEDINGS. [A67-20609 08-05]
Conference sponsored by the University of California, the University of Minnesota, and the Wayne State University.
New York, Society of Automotive Engineers, Inc., 1967, p. 117-123. 13 refs.
Contract No. AF 29(600)-5184.

Study in which impact tests, using animals as subjects, at velocity changes comparable with those encountered in automobile accidents, reveal that isovolumetric containment of the torso greatly increases survival limits in most orientations. Analytical considerations also indicate the superior torso dynamic response of the isovolumetric system. This isovolumetric support-restraint system minimizes distortion and, in essence, allows the organs and bones to "float." Experimental verification has been obtained, using animals as test subjects, to indicate that survival limits may be considerably enhanced by this method of containment. M.F.

A67-20613 * #

EFFECT OF RAPID LOADING RATES ON THE STRESS-STRAIN PROPERTIES OF RESTRAINT WEBBING.

Joseph L. Haley, Jr. (Flight Safety Foundation, Inc., Aviation Safety Engineering and Research Div., New York, N.Y.).

IN: SOCIETY OF AUTOMOTIVE ENGINEERS, STAPP CAR CRASH CONFERENCE, 10TH, HOLLOMAN AFB, N. MEX., NOVEMBER 8, 9, 1966, PROCEEDINGS. [A67-20609 08-05]
Conference sponsored by the University of California, the University of Minnesota, and the Wayne State University.
New York, Society of Automotive Engineers, Inc., 1967, p. 132-136. 5 refs.
Contract No. NSR-33-026-003.

Stress-strain data for nylon and dacron webbing of 5500- and 6000-lb strengths are presented for quasi-static and very rapid loading rates up to about 450,000 lb/sec. The preliminary data indicate that the stress-strain slope is about twice as great with both materials for the rapid loading rates. The results also indicate that the failure load is the slightly higher (6 to 18%) for the rapid loading. The variation of the stress-strain slope with a changed loading rate will undoubtedly have an effect on the prediction of loads and accelerations for crash restraint systems in all types of vehicles. (Author)

A67-20614 #

RADIOGRAPHIC STUDIES OF CARDIAC DISPLACEMENT DURING ABRUPT DECELERATION.

Peter G. Hanson (USAF, Systems Command, Aerospace Medical Div., Aeromedical Research Laboratory, Holloman AFB, N. Mex.).

IN: SOCIETY OF AUTOMOTIVE ENGINEERS, STAPP CAR CRASH CONFERNECE, 10TH, HOLLOMAN AFB, N. MEX., NOVEMBER 8, 9, 1966, PROCEEDINGS. [A67-20609 08-05]
Conference sponsored by the University of California, the University of Minnesota, and the Wayne State University.
New York, Society of Automotive Engineers, Inc., 1967, p. 137-145. 20 refs.

Observation that abrupt deceleration associated with vehicle crash environments commonly produces rupture of the heart and great vessels of the thoracic cavity. A study of the mechanism of these lesions has yielded a series of high-speed radiographs obtained at selected time intervals during controlled deceleration. Lightly anesthetized Beagle dogs were rigidly restrained in form-fitted stafoam capsules and subjected to ± Gz impact on the Bopper and Daisy Decelerator. Flash radiographs were taken with a Flexitron Model 233 (300 kv) X-ray pulser initiated by microswitch on the decelerator track. Preliminary data indicate that the heart undergoes considerable inertial movement during deceleration. These observations suggest that the mechanism of vessel rupture may involve mechanical tearing from violent displacement of the heart and diaphragm. M.F.

A67-20615 #

REVIEW OF AIR FORCE RESEARCH ON BIODYNAMICS OF COLLISION INJURY.

John P. Stapp (U.S. Armed Forces Institute of Pathology, Washington D.C.).

IN: SOCIETY OF AUTOMOTIVE ENGINEERS, STAPP CAR CRASH CONFERENCE, 10TH, HOLLOMAN AFB, N. MEX., NOVEMBER 8, 9, 1966, PROCEEDINGS. [A67-20609 08-05]
Conference sponsored by the University of California, the University of Minnesota, and the Wayne State University.
New York, Society of Automotive Engineers, Inc., 1967, p. 204-210. 15 refs.

Summary of previously unpublished experiments and results for biological injury encountered in aircraft situations. Acceleration forces exceed primary acceleration of catapult due to oscillations excited between the man-seat system. Theory behind calculation of these effects is reported. Confirming test results on human and animals are given. (Author)

A67-20643

CHANGES IN EKG DURING ASCENT IN A DEPRESSURIZED CHAMBER [EKG-VERÄNDERUNGEN BEIM HÖHENAUFSTIEG IN DER UNTERDRUCKKAMMER].

Georg Fragoyannis (Luftfahrtmedizinisches Institut, Athens, Greece).

Astronautik, vol. 3, Nov.-Dec. 1966, p. 188-190. In German.
Research supported by the Griechische Königliche Forschungsstiftung.

Account of the results of EKG measurements in 95 pilots in a depressurized chamber with a 64-mm oxygen partial pressure, simulating the altitude of 6000 m. Dislocation of the electrical axis of the heart, caused by diaphragm lift, is found to be the principal depressurization effect. Other changes in EKG depended in general on a number of factors such as age, parasympathicotonia, etc. V.Z.

A67-20983 *

SPORULATION MUTATIONS INDUCED BY HEAT IN BACILLUS SUBTILIS.

J. Northrop and R. A. Slepecky (Syracuse University, Dept. of Bacteriology and Botany, Biological Research Laboratories, Syracuse, N.Y.).

Science, vol. 155, Feb. 17, 1967, p. 838, 839. 8 refs.
NSF Grant No. GB-3816; Grant No. NsG-693.

Results of heating spores of Bacillus subtilis strain Marburg to 90 to 100°C in a vacuum for 9 to 12 hr and then plating them. Numerous mutants are obtained, and very few spores are killed. Disproportionately large numbers of these mutants exhibit abnormal sporulation. F.R.L.

A67-21068

PERFORMANCE CAPABILITIES OF MAN ON EARTH AND IN SPACE - A STUDY IN CONTINUITY.

Julien M. Christensen (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Human Engineering Div., Wright-Patterson AFB, Ohio).

IN: POST APOLLO SPACE EXPLORATION; AMERICAN ASTRONAUTICAL SOCIETY, ANNUAL MEETING, 11TH, CHICAGO, ILL., MAY 3-6, 1965, PROCEEDINGS. [A67-21064 08-30]
Meeting sponsored by the American Astronautical Society and the IIT Research Institute.
Edited by Francis Narin.
Tarzana, Calif., American Astronautical Society (Advances in the Astronautical Sciences. Volume 20. Part I); Sun Valley, Calif., Scholarly Publications Corp., 1966, p. 37-56. 44 refs.

Analysis of the validity for space programs of human performance data collected under terrestrial conditions. Attempt is made to establish a continuity bridge between human engineering problems in terrestrial and in space-flight environments. Depth perception, visual acuity and perception, walking ability, and reaction time are the basic performance functions considered. Evidence is found that many of these data are useful to the study of human performance in space. V. Z.

A67-21069
THE RATIONALE AND SCOPE OF BIOMEDICAL/BEHAVIORAL EXPERIMENTS IN EARTH ORBIT.
P. R. Tobias (International Business Machines Corp., Federal Systems Div., Bethesda, Md.) and W. J. Burke (International Business Machines Corp., Thomas J. Watson Research Center, Yorktown Heights, N.Y.).
IN: POST APOLLO SPACE EXPLORATION; AMERICAN ASTRONAUTICAL SOCIETY, ANNUAL MEETING, 11TH, CHICAGO, ILL., MAY 3-6, 1965, PROCEEDINGS. [A67-21064 08-30]
Meeting sponsored by the American Astronautical Society and the IIT Research Institute.
Edited by Francis Narin.
Tarzana, Calif., American Astronautical Society (Advances in the Astronautical Sciences. Volume 20. Part I); Sun Valley, Calif., Scholarly Publications Corp., 1966, p. 65-94. 14 refs.

Development of an experimental program for an orbiting biomedical/behavioral laboratory. The program includes (1) a survey of body function response in zero-g, (2) investigations of the adequacy of protective devices and techniques, (3) assessment of basic psychomotor, sensory, and cognitive capabilities, and (4) operational assessment of the man in the vehicle and experimental system. An information data bank is suggested to aid the design of future space missions with maximum utilization of man as an integral part of the system. V. Z.

A67-21070
A PROGRAM - BIOLOGICAL RESEARCH IN A MANNED SPACE LABORATORY.
H. Richter, F. Crandall, and A. McGuire (Electro-Optical Systems, Inc., Pasadena, Calif.).
IN: POST APOLLO SPACE EXPLORATION; AMERICAN ASTRONAUTICAL SOCIETY, ANNUAL MEETING, 11TH, CHICAGO, ILL., MAY 3-6, 1965, PROCEEDINGS. [A67-21064 08-30]
Meeting sponsored by the American Astronautical Society and the IIT Research Institute.
Edited by Francis Narin.
Tarzana, Calif., American Astronautical Society (Advances in the Astronautical Sciences. Volume 20. Part I); Sun Valley, Calif., Scholarly Publications Corp., 1966, p. 95-114.

Opportunities for the conduct of a program of research in the basic biosciences utilizing the unique features of a manned spacecraft equipped as a research laboratory are discussed. The discussion is presented in the form of a set of specific experiments which can be performed in a manned-spacecraft laboratory. The assumptions, constraints, and scientific motivation used to develop a rationale for the selection of specific experiments are discussed. The specific experiments are identified and described. The general and the role of the astronaut-scientist is defined. The type and importance of results to be derived from the program are discussed. (Author)

A67-21111
RESULTS OF MEDICAL INVESTIGATIONS MADE ON THE SPACESHIPS VOSKHOD AND VOSKHOD-2.
O. G. Gazenko and A. A. Giurdzhian (Academy of Sciences, Physiology Dept., Commission on the Study and Use of Outer Space, Moscow, USSR).
IN: POST APOLLO SPACE EXPLORATION; AMERICAN ASTRONAUTICAL SOCIETY, ANNUAL MEETING, 11TH, CHICAGO, ILL., MAY 3-6, 1965, PROCEEDINGS. [A67-21087 08-30]
Meeting sponsored by the American Astronautical Society and the IIT Research Institute.
Edited by Francis Narin.
Tarzana, Calif., American Astronautical Society (Advances in the Astronautical Sciences. Volume 20. Part II); Sun Valley, Calif., Scholarly Publications Corp., 1966, p. 1091-1108.

Results of mainly physiological medical investigations made during the flights of the Voskhod and Voskhod-2 spaceships which may be of interest for future space flights. The data obtained indicate that cosmonauts retain a fairly high level of efficiency which guarantees complete execution of a complex flight program. The results obtained from investigation of a 24-hr flight, as well as those of clinical and physiological observations following it, gave no indication of any disruption of the organism's basic functional systems. F. R. L.

A67-21356 *
FURTHER NOTES ON THE CENTER MEDIAN NUCLEUS OF LUYS.
William R. Mehler (NASA, Ames Research Center, Office of Life Sciences, Neurobiology Branch, Moffett Field, Calif.).
IN: THE THALAMUS; PROCEEDINGS OF THE FIRST INTERNATIONAL SYMPOSIUM, COLUMBIA UNIVERSITY, NEW YORK, N.Y., NOVEMBER 1964.
Symposium sponsored by Columbia University.
Edited by D. P. Purpura and M. D. Yahr.
New York, Columbia University Press, 1966, p. 109-122; Discussion p. 122-127. 87 refs.
NASA-supported research.

Survey of a number of studies concerning the identification and localization of the center median nucleus of Luys. It is established by neuropathological evidence supported by consistent experimental findings in both retrograde cell and antegrade fiber degeneration studies that the CM projects primarily upon the putamen. It is contended that reports of the presence of ascending afferent connections with the CM represent fallacious identification or erroneous localization of C1 intralaminar connections or reflect neural events reflecting from the globus pallidus or precentral cortex. A contention that the only significant afferent connections with the CM originate from forebrain structures lying rostral to this nucleus is supported by findings that both the globus pallidus and the precentral "motor" cortex project in a convergent manner upon the CM nucleus. Schulman's hypothesis that the CM might play a critical role in mechanisms that mediate certain dyskinesias is bolstered. A. B. K.

A67-21500
SOME EFFECTS OF RAISED INTRAPULMONARY PRESSURE IN MAN.
John Ernsting (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).
Maidenhead, Berks., England, Technivision, Ltd. (AGARDograph 106), 1966. 343 p.
$13.50.

This book discusses positive-pressure breathing as a means of maintaining acceptable arterial oxygen tension at altitudes above 40,000 ft, with particular reference to the disturbances induced by raising the intrapulmonary pressure by 30 to 140 mm Hg. It is shown that the disturbances can be reduced to acceptable limits by applying counterpressure to specific regions of the body. Pressure breathing at these pressures distends the lungs and induces a marked alveolar hyperventilation. The application of counterpressure to the trunk tends to reduce this effect and is essential at positive pressures above 40 mm Hg. The use of an oronasal mask for pressure breathing permits distension of the mouth and pharynx, increased activity of the carotid baroreceptors and hemorrhages in the conjunctivae and tympanic membrane. Counterpressure to the head and neck is required at positive pressures above 65 mm Hg. Raising the intrapulmonary pressure reduces the effective blood

volume, and collapse occurs when the reduction exceeds 700 to 800 ml. These collapses - which exhibit all the features of vasovagal syncope - may also be precipitated during pressure breathing by hypoxia, hypocapnia, discomfort, or pain. The magnitude of the reduction of effective blood volume may be decreased by applying counterpressure to the limbs, but the cardiovascular disturbances induced by pressure breathing limit the time for which this maneuver may be used at high altitudes. It is shown, however, that if the duration of an exposure is less than 4 min, pressure breathing with limited counterpressure will provide protection against hypoxia at altitudes of up to 70,000 ft.

V.P.

LC ENTRIES

A67-80413
CHANGES IN ARTERIAL SUBSTRATE LEVEL UNDER THE INFLUENCE OF STRENUOUS EXERCISE [DIE VERANDERUNGEN ARTERIELLER SUBSTRATSPIEGEL UNTER DEM EINFLUSS KORPERLICHER ARBEIT].
J. Keul, E. Doll, D. Keppler, and H. Reindell (Med. Universitätsklin., Freiburg i. Br., West Germany).
Internationale Zeitschrift für angewandte Physiologie, vol. 22, Aug. 4, 1966, p. 356–385. 79 refs. In German.

Healthy adults and athletes have been tested for the arterial level of glucose, lactate, pyruvate and free fatty acids during rest, physical work and during recovery. The level of glucose during physical work decreased by 20%. Three minutes after workstop the concentration of glucose increased by 15%. During stress, athletes showed less increase in the lactate concentration than the average person. There was a negative relation between the heart volume and the arterial lactate concentration during maximal steady state. The lactate/pyruvate quotients on a defined working level may be considered as a measure of physical capacity: The quotient depends on the training situation, on the age as well as on the quantity and quality of the exercise. If the exercise was preceded by a light physical work, the increase of the lactate concentration and of the lactate/pyruvate-quotient was significantly less compared to a suddenly started exercise. The arterial level of free fatty acids was influenced by the amount and duration of physical work as well as by the age. The physical capacity, however, had no influence on it.

A67-80414
ATTENTION AND CONSOLIDATION AS FACTORS IN RETENTION.
Edward Levonian (Calif. U., Los Angeles).
Psychonomic Science, vol. 6, Oct. 25, 1966, p. 275–276. 8 refs. U.S. Dept. of Com. supported research.

The skin resistances of subjects (61 high school students) were recorded during a 10-min. instructional film, and subjects were tested for retention of information immediately after (short-term) and one wk. after (long-term) the film. Resistance decrements which preceded information presentation (pre-decrements) led to short-term and long-term retention, whereas post-decrements led to reminiscence. These results were interpreted in terms of attention and consolidation.

A67-80415
IDENTICAL FIGURES, EXPOSURE TIME AND DISAPPEARANCE PHENOMENA UNDER REDUCED STIMULATION CONDITIONS.
Richard C. Tees and Linda K. More (British Columbia U., Vancouver, Canada).
Psychonomic Science, vol. 6, Oct. 25, 1966, p. 289–290. 9 refs.
Grant NRC, Canada APA-179 and British Columbia U. supported research.

The extent to which two identical stimuli (same letters or figures) in a three-element design disappear together under reduced stimulation conditions was found to be significantly greater than other possible paired disappearances. Moreover, during the course of three observational sessions, the proportion of identical-pair disappearances increased significantly.

A67-80416
ADAPTATION TO DISPLACED VISION CONTINGENT UPON VIBRATING STIMULATION.
Jerome H. Kravitz and Hans Wallach (Swarthmore Coll., Pa.).
Psychonomic Science, vol. 6, Dec. 5, 1966, p. 465–466. NSF supported research

In two experiments subjects were exposed to a prismatically displaced view of their right hand resting on a board that could be made to vibrate. Groups receiving vibration achieved significantly more adaptation as measured by a pointing test than control groups who did not.

A67-80417
THE INFLUENCE OF STIMULUS UNCERTAINTY IN A REACTION TIME SITUATION.
Philip Tolin.
Psychonomic Science, vol. 6, Dec. 5, 1966, p. 473–474.

Forty-eight subjects participated in an experiment designed to test the effects of stimulus uncertainty on reaction time (RT). The results were interpreted as supporting the notion of increasing RT as a function of monitoring difficulty, rather than stimulus uncertainty.

A67-80418
CHANGES OF EEG IN A HEALTHY INDIVIDUAL WITH TRIGGER LIGHT STIMULATION [IZMENENIIA EEG ZDOROVOGO CHELOVEKA V USLOVIIAKH TRIGGERNOI SVETOVOI STIMULIATSII].
L. G. Makarova (USSR Acad. of Med. Sci., Inst. of Neurol., Moscow).
Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 62, Nov. 1966, p. 6–11. 12 refs. In Russian.

Dynamics of the electroencephalographic (EEG) rhythms was studied in 40 healthy individuals under the influence of light stimulation. The trigger system received potentials which were recorded with various bipolar leads. In accordance with previous data various types of EEG reaction in a healthy individual were found depending on the relationship between the stimulus and the phase of cerebral wave. The author found not only qualitative but quantitative characteristics of these reactions. Data obtained confirm the opinion of a number of authors on affecting by alpha-rhythm the cycle of excitability of the neural cells of the brain. This apparently may be applied also on the slow forms of activity of the theta-wave type, which are not infrequently recorded in the EEG of healthy individuals.

A67-80419
STIMULUS CHANGE PROPERTIES OF THE RT READY SIGNAL.
Calvin K. Adams and Isaac Behar (U.S. Army Med. Res. Lab., Fort Knox, Ky.).
Psychonomic Science, vol. 6, Nov. 15, 1966, p. 389–390. 5 refs.

Two studies tested the generality of the Perkins–Logan hypothesis in the reaction-time (RT) experiment. Both studies used a parametric design with four ambient (intertrial) intensities of white noise ranging from 0 to 90 db. in all combinations with the same four intensities used as ready signals. The results were consistent with the Perkins–Logan interpretation of stimulus intensity effects as magnitude of change (increase and decrease) produced a highly significant effect in both studies. However,

RTs were shorter when ready signals were decreased rather than increased in intensity (significant in one study).

A67-80420
A DEVELOPMENTAL STUDY OF TACTUAL DISCRIMINATION IN BLIND AND SIGHTED CHILDREN AND ADULTS.
Anne D. Pick and Herbert L. Pick, Jr. (Minn. U., Minneapolis).
Psychonomic Science, vol. 6, Nov. 15, 1966, p. 367–368.
Grant NIH MH 07631.

Normally sighted, partially sighted and totally blind subjects from six years to adults performed a tactual discrimination task requiring them to judge whether two raised line figures were alike or different. The number of errors made in the task depended on the age of subjects, the amount of vision present, and the nature of the differences between members of the pairs. These results were compared to data obtained by other investigators on visual discrimination of similar figures.

A67-80421
THE EFFECT OF HYPERBARIC OXYGENATION ON CEREBRAL AMINES.
Morris D. Faiman and Arun R. Heble (Kan. U., School of Pharm., Lawrence).
Life Sciences, vol. 5, Dec. 1966, p. 2225–2234. 19 refs.
Kan. U. supported research.

The effect of hyperbaric oxygenation (OHP) on the norepinephrine (NE) and 5-hydroxytryptamine (5-HT) concentration in the total brain was studied in white mice. The animals were kept in humidity and CO_2-free chambers. The temperature was maintained at 25°C. Seizures of the tonic type of convulsions were induced by flushing the air with O_2 to 100%, under pressure. Various parameters describing the amine depletion, pressure and convulsive time were calculated. The results showed a reduced NE and 5-HT concentration in the total brain. The depletion of these substances appeared to follow first order of kinetics at least 75% of the time for inducing convulsions. The mathematical relationship between the rate of approach of oxygen toxicity and velocity of compression is discussed in detail.

A67-80422
BACKWARD VISUAL MASKING AS A FUNCTION OF AVERAGE UNCERTAINTY OF THE MASKING PATTERN.
Robert E. Fitzgerald and Richard Kirkham (Western Australia U., Perth).
Psychonomic Science, vol. 6, Dec. 5, 1966, p. 469–470. 7 refs.

The present experiment investigated informational content of the masking pattern in backward visual masking. Vertical or horizontal lines were flashed for from 4–17 msec. in a tachistoscope and were followed after a dark interval of 15 msec. by a random checkboard pattern presented for 150 msec. The probability of black squares in the checkboard was varied from 0.0 (all white) to 1.0 (all black). Accuracy of report of the orientation of the lines was a U-shaped function of the probability of black in the masking pattern. The similarity of this function to that of the average uncertainty of dichotomous distributions suggested a possible relationship between informational content and amount of masking.

A67-80423
PHYSIOLOGY OF THE LATERAL VESTIBULAR NUCLEUS.
Richard B. Yules, Claire Q. Krebs, and Frederick P. Gault (Yale U., School of Med., New Haven, Conn.).
Experimental Neurology, vol. 16, Oct. 1966, p. 172–180. 25 refs.
Grant PHS M-4163.

Simultaneous bilateral stimulation of the lateral vestibular nucleus in cats demonstrated that nystagmus evoked from each nucleus could be algebraically summated. This precise interaction was destroyed by labyrinthectomy which produced a resting nystagmus contralateral to the lesion. Resting nystagmus could be potentiated or inhibited by stimulating the appropriate nucleus. Atropine eliminated and amphetamine potentiated resting and elicited nystagmus. These data suggest a resting labyrinthine discharge which is necessary for vestibular stability in the intact animal and which enters the ipsilateral vestibular nucleus from which projections–possibly via the reticular formation–inhibit the contralateral lateral vestibular nucleus.

A67-80424
THE CONSERVATION OF WATER BY YOUNG ADULT RATS WITH RESTRICTED WATER SUPPLIES.
S. A. Osman, J. D. Smith, L. E. Hanson, and R. J. Meade (Minn. U., Animal Husbandry Dept., St. Paul).
Journal of Nutrition, vol. 90, Nov. 1966, p. 268–274. 14 refs.

The water balance of laboratory rats under restricted water conditions, with particular attention to insensible water loss was studied. Young adult female rats were fed liquid diets by gavage in amounts which maintained constant body weights. The diets were identical except for their water content which was 61.5, 48.3 and 38.7% of the diets. Carbon dioxide production, O_2 consumption, and urine osmotic pressure determinations were made in addition to complete water balance studies. The rats adapted to these reduced water intakes without apparent difficulty and reduction of water to 28.1% water. When the diet contained 38.7% water, the mean urine osmotic pressure was 3581 millisomoles/liter in the main trial and rechecked at 3276 millisomoles/liter. The greatest saving of water, over the range of water restriction, was made by reduction of urine volume. Decreased dietary water was associated with a decreased proportion of water in the feces. The insensible water loss was less in grams, grams per liter of O_2 uptake or grams per liter of CO_2 production when water was restricted.

A67-80425
EYE MUSCLE PROPRIOCEPTION AND THE SEMILUNAR GANGLION.
Ermanno Manni, Ruggero Bortolami, and Carlo Desole (Sassari U., Inst. of Human Physiol. and Vet. Anat., Sardinia, Italy).
Experimental Neurology, vol. 16, Oct. 1966, p. 226–236. 40 refs.

A cellular pool was found in the medial dorsolateral part of the similunar ganglion of lambs which contains the soma of afferent proprioceptive fibers from extraocular muscles. The unitary discharge of these cells was recorded by means of tungsten microelectrodes. The responses of the units to stretching the extraocular muscles were characterized by a sustained increase in the discharge rate which ceased as soon as the stretch was released. The latencies were very short: 1–3 msec. The firing of the units during stretching was inhibited by electrical stimulation of the extraocular muscles. The units could thus be identified as muscle spindle afferents. The units responsive to stretching the extraocular muscles were unaffected by stimulation of other trigeminal fields or by jaw movements. Nembutal anesthesia did not eliminate the responses. The responses were abolished completely by severing the ipsilateral ophthalmic branch of the trigeminal nerve. The conclusion was reached that the semilunar ganglion contains the cells bodies of afferent fibers from the extraocular muscles coursing through the ophthalmic branch of the trigeminal nerve.

A67-80426
VISUAL PRESENTATION OF STIMULI IN IMMEDIATE MEMORY.
Robert G. Crowder (Yale U., New Haven, Conn.).
Psychonomic Science, vol. 6, Dec. 5, 1966, p. 449–450. 7 refs.
Grant NSF GB 4066.

Simultaneous (SM) and sequential (SQ) visual presentation of consonant series varying in length were compared as a function of stimulus duration and presentation rate, respectively. A systematic dependence of recall upon these parameters was demonstrated for two measures of performance. Second for second, SM presentation was found to be more efficient than SQ.

A67-80427
CORTICAL EFFERENT FLOW INFLUENCING UNIT RESPONSES OF MEDIAL GENICULATE BODY TO SOUND STIMULATION.
Takeshi Watanabe, Keiji Yanagisawa, Jin Kanzaki, and Yasuji Katsuki (Tokyo Med. and Dental U., Dept. of Physiol., Yushima, Bunkyo-ku, Japan).
Experimental Brain Research, vol. 2. Nov. 15, 1966, p. 302–317. 34 refs.

Single units in the medial geniculate body and inferior colliculus of the cat were activated by acoustic stimulation and their activity was tested by orthodromic conditioning stimulation of the auditory cortex with the following findings: (1) two groups of the cells in the medial geniculate body and the inferior colliculus, activated by both cortical electric stimulation and tonal stimulation, have been classified as "modification" units and "no modification" units; (2) corticofugal stimulation inhibited or facilitated "modification" units; (3) in general, fibers from AI elicit inhibitory while those from AII elicit facilitatory effects in the medial geniculate body; (4) cortical stimulation produced a threshold change on the response area of "modification" units; (5) it is concluded that a number of, not very many, centrifugal fibers innervate the ipsilateral geniculate neurons; and (6) a centrifugal control mechanism may play an important role in the frequency selective gating mechanism of the central auditory system.

A67-80428
LUNG COMPLIANCE OF THE RABBIT AND POSTURALLY INDUCED CHANGES IN FUNCTIONAL RESIDUAL CAPACITY.
Joseph T. Davidson, Karlman Wasserman, and Glen A. Lillington (Palo Alto Med. Res. Found., Calif.).
(Am. Physiol. Soc. Meeting, Los Angeles, Calif., Aug. 26, 1965).
Anesthesiology, vol. 27, Nov.–Dec. 1966, p. 817–822. 21 refs.
Grant PHS HE-06591 and Tuberc. and Health Assn., Calif. supported research

The effects of alterations in body posture on functional residual capacity (F.R.C.) were studied in young and old rabbits. The pulmonary complicance was significantly greater in the older than in the younger rabbits, and the F.R.C. of the older animals was more sensitive to the changes in posture than the smaller F.R.C. in the younger animals. A close correlation between the pulmonary compliance and the magnitude of posturally-induced changes in F.R.C. was noted, and we concluded that the two are causally related. Certain clinical implications are discussed.

A67-80429
SEPARATION THRESHOLDS FOR BAR TARGETS PRESENTED WITH COLOR CONTRAST ONLY.
Harold P. Bishop (Tufts U., Medford, Mass.).
Psychonomic Science, vol. 6, Oct. 25, 1966, p. 293–294.
Grant NIH NB 05088-02.

Separation threshold scores for rectangular bar targets with combination of red, yellow, green and blue targets and grounds were obtained. Threshold scores were low, with small differences between scores obtained with the different color combinations.

A67-80430
RESPONSES OF UNITS OF THE INFERIOR COLLICULUS TO TIME-VARYING ACOUSTIC STIMULI.
P. G. Nelson, S. D. Erulkar, and J. S. Bryan (NIH, Natl. Inst. of Neurol. Diseases and Blindness, Bethesda, Md. and Pa. U., School of Med., Dept. of Pharmacol., Philadelphia).
Journal of Neurophysiology, vol. 29, Sep. 1966, p. 834–860. 13 refs.
Grant PHS NB-02941.

Responses of single units of the cat inferior colliculus were elicited by a variety of acoustic stimuli. The unitary responses to these stimuli were concurrently analyzed "on line" by the computer. The responses to frequency- and amplitude-modulated tones showed the following relationships between the density of unitary firing and the modulated stimuli. (1) Some units were directionally selective to frequency- or amplitude-modulated tones so that responses were elicited as the stimulus changed in one direction but not the other. Other units showed a linear relationship between the modulated stimulus and the density of firing. (2) The degree and nature of synchronization of the unit's response with the modulated signal was critically dependent upon both the rate and depth of modulation. (3) Most units responded to both frequency- and amplitude-modulated stimuli. Some, however, showed markedly greater activation by one stimulus than by the other. (4) A few units responded to frequency-modulated stimuli at frequencies lying completely outside the frequency-response plots. Attempts were made to explain these responses to time-varying acoustic stimuli on the basis of information obtained from different types of frequency-response plots. These were: (1) the on- and off- 2-sec. serial frequency-response plots; (2) the on- and off- 100-msec. serial frequency-response plots; and (3) the on- and off- 100-msec. random frequency-response plots. In some, but not all, of the units the behavior of the unit with respect to the modulated stimuli could be predicted on the basis of the frequency-response plots.

A67-80431
OBSERVATIONS ON THE EFFECT OF EXTERNAL COUNTERPRESSURE ON THE CIRCULATION THROUGH THE FOREARM.
B. L. Ardill and P. H. Fentem (St. Mary's Hosp. Med. School, Dept. of Physiol., London, Great Britain).
American Heart Journal, vol. 72, Nov. 1966, p. 664–674. 25 refs.

The effect of exposure of a 15-cm. forearm segment to counterpressures in the range of 10 to 50 cm.H_2O on forearm blood flow was measured in each of six subjects. An increase in counterpressure resulted in an approximately linear decrease in forearm blood flow. There was no consistent evidence for the existence of a range of counterpressures over which apparent blood flow remained constant. Results of experiments in which forearm blood flow was measured at counterpressures of 10 and 45 cm. H_2O, during body heating and during the period of elevated blood flow in the forearm after exercise of the forearm muscles, did not demonstrate that exposure to a counterpressure of 45 cm.H_2O, in our apparatus, caused suppression of blood flow through the skin of the forearm. Exposure of the forearm

segment to a counterpressure of 45 cm.H_2O for 45 min. did not result in reactive hyperemia comparable to that induced in skin, at other sites, by periods of arterial occlusion of much shorter duration. Although it may be possible to suppress blood flow in skin, without affecting blood flow in muscle, by applying counterpressure to a short segment of forearm, our experiments indicate that it is not possible to do this in longer segments.

A67-80432
SIMPLE METHOD FOR DETERMINATION OF $^{14}CO_2$ FROM EXPIRED AIR.

S Y Yeh, John H Cavanaugh, and L A Woods (Iowa U., Coll. of Med., Dept. of Pharmacol., Iowa City).

Journal of Pharmaceutical Sciences, vol. 55, Nov. 1966, p. 1212–1215. 10 refs.
Grant NIH NB 02928.

Two simple procedures for preparation of homogeneous $^{14}CO_2$ samples for liquid scintillation counting are described. In one procedure (A), the CO_2 absorbing agent and the carbonate solution are placed in one tube. Carbon dioxide is released from the carbonate solution by H_2SO_4 and absorbed by phenethylamine directly. Added NaH $^{14}CO_3$ (16-8000 dpm/ml.) is recovered nearly quantitatively in the amine phase. Similar results are obtained with another procedure (B), with which $^{14}CO_2$ is released from the carbonate solution and flushed with N_2 into a counting vial containing absolute methanol and phenethylamine.

A67-80433
AN ANALYSIS OF FACTORS DETERMINING THE CIRCADIAN PATTERN OF ALDOSTERONE EXCRETION.

Lawrence K. Wolfe, Richard D. Gordon, Donald P. Island, and Grant W. Liddle (Vanderbilt U., School of Med., Dept. of Med., Nashville, Tenn.).

Journal of Clinical Endocrinology and Metabolism, vol. 26, Nov. 1966, p. 1261–1266. 15 refs
Grants NIH 5-K6-AM-3782, T1-AM-5092, 5-ROI-AM-05318, and 8-MOI-FR-95.

There is an apparent circadian rhythm in the secretion of aldosterone by normal active subjects which is relfected in the excretion of larger quantities of aldosterone in the forenoon than at other times of the day. The aldosterone rhythm is not abolished by the administration of dexamethasone in doses sufficient to suppress 17-hydroxycorticosteriods to negligible values. The aldosterone rhythm can be suppressed, however, by having the subjects remain recumbent at all times. When normal subjects assume the upright posture at 8 p.m. rather than 8 a.m., their aldosterone values are higher at night than during the day. The increase in aldosterone excretion which occurs after assumption of upright posture at 8 a.m. is followed by a decrease in aldosterone values in the afternoon, despite continued maintenance of upright posture. Under all these circumstances changes in plasma renin activity tend to parallel those in aldosterone excretion. It is concluded that posture is the dominant factor conferring apparent circadian rhythmicity on aldosterone secretion and that the effect of posture is mediated by changes in renin secretion.

A67-80434
PARTIAL INHIBITION OF THE LASER REACTION IN MAN BY TOPICAL CORTICOSTEROIDS.

Leon Goldman and K. W. Kitzmiller (Cincinnati U., Coll. of Med., Dept. of Dermatol., Laser Lab., Ohio).

Life Sciences, vol. 5, Dec. 1966, p. 2215–2224. 11 refs.
Grant PHS OH-00118 and John A. Hartford Found. supported research.

An individual working in laser research was made reactive to impacts of low energy normal mode ruby laser. The energy level at the beginning of the experiments was 100 joules/cm.^{2}. His minimal reactive dose was found to be 38 joules/cm.^{2}. Partial inhibition to the delayed papular response of his laser skin reaction was done by topical applications of 0.2 and 0.025% fluocinolone acetonide, but not by 0.01% fluocinolone acetonide. Occlusive dressings with 0.01% fluocinolone acetonide, 0.4 mgs. and 0.1 mgs. of fluorandrenolone acetonide per 100 cm.^{2} of an occlusive tape were also effective. The failure of inhibition of the petechial phase of the delayed inflamatory response to the laser is not explained.

A67-80435
CHRONIC EXPOSURE OF YOUNG RATS TO HYPOXIA AND HYPERCAPNIA.

Elinor M. Glauser (Temple U., School of Med., Philadelphia, Pa.).

Archives of Environmental Health, vol. 13, Nov. 1966, p. 597–600. 11 refs.
Grant NIH HE-08752.

Chronic exposure of young rats to the effects of low O_2 and high CO_2 levels was investigated in an effort to ascertain what part this environment plays in the production of chronic lung disease. This was accomplished by use of an environmental chamber into which the gas mixture was introduced. Daily exposures of the rats were made for eight-hours duration for a period of six weeks. The rats exposed to this gas mixture hyperventilated during this period. The rats failed to gain weight, developed polycythemia with a decreased blood pH, and the lungs were noted to show changes in the pulmonary parenchyma compatible with chronic lung disease.

A67-80436
SPONTANEOUS SPIKE DISCHARGES FROM SINGLE UNITS IN THE COCHLEAR NUCLEUS AFTER DESTRUCTION OF THE COCHLEA.

K. C. Koerber, R. R. Pfeiffer, W. B. Warr, and N. Y. S. Kiang (Mass. Inst. of Technol., Res. Lab. of Electron., Center for Commun. Sci. and Mass Eye and Ear Infirmary, Eaton-Peabody Lab. of Auditory Physiol., Boston).

Experimental Neurology, vol. 16, Oct. 1966, p. 119–130. 24 refs.
NASA Grant NsG-496, Contract DA-36-039-AMC-03200(E), Grants NSF GK-835, NIH 2PO1 MH-04737-06 and NB-01344.

Spike discharges occurred in single units in the cochlear nucleus of anesthetized cats in the absence of controlled acoustic stimuli. The origins of this spontaneous activity are unknown. The present paper compares the spontaneous activity in the cochlear nucleus of intact animals with that found in animals with destroyed cochleas. Cochlear destruction results in an immediate disappearance of almost all activity in the ventral cochlear nucleus, while the activity in the dorsal cochlear nucleus is relatively unaffected even in chronic preparations. Thus most of the spontaneous activity in the ventral nucleus appears to be dependent on the spontaneous activity of the auditory nerve. The spontaneous activity in the dorsal nucleus, on the other hand, appears either to be a result of activity in other pathways to the cochlear nucleus or to originate in the units themselves. These physiological results are consistent with anatomical descriptions of the effects of cochlear destruction on the neurons in the cochlear nucleus.

A67-80437
INFLUENCE OF ANTIBIOTICS ON CHANGES IN THE IMMUNOLOGIC SPECIFICITY OF PROTEINS IN ACUTE RADIATION SICKNESS [VLIIANIE ANTIBIOTIKOV NA IZMENENIE IMMUNOLOGICHESKOI SPETSIFICHNOSTI BELKOV PRI OSTROL LUCHEVOI BOLEZNI].
M. Sh. Mil'man (Min. of Health, Sci.-Res. Inst. of Roentgenol., Radiol., and Oncol., Tashkent, UzbekSSR).
Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 62, Nov. 1966, p. 85–87. In Russian.

A study was made on the influence of penicillin, streptomycin, and oxytetracycline on processes causing changes in the immunologic specificity of proteins in rabbits X-irradiated in a dose of 600 r. A change in the immunologic specificity of proteins was determined by the method of anaphylaxis followed by desensitization. It has been found that 30 minutes after irradiation changes occur in the antigenic structure of the liver proteins and that streptomycin and oxytetracycline exert an influence on processes leading to a change in the immunologic specificity of proteins.

A67-80438
FORCED-CHOICE FORM RECOGNITION DURING BINOCULAR RIVALRY.
Robert Fox and Ronald Check (Vanderbilt U., Nashville, Tenn.).
Psychonomic Science, vol. 6, Dec. 5, 1966, p. 471–472.
Grant PHS MH-0834.

Forced-choice form recognition thresholds were obtained for both eyes concurrently under rivalry suppression and nonsuppression and for nonrivalry control condition. Suppression produced a significant decrement in recognition; nonsuppression and nonrivalry did not differ significantly. These data support the hypotheses that suppression represents an inhibitory state, and that nonsuppression represents a state of normal visual sensitivity.

A67-80439
RECOGNITION: MEMORY FOR WORDS CORRECTLY HEARD IN NOISE.
Patrick Rabbitt (Appl. Psychol. Res. Unit, Cambridge, Great Britain).
Psychonomic Science, vol. 6, Nov. 15, 1966, p. 383–384. 5 refs.

The increase in effort necessary to correctly identify words over degraded communications channels has been shown to be reflected in lowered efficiency on simultaneously-performed non-verbal secondary tasks. Two experiments show that a similar loss of efficiency may be observed for operations performed on the material shadowed. Recognition memory is poorer for words correctly shadowed over a degraded channel.

A67-80440
SHORT-TERM MEMORY FOR UNBALANCED DICHOTIC LISTS.
M. P. Bryden (Waterloo U., Canada).
Psychonomic Science, vol. 6, Nov. 15, 1966, p. 379–380. 8 refs.
Grant DRB, Canada 9401-26.

Subjects heard dichotic lists in which four numbers were presented on one ear and, at the same time, two numbers were presented to the other ear. Consistent with a decay theory of immediate memory, accuracy on the two-number series decreased as a function of time since presentation. Variations in recall order indicated that the order of report is determined only after all the material has been heard.

A67-80441
SHORT-TERM MEMORY: EFFECTS OF ACOUSTIC SIMILARITY, PRESENTATION RATE AND PRESENTATION MODE.
Kenneth R. Laughery and Allen L. Pinkus (N. Y. State U., Buffalo).
Psychonomic Science, vol. 6, Oct. 25, 1966, p. 285–286. 10 refs.
Grant MH-11595.

The effects of four variables on short-term memory were studied: Presentation Rate (20, 60 or 180 items/min.), Presentation Mode (visual or auditory), Acoustic Similarity (High, BCDEGPTVZ or Low, HJLOQRWXY), and Length of Sequence (6 or 8 items). Performance varied inversely with the Length of Sequence and Acoustic Similarity and directly with Presentation Rate. A significant Presentation Rate by Presentation Mode interaction was explained on the basis of less available time for the implicit translation from visual input to the storage of auditory cues.

A67-80442
COMPARATIVE EFFECTS OF HYPOXIA ON RESPIRATORY AND CARDIAC FUNCTION IN REPTILES.
Don R. Boyer (Washburn U., Topeka, Kan.).
Physiological Zoology, vol. 39, Oct. 1966, p. 307–316. 10 refs

Resistance to hypoxia in turtles was compared with bullsnakes desert iguanas and an alligator. All four reptile species had increased heart rates with hypoxia, except in the snakes there was a decrease in rate at the lowest O_2 tension. Oxygen consumption was lowest in the turtles and was maintained at a constant level in all hypoxic tensions, while, at a "critical tension" of about 75 mm.Hg (10% O_2), the other reptiles began using less O_2 and had accompanying changes in breathing and cardiac responses. Size differences in relation to breathing and heart rates and to O_2 consumption are discussed. An analysis of duration of parts of the cardiac cycles of the lizards, some of the snakes, and the alligator revealed that, in lizards, hypoxia causes a decrease in both conduction and repolarization time, while in the snakes and the alligator, the only apparent effect is a slight decrease in conduction time. Oxygen pulse values ($cm.^3$ O_2/gm. body weight) decreased with increasing hypoxia and were strikingly similar in all species at all O_2 tensions. Excepting the increase in ventilation rate, organ system responses of turtles did not seem to provide the explanation for their resistance to hypoxia, and their ability to use anaerobic metabolism is probably more directly involved.

A67-80443
COMPARISON OF RESPONSES TO ANTICIPATED STRESS AND STRESS.
Roy B. Mefferd, Jr. and Betty A. Wieland (Veterans Admin. Hosp., Psychiat. and Psychosomat. Res. Lab., Baylor U., Coll. of Med., and Houston U., Tex.).
Psychosomatic Medicine, vol. 28, Nov.–Dec. 1966, p. 795–807. 40 refs.
Contract AF 41(657)-55.

Young, volunteer Air Force Selectees were exposed to reduced barometric pressure equivalent to that of 15,000-ft. altitude. The pretress situation was designed to enhance anxiety (but to allay fear) about the stress just prior to exposure. Measurements were made on the night before, immediately before, during, and after the test. The data from the anticipatory period immediately before the test were compared with those of the stress period. Pulse rates (and to a lesser extent, oral temperatures and blood pressures) and norepinephrine levels were parallel in unstressed but anticipatory subjects. Epinephrine levels were elevated only in the subjects having the highest

pulse rates. Blood and urinary levels of 17-hydroxycorticosteroids were distributed randomly with respect to pulse rates. The level of sympathetic nervous system activity related negatively to performance on a psychometric test battery. That these tendencies of traits were not persistent was shown by the fact that the subjects were distributed randomly relative to those variables measured on the preceding night, and the correlation between those variables occurred only when the threat of the stressor became imminent. These effects of anticipation carried over into the stress, and the subjects who had high anticipatory values developed even higher pulse rates, and made more errors and lower scores on the psychometric tests than did the low negative subjects. The general aspects of the responses were distinguishable only in degree, ie.e., the physiological activation of anticipation was only quantitatively different from that of stress. Specific indices of the altitude stress appeared in all subjects, but those who had very high or very low anticipatory values had inappropriate, inadequate, or extravagant responses.

A67-80444
THE EFFECTS OF VESTIBULAR STIMULATION ON SPONTANEOUS ACTIVITY IN THE RAT.
Arnold Eskin (Tex. U., Austin) and David C. Riccio (Kent State U., Ohio).
Psychological Record, vol. 16, Oct. 1966, p. 523–527. 8 refs.
NASA supported research.

Fifty-six unrestrained rats were individually exposed to rotation speeds between 0–18 r.p.m. Their activity was measured using a fourpoint scale. Amount of activity decreased as a function of rotation speed. Rate of activity decline was also directly related to velocity. Suppression of activity persisted for several minutes following rotation. The response decrement was attributed to vestibular stimulation produced by head movements. The relationship to motion sickness in other species was considered.

A67-80445
ORIENTATIONAL SELECTIVITY OF THE HUMAN VISUAL SYSTEM.
F. W. Campbell and J. J. Kulikowski (Physiol. Lab., Cambridge, Great Britain).
Journal of Physiology, vol. 187, Nov. 1966, p. 437–445. 9 refs.
Grant PHS NB 06046-01 and Brit. Council supported research.

The effect of changing the orientation between the object and background is investigated. Gratings of variable contrast were generated on two oscilloscopes; these were superimposed optically. The angle of orientation between them could be changed. The threshold of one grating, the test grating, was determined in the presence of the other, the masking grating. When the gratings were presented with the same orientation (and locked in phase) the increment threshold of the test grating was found to be proportional to the suprathreshold contrast of the masking grating. As the angle between the test and masking gratings was increased the masking effect fell exponentially. At 12° on either side of a vertical test grating the masking effect was reduced by a factor of two with respect to its maximum value. This angle was independent of the contrast level of masking, the focus, and also the phase coherence of the masking grating. If the test grating was presented obliquely the effect of masking was slightly less. The narrow orientationally tuned channels found psychophysically by this masking technique are compared with the orientationally sensitive cells discovered electrophysiologically in the visual cortex of the cat.

A67-80446
THE EFFECT OF TIRING THE FOREARM MUSCLES IN DIFFERENT WAYS ON VENOUS BLOOD PH, P_{CO2} AND STANDARD BICARBONATE.
H. Barcroft and L. J. F. Youlten (St. Thomas's Hosp. Med. School, Sherrington School of Physiol., London, Great Britain).
Journal of Physiology, vol. 187, Nov. 1966, p. 343–349. 7 refs.

The changes in venous blood pH, carbon dioxide tensions (PCO_2) and standard bicarbonate caused by tiring the forearm by (a) rhythmic work with free circulation, (b) rhythmic work with ischemic circulation, were determined using the Astrup apparatus. For rhythmic work, opening and shutting the hand as quickly as possible for two min., the averaged results on six subjects were: pH fell 0.19 units; PCO_2 (after full oxygenation of venous blood) rose 52 mm. Hg; standard bicarbonate fell 2.9 mEq./l. For rhythmic work during ischemia and accompanied by pain, the averaged results on six subjects were: pH fell 0.19 units; PCO_2 (after full oxygenation of venous blood) rose 26 mm. Hg; standard bicarbonate fell 6.3 mEq/l. These results are compared with those obtained in an earlier investigation on the effect of strong hand grips for one min.

A67-80447
ULTRASTRUCTURAL ALTERATIONS IN HUMAN HEPATOCYTES FOLLOWING INGESTION OF ETHANOL WITH ADEQUATE DIETS.
Bernard P. Lane and Charles S. Lieber (N. Y. U., Schools of Med., Bellevue Hosp., and Cornell U., Med. Coll., New York City).
American Journal of Pathology, vol. 49, Oct. 1966, p. 593–603. 35 refs.
Grants PHS FR-5399-05; AM-09536, AM-06284, and K3-AM-22590.

Four human subjects, continuously receiving a normal balanced diet under metabolic ward conditions for four to six months, were given a measured amount of pure ethanol during two widely spaced 16- to 18-day periods. Liver specimens were obtained by percutaneous Menghini needle biopsy before and after each course of alcohol and the multiple specimens from each patient were compared. In addition to steatosis, all tissues obtained after alcohol ingestion exhibited vesiculation and increase in extent of the agranular endoplasmic reticulum. Less uniform alterations in metochondrial structure were also noted. The study indicates that a reproducible alteration occurs in the human liver cell in response to alcohol ingestion under normal dietary conditions.

A67-80448
VISCERAL PATHOMORPHOLOGY OF EXPERIMENTAL ANIMALS SUBJECTED TO THE ACTION OF 10.7 MHZ FREQUENCY ELECTROMAGNETIC FIELD.
W. Niepolomski and K. Smigla (Silesian Med. Acad., Dept. of Pathol. Anat., Zabrze, Poland).
(Patologia Polska, vol. 16, no. 2, 1965).
Polish Medical Journal, vol. 5, no. 2, 1966, p. 396–405. 19 refs.

On the assumption of a harmful effect on the living body of electromagnetic fields and waves of high frequency, experiments were carried out with rats which were subjected to the action of an electromagnetic field of 10.7 MHz frequency. The experiments were performed with a signal generator, with a frequency range from 100 MHz and starting potential 0.IV. Histopathologically, in the exposed animals, numerous disseminated degenerative, inflammatory and proliferative changes of various degrees of intensity and duration were found especially in the central nervous system.

A67-80449
STUDIES OF THE MAXIMUM CAPACITY OF MEN FOR PHYSICAL EFFORT PART III. THE EFFECTS ON THE MAXIMUM OXYGEN INTAKE OF YOUNG MALES OF A REGIME OF REGULAR EXERCISE AND AN ADEQUATE DIET.
C. H. Wyndham, N. B. Strydom, W. P. Leary, C. G. Williams, and J. F. Morrison (Transvaal and Orange Free State Chamber of Mines, Human Sci. Lab., Johannesburg, South Africa).
Internationale Zeitschrift für angewandte Physiologie, vol. 22, Aug. 4, 1966, p. 304–410. 7 refs.

It is the normal pattern for the Bantu to gain about 2.7 kg. in weight during the first month of his service on the mines. This is because the mines provide an excellent and well-balanced diet, which supplies 136 gm./man/day of protein, of which 65 gm. are from animal origin, and 4000 cal./man/day. This is very different from the diet they enjoy in the Bantu homelands, where they also rarely do regular physical work. In the mines they work for six days at a moderate rate of work. The regular work and good diet results in the Bantu gaining significantly in weight and in an increase in his maximum oxygen intake from 3.32 to 2.79 l./min. The nutritional and exercise background of the young South African Caucasian is very much different. At home, in the school and during their military training these factors are well catered for. While the Bantu gains in weight and increases his maximum oxygen intake, the young Caucasian does not gain either in weight or maximum oxygen intake during six months of his military training. By comparison, therefore, the young Caucasian in South Africa is in a good nutritional state and is fit for endurance effort, while the Bantu lacks both of these in his homelands, but rapidly gains in both during the first few months of his work in the mines.

A67-80450
STUDIES OF THE MAXIMUM CAPACITY OF MEN FOR PHYSICAL EFFORT PART I. A COMPARISON OF METHODS OF ASSESSING THE MAXIMUM OXYGEN INTAKE.
C. H. Wyndham, N. B. Strydom, W. P. Leary, and C. G. Williams (Transvaal and Orange Free State Chamber of Mines, Human Sci. Lab., Johannesburg, South Africa).
Internationale Zeitschrift für angewandte Physiologie, vol. 22, Aug. 4, 1966, p. 285–295. 11 refs.

The Human Sciences Laboratory measured the maximum oxygen intakes of 40 active, young men during a bicycle ergometer test, a step test and during an intermittent and a continuous treadmill test. The results obtained during the intermittent treadmill test proved to be the most accurate. It is however, very time-consuming. The results of the continuous treadmill test are very similar to those obtained from the intermittent treadmill test, and the time required is very much shorter. It is, however, a very strenuous test. The results of the bicycle ergometer test is similar to those of the intermittent treadmill test at low levels of effort, but is significantly lower at high levels of effort. The results of the step test compared favourably with those of the intermittent treadmill test, although at low levels of effort the step test overestimates the maximum oxygen values and at high levels of effort it underestimates the values. The step test, however, has the great advantage that only submaximum work loads are used. It can therefore be employed without any danger for measuring the maximum oxygen intake of large groups of people and also of people of any age group.

A67-80451
ENDOCRINE STUDIES AT HIGH ALTITUDE. I. THYROID FUNCTION IN SEA LEVEL NATIVES EXPOSED FOR TWO WEEKS TO AN ALTITUDE OF 4300 METERS.
F. Moncloa, R. Guerra-Garcia, C. Subauste, L. A. Sobrevilla, and J. Donayre (U. Peruana Cayetano Heredia, Inst. de Invest. de la Altura, Lima, Peru).
Journal of Clinical Endocrinology and Metabolism, vol. 26, Nov. 1966, p. 1237–1239. 7 refs.
Grant NIGMS GM 08576.

Ten young adults males, natives of a sea level community, were taken to Cerro de Pasco (4300 m.) for 2 weeks. During the stay at high altitude the thyroidal uptake of 131I was increased from 34.4±2.5% at 24 hr. to 51.4±3.7% The basal metabolic rate was unaltered. Possible explanations for these findings are discussed.

A67-80452
STUDIES OF THE MAXIMUM CAPACITY OF MEN FOR PHYSICAL EFFORT PART II. THE MAXIMUM OXYGEN INTAKES OF YOUNG, ACTIVE CAUCASIANS.
C. H. Wyndham, N. B. Strydom, and W. P. Leary (Transvaal and Orange Free State Chamber of Mines, Human Sci. Lab., Johannesburg, South Africa).
Internationale Zeitschrift für angewandte Physiologie, vol. 22, Aug. 4, 1966, p. 296–303. 10 refs.

Young South African Caucasian males were tested to determine their oxygen intake in terms of their body weights. The figure obtained was 47.7±3.79 ml./kg. This figure compares favourably with the figure for U.S. Army recruits (48.3±0.94 ml./min./kg.), with the figure for U.S. White sharecroppers (49.6±0.52 ml./min./kg.) and the figure for the Arctic Indian (49.1 ml./min./kg.). When a correction factor for the high altitude of Johannesburg is employed then the figure for the S.A. Caucasian is 55 ml./min./kg. This would indicate that the active, young S. A. Caucasians are, in fact, fitter than their counterparts in other advanced Western countries. If the effort involved in any task and the oxygen intake in ml./min./kg. are known quantities, it is possible for the physiologist to assess whether or not the individual or the group of individuals will be able to perform the task concerned. Judged on the criteria of oxygen intake in ml./min./kg. and the 50% level required for prolonged effort, it was found that all S.A. Caucasians were capable of moderate work, but that 24% were incapable of hard work.

A67-80453
MODIFYING SPEED OF GROUP DECISION MAKING WITHOUT AWARENESS OF GROUP MEMBERS.
W. D. Joslyn (Wis. U., Madison) and Thomas J. Banta (Cincinnati U., Ohio).
Psychonomic Science, vol. 6, Oct. 25, 1966, p. 297–298. 6 refs.
Grant NIMH MH06033-2.

Contingent reinforcement successfully modified speed of decision making by two-person groups. Depending on the reinforcement contingency, groups either increased or decreased decision time relative to control groups given non-contingent reinforcement on matching schedules. As far as could be determined from post-experimental questionnaires subjects and interviews, none of the subjects had insight into the reinforcement contingency. The results suggest that the basic operant conditioning paradigm may be applicable to the modification of interdependent behavior patterns in free-responding groups even though the members of the group are unaware that they are adjusting their interaction patterns to fit the external situation.

A67-80454
DEPTH INFORMATION IN SINGLE TRIANGLES AND ARRAYS OF TRIANGLES.

Howard R. Flock (York U., Toronto, Canada), James H. Tenney (Harvard U., Cambridge, Mass.), and David Graves (Dartmouth Coll., Hanover, N. H.).
Psychonomic Science, vol. 6, Oct. 25, 1966, p. 291–292. Grants NSF GB 2474 and NRC, Canada APA-143.

When six obtuse triangles varying in angular height from 75° to 10° were presented singly at six different slants, slant judgments were at chance level. When the view of an array of triangles was varied from 82° to 40° to 22° for the same six slants, the accuracy of slant judgments correspondingly varied. It was concluded that arrays of triangles carry information about their spatial orientation even though the individual elements of the array do not.

A67-80455
SELF-EVALUATION IN A SIMULATED TEAM.
William A. Johnston (Ohio State U., Columbus).
Psychonomic Science, vol. 6, Oct. 25, 1966, p. 261–262. 5 refs.
Grant AF-AFOSR-985-66.

A subject received feedback purported to represent his individual or team tracking performance relative to average ability. The "average ability" criterion was made lenient, moderate, or stringent. After the session the subjected estimated his individual ability. Under individual instructions, the subject's estimate agreed with his feedback. Under team instructions, the subject accepted credit for good scores (lenient criterion) but blamed his "partner" for poor scores (stringent criterion).

A67-80456
ROD AND CONE INDEPENDENCE IN THE ELECTRORETINOGRAM OF THE DARK-ADAPTED MONDKEY'S PERIFOVEA.
P. Gouras (NIH, Natl. Inst. of Neurol. Diseases and Blindness, Ophthalmol. Branch, Bethesda, Md.).
Journal of Physiology, vol. 187, Nov. 1966, p. 455–464. 15 refs.

Rod and cone interaction was studied in the vitreal and intraretinal electroretinogram (erg) in the perifovea of the dark-adapted Rhesus monkey retina. Rod and cone responses can be completely isolated in the erg using dim, monochromatic stimuli. The threshold cone response begins at about 50 msec. whereas that of the rods begins at 150 msec. There is no detectable interaction between these two responses. By comparing the erg with ganglion cell responses, it is concluded that the time delays and interactiosn of rod and cone signals arriving at the ganglion cell layer are determined respectively before and after the origin of the b-wave.

A67-80457
SLEEP DURING THE EARLY MORNING.
Wilse B. Webb, Harman W. Agnes, Jr., and Hyman Sternthal (Fla. U., Gainesville).
Psychonomic Science, vol. 6, Oct. 25, 1966, p. 277–278.
Grant AFOSR-395-65.

The intrasleep electroencephalogram characteristics of male subjects who returned to sleep in the early morning more closely resemble the sleep characteristics which occur late in a full nights sleep rather than the sleep which occurs at the onset of nocturnal sleep. It would appear that sleep does not simply "recycle" with sleep onset.

A67-80458
STATE OF THE PROTEINFORMING FUNCTION OF THE LIVER IN PERSONS WORKING WITH CHLORORGANIC CHEMICAL POISONS [SOSTOIANIE BELKOVOOBRAZOVATEL'NOI FUNKTSII PECHENI U RABOTAIUSHCHIKH S KHLORORGANICHESKIMI IADOKHIMIKATAMI].
V. M. Paramonchik (Kiev Inst. of Labor Hyg. and Prof. Diseases, UkrSSR).
Vrachebnoe Delo, no. 11, Nov. 1966, p. 85–88. 10 refs. In Russian.

Results of a study of 65 persons working with chlororganic compounds (DDT, ethersulfonate, hexachlorane) suggest that these workers develop functional disorders of the liver, mainly disorders of its protein forming function hypoalbuminemia, hypergammaglobulinemia, hyperalpha- and betaglobulinemia, decrease of alpha- and increase of beta-lipoproteins.

A67-80459
INFLUENCE OF VITAMIN B_{12} AND FOLIC ACID ON RADIATION SYNDROME OF WHOLE-BODY IRRADIATED RATS [EINFLUSS VON VITAMIN B_{12} UND FOLSAURE AUF DAS STRAHLENSYNDROM GANZKORPERBESTRAHLTER RATTEN].
A. Morczek and W. Schmidt (Med. Akad. Magdeburg, Strahleninst. and Strahlentherap. Klin., East Germany).
Radiobiologia Radiotherapia, vol. 7, no. 4, 1966, p. 487–495. 50 refs. In German.

The effect of folic acid and vitamin B_{12} upon the course of radiation syndrome was studied on 192 rats irradiated with 600, 800, 1000, and 1200 r (groups of 24 animals each). After 600 r there was a higher survival rate for both vitamins. Following the administration of vitamin B_{12} the survival rate was significantly increased even after irradiation with 800 r. Examinations of the blood-picture performed in fixed time intervals before and after irradiation showed both vitamins to have a certain stimulating effect upon reticulocytes, erythrocytes and thrombocytes in the dose ranges of 600 and 800 r. Whereas in reticulocytes and erythrocytes regeneration begins acceleratedly and the initial values are reached again earlier than in animals without an application of vitamins the radiation-induced decrease after 600 r and 800 r is also milder in thrombocytes the minimum values being higher than in the untreated animals. Following radiation doses of 1000 r and 1200 r no effect favouring regeneration could be demonstrated neither for folic acid nor vitamin B_{12}.

A67-80460
RESISTANCE TO AN OPTICAL ILLUSION, FIGURAL AFTER-EFFECTS, AND FIELD DEPENDENCE.
Ludwig Immergluck (San Francisco State Coll., Calif.).
Psychonomic Science, vol. 6, Oct. 25, 1966, p. 281–282. 6 refs.
NSF supported research.

The ability to resist geometric illusions is shown to be related both to measures of field independence and to figural after-effect potency. Subjects who demonstrated figural after-effects on a particular task, in contrast to those who did not, were able to counteract a presented visual illusion and were also clearly identified as field-independent on a pertinent perceptual task. Consonant with the evidence of previously reported related studies, the present findings continue to show that individual differences in figural after-effect potency are systematically related to a wider gamut of perceptual and behavioral response categories.

A67-80461
THE PHOTOASSIMILATION OF GLUCOSE IN CHLORELLA WITH REFERENCE TO THE ROLE OF GLYCOLLIC ACID.
A. F. H. Marker and C. P. Whittingham (Imp. Coll. of Sci. and Technol., Botany Dept., London, Great Britain).
Proceedings of the Royal Society, vol. 165, Oct. 11, 1966, p. 473–485. 32 refs.
Grant AF EOAR 65-2 and Sci. Res. Council, Great Britain supported research.

The photometabolism of glucose by *Chlorella pyrenoidosa* was studied by following the fate of exogenously supplied glucose-1-^{14}C, glucose-2-^{14}C, and glucose-6-^{14}C. The sucrose and insoluble polyglucan formed were extracted and hydrolysed. The constituent glucose units were degraded to determine the distribution of radioactivity between the six carbon atoms of the glucose chain. Formation of glycollic acid and of glycine was stimulated by a gas stream of 100% oxygen and by adding isonicotinyl hydrazide (INH). Although increases of glycollic acid and glycine were observed as a result of these treatments and at the expense of both sucrose and polyglucan, the distribution of ^{14}C between the carbon atoms of the glucose units was scarcely affected. The results are discussed with particular reference to the metabolism of glycollic acid in *Chlorella*.

A67-80462
CHLORPROMAZINE AND AMPHETAMINE EFFECTS ON THREE OPERANT AND ON FOUR DISCRETE TRIAL REINFORCEMENT SCHEDULES.
Oakley S. Ray and Lyle W. Bivens (Veterans Admin. Hosp., Psychol. Res. Labs., Pittsburgh, Pa.).
(Symp. on Methods in Drug Evaluation, Milan, Italy, 1965). Psychopharmacologia, vol. 10, Sep. 26, 1966, p. 32–43. 13 refs.
Grant NIMH MH 08111

Several doses of chlorpromazine (CPZ) and amphetamine (AMP) were given to rats trained on one of three operant schedules of reinforcement (VI 60", FI 60", or FR 100) or one of three discrete trial schedules (conditioned approach, CA; conditioned discrimination, CD; or stimulus self selection, SSS). The discrete trial procedures were more resistant to disruption by CPZ than were the operant schedules. AMP facilitated behavior only in the VI and FI schedules and had differential effects in the CD schedule (milk rewarded behavior). AMP was also given to subjects trained to respond on one of three response levers for milk, water or food reinforcement. Food responding was most disrupted while milk responding was least disrupted. It was concluded that depressants such as CPZ can be studied equally well in many behavioral procedures while compounds like AMP which activate require a variety of behavioral procedures to show their many different effects.

A67-80463
FACILITATION OF SIMULTANEOUS VISUAL DISCRIMINATION BY NICOTINE IN THE RAT.
F. Bovet-Nitti (Sassari U., Inst. di Farmacol., Italy and Calif. U., School of Med., Dept. of Pharmacol., Los Angeles).
Psychopharmacologia, vol. 10, Sep. 26, p. 59–66. 11 refs.
Calif. U. and AMA supported research.

Effect of nicotine was tried with an increasing difficult visual discrimination learning in rats. The animals could avoid the electrical shock by choosing the right pattern of the only movable door adjacent to the goal box. Different couples of patterns were used. The facilitating effect of nicotine (0.2 mg./kg) appeared evident when the animals chose between two patterns and less evident in the five-pattern choice. Nevertheless, nicotine facilitated strongly the reversal of program.

A67-80464
ELECTROCARDIOGRAPHIC AND RADIOGRAPHIC HEART CHANGES IN WOMEN AT HIGH ALTITUDE.
Charles W. Harris, Jim L. Shields, and John P. Hannon (U.S. Army Med. Res. and Nutr. Lab., Fitzsimons Gen. Hosp., Physiol. Div., Denver, Colo.).
American Journal of Cardiology, vol. 18, Dec. 1966, p. 847–854. 22 refs.

Electrocardiographic, vectorcardiographic and radiographic cardiac changes are described in eight women during 10 weeks of residence at high altitude (14,110 ft.). The changes in electrical activity were similar in type to those reported in natives of high altitude and also to those in male subjects previously observed at this altitude. Prominent findings at altitude included increased heart rate, a rightward shift in AQRS and increased spatial vector magnitude of terminal QRS force (S vector). Minor changes were observed in P wave contour, T wave voltage and contour and in QRS amplitude. A slight reduction in frontal radiographic heart size was also noted; however, lateral views suggested that the over-all size of the heart was probably unchanged during the stay at altitude. Some comments on the probable etiology and significance of the observed changes are given.

A67-80465
REVERSAL OF HIGH ALTITUDE PULMONARY HYPERTENSION.
Robert F. Grover, John H. K. Vogel, Gustav C. Voigt, and S. Gilbert Blount, Jr. (Colo. U., Med. Center, Dept. of Med., Cardiovascular Pulmonary Labs., High Altitude Res. Lab., Denver and Johns Hopkins Hosp., Cardiovascular Div., Baltimore, Md.).
American Journal of Cardiology, vol. 18, Dec. 1966, p. 928–932. 16 refs.
Grants PHS HE-08728-02, 2 ROI HE 05584, FR-35, 1-K3-HE-29,237-01, and 1-F2-HE-28,655-01.

Significant pulmonary hypertension is present in most normal residents of the high altitude community of Leadville, Colorado, elevation 10,200 ft. One 15 year old girl with unusually severe pulmonary hypertension in Leadville was studied again after she had lived near sea level for 11 months. Marked regression of her pulmonary hypertension had occurred. This is the first demonstration of versibility of high altitude pulmonary hypertension in a girl of European ancestry.

A67-80466
FIELD-DEPENDENCE AND FORM DISCRIMINATION.
Glen M. Vaught and John Ellinger (Albion Coll., Mich.).
Psychonomic Science, vol. 6, Nov. 15, 1966, p. 357–358.

Rod-and Frame Test (RFT) scores were correlated with performance in a tactile form discrimination task. It was found that the more field-independent the subjects, the higher the accuracy in the discrimination task. Of additional interest was the finding that the strongest correlation emerged between female RFT scores and the active touch condition.

A67-80467
LIMITS OF DETECTION OF BERYLLIUM IN TISSUES BY MICROEMISSION SPECTROGRAPHY.
Solomon F. Brokeshoulder, Farrel R. Robinson, Anthony A. Thomas, and J. Cholak (Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
American Industrial Hygiene Association Journal, vol. 27, Nov.–Dec. 1966, p. 496–500. 11 refs.
Contract AF 33(615)-11036.

The metal beryllium has been successfully and unequivocally demonstrated by microemission spectrography on a semiquantitative basis in tissue sections 50 microns thick. The beryllium was localized in individual pulmonary granulomas in dogs exposed to beryllium. The determination of the lower limit of detection could indicate the threshold level of beryllium in tissue that can induce injury. Beryllium acetylacetonate dissolved in technical-grade xylene was used to prepare a series of working standards. Initial results indicate that as little as 1.48×10^{-12} gm. of beryllium is a sample of paraffin weighing about 2.91×10^{-8} gm. has been detected. Similar or greater quantities of beryllium have been demonstrated in similar-size samples of embedded lung tissue from dogs exposed to beryllium.

A67-80468
CHANGES OF THE CERTAIN IMMUNOBIOLOGICAL CRITERIA DURING THE CLIMATIC TREATMENT IN THE HIGH-MOUNTAINS [ZMENY NIEKTORYCH IMUNOBIOLOGICKYCH UKAZATEL'OV PRI VYSOKOHORSKEJ KLIMATICKEJ LIECBE CHRONICKEJ BRONCHITIDY].

J. Kolesár, M. Antal, and Z. Duranová.

Fysiatrický a reumatologický Vestník, vol. 44, Oct. 1966, p. 297–303. 10 refs. In Slovak.

The effect of rest treatment at the high altitude was investigated in ten patients suffering from chronic bronchitis. Changes in phagocytic ability of leucocytes, bactericidity of the serum, complement-values in serum, leucocyte-changes were studied during the six-week rest in Strbske. A decrease in all values was noted during the first 11–18 days; after this date the increase proceeded to the nearly initial level. The changes observed may be considered as signs of adaptation to the high-mountain climate.

A67-80469
HEMODYNAMICS DURING VESTIBULAR STIMULATION [GEMODINAMIKA PRI VESTIBULIARNYKH RAZDRAZHENIAKH].

I. I. Brianov, V. A. Degtiarev, N. A. Lapshina, N. D. Kalmykova, and S. R. Raskatova.

Voenno-Meditsinskii Zhurnal, no. 11, Nov. 1966, p. 45–50. 16 refs. In Russian.

Clinical tests of the cardiovascular system functions were performed before, during and after stimulation of vestibular apparatus in healthy young males. Few changes occurred in hemodynamics in persons who tolerated the effect of rotation and the coriolis effect. In subjects affected by rotational stress the changes in the hemodynamics were noted by a decrease in systolic and minute volume, and increase in the peripheral arterial resistance, and a fall of the pulse pressure. These changes usually indicated an onset of motion sickness. The important factor in the disturbance of blood circulation is the lack of venous return, which can be alleviated by leaning down the head and torso. Although in the same individual the hemodynamic response varied during the test, the coordinated characters of values indicated the degree of motion tolerance. This test may be valuable in selecting flight personnel and spacecrews.

A67-80470
EFFECT OF THE AVIATION NOISE ON CERTAIN FACTORS OF PROTEIN AND VITAMIN METABOLISM [VLIIANIE AVIATSIONNOGO SHUMA NA NEKOTORYE POKAZATELI BELKOVOGO I VITAMINNOGO OBMENA].

IU. F. Udalov, E. V. Lapeav, and IU. K. Syzrantsev.

Voenno-Meditsinskii Zhurnal, no. 7, Jul. 1966, p. 61–64. In Russian.

Young healthy males were exposed to noise of 110 db. intensity for three hours in a sound chamber. The frequency was about 150–2000 c.p.s. which is similar to the noise of jet engines. The effect on the protein metabolism was judged by the urinary excretion of the total nitrogen, urea nitrogen, ammonia and the index of imcomplete oxidation of urinary acid compounds. Blood was analyzed for substances connected with protein metabolism. The results did not indicate a state of stress, and the indices of nitrogen metabolism did not show any shift. There was some indication of a decrease in blood concentration of some amino acids. Tests for the metabolic pathways of injected vitamins indicated an increase in excretion of vitamins. Amino acid concentration was slightly increased with exception of glutamic acid which was higher after the exposure, while the blood glutamic acid was lower.

A67-80471
RESISTANCE OF WHITE MICE TO DIFFERENT ENVIRONMENTAL TEMPERATURES [USTOICHIVOST' ORGANIZMA BELYKH MYSHEI K RAZLICHNYM TEMPERATURAM VNESHNEI SREDY].

I. P. Shcherbachev (S. M. Kirov Mil.-Med. Acad., Dept. of Avaiation Med., Leningrad, USSR).

Fiziologicheskii Zhurnal SSSR, vol. 52, Sep. 1966, p. 1136–1138. 12 refs. In Russian.

Experiments were conducted on white mice kept in thermal chambers in which the temperature could be regulated from −65°C. to 100°C. The body temperature was measured, and the results indicated that optimism temperature range for survival was between 0°C. and 40°C. Survival time as a function of the ambient temperature had a hyperbolic character, which may be considered common for all warm-blooded animals. It appears that below −25°C. and above 45°C. the thermoregulatory mechanisms of the body are not adequate for sustaining life for long periods of time.

A67-80472
FUNCTIONAL CHANGES IN THE CUTANEOUS THERMORECEPTIVE SYSTEM DURING THERMOREGULATION [FUNKTSIONAL'NYE IZMENENIIA TERMORETSEPTORNOI SISTEMY KOZHI V PROTSESSE TERMOREGULIATSII].

L. M. Kurilova (USSR, Acad. of Med. Sci., Inst. of Normal and Pathol. Physiol., Lab. for Physiol. and Pathol. of Sensory Organs, Moscow).

Fiziologicheski Zhurnal, vol. 52, Sep. 1966, p. 1144–1151. 26 refs. In Russian.

The degree of involvement of the skin thermoreceptor system in the body heat regulation was studied in healthy adults and patients. The results of tests showed that the number of cold and heat receptors which were functioning at any given time depended on the type of stimulus (local or general), and the duration of stimulation. In patients the cold and heat sensitivity often remained normal, while the number of thermoreceptor units did not reflect the normal state of skin. Feedback through the efferent paths determined the number of functioning units in the thermoanalyzer. This fact was important in coordination of all adaptation mechanisms which took part in the body heat regulation.

A67-80473
EFFICIENCY OF INTERMITTENT WORK IN COMPARISON WITH A CONTINUOUSLY PERFORMED WORK OF THE SAME VOLUME [UCINNOST INTERVALOVE PRACE VE SROVNANI S KONTINUALNE PROVADENOU PRACI STEJNEHO OBJEMU].

Jaroslav Čermák.
Pracovní lékařství, vol. 18, Aug. 1966, p. 279–282. 11 refs. In Czech.

Differences in efficiency of the performed work were investigated in case of the continuous work (100 W/20 min., 90 turns on a bicycle ergometer), and in work performed at intervals (200 W/5×2 min.). In sportsmen trained for a longer work of cyclic character track, bicycle and sking a higher efficiency was found in the case of interval work ($P < 0.001$, resp. $P < 0.05$) than in work of a half intensity, which was performed in steady state. This is considered as a consequence of specific adaptation of muscles of lower extremities to laborious work and of the adaptation of the whole organism to an intensive longer work. In gymnasts having a different type of training no differences were found in the efficiency of the both types of work.

A67-80474
FRACTIONATION OF LIPIDS [FRAKTSIONIROVANIE LIPIDOV CHLORELLA PYRENOIDOSA].
IU. I. Maslov.
Vestnik Leningradskogo Universiteta, no. 21, 1966, p. 102–109. 21 refs. In Russian.

A method of fractionation of total lipid extract from *Chlorella pyrenoidosa* cells is developed. About 100 mg of lipid mixture in petroleum hydrocarbon is poured on a column of 15 g of silicic acid. 200 ml of petroleum hydrocarbon and 100 ml of mixture of petroleum hydrocarbon and diethyl ether (80: 20 v/v) eluate neutral (nonpolar) lipids. 200 ml of mixture of petroleum hydrocarbon and diethyl ether (20: 80 v/v) remove the fraction of pigments, 200 ml of acetone eluate glycolipids and, finally, the phospholipids are eluated by 150 ml of neutral and 100 ml of acidified (by HCL) methanol.

A67-80475
EFFECT OF LUNG VOLUME ON SPONTANEOUS BREATHING AND ON CO_2 VENTILATION REACTION IN THE DOG [DER EINFLUSS DES LUNGENVOLUMENS AUF DIE SPONTANATMUNG UND DIE VENTILATORISCHE CO_2-REAKTION BEIM HUND].
Claus Albers, Wolfgang Usinger, and Klaus Pleschka
(Max-Planck-Gesellschaft, W. G. Kerckhoff-Inst., Bad Nauheim, West Germany).
Pflügers Archiv für die gesamte Physiologie, vol. 291, Sep. 5, 1966, p. 221–235. 44 refs. In German.

The effects of inflating or deflating the lungs on the spontaneous ventilation and the CO_2 response curve were investigated in 16 dogs under light anesthesia (Chloralose or Pernocton) using positive or negative pressure breathing. Negative pressure breathing caused an increase of respiratory rate and total ventilation whereas tidal volume and arterial CO_2 tension decreased. The opposite effect was observed with positive pressure breathing. The CO_2 response curve for the total ventilation and for the respiratory rate were shifted to lower values of arterial CO_2 tensions with negative pressure breathing and to higher values of CO_2 tensions with positive pressure breathing. The slope of the CO_2 response curves however was not influenced systematically by changing the lung volume. After cutting both vagus nerves changes in lung volume did not influence the spontaneous ventilation and the position of the CO_2 response curve. Rising the arterial CO_2 tension increased the respiratory rate both before and after vagotomy. It is concluded that vagal afferent impulses and CO_2 are additive in producing the net respiratory drive rather than interacting in a multiplicative manner.

A67-80476
PRELIMINARY RESULTS OF INVESTIGATION OF NOISE EFFECT ON SOME VEGETATIVE FUNCTIONS [PREDBEZNE VYSLEDKY VYSKUMU VPLYVU HLUKU NA NIEKTORE VEGETATIVNE FUNKCIE].
L'udmila Blažeková.
Pracovni lekařstvi, vol. 18, Aug. 1966, p. 276–279. 9 refs. In Czech.

The blood-pressure, pulse-rate and electrocardiogram were investigated in ten healthy subjects age 15–25 who were exposed to noise of various frequencies, and to accoustic pressure of 85 db. Changes of the blood-pressure and pulse-rate caused by noise effect were negligible; an increase or a decrease did not exceed in average 10 mm. Hg or 7 pulse/min. However, during some frequencies they were statistically significant. The most frequent change observed on electrocardiogram due to noise effect was the height of T_2 wave, being increased by 1/2-2 mm. The frequency of this phenomenon was of statistical significance. Results are only preliminary and will be completed by investigation of skin temperature and plethysmography, in order to contribute to development of a complete criterion; based on it the noise-standard will be determined.

A67-80477
RADIOTELEMETRY OF TEMPERATURE MEASUREMENT DATA OF HUMAN STOMACH AND INTESTINE [PRIMENENIE RADIOTELEMETRII DLIA ISSLEDOVANIIA TEMPERATURY V ZHELUDKE I KISHECHNIKE CHELOVEKA].
E. B. Babsskii, B. E. Votchal, and A. S. Belousov (USSR, Acad. of Med. Sci., Inst. of Normal and Pathol. Physiol., Central Inst. of Advan. Training of Physicians and Lab. of Clin. Physiol., Moscow).
Terapevticheskii Arkhiv, vol. 37, Nov. 1965, p. 96–100. 5 refs. In Russian.

In healthy people radiotelemetric examinations showed uniform temperature waves in various parts of the digestive tract. When the radiocapsule passes the small intestine the temperature wave was the highest, and when it passes through the stomach and the ampulla of the large intestine it is the lowest. In various acute and chronic inflammatory processes (acute gastritis, acute colitis, chronic ulcerative colitis, subacute cholecystitis) registration of temperature showed changes of temperature in the corresponding localizations of inflammatory processes in the segments of the digestive tract. The clinical observations showed that radiotelemetric thermometry in the stomach and intestine of healthy individuals and patients provided valuable data on the condition of the gastrointestinal tract and helped to reveal local foci of inflammation.

A67-80478
EFFECT OF OXYGEN LACK ON THE MICROPHONIC POTENTIALS OF THE GUINEA PIG [VLIV NEDOSTATKU KYSLIKU NA MIKROFONNI POTENCIALY MORCETE].
L. Faltýnek and C. Veselý
Ceskoslovenská Otolaryngologie, vol. 15, Oct. 1966, p. 260–263. 10 refs. In Czech.

The effect of hypoxia, induced by inspiration of the mixture of 5% O^2 in nitrogen and by asphyxiation during a two minute closing of the trachea on the microphonic potentials of the guinea-pig is described. In both cases the decrease of amplitude of the microphonic potentials occurred. After the breathing recovery the amplitude of the microphonic potentials gradually returned to normal. By the intravenously administered adenosine triphosphate the amplitude decrease of the microphonic potentials during aspiration of the mixture was checked and the restitution of the microphonic potential decreased during asphyxiation from the trachea closure was considerably speeded up.

A67-80479
CRITICAL FUSION FREQUENCY AS A FUNCTION OF EXPOSURE TIME.
Duane A. Anderson, Jane Huntington, and Ernst Simonson (Minn. U., Lab. of Physiol. Hyg., Minneapolis).
Journal of the Optical Society of America, vol. 56, Nov. 1966, p. 1607–1611. 17 refs.
Grant NIH NB-01404.

The effect of exposure time from 0.1 to 1.1 sec. on the critical flicker frequency (CFF) was studied. For all five subjects the CFF drops with shortening of the exposure time below 0.5 to 0.7 sec. gradually to 0.2 sec. and steeply below 0.2 sec. The steepness of slope varied with the light-dark ratio (LDR) in the following order from most to least pronounced: LDR=1:9, 5:5, 9:1. The data were plotted in terms of "critical number of flashes," i.e., the number of light flashes at fusion multiplied by exposure time in milliseconds, versus exposure time. There was a linear relationship between 0.2 to 0.9 sec.

A67-80480
FREQUENCY DOUBLING IN VISUAL RESPONSES.
D. H. Kelly (Itek Corp., Vidya Div., Palo Alto, Calif.).
(Opt. Soc. of Am., 50th Anniv. Meeting, Washington, D.C., Mar. 1966).
Journal of the Optical Society of America, vol. 56, Nov. 1966, p. 1628–1633. 12 refs.
Contract DA-44-009-AMC-453(T).

This paper reports an unexpected visual phenomenon. When a wide, photopic stimulus field is sinusoidally modulated in both space and time, over a certain frequency range the apparent spatial frequency of the stimulus is doubled. In its original form, the (deLange) flicker-fusion model which has been accepted by the author and others cannot account for this result. But it can be explained by assuming that there is a second (low-pass) filtering operation which follows the nonlinear (brightness) response of the visual system, rather than preceding it. If this hypothesis is correct, then the frequency-doubling effect is the result of neural mechanisms which are more central than the locus of flicker fusion.

A67-80481
RESERPINE: ITS EFFECT ON THE SLEEP-DREAM CYCLE IN MAN.
Ernest Hartmann (Tufts U., Boston State Hosp., Medford, Mass.).
Psychopharmacologia, vol. 9, Oct. 6, 1966, p. 242–247. 16 refs.

The effect of reserpine on the sleep and dream patterns of six normal human subjects was investigated. All-night electroencephalogram (EEG) and eye-movement recordings were obtained on about 15 nights for each subject. Results indicate that reserpine, in single doses of 1.0 to 2.0 mg. increased the time spent in the D-state ("dreaming sleep", "rapid eye movement sleep") both in absolute terms and as a percentage of total time asleep. Reserpine also increased the number of awakenings but did not significantly affect the total amount of sleep. It is suggested that the central effect of reserpine, its action in releasing serotonin and norepinephrine from storage in brain cells, is probably involved.

A67-80482
EFFECT OF THE LABYRINTH VESTIBULAR PORTION ON POST-ROTATION CHANGES OF ADRENALIN AND NORADRENALIN CONTENTS IN WHITE RAT TISSUES [ROL' VESTIBULIARNOI CHASTI LABIRINTOV V POSTVRASHCHATEL'NYKH IZMENENIIAKH UROVNIA SODERZHANIIA ADRENALINA I NORADRENALINA V NEKOTORYKH TKANIAKH BELYKH KRYS].
A. A. Pushkarchuk (Acad. of Sci., Inst. of Physiol., Bessarabian SSR).
Doklady Akademii Nauk BSSR, vol. 10, Oct. 1966, p. 803–807. 21 refs. In Russian.

Intact white rats and rats with destroyed labyrinths were subjected to an acceleration stress (0.6–0.16 g) for a period of one min. The animals were sacrificed immediately and samples of brain, heart, adrenal glands and skeletal muscles were analyzed for the adrenaline and nor-adrenaline content. The nor-adrenaline values showed an increase in brain, heart and skeletal muscles after the exposure. The adrenaline content of these tissues varied with the individuals, with the exception of the medula where it was increased. The adrenaline content of the adrenal glands was also increased, but the noradrenaline showed greater values only after a maximum stress. The destruction of labyrinths caused an increase in catechnolamines in all tested tissue, except the heart muscle where the noradrenalin content was less than normal. Rotation of the operated animals did not show the same degree of the increase in the cathecholamines, and at low accelerations the readings varied. It can be concluded that the vestibular apparatus affects the catecholamine content after acceleration stress.

A67-80483
CHANGES IN HUMAN BODY FUNCTIONS AND WORK CAPABILITY DUE TO THE VELOCITY OF CO_2 INCREASE IN A SEALED CHAMBER [IZMENENIE FUNKTSII ORGANIZMA CHELOVEKA I EGO RABOTOSPOSOBNOSTI V ZAVISIMOSTI OT SKOROSTI NARASTANIIA SODERZHANIIA UGLEKISLOTY V GERMETIZIROVANNOM POMESHCHENII].
V. P. Zagriadskii, O. IU. Sidorov, and Z. K. Sulimo-Samuillo.
Voenno-Meditsinskii Zhurnal, no. 10, Oct. 1966, p. 58–61. In Russian.

Biochemical tests in young, healthy male subjects enclosed in the sealed chambers showed certain changes in the body functions. With the 1–3 $m.^3$ available air per person the increase in the CO_2 concentration was equal to 250 ml./min. at rest, and 830 ml./min. during moderate exercise requiring 3–5 kcal. per 1000 gm. of body weight. The increase during one hour was about 6% of the total air volume, which resulted in the increased CO_2 concentration of the inhaled air and subsequent adaptation to hypercaphia. The blood alkaline reserve and the function of the suprarenal glands decreased, while the erythrocyte fragility increased. Thematopoieses was stimulated, and blood circulation was slightly increased. Mental work reflected an increase in the performance rate, but a decrease in accuracy. When the CO_2 concentration reached 6% during 2–5 hrs. When the same concentration was reached within one hr. the performance rate decreased as well as the accuracy. An increase in oxygen concentration to 21% improved the performance considerably.

A67-80484
EXPERIMENTAL STUDY OF ILLUSIONS OF THE POSITION IN SPACE DURING FLIGHT [EKSPERIMENTAL'NOE IZUCHENIE ILLIUZII PROSTRANSTVENNOGO POLOZHENIIA V POLETE].
E. A. Derevianko and V. G. Kuznetsov.
Voenno-Meditsinskii Zhurnal, no. 11, Nov. 1966, p. 50–54. In Russian.

The study was performed in an aircraft equipped with devices allowing the measurement of physiological responses in order to establish the cause, conditions and mechanism of illusion due to dominance of the vestibular analyzer over the visual judgement of body position in space. Sensors were employed which established acceleration stress, banking, angular

acceleration during banking, start, recovery, and the extent of skidding. The subjective reactions of leans and skidding to the right or left were recorded by pressing buttons by subjects. The tests were conducted in dark compartments of the aircraft. The results were used to establish the sensitivity of the afferent pathways to various types of acceleration, the latency of response, the degree of displacement of perceived position from the real, and the duration of illusory sensation. Three types of illusions were noted after the actual banking ceased. These were continuations of banking in the same direction, also in opposite direction, and combination of both directions. Medical intervention through training to prevent such illusions is of great importance.

A67-80485

CONTRIBUTION TO THE PROBLEM OF EXCRETION OF ADRENOCORTICAL PRODUCTS IN DEPENDENCE ON CLIMATIC CONDITIONS [PRISPEVOK K OTAZKE VYLUCOVANIA ADRENOKORTIKALNYCH PRODUKTOV V ZAVISLOSTI OD KLIMATICKYCH PODMIENOK].

Václav Krampl and Miloslav Hubač.

Pracovní lékařství, vol. 18, Aug. 1966, p. 272–276. 13 refs. In Czech.

Changes in urinary excretion of 17-ketosteroids, 17-ketogenous steroids, sodium and potassium were investigated within 24 hours once in a quarter in individual year seasons (winter-spring-summer-autumn-winter), in following occupations; agricultural workers, workers of freezing plants permanently exposed to low temperature of their working environment, workers employed in enamelling exposed to heat stress, and employees exposed to a standard room temperature, in order to determine the load of the organism by microclimatic conditions. It was found that the excretion of 17-ketosteriods and 17-ketogenous steroids in urine is influenced by seasonal changes on the first place, the effect of microclimatic conditions being marked in a certain extent. However, also other factors are participating significantly on excretion of these steroids metabolites. These factors are not connected with the effect of climatic conditions; the excretion of 17-ketosteroids and 17-ketogenous steroids cannot serve solely as a criterion for quantitative evaluation of effect of climatic conditions on the organism. Results showed that the production of 17-ketosteroids and 17-ketogenous steroids is in connection with the sodium metabolism and will probably be dependent on its reception.

A67-80486

THE EFFECTS OF VENTILATION OF DOGS WITH DIFFERENT GAS MIXTURES ON AIRWAY CALIBRE AND LUNG MECHANICS.

M. Green and J. G. Widdicombe (U. Lab. of Physiol., Oxford, Great Britain).

Journal of Physiology, vol. 186, Oct 1966, p. 363–381. 34 refs. M.R.C. and Roy. Soc. supported research.

Dead space (CO_2-front method), lung compliance, cervical trachael volume change and total lung resistance were measured simultaneously in anaesthetized dogs, paralysed or open-chest, and the responses to nerve section and stimulation and to ventilation of the dogs with different gas mixtures were studied. Bilateral cervical vogotomy changed all four parameters in a way consistent with airway dilation, and bilateral vagal stimulation had the opposite actions. A weak airway dilator role was indicated for the sympathetic nerves. Ventilation with 4% CO_2, 8% CO_2 or 10% O_2 changed all four parameters as if the airways had constricted, and 100% O_2 caused opposite, but weaker, responses. The responses to the three airway constricitng gas mixtures were present, but reduced in intensity, after bilateral cervical vagotomy and some even weaker responses were present after additional bilateral sympathectomy. During restoration of airway smooth muscle tone by electrical stimulation of the distal ends of the cut vagus nerves, administration of CO_2-rich or hypoxic gas mixtures had no greater effect than during controls with vagi cut but without stimulation. No dilator responses to hypercapnia or hypoxia were seen, either in innervated or denervated trachea and airways.

A67-80487

HELICOPTER TRAINEE PERFORMANCE FOLLOWING SYNTHETIC FLIGHT TRAINING.

Paul W. Caro, Jr. and Robert N. Isley (HumRRO Div. No. 6 (Aviation), Fort Rucker, Ala.).

(Southeastern Psychol. Assn., Meeting, New Orleans, La., 1966).

Journal of the American Helicopter Society, vol. 11, Jul. 1966, p. 38–44.

In a study to determine whether the use of a synthetic helicopter flight training device would improve the subsequent primary flight performance of trainees at the U.S. Army Primary Helicopter School, two groups were trained to "fly" a captive helicopter mounted on a ground effects machine. The device had the approximate handling characteristics of a free-flying vehicle, yet it allowed the trainees to obtain "aeronautical experience" not otherwise possible at their level of training. It was found that the device-trained subjects, when compared with non-device-trained controls, were significantly less likely to be eliminated from subsequent primary helicopter training for reasons of flight skills deficiency. Further, measures of relative performance during primary flight training indicated the device-trained group soloed the helicopter earlier and made better flight grades during the pre-solo phase of training than did the controls. Implications of the device concepts investigated in this study are illustrated.

A67-80488

FUNCTIONAL AND MORPHOLOGICAL CHANGES IN THE THYROID GLAND AFTER ULTRASONIC IRRADIATION.

Ivo Hrazdira and Milan Konečný (Purkyne U., Fac. of Med., Dept. of Radiol. and Nucl. Med. and Dept. of Med. Phys., Brno, Czechoslovakia).

American Journal of Physical Medicine, vol. 45, Oct. 1966, p. 238–243. 6 refs.

Action of ultrasonic irradiation on the thyroid gland of rabbits was studied. Irradiation with therapeutical intensities of ultrasound (up to 2 watts per $cm.^2$) produces a decrease of radioiodine uptake by the thyroid. As a result of histological and histoautoradiographical examinations a partial loss of concentrating activity by the follicular epithelium is suggested.

A67-80489

THE ROLE OF ISOCITRATE LYASE IN THE METABOLISM OF ALGAE.

Linda C. Harrop and H. L. Kornberg (Leicester U., Dept. of Biochem., Great Britain).

Proceedings of the Royal Society, vol. 166, Nov. 15, 1966, p. 11–29. 50 refs.

Grant SRC B/SR/652 and Med. Res. Council supported research.

The incorporation of isotope from [2-^{14}C] ethanol by cultures of the Brannon no. 1 strain of *Chlorella vulgaris*, growing on ethanol aerobically in the dark, was consistent with the operation of the tricarboxylic acid and glyoxylate cycles.

Results obtained with [1-^{14}C] acetate, added to similar cultures growing on glucose in the dark or on carbon dioxide in the light, indicated that the glyoxylate cycle did not function under these conditions. However, one of the key enzymes of this cycle, isocitrate lyase, was present in large amounts in extracts of this organism under all conditions of growth; in contrast, isocitrate lyase was inducibly formed by *Chlamydomonas reinhardii* prior to growth on acetate. No obvious disfunction of the tricarboxylic acid cycle, which might necessitate the activity of isocitrate lyase during growth on other than C_2-compounds, was detected in the Brannon no. 1 strain, nor were differences observed between the properties of the enzyme purified from cells grown on acetate and on glucose. But, whereas isocitrate lyase was wholly found in a soluble fraction of the organism after growth on glucose or on carbon dioxide, acetate-grown cells contained a major portion of their isocitrate lyase in a dense, particular fraction. The Brannon no. 1 strain of *Chlorella* excreted labelled glycollate during growth in the dark on glucose in the presence of sodium [^{14}C] bicarbonate, but ceased to do so after transfer to acetate growth medium. The Pearsall's strain of *Chlorella,* which does not form isocitrate lyase under all conditions of growth, but that this enzyme participates in the glyoxylate cycle only when it is incorporated into a particulate structure.

A67-80490
PERFORMANCE CHANGES AT MODERATELY HIGH ALTITUDE: SHORT-TERM MEMORY MEASURED BY FREE RECALL.
Laura W. Phillips and Nello Pace (Calif. U., Berkeley and White Mt. Res. Sta., Bishop, Calif.).
Psychological Reports, vol. 19, Oct. 1966, p. 655–665. 12 refs.
Grant PHS GM-09268.

Short-term memory for common English words was tested both at 3800 m. altitude and at sea level. Recall for half the lists was tested immediately and half after 30 sec. delay. Eighteen subjects were run at both altitudes in a counterbalanced design. The words were presented serially in 10-item lists at a rate of one sec. each. Standard physiological tests showed significant reaction to the hypoxia. No significant change in total recall scores was found; however, improvement on some items cancelled out the slight decrement in others. These differential changes at altitude were a function of the serial positions of the items. The interaction was significant but transitory. The order-of-recall of the items reflected the differential recall frequencies and also showed a significant interaction between recall interval and altitude. The results are discussed in terms of proactive inhibition and increased generalized drive, possibly related to autonomic arousal at high altitude.

A67-80491
EFFECTS OF SLEEP DEPRIVATION AND REVERSAL OF DIURNAL ACTIVITY ON PROTEIN METABOLISM OF YOUNG MEN.
N. S. Schrimshaw, J. P. Habicht, P. Pellet, M. L. Piché, and B. Cholakos (Mass. Inst. of Technol., Dept. of Nutr. and Food Sci., Cambridge).
American Journal of Clinical Nutrition, vol. 19, Nov. 1966, p. 313–319. 18 refs.
Contract DA-49-193-MD-2239 and Grant NIH AM 06274.

In the present study the effects of sleeplessness and sudden reversal of the diurnal sleep pattern on protein metabolism and protein requirements were studied. Six male university students, aged 19–24, were studied during two days without sleep and for four days afterwards. Nineteen similar subjects, aged 19–27, were subjected to two to seven days of work and meals on a reversed dirurnal pattern, following 24 hours of sleep deprivation. Of these, one group of nine students was followed for nine days after returning to a normal diurnal pattern. A constant amount of a liquid formula diet was fed through the studies and complete urine collections were obtained. Deprivation of sleep for 24 hours, whether a prelude to a reversal of diurnal pattern or to further sleeplessness, resulted in retention of nitrogen, sodium and water, and a decrease in pulse rate and body temperature. The principal finding was an average increase of 7% in nitrogen excretion on the second day of reversal there was an average increase in nitrogen excretion of 5%. Maximum individual responses were a 20% increase in nitrogen excretion on the day following sleep deprivation and a 10% average increase for five days following sleep reversal.

A67-80492
EFFECT OF CHLORAMPHENICOL ON MUTANTS OF CHLORELLA PYRENOIDOSA.
Franz-Christian Czygan (U. Botan. Inst., Erlangen, West Germany).
Nature, vol. 212, Nov. 26, 1966, p. 960. 7 refs.
Deut. Forschungsgemeinschaft supported research.

The mutants of a wild strain of *chlorella pyrenoidosa* possessed the biochemical characteristics of the original strain but not the ability to liquefy gelatin and to synthesize the secondary carotenoids during nitrogen deficiency, although hydrogenase was present. The mutants did not grow in the inorganic medium. The addition of 10^{-4} molar concentration of chloramphenicol caused some cells to turn green after four–eight weeks. The control cultures with glucose and glutamic acid indicated that the effect of chloramphenicol was not caused by the assimilation of the carbon skeleton or by the normality of the chloramphenicol. After transfer to the inorganic medium lacking chloramphenicol the mutants recovered all biochemical characteristics of the wild strain.

A67-80493
EFFECT OF THYROCALCITONIN ON BONE.
G. V. Foster, F. H. Doyle (Roy. Postgraduate Med. School, London, Great Britain), P. Bordier, and Hayde Matrajt (Centre du Metab. Phosphocalcique, Hop. Lariboisière, Paris, France).
Lancet, vol. 2, Dec. 31, 1966, p. 1428–1431. 22 refs.

The long-term effect of thyrocalcitonin was determined in a series of parathyroidectomised rats. Thyrocalcitonin was given subcutaneously, either as 160 or 80 milliunits daily in buffer for 28 days; control animals were given buffer alone. Caudal vertebrae were examined by quantitative radiology and quantitative microscopy. Thyrocalcitonin was found to act on bone independently of parathyroid hormone. It increased trabecular bone in the metaphyses. This increase is due to a reduction of bone resorption.

A67-80494
EFFECTS OF VOLUNTARY AND INVOLUNTARY MEDIATION ON ESTIMATES OF SHORT TIME INTERVALS.
Elvis C. Jones and Richard L. Narver (Tex. Christian U., Fort Worth).
Psychonomic Science, vol. 6, Dec. 25, 1966, p. 505–506. 5 refs.

Subjects estimated five sec. and twenty sec. intervals via the method of production or reproduction. Different groups of subjects were either given no instructions as to the bases on which to estimate, were told to count their pulses, or were instructed

to orally count "one-thousand-one, one-thousand-two, etc." Subjects were trained with and without knowledge of results. Correlations between group means over trials suggest that the method of production may be mediated by involuntary processes, but that reproduction of 20 sec. intervals may be mediated by other processes.

A67-80495

IMPROVEMENT OF SUSTAINED ATTENTION WITH CYLERT.

George A. Talland (Harvard U., Med. School, Cambridge, Mass.).

Psychonomic Science, vol. 6, Dec. 15, 1966, p. 493–494. 5 refs.

Abbott Labs. supported research.

Cylert (pemoline with magnesium hydroxide) administered in single doses of 25 mgm. improved accuracy in performance of a continuous attention task. This effect was strongest within an hour from oral administration of the drug, and on a task that involved a relatively difficult test in short term memory. The findings are considered as evidence for a non-specific alerting or anti-fatigue effect, as distinct from a specific effect on memory function attributed to Cylert.

A67-80496

ELECTRICAL RESPONSES OF THE HUMAN EYE TO CHANGES IN WAVELENGTH OF THE STIMULATING LIGHT.

Lorrin A. Riggs, E. Parker Johnson, and Amy M. L. Schick (Brown U., Hunter Lab. of Psychol., Providence, R. I.).

Journal of the Optical Society of America, vol. 56, Nov. 1966, p. 1621–1627. 7 refs.

Grant PHS NB-01453.

The eye fixates on a stationary point at the center of a pattern consisting of alternate stripes of two different wavelengths of light. The pattern exhibits quick, lateral displacements so that each point on the observer's stationary retina is exposed first to one wavelength, then to the other, then back to the first, and so on for several hundred repetitions. A conventional corneal electrode, together with amplifying equipment and a computer of average transients, provides cumulated records of the electrical responses of the eye to these wavelength shifts. The striped pattern is used to present pairs of monochromatic lights throughout the visible spectrum, the energy of each individual monochromatic light being carefully adjusted so as to be capable of producing a constant amplitude of electrical response from the eye. Alternation between two such monochromatic lights yields electrical responses, the amplitudes of which are related to the difference in wavelength between the two lights. We have found that the algebraic sums of output functions of three color response mechanisms provide a reasonably good fit to the measured amplitudes of response. We conclude that wavelength changes arouse responses, at the retinal level, that are consistent with a simple, additive trichromatic theory.

A67-80497

RESERPINE: ITS EFFECT ON THE SLEEP-DREAM CYCLE IN MAN.

Ernest Hartmann (Tufts U., Boston State Hosp., Medford, Mass.).

Psychopharmacologia, vol. 9, Oct. 6, 1966, p. 242–247. 16 refs.

The effect of reserpine on the sleep and dream patterns of six normal human subjects was investigated. All-night electroencephalogram (EEG) and eye-movement recordings were obtained on about 15 nights for each subject. Results indicate that reserpine, in single doses of 1.0 to 2.0 mg. increased the time spent in the D-state ("dreaming sleep", "rapid eye movement sleep") both in absolute terms and as a percentage of total time asleep. Reserpine also increased the number of awakenings but did not significantly affect the total amount of sleep. It is suggested that the central effect of reserpine, its action in releasing serotonin and norepinephrine from storage in brain cells, is probably involved.

A67-80498

THE EFFECTS OF HYPERVENTILATION ON THE REFLEX CARDIAC RESPONSE FROM THE CAROTID BODIES IN THE CAT.

Mary J. Scott (New South Wales U., School of Physiol., Kensington, Australia).

Journal of Physiology, vol. 186, Oct. 1966, p. 307–320. 25 refs. Life Insurance Fund, Australia and New Zealand supported research.

Cats were anaesthetized with chloralose and urethane, and ventilated by an artificial intermittent negative pressure applied to the thorax. The carotid body chemoreceptors were isolated and perfused with oxygenated blood. They were stimulated by substituting hypoxic blood obtained from a donor animal. Stimulation of the carotid bodies during constant ventilation caused a bradycardia. When an artificial hyperventilation was induced during carotid body stimulation the heart rate increased. The increase in heart rate during hyperventilation, and while the carotid bodies were being stimulated, was due to at least two mechanisms; first a reflex from the lungs, and secondly, a fall in arterial blood carbon dioxide tension, both of which accompany the hyperventilation.

A67-80499

FASTING AND REFEEDING OF VARIOUS SUBOPTIMAL ISOCALORIC DIETS: EFFECTS ON MINERAL AND NITROGEN BALANCES IN OBESE PATIENTS.

John E. Jones, Margaret J. Albrink, Paul C. Davidson, and Edmund B. Flink (W. Va. U., Med. Center, Dept. of Med., Morgantown).

American Journal of Clinical Nutrition, vol. 19, Nov. 1966, p. 320–328. 31 refs.

Grants PHS AM 05578, NB 03152, and HE 06714.

Mineral and nitrogen balance studies were carried out in six obese patients during short-term fasts and refeeding with suboptimal isocaloric diets composed primarily of carbohydrate, fat and essentially equal mixtures of protein, fat and carbohydrate. Two patients were studied during the ingestion of diets containing only protein. Sodium and nitrogen retention were greatest during refeeding with carbohydrate-containing diets. A diet composed largely of fat did result in sodium and nitrogen retention, but at a slower rate and to a lesser degree than observed with diets containing substantial amounts of carbohydrates. Sdoium and nitrogen retention with the fat diet were greatly potentiated by prior carbohydrate feeding. Plasma ketones increased during fasting, were maintained at high levels during refeeding with fat diets, and decreased quickly towards normal with carbohydrate diets. The rate of decline and degree of reduction of plasma ketones were directly correlated to the carbohydrate content of the diets. Calcium balance and urinary excretion of calcium appeared to be directly correlated to the degree of ketosis. Even though fasting may activate mechanisms leading to maximum nitrogen retention on refeeding, fat is unable to initiate nitrogen retention nearly as effectively as carbohydrate or protein.

A67-80500

TEMPERATURE REGULATION IN MAN—A THEORETICAL STUDY.

J. A. J. Stolwijk and J. D. Hardy (Yale U., School of Med., Dept. of Physiol. and John B. Pierce Found. Lab., New Haven, Conn.).
Pflügers Archiv für die gesamte Physiologie, vol. 291, Sep. 5, 1966, p. 129–162. 70 refs.
NASA Contract NAS-9-4522 and Grant NIH GM-10289-02.

For purposes of theoretical analysis of experimental results and evaluation of hypothetical concepts a mathematical model of thermoregulation in man is presented. The human body is represented by three cylinders: the head, the trunk, and the extremities. Each cylinder is divided into two or more concentric layers to represent anatomical and functional differences in so far as they are of primary importance in thermoregulation. Heat flow between adjacent layers is by conduction, and all layers exchange by convection with a central blood compartment. All three skin layers exchange heat with the environment by conduction, convection, radiation, and evaporation. Signals which are proportional to temperature deviations in the brain and to deviations in average skin temperature are supplied to the regulator portion of the model. The regulator then causes evaporative heat loss, heat production by shivering or changes in the peripheral blood flow to occur in the appropriate locations in the body. If a proposed mechanism of thermoregulation it describes the relationshps between the input signals and the resulting thermoregulatory response; the model can be used to compare the quantitative response resulting from a proposed mechanism with the responses obtained by measurement. A number of experimental results are compared with predictions furnished by the mathematical model using a regulator with an output which is proportional to the product of the input signals. It is emphasized that models of this type should be used in close connection with an experimental program to attain their full usefulness.

A67-80501
THE LIGHT-DEPENDENT FORMATION OF NUCLEIC ACIDS IN CULTURES OF SYNCHRONIZED CHLORELLA.
H. Senger and N. I. Bishop (Ore. State U., Dept. of Botany and Plant Physiol., Corvallis).
Plant and Cell Physiology, vol. 7, Sep. 1966, p. 441–455. 41 refs.
Grant PHS GM-11745 and Deut. Forschungsgemeinschaft supported research.

(1) In synchronized auto- and mixotrophic cultures of *Chlorella pyrenoidosa* increased light intensities cause an increased ratio of deoxyribonucleic acid (DNA) and ribonucleic acid (RNA) (on a dry weight basis). In an achlorophyllous mutant a marked enhancement of RNA synthesis occurs but only a slight increase of DNA. It appears that the light dependent formation of nucleic acid in *Chlorella* is mainly induced by photosynthetically active light. However, RNA synthesis, and to some extent DNA synthesis, is stimulated by light most probably absorbed by carotenoids. (2) Comparison of the time course of DNA and RNA development during the life cycle in mixotrophic cultures to those reported for autotrophic cultures demonstrated that a marked change in the time of onset of DNA synthesis occurs although the burst of cell division, i.e., the visible effect of synchrony, happens at the same time. RNA is produced during the entire life cycle in both types of cultures; only the total amount differs. (3) The action spectrum for cell division in mixotrophic cultures of the normal strain compares, in the blue region, with the in vivo absorption spectrum of the achlorophyllous mutant: This evidence and the comparison of the nucleic acid formation under different wavelengths lead to the suggestion that RNA formation and induction of cell division might be connected.

A67-80502
OBSERVATIONS OVER THE LIFETIME OF A SMALL ISOLATED GROUP: STRUCTURE, DANGER, BOREDOM, AND VISION.
William M. Smith (Walter Reed Army Inst. of Res., Washington, D.C.).
Psychological Reports, vol. 19, Oct. 1966, p. 475–514. 66 refs.
Grants NSF 9904 and 19495.

Seven men, working as a self-contained unit in Antarctica, were observed from the beginning to the end of their association as a group. Presented and discussed are data on certain properties of informal group structure, effects of personal danger, monotony, boredom, and visual perception in whiteouts.

A67-80503
POSITIVE AFTERIMAGE AS A BACKGROUND LUMINANCE.
Norma D. Miller (Ohio State U., School of Optometry, Columbus).
Journal of the Optical Society of America, vol. 56, Nov. 1966, p. 1616–1620. 13 refs.
AF Systems Command supported research.

In one experimental session, each of six subjects received six flashes of 1.4-msec. duration from a centrally fixated 10° field of 4×10^5L. The brightness of the afterimage was tracked, following the first two flashes, by means of a monocular bipartite photometric field. The bipartite field was formed by blocking one-half of the flash field to provide a semicircular afterimage and arranging a semicircular comparison field in juxta-position. The comparison field could be varied over an 8-log-unit range by the subject. The density of the wedges was continuously recorded as the match was maintained. Recovery times for recognition of 28.7′ and 16.3′ Sloan Snellen letters at various luminance levels were measured following the other flashes. The letters were transilluminated and viewed against a dark surround. They were presented at one-second two successive letters, the luminance was reduced by introducing a neutral density filter. In this manner, ten imposed on a 10° variable-luminance field and each subject determined the field luminance necessary for threshold recognition of each letter condition. The recovery times for the various letter conditions were then predicted for each subject from his after-image brightness measurements and cross correlated with the measured recovery times. The correlation coefficient for the measured and predicted values was 0.82.

A67-80504
NERVE CONDUCTION VELOCITY DURING HYPOTHERMIA IN MAN.
Rudolph H. de Jong, William N. Hershey, and Irving H. Wagman (Calif. U., Biomech. Lab., San Francisco).
Anesthesiology, vol. 27, Nov.–Dec. 1966, p. 805–810. 15 refs.
Grants NIH GM-08013 and 5T1-GM-63-06.

Conduction velocity was determined for the fastest conducting fibers of the peroneal nerve supplying the extensor digitorium brevis muscle of seven surgical patients during hypothermia. Mean nerve conduction velocity prior to induction of hypothermia was 49.6 ± 0.9 m./sec. at a mean nerve temperature of 35.5°C. The association between conduction velocity and temperature was linear above 23°C. ($P<0.001$). Conduction velocity fell 1.84 m./sec. per degree fall in temperature between 36° and 23°C. Threshold stimulus strength remained constant down to 23°C. Below this temperature, stimulation threshold rose sharply and the nerve-muscle system became apparently inexcitable between 18° and 20°C. Conduction velocity could therefore not be studied below 20°C., although extrapolation

of the data to 0 m./sec. indicated that complete conduction block presumably occurred at 9°C. Changes observed in conduction velocity during cooling and rewarming are attributable to thermal effects on the neural membrane.

A67-80505
TEMPORAL LUMINANCE SUMMATION EFFECTS IN BACKWARD AND FORWARD MASKING.
Charles W. Eriksen (Ill. U., Urbana).
Perception and Psychophysics, vol. 1, Mar. 1966, p. 87–92. 15 refs.
Grants PHS MH-1206 and K6-MH-22,014.

Two experiments tested six predictions derived from the assumptions underlying the luminance summation-contrast reduction explanation for certain instances of forward and backward masking effects. The predictions concerned the circumstances under which masking would occur and also that forward masking would be more extensive than backward masking under specified luminance arrangements. All six predictions were confirmed.

A67-80506
DURATION, LUMINANCE, AND THE BRIGHTNESS EXPONENT.
S. S. Stevens (Harvard U., Lab. of Psychophys., Cambridge, Mass.).
Perception and Psychophysics, vol. 1, Mar. 1966, p. 96–100. 30 refs.

The relation of brightness to duration and luminance has been studied by matching one brightness to another and also by matching numbers to brightnesses (magnitude estimation). The two methods concur in confirming certain well-known visual functions: Bloch's law, the Broca–Sulzer effect, and the shift of the Broca–Sulzer enhancement to shorter durations when luminance increases. It is shown that the shift with luminance requires the exponent of the power function for short-flash brightness to be larger than the exponent for stimuli of longer duration. An attempt is made to analyze some of the reasons why the procedure advocated by Graham may not give comparable results.

A67-80507
PRELIMINARY FINDINGS ON SOME EFFECTS OF VERY FAST SEQUENTIAL INPUT RATES ON PERCEPTION.
Im. S. Mayzner, M. E. Tresselt, and A. Cohen (N.Y. U., New York City).
Psychonomic Science, vol. 6, Dec. 25, 1966, p. 513–514. 7 refs.

A study was made of the effects of presenting to the visual system a string of very fast sequential inputs, employing computer-based CRT display system. The results showed that for either five or ten inputs (i.e., all Xs, random letters, letters forming a work, or small line segments) approximate the first half of these sequentially presented inputs were not perceived, if display order was irregular and display input rate was fixed at certain values between clear simultaneity and clear sequentiality.

A67-80508
LEVEL OF ISOMETRIC STRENGTH AND ISOMETRIC ENDURANCE IN REPEATED CONTRACTIONS.
Walter Kroll (Tex. U., Austin).
Research Quarterly, vol. 37, Oct. 1966, p. 375–383. 21 refs.
Grant NIH NB-05305-01.

Thirty male subjects were given 20 trials of isometric wrist flexion on each arm. Each trial consisted of five sec. of maximum exertion followed by a 30 sec. rest period. Subjects were ranked on the basis of the first two trials for each of the limbs and divided into three groups of ten subjects each representing high, middle, and low levels of strength. Analysis of variance of the fatigue curve trends suggested that: (a) there is no biologically fixed and constant absolute critical intensity level of isometric muscular tension which occludes intramuscular circulation, and (b) different levels of strength possess dissimilar local circulatory efficiency and/or tolerance to fatigue products.

A67-80509
EFFECTS OF AUTOSUGGESTED MUSCLE CONTRACTION ON MUSCULAR STRENGTH AND SIZE.
Louis Bowers (Southwestern La. U., Lafayette).
Research Quarterly, vol. 37, Oct. 1966, p. 302–312. 9 refs.
Southwestern La., U. supported research.

The study investigated the effects of autosuggested muscular contraction on muscle strength and size as compared to the effects of isometric and static contraction exercises. The cross-transfer of strength and size development of the contralateral unexercised limb was also investigated, and an analysis by means of electromyographic techniques was made of the role of the suggested weight in autosuggested elbow flexion exercises. Male subjects (N=61) assigned to one of four groups performed five contractions of the elbow flexor muscles, which were either autosuggested, isometric, or static in nature, on three days a week for a six-week period. One group which served as a control performed no exercise. The results of the study showed that either isometric, static, or autosuggested muscular contractions significantly increased muscle strength but not over a six-week period. Further analysis, however, showed that isometric exercise was significantly more effective than either static or autosuggestion exercises in developing muscle strength. No crosstransfer of strength or size from the exercised to the contralateral unexercised arm occurred in this study. Electromyographic recordings indicated that the suggestion of lifting a heavy weight elicited a more forceful autosuggested contraction.

A67-80510
COMPARISON OF VARIOUS FACTOR ANALYSES OF CARDIOVASCULAR-RESPIRATORY TEST VARIABLES.
Thomas K. Cureton (Ill. U., Urbana).
Research Quarterly, vol. 37, Oct. 1966, p. 317–325. 46 refs.

Various factor analyses completed in the area of cardiovascular-respiratory tests between 1936 and 1962 were studied and the factors grouped into clusters of resting state, change of postural position from quiet sitting to lying or standing, moderate circulatory performing capacity, maximal performing capacity, recuperative ability after exercise, and respiratory capacity and reserve. The cardiovascular-respiratory tests were grouped according to three different types and periods of factor analyses. The factors from various studies are affected by the type of subjects, the body positions, and the relative state of fitness, and they can usually be subdivided. The various tests in the quiet state indicate relative sympathetic or parasympathetic dominance, blood flow, cardiac output, and metabolism. The electrocardiographic and ballistocardiographic observations have been included only in the last factor analyses. Moderate circulatory performing capacity tests indicate that there is relative economy to the work in terms of lower relative pulse rates, lower blood pressure during work, and lower relative oxygen intake for the relatively fitter men. The respiratory volumes have appeared as relatively independent from factor analyses of some authors.

A67-80511
SIMULATED GRAVITY: THE AVERSIVE STIMULUS IN AN ESCAPE AND PUNISHMENT SITUATION.
R. Chris Martin (Hollins Coll., Va.), W. K. Richardson, and Wayne L. Martin (Ky. U., Lexington).
Journal of Engineering Psychology, vol. 5, no. 1, 1966, p. 21–24.
NASA Grant NsG456.

Squirrel monkeys learned a lever-press response to escape from the centrifugally produced accelerations of 2 g, as shown by decreases in latency of response. The onset of 2 g was then made contingent upon the response and resulted in increased latencies. After exposure to the above conditions performance on the escape task was disrupted. The results demonstrate the aversiveness of simulated gravity (2 g) and accent the importance of separating the affects of rotation from the effects of g-forces.

A67-80512
PAIN AND ENDURANCE OF ISOMETRIC MUSCLE CONTRACTIONS.
Lee S. Caldwell (U.S. Army Med. Res. Lab., Fort Knox, Ky.) and Richard P. Smith (Louisville U., Ky.).
Journal of Engineering Psychology, vol. 5, no. 1, 1966, p. 25–32. 8 refs.

Twelve subjects maintained a constant pressure on a hand dynamometer as long as possible and reported pain intensity on a five-point scale as it developed during the performance. Each subject maintained loads of 25%, 40%, and 55% of his maximum strength with normal circulation and with circulation occluded by a pressure cuff. The main results of the study were as follows: (a) with an increase in load there was a progressive increase in the rate of pain development; (b) occlusion of the blood supply to the arm produced accelerated pain development, especially for the lightest load; (c) test-retest correlations for all pain intensities above threshold were statistically insignificant; and (d) all intercorrelations of supra-threshold pain intensities were statistically significant. The results indicate that the pain scaling procedure may prove useful as a device to assess reserve strength well in advance of task termination.

A67-80513
EFFECTS OF FREQUENCY OF VIBRATION ON HUMAN PERFORMANCE.
Charles S. Harris and Richard W. Shoenberger (Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
Journal of Engineering Psychology, vol. 5, no. 1, 1966, p. 1–15. 39 refs.
AEC supported research.

The effect on human performance of whole body vibration at frequencies of 5, 7, and 11 cycles per sec. was investigated. The minimum g level necessary to produce a significant decrement in tracking performance was determined at each frequency. The results showed that performance decrements tend to follow the general shape of physiological tolerance curves.

A67-80514
TARGET DETECTION PERFORMANCE WITH A BOWTIE RADAR DISPLAY.
C. H. Baker (Human Factors Res., Inc., Santa Barbara, Calif.).
Journal of Engineering Psychology, vol. 5, no. 1, 1966, p. 16–20. 7 refs.
Contract Nonr 4120(00).

A comparison was made of two airborne radar displays, the conventional Plan Position Indicator and a new type, the Bowtie display, with respect to their effectiveness for detecting relatively motionless targets. It was found that the target detection performance observers (N=30) using the new type display is superior to that when using the conventional display.

A67-80515
CLINICAL PICTURE AND PATHOGENESIS OF VIBRATION DISEASE [K KLINIKE I PATOGENZU VIBRATSIONNOI BOLEZNI].
V. A. Madorskii (Med. Inst., Kuibyshev, USSR).
Gigiena Truda i Professional'nye Zabolevaniia, Jul. 1966, p. 3–6. 14 refs. In Russian.

An examination of 151 patients suffereing from vibration disease revealed, that the syndrome of functional polyneuritis appears as a major and earliest manifestation in patients with both local and mixed forms of vibration disease (produced by the local and total effect of vibration). Further progress of the disease was marked by the emergence of reflex-dynamic changes in the activity of the spinal cord and diencephalon (chiefly in a combined form of the affliction). In far advanced cases there may appear a syndrome closely resembling syringomyelia with segmental derangement of the sensitivity in some areas. Insofar as the development rate and features peculiar to the formation of the syndrome are concerned of importance is a number of factors related to the premorbid state of the organism, including congential particularities in the structure and blood supply of the spinal cord, as well as injuries of the nervous system sustained in the past.

A67-80516
CHANGES IN INTENSITY OF ILLUMINATION AS A FACTOR RAISING WORKING EFFICIENCY IN MAN [IZMENENIE INTENSIVNOSTI OSVESHCHENIIA KAK FAKTOR POVYSHENIIA RABOTOSPOSOBNOSTI CHELOVEKA].
F. M. Chernilovskaia (Inst. of Hyg. Labor and Prof. Diseases, Leningrad, USSR).
Fiziologicheskii Zhurnal SSSR, vol. 52, Nov. 1966, p. 1332–1339. 17 refs. In Russian.

Workers in a film-splicing shop were the subjects of experiments in determining the effect of an increasing intensity of illumination on the efficiency of performance during progressive development of fatigue. This type of work requires visual concentration, and the accepted illumination of the field is 500 lux. Experimentally the intensity was increased within the working day from 300 to 500, and to 700 lux. The degree of fatigue throughout the day was determined by the comparison of an individual's physiological functions, such as stability of visual perception, and various nervous system responses. The results showed that the increase in the illumination intensity led to alleviation of fatigue and an improvement in performance. This effect may be due to the stimulation of the cerebral cortex by photic changes, which increase the excitability of the cortical cells.

A67-80517
GEMINI PROGRAMME.
Kenneth W. Gatland (Brit. Interplanet. Soc., London, Great Britain).
New Scientist, vol. 32, Nov. 17, 1966, p. 342–343.

As the six manned Mercury flights between May 1967 and March 1963 proved the ability to construct craft in which man can survive and work in the space environment, so the ten Gemini flights between March 1965 to November 1966 showed that space operations can be conducted with precision and that well-trained astronauts have considerable flexibility in handling

their craft. Examples given which have contributed markedly to astronautical progress include: (1) the ability of astronauts to maneuver their spacecraft from one orbit to another by applied bursts of thrust from steering rockets; (2) performance of extra-vehicular experiments by the astronauts of varying duration and complexity; (3) successful rendezvous between Gemini 6 and 7, while the latter was performing a mission lasting nearly 14 days; and (4) demonstration of the ability to rendezvous and dock with Agena target vehicles. Mention is made of the future Apollo man-on-the-moon project.

A67-80518

FUNCTIONAL STATE OF THE HYPOTHALAMUS-HYPOPHYSIS-ADRENALS SYSTEM IN VIBRATION-INDUCED PATHOLOGY [K VOPROSU O FUNKTSIONAL'NOM SOSTOIANII SISTEMY GIPOTALAMUS-GIPOFIZ-NADPOCHECHNIKI PRI VIBRATSIONNOI PATOLOGII].

V. N. Dumkin (USSR, Acad. of Med. Sci., Inst. of Hyg., Lab. and Prof. Diseases, Moscow).

Gigiena Truda i Professional'nye Zabolevaniia, Jun. 1966, p. 14–18. 9 refs. In Russian.

The 17-oxycorticosteroids level in the urine of 30 middle-aged patients afflicted with a marked form of vibration disease was studied. Injections with the prolonged-action ACTH (40 units per day) were given during three days in order to evaluate the extent and potential reserves of the adrenals. Relative adrenal deficiency, disclosed in some of the patients, was found to be of a secondary nature, being, possibly, due to the intensification of inhibitory effects in the hypothalamus. Low doses of insulin and adrenalin were administered to judge about the state of homeostatic mechanisms in the hypothalamus. The majority of the patients examined demonstrated an intact homeostatic mechanism. Some patients showed weakening of the compensatory mechanisms in the hypothalamus, of functional character, this manifesting itself in the development of neuro-vascular crises and in a more intensive excretion of 17-oxycorticosteroids during pharmacological tests.

A67-80519

SOME CLINICAL DATA ON THE EFFECTS PRODUCED BY VIBRATION OF DIFFERENT FREQUENCIES [NEKOTORYE KLINICHESKIE DANNYE O VOZDEISTVII VIBRATSII RAZLICHNYKH CHASTOT].

N. B. Metlina, L. E. Milkov, N. N. Shatalov, and N. I. Ponomareva (USSR, Acad. of Med. Sci., Inst. of Hyg., Labor and Prof. Diseases, Moscow).

Gigiena Truda i Professional'nye Zabolevaniia, Jun. 1966, p. 6–10. 5 refs. In Russian.

When comparing the nature and the degree of body reaction to the effects of high and low-frequency vibration data were gained pointing to certain differences. In a group of individuals exposed to the action of low-frequency (12–20 sec.) vibration (moulders and core-makers) changes were encountered which resembled the type of hand functional myofascitis, with depression of the cutaneous, motor, vestibular and auditory analysers. The reduced excitability of the analyser function in these persons was, apparently caused by microtraumatization, due to a fairly high amplitude of the vibration produced by the tool, which resulted in the blocking of impulses in the spinal and peripheral sympathetic formations. In the group of persons exposed to the effects of high-frequency vibration (500–900/sec.) it was the angiospastic syndrome in hands whereby the state of the automonic nervous system and of some analyser functions (particularly vestibular and pain sensitivity) largely characterized by an elevated excitability. The presence of the angiospastic syndrome in them was, in all probability, conditioned by the upset function of the peripheral vegetative structures.

A67-80520

FUNCTIONAL INTERACTION OF SOME ANALYZERS UNDER THE EFFECT OF A NOISE AND VIBRATION STIMULUS [O FUNKTSIONAL'NOM VZAIMODEISTVII NEKOTORYKH ANALIZATOROV PRI DEISTVII SHUMO-VIBRATSIONNOGO RAZDRAZHITELIA].

A. F. Lebedeva (Sanit.-Gigien. Med. Inst., Leningrad, USSR).

Gigiena Truda i Professional'nye Zabolevaniia, Jun. 1966, p. 22–28. 12 refs. In Russian.

Research done by the author demonstrated the low-frequency vibration eliciting a specific reaction of the organism, which differs from the action exerted by high-frequency vibration. The group of workers under examination showed a reduced vascular tone, a markedly diminished sensitivity to pain, with extremely insignificant changes in vibration sensitivity. Characteristic shifts were seen to occur in the vestibular analyzer. Low-frequency vibration, in conjuction with static muscular tension, bring forth clear-cut alterations in the motor analyzer. To avert harmful effects of low-frequency vibration measures were taken which ensure safe handling of certain vibrating tools.

A67-80521

EFFECTS OF NOISE AND VIBRATION ON THE GENERAL MORBIDITY [K VOPROSU O VLIIANII VIBRATSII I SHUMA NA OBSHCHUIU ZABOLEVAEMOST'].

S. S. Kangelari, D. K. Abramovich-Poliakov, and V. F. Rudenko (Inst. of Hyg., Labor and Prof. Diseases, Kharkov, UkrSSR).

Gigiena Truda i Professional'nye Zabolevaniia, Jun. 1966, p. 47–49. 5 refs. In Russian.

Loud industrial noises and a simultaneous violet vibration were determined as contributing factors in workers' physical disability. A comparative study was made in a group of diesel engine testing workers, and conveyor belt assembly workers. The background factory noise reached 88–90 db., of predominantly low and medium frequencies. In the engine testing section the noise reached 116–120 db., to which the workers were exposed almost continuously (95% of time). High frequencies (2,500 c.p.s.) predominated. The overall number of episodes were 103.1 cases in diesel testers and 77.0 cases in the assembly group. The common cold, respiratory involvement and insults of digestive track were higher in diesel workers. In other industrial fields where pneumatic hammers and similar machines were used, a number of workers were found to acquire vibrational disease. In these patients returning to work the survey showed a higher incidence of common diseases than in healthy workers. It appeared that vibration and noise reduces the organism's resistance to infections.

A67-80522

SOME PHYSIOLOGICAL FEATURES CHARACTERISTIC OF BODY EXPOSURE TO LOW-FREQUENCY VIBRATION [O NEKOTORYKH FIZIOLOGICHESKIKH OSOBENNOSTIAKH VOZDEISTVIIA NIZKOCHASTOTNOI VIBRATSII NA ORGANIZM].

A. M. Mikulinskii (Inst. of Hyg., Labor and Prof. Diseases, Gorkii, USSR).

Gigiena Truda i Professional'nye Zabolevaniia, Jun. 1966, p. 18–22. 11 refs. In Russian.

Studies conducted on workers with electrically operated tools demonstrated that low-frequency vibrations elicited a specific reaction of the organism which differs from the

reaction exerted by high-frequency vibration. In a group of workers the typical reaction was a reduced vascular tone, a markedly diminished sensitivity to pain, with extremely insignificant changes in vibration sensitivity. Characteristic shifts were seen to occur in the vestibular analyzer. Low-frequency vibration, in conjunction with static muscular tension, brought forth clear-cut alterations in the motor analyzer. To avert harmful effects of low-frequency vibration measures were taken which ensure safe handling of certain vibrating tools.

A67-80523

FIXED SET OF VARIANTS OF THE INTERACTION OF TWO JUNCTION MUSCLES, USED WHILE ACCOMPLISHING SIMPLE RANDOM MOVEMENTS [FIKSIROVANNYI NABOR VARIANTOV VZAIMODEISTVIIA MYSHTS DVUKH SUSTAVOV, ISPOL'ZUEMYI PRI VYPOLNENII PROSTYKH PROIZVOL'NYKH DVIZHENII].

IA. M. Kots and A. V. Syrovegin (Lenin State Inst. of Phys. Culture, Moscow, USSR).

Biofizika, vol. 11, no. 6, 1966, p. 1061–1066. 6 refs. In Russian.

The control of motor activity by the central nervous system has a certain degree of freedom. The same repeated action may show a certain variable pattern. As a model, the study of simultaneous voluntary movements of muscles which control flexion and extention of the wrist and elbow joints of the right extremity was conducted on humans. The motion in the two joints was either in the same direction, such as both flexing, or both extending, or in the opposite direction. Any displacement in the planetary angle of each joint was registered on the goniometer. The exercise was performed several hours a day. The experiments lasted over five months. The results showed a pattern of angular shift in direct relation to the angular velocity. Each subject exhibited an individual predominant pattern which evolved with time.

A67-80524

EFFECTIVENESS OF SOME INDIVIDUAL NOISE-PROTECTOR TYPES AND THEIR CHOICE DEPENDING UPON CONDITIONS ATTENDING THEIR USE [EFFEKTIVNOST' NEKOTOROKH TIPOV INDIVIDUAL'NOKH PROTIVOSHUMOR I VYBOR IKH V ZAVISIMOSTI OT USLOVII PRIMENENIIA].

L. N. Shkarinov and E. I. Denisov (USSR Acad. of Med. Sci., Inst. of Hyg., Labor and Prof. Diseases, Moscow).

Gigiena Truda i Professional'nye Zabolevaniia, Jun. 1966, p. 38–43. 9 refs. In Russian.

Procedures employed in verifying the effectiveness of various noise-protectors are described. Data characterizing the efficacy of some noise absorbing types, including those which are mass produced in the USSR, are listed. Recommendations are given as to a rational selection of noise absorbers, depending upon the nature and spectrum of any particular noise and also of the conditions attending their application.

A67-80525

PROPHYLACTIC MEASURES TO PROTECT THE HEALTH OF OPERATORS WORKING UNDER NOISY CONDITIONS [PROFILAKTICHESKIE MEROPRIIATIIA PO SOKHRANENIIU ZDOROV'IA LITS, RABOTAIUSHCHIKH V SHUMNYKH USLOVIIAKH].

M. Kvaas and A. Fuks-Shmuk (Karl Gustaf Karus Med. Acad., Inst. of Hyg. Labor, Dresden, East Germany).

Gigiena Truda i Professional'nye Zabolevaniia, Jun. 1966, p. 56–58. In Russian.

A very simple device is described which is an audiometer with a simplified scale and equipped with a pair of earphones. It can be used on the job, for estimation of the threshold of noise perception. The scale is in the 5 db. units, with a range from −10 db. to +60 db. It was tested at frequencies between 500 c.p.s. and 6,000 c.p.s. The results can be kept as a permanent record on individual cards. Abnormal findings can alert the physician to examine a case in detail, thus preventing a further injury. The audiometer is portable and easy to handle.

A67-80526

EFFECT OF NOISE ON THE ANTIBODY GENESIS [O VLIIANI SHUMA NA ANTITELOGENEZ].

N. N. Klemparskaia.

Gigiena Truda i Professional'nye Zabolevaniia, Jun. 1966, p. 54–56. In Russian.

Rabbits were inoculated with a heat-killed vaccine of *Salmonella paratyphi* during an experiment to study the noise effect on the immunogenesis mechanism. The titre was periodically determined during several weeks after the immunization when the animals were exposed to continuous noise of 58–62 db. After subcutaneous injections (500,000 cells) the noise stimulated production of antibodies, particularly during the first two weeks. However, revaccination of these animals after termination of noise stimulus did not increase the titre. An opposite effect was produced by inoculation of the same vaccine in small doses (25,000 cells): the production of antibodies was suppressed by noise. Evidently a number of factors determined the effect of noise stress in a rather complicated mechanism of immunogenesis. Therefore further studies are necessary in order to elucidate the effect of noise.

A67-80527

THE MUSCULAR PULMONARY ARTERIAL BRANCHES IN STILLBORN NATIVES OF HIGH ALTITUDE.

Javier Arias-Stella and Yolanda Castillo (U. Peruana, Inst. de Invest. de la Altura, Dept. of Pathol., Lima, Peru).

Laboratory Investigation, vol. 15, Dec. 1966, p. 1951–1959. 22 refs.

Grants PHS HE-07000-05 and RG-8576-04.

A similar structural pattern in the pulmonary arterial tree at birth was found in lungs of two groups of stillborn children, one from high altitude areas (Cerro de Pasco, 14,300 ft. above sea level, and Rio Pallanga, 15,100 ft. above sea level) and the other from sea level (Lima, 500 ft.). The following findings in the two groups do not show a statistically significant difference when submitted to a Fisher's t-test: (1) relation of the number of distal arteries; (2) the internal and external diameters of proximal and distal arteries; (3) the ratio of internal diameter to external diameter from proximal and distal arteries; and (4) the total area of arterial muscle at distal level per proximal artery. Therefore, it can be concluded that the difference demonstrated previously in the peripheral pulmonary vascular structure of high altitude inhabitants after the first month of life is an acquired change.

A67-80528

DIGESTIBILITY AND RESORPTION OF ANIMAL AND VEGETABLE PROTEIN CARRIERS WITH AND WITHOUT FAT SUPPLEMENT. POSTCIBAL CHANGES OF THE BLOOD LIPIDS AND AMINO-ACIDS [UBER VERDAULICHKEIT UND RESORPTION TIERISCHER UND PFLANZLICHER PROTEINTRAGER OHNE UND MIT FETTZUSATZ. POSTCENALE VERANDERUNGEN DER LIPIDE UND AMINOSAUREN DES BLUTES].

H. Canzler, H. Glatzel, and H. Zimmerman (Max-Planck-Inst. für Ernährungsphysiol., Dortmund, West Germany).
Die Nahrung, vol. 10, no. 4, 1966, p. 281–289. 30 refs. In German.

It was investigated if the resorption of fats and proteins from experimental diets of mainly animal or purely vegetable origin is influenced by fat supplements. Ten healthy subjects were fed experimental diets containing the same amounts of protein and carbohydrates, but differing from each other in fat content. The serum was analyzed for triglycerides (on an empty stomach and 1, 2, 3, 4, 5 and 6 hours postcibally) and x-amino nitrogen (on an empty stomach and 1, 2, 3, 4 and 5 hours posticibally). The level of lipemia and the moment of its maximum are independent of the nature of the dietary protein and are determined only by the amount and the kind of the dietary fat. The postcibal amino-acid level of the serum is not influenced by the fat content of the experimental diet. The x-amino nitrogen increases slowly and in the same manner after the intake of low-fat and high-fat experimental diets containing animal protein, but it is less high than after the intake of analogous experimental diets containing vegetable protein. The possible causes for this difference are discussed.

A67-80529
HEALTH STATUS OF WORKERS ENGAGED IN THE PRODUCTION OF TRICHLORETHYLENE (THE INFLUENCE OF CHLORINATED HYDROCARBON ON THE ORGANISM) [SOSTOIANIE ZDOROV'IA RABOCHIKH V PROIZVODSTVE TRIKHLORETILENA (OVLIIANII KOMPLEKSA KHLORIROVANNYKH UGLEVODORODOV NA ORGANIZM)].
L. I. Geller, E. M. Bongard, and L. L. Braginskaia (Inst. of Hyg. and Prof. Diseases, Ufa, USSR).
Gigiena Truda i Professional'nye Zabolevaniia, Nov. 1966, p. 61–63. In Russian.

Clinical examination of workers engaged in plants manufacturing trichlorethylene disclosed a toxic effect of chlorinated hydrocarbons which escape into air during the industrial process. The toxic effect was expressed in some neurological symptoms, such as drowsiness, alcohol intolerance, asthenovegetative syndrome and vascular disfunction. In some cases there was a disturbance of digestive function, including hepatic disorders.

A67-80530
ELECTRORETINOGRAPHIC RESPONSE, SUBJECT'S AGE AND SEX, AND RECORDING RESISTANCE.
Lucia Ronchi and Anna Maria Ercoles.
Atti della Fondazione Giorgio Ronchi e Contributi dell'Istituto Nazionale di Ottica, vol. 21, Mar.–Apr. 1966, p. 185–193. 5 refs.
Contract AF 61(052)-850.

The size of the b-wave is known to vary appreciably as a function of subject's age. This effect is ascribed to the development of retinal structure, during the first months of life, and to the decrease in visual responsiveness after the 50th year. However, it cannot be excluded that also the resistance of tissues surrounding the eye changes during the course of life in such a way that the size of recorded potential is seriously affected. The influence of such a factor is discussed in terms of lumping approximation, by using the steady-state formula. Sex differences in the size of the b-wave are also discussed.

A67-80531
ARTIFICIAL CULTURE OF MARINE SEA WEEDS IN RECIRCULATION AQUARIUM SYSTEMS.
John A. Strand, Joseph T. Cummins, and Burton E. Vaughan (U.S. Naval Radiol. Defense Lab., Biol. and Med. Sci. Div., San Francisco, Calif.).
Biological Bulletin, vol. 131, Dec. 1966, p. 487–500. 28 refs.

Ulva as either sporeling or transplant could be cultured for periods of three months in closed recirculating aquarium systems. Early development of *Ulva lobata* sporelings proceeded normally and rapidly under conditions imposed and compared to closely related species, i.e., *Ulva pertusa* and *Ulva lactuca.* A modified Haxo-Sweeney enrichment was used, substituting B vitamins and organic phosphate for soil extract. Continuous flow ultraviolet sterilization and microfiltration were provided. The pH was maintained automatically at 7.9 ± 0.3, using Tris buffer and gaseous CO_2. Improved fluorescent illumination for 13–15 hrs. favored culture of sporelings and summer transplants. Irradiance was confined to the spectrum lying between approximately 380–725 mμ, and amounted to 3.7 kilolux. From field observations, photoperiod appeared closely correlated to initiation of vegetative growth during early spring. Water temperature seemed to have a greater effect on the rapid maturation of gametes and zoospores.

A67-80532
THE EFFECT OF PARTIAL REM SLEEP DEPRIVATION AND DELAYED RECOVERY.
William Dement, Stephen Greenberg, and Robert Klein (Stanford U., School of Med., Dept. of Psychiat., Palo Alto, Calif.).
Journal of Psychiatric Research, vol. 4, Dec. 1966, p. 141–152. 42 refs.
Grants NIMH MH-08185 and K3-MH-5804.

Four young adult subjects each slept ten consecutive nights in the laboratory without awakenings. The mean nightly rapid eye movement (REM) sleep time was calculated for each subject and used as the baseline value for further procedures. Two subjects were allowed 75 per cent of their baseline REM sleep time for nineteen consecutive nights and slept without disturbance for the next five (recovery) nights. The first recovery nights were 54 per cent and 13 per cent respectively above the baseline with a more or less exponential decline to the basal level on subsequent nights. The compensatory rises in REM time were compatible with what might have been expected following five nights of complete deprivation and suggest that partial REM deprivation has a cumulative effect roughly proportional to the degree of partial deprivation. The other two subjects underwent complete REM sleep deprivation for five consecutive nights followed by five nights upon which REM sleep time was held to the baseline level. The next five nights were undisturbed and the REM sleep fraction was elevated 100 per cent and 66 per cent respectively above the baseline. These results suggest that the REM sleep deprivation effect can be reversed only by extra amounts of REM sleep and will persist if such compensation does not take place.

A67-80533
BRAIN AMINES AND EMOTIONAL STRESS.
Eugene L. Bliss and Janet Zwanziger (Utah U., Coll. of Med., Dept. of Psychiat., Salt Lake City).
Journal of Psychiatric Research, vol. 4, Dec. 1966, p. 189–198. 22 refs.
Grants PHS MH-04231 and MH-10284; Scot. Rite Found. supported research.

Evidence is presented that emotional stress in the mouse, guinea pig, and rat are associated with 10–30% decrements in brain norepinephrine. This does not appear to be primarily a function of muscular activity and is probably a neurochemical concomitant of the emotional upset. It is a generalized phenomenon that occurs in cortex, subcortex, cerebellum,

hypothalamus, and brain stem, to approximately the same degree. Under these circumstances the concentration in brain of serotonin, gamma-aminobutyric acid, and dopamine remain stable. It appears that decreases of brain norepinephrine may be a component of a general response to intense, emotional distress.

A67-80534
ON THE FIDELITY OF THE VISUAL SYSTEM UNDER TRANSIENT ADAPTATION. I. BLACK SPOT ON A BRIGHT BACKGROUND.
Lucia Ronchi and Giuseppe Bottai.
Atti della Fondazione Giorgio Ronchi e Contributi dell' Istituto Nazionale di Ottica, vol. 21, Mar.–Apr. 1966, p. 235–247. 18 refs.
Contract AF 61(052)-850.

The aspect of a steadily fixated black spot changes, after the onset of the bright background, during the course of adaptation to light, until a final situation is attained, which differs when passing from "small" to "large" spots. The changes in retinal organization during incoming adaptation to light, the spread of light-adaptation, the type of noise suggested by Barlow and eye tremor are regarded as responsible for both the reported transitory and stable distortions in the photometric profile. The fidelity of the visual system is found to be maximum throughout a time interval, after the onset of the background, which varies as a function of the size of the spot.

A67-80535
ELECTROPHYSIOLOGICAL EVIDENCE FOR A NEURAL STAGE IN DARK ADAPTATION.
L. Maffei and R. E. Poppele (Pisa U., Inst. di Fisiol. and Consiglio Nazl. delle Ric., Centro di Neurofisiol. and Gruppo d'Elettrofisiol., Pisa, Italy).
Experientia, vol. 22, Oct. 15, 1966, p. 685–686. 6 refs.
Contract AF 61(052)-830.

Electroretinographic studies were made of the amplitude variations of the b-wave and late receptor potential isolated by photocoagulation of the retinal artery of one eye during dark adaptation in anesthetized cats. Analysis of the results show clearly that the strong attenuation of the sensitivity of the eye in the early part of dark adaptation is not only due to the loss of receptor sensitivity. It is also due to a neural process occurring in the retinal visual pathway, either between the receptors and the inner nuclear layer or within the inner nuclear layer itself.

A67-80536
INFLUENCE OF TIME OF EXPOSURE TO LIGHT ON THE ACTIVITY OF THE ANTIBACTERIAL SUBSTANCE IN CHLORELLA VULGARIS.
A. Krzywicka (Coll. of Agr., Dept. of Botany, Lublin, Poland).
Bulletin de l'Academie Polonaise des Sciences, vol. 14, no. 7, 1966, p. 509–512. 5 refs.

Chlorella vulgaris is an alga which elaborates an antibiotic substance as an intermediate during chlorophyll synthesis. Exposure to illumination with fluorescent tubes of 9,000 lux at 30°C. was used to determine the effect of time of exposure on production of the antibacterial factor. The *bacterium, Bacillus subtilis* was used for testing the degree of antibiotic effect of the medium after algal growth. It was noted that the antibiotic factor require illumination for its activity, but even with the activation by light the bacteriostatic effect was produced only at a certain stage of the bacterial growth. This was the period of 30 min. to 2 hrs. after incubation and coincided with the log-phase. The mechanism of the bacterial growth inhibition was not understood. It was possible that the light produced a chemical change in the algal compound which was active only in this form, and only during the active growth phase.

A67-80537
SPACE TECHNOLOGY AND MICROCIRCULATION RESEARCH.
Benjamin W. Zweifach (N. Y. U., New York City), Marcos Intaglietta, and Sidney J. Slomich (Calif. Inst. of Technol., Pasadena).
Yale Scientific Magazine, vol. 41, Nov. 1966, p. 20–21.

The techniques and instrumentation developed in the course of the space program may be applied directly, or with modification, to important areas of research on the human microcirculatory system. Research areas in electronic monitoring, microphysics, and extra-terrestrial life are reviewed briefly to illustrate their applicability in research on vascular disease and stroke, and on changes in microcirculatory physiology.

A67-80538
INVOLUNTARY EYE MOVEMENTS DURING ATTEMPTED MONOCULAR FIXATION.
Adrianna Fiorentini and Anna Maria Ercoles.
Atti della Fondazione Giorgio Ronchi e Contributi dell' Istituto Nazionale di Ottica, vol. 21, Mar.–Apr. 1966, p. 199–217. 9 refs.
Contract AF 61(052)-850.

The horizontal and vertical components of the involuntary movements of the eye were recorded during attempted monocular fixation of a bright spot in a dark surround and after the extinction of the fixation spot, when the eye was in the dark or viewed a bright spot whose image was stabilized on the retina. The results obtained from two subjects confirm in part the findings of previous work in this field, but two unexpected facts have emerged from the analysis of the records. For one subject, the rate of occurrence of involuntary flicks is as high in the dark as in the presence of a fixation point, and most flicks in the dark seem to correct for a previous slow movement of the eye, as if they were under the control of a nonretinal servo system. For the other subject the rate of occurrence of flicks is exceedingly low during the fixation period, while it is quite normal in the periods of preliminary fixation that preceded the true fixation run. This subject seems to be able to avoid the so-called involuntary flicks when required to keep her eye as steady as possible, still she maintains the assigned direction of fixation with reasonable accuracy when the fixation spot is on.

A67-80539
DISORIENTATION IN FLIGHT.
Charles I. Barron (Lockheed-Calif. Co., Burbank).
Approach, vol. 12, Sep. 1966, p. 28–32.

Disorientation is a condition associated with low altitude, high speed flight and is unusually hazardous. In jet aviation disorientations are related to illusions of altitude and motion resulting from false sensations originating in the balance mechanisms of the inner ear, and to the difficulties in perceiving proper cues and information in flight. Regardless of the cause, the end result is a state of confusion with difficulty in controlling the aircraft. Disorientation is one of the more frequent and important known causes of accidents in jet aircraft, in low altitude, high speed flights, in formation flying, gunnery practice, and during acrobatics. Disorientation may be effectively combated and its significance in accident causation minimized by awareness, education and training, and by avoidance in flight. The individual pilot can contribute to its control.

A67-80540
SIZE OF FLICKERING ENTOPTICAL HALO AS A FUNCTION OF THE INTENSITY AND COLOR OF THE CENTRAL SPOT.
Giuseppe Salvi (Florence U., Clin. Oculist., Italy).
Atti della Fondazione Giorgio Ronchi e Contributi dell' Istituto Nazionale di Ottica, vol. 21, Mar.–Apr. 1966, p. 194–198. 7 refs.
Contract AF 61(052)-850.

An intermittently illuminated (21 c.p.s.) spot, centrally viewed, is seen surrounded by a flickering halo, which increases in diameter (D) as the intensity (L) of the spot is increased. The rate of the increase of D vs. L is found to be greater for blue light than for red, green, and lastly for white light.

A67-80541
PHYSICAL PERFORMANCE AND MAXIMUM OXYGEN UPTAKE IN MAN IN EXERCISE DEHYDRATION.
S. Kozlowski (School of Med., Dept. of Appl. Physiol., Warsaw, Poland).
(Polish Physiol. Soc., 7th Congr., Torun, Dec. 12, 1963). *Bulletin de l'Academie Polonaise des Sciences,* vol. 14, no. 7, 1966, p. 513–519. 18 refs.

Dehydration of the body occurring during long lasting physical effort at 18–22°C. reduced physical performance capacity in man. The decrease of the capacity subsisted after a three-hour rest if the deficient water was not supplied. The diminution in the physical performance capacity becomes marked already when dehydration attains 2–3 l. and it depends on the quantity of water lost by the body. Replacement of the water lost during physical work reduced to a statistically significant degree the decrease of the physical performance capacity occurring during this work. The reduction of physical performance capacity caused by exercise dehydration was not accompanied by a reduction of maximum minute oxygen uptake. It was, therefore, not caused by the impairment of the efficiency of the functions co-operating in meeting the oxygen demand of the body.

A67-80542
HYPEROXIA AND THE INTRAVASCULAR VOLUMES OF TISSUES IN THE GROWING RAT.
Annette Trappitt and R. G. Spector (Guy's Hosp. Med. School, Paediat. Res. Unit, London, Great Britain).
Nature, vol. 212, Oct. 29, 1966, p. 523. 8 refs.

The blood volumes of lung, liver, kidney, and brain were studied in adult and immature normal rats and in nine day old rats reared from birth in an atmosphere containing 90–100% oxygen. Although there is evidence that cerebral cortical capillary growth is markedly inhibited by chronic hyperoxia in growing animals, the present experiments suggest that the development of the total intravascular space in the entire forebrain was not greatly altered under these conditions. Similarly, no detectable difference in the blood volumes of lung, kidney, and liver tissues was observed. The hyperoxia was sufficiently severe to lower hematocrit.

A67-80543
APPARENT SHRINKAGE OF A ROTATING ARC AS A FUNCTION OF LUMINANCE RELATIONS BETWEEN FIGURE AND SURROUND.
Gordon Stanley (Western Australia U., Dept. of Psychol., Perth).
Acta Psychologica, vol. 25, Nov. 1966, p. 357–364. 5 refs.

Subjects were required to compare a centrally-fixed illuminated straight line with an illuminated rotating arc standard 0.4 cm. wide. The arc was located at a radial distance of 21 cm. from the center of a black disc 50 cm. in diameter. Reflected light was used. The apparatus was located in a dark room with black walls and the subjects were tested in one of four experimental conditions: white arc on black background, disc stationary; white arc on black background, disc rotating; black arc on white background, disc stationary; and black arc on white background, disc rotating. The mean response of each subject for each length of line was calculated and the mean of these scores calculated for each of the four experimental conditions. The results indicated that an illuminated arc on black surrounds shrinks whereas a black arc on white surrounds does not. Apparent lengthening of the black arc occurred, but this lengthening was only significant for the 6 and 12 cm. lines. Lengthening represents 30% of the apparent length when stationary as against the shrinkage of 80% found with the white arc on black. Under rotating conditions the subjects reported that the contracted white arc appeared brighter in luminance than the center line which was judged of equal brightness when the arc was stationary. The subjects reported increase in length of the black arc may possibly be partly due to an expectation that the arc would lengthen.

A67-80544
MUSCLE STRENGTH, FLEXIBILITY, AND BODY SIZE OF ADULT MALES.
Lloyd L. Laubach and John T. McConville (Antioch Coll., Yellow Springs, Ohio).
Research Quarterly, vol. 37, Oct. 1966, p. 384–392. 23 refs.
Contract AF 33(615)-1101.

Four measures of muscle strength, two measures of flexibility, 30 anthropometric measures (both direct and indirect), and the somatotypes of 45 male subjects were obtained, and the interrelationships among these measures investigated. A low but statistically significant correlation was found between hip flexion strength and the range of motion of hip extension-flexion; however, this was the only strength measurement to correlate significantly with the flexibility measurements. Many statistically significant ($p = .05$) correlations were found between the anthropometric and the strength measurements, but none between the anthropometric and the flexibility measurements. The only somatotype component to correlate significantly with the measures of muscle strength was mesomorphy; the correlations between the somatotype components and the measures of flexibility were insignificant.

A67-80545
THE VALUE OF SUPPLEMENTARY VISUAL INFORMATION DURING PRACTICE ON DYNAMIC KINESTHETIC LEARNING.
W. R. Morford (Calif. U., Berkeley).
Research Quarterly, vol. 37, Oct. 1966, p. 393–405. 19 refs.

Ninety male subjects were each given ten one-min. trials on an apparatus that generated a very mechanical force against a pivoted lever and recorded the counter force exerted by the subject. The task was to respond to changes in such a fashion as to keep the subject vs. lever differential force at a constant value of zero. The results were scored in terms of the accuracy of immediate corrective response to the changing force. All subjects performed the initial trials (one and two) and the final trials (nine and ten) blindfolded. The six intermediate trials were practiced by one-third of the subjects under purely kinesthetic conditions, by another third under automatic visual supplementation conditions, and by the remaining third under conditions of lesser automatic visual supplementation of the error information. It was concluded that little or no improvement in the criterion condition can be expected when practice involves kinesthetic error information only. In contrast, provision of appropriate amounts of supplementary

visual information during practice can produce learning of a purely kinesthetic criterion response.

A67-80546
COEFFICIENT OF GLUCOSE CONSUMPTION (Q_{gl}) IN THE CAT'S BRAIN IN HYPERTHERMIA CORRELATION WITH ARTERIAL BLOOD PRESSURE AND RESPIRATION [WSKAZNIK ZUZYCIA GLIKOZY PRZEZ MOZGOWIE W HIPERTERMII KORELACJA Z CISNIENIEM TETNICZYM KRWI I ODDYCHANIEM].

Dominik Samek.

Acta Physiologica Polonica, vol. 17, no. 5–6, 1966, p. 883–899. 15 refs. In Polish.

Hyperthermia was caused in cats either by warming up the whole animal or its head only. Simultaneously with coefficient of glucose consumption (Qgl) determination, the brain and rectal temperature, brain blood flow, arterial blood pressure, respiratory frequency and e.c.g. were recorded. Glucose concentration in blood was also determined. It was found that whatever the mode of applying the heat to the animal, the Qgl rises with the brain temperature. When the head alone is warmed, the Qgl reaches its maximum at 38.5–40.0°C. brain temperature. If the heat is applied to the whole body, the Qgl maximum shifts to 42.0–42.5°C. Over these critical temperatures there ensues an abrupt decline in Qgl, indicating that the optimal temperature for glycolytic processes in the brain has been exceeded. At lethal temperatures Qgl attains very low values. In the case of warming of the head alone the lethal temperature amounts to 40.4°C. (mean value). When the whole animal is warmed, death occurs at 42.8°C. (mean value). In every case hyperglycemia was observed, which outlasted the decline of the Qgl at the critical temperature. There exists a correlation between the Qgl and the arterial blood pressure and respiration, in so far as a diminution of Qgl at the critical temperature is invariably accompanied by a fall in blood pressure and arrest of respiratory movements.

A67-80547
RELATIONS BETWEEN TOTAL MUSCULAR WORK AND CHANGES IN THE LEVELS OF 17-HYDROXYSTEROIDS IN THE BLOOD [ZALEZNOSC MIEDZY CALKOWITA ILOSCIA WYKONANEJ PRACY MIESNIOWEJ A ZMIANAMI POZIOMU 17-HYDROKSYSTERYDOW WE KRWI].

Krystyna Nazar.

Acta Physiologica Polonica, vol. 17, no. 5–6, 1966, p. 915–922. 16 refs. In Polish.

Experiments with eight healthy males aged 18 to 25 yrs. were performed consisting in determination of blood levels of 17-hydroxysteroids (17-OCHS) under the influence of moderate muscular work performed on the cycloergometer. Plasma concentrations of 17-OHCS were determined during and after muscular work. Each subject took part in two experiments differing in the total amount of work performed with the same intensity. When the total amount of work done was small, individual differences in the scope and direction of changes were very marked; lowering as well as rise in the blood levels of 17-OHCS were observed. Increasing the total amount of work done caused a rise in the concentration of 17-OHCS in the plasma. The experimental results suggest that the mechanism of the studied reaction consists in simultaneous stimulation of secretion and increased elimination of hormones from the blood, and that increased secretion of adrenal hormones is related to the exercise metabolism and is dependent on the total energetic expenditure.

A67-80548
EFFECT OF CHRONIC VIBRATION ON ^{32}P PHOSPHORUS TURNOVER IN THE CENTRAL NERVOUS SYSTEM [WPLYW PRZEWLEKLEGO ODDZIALYWANIA WIBRACJI NA PRZEMIANE FOSFORANU ^{32}P W OSRODKOWYM UKLADZIE NERWOWYM].

Marek Jurczak.

Acta Physiologica Polonica, vol. 17, no. 5–6, 1966, p. 743–753. 21 refs. In Polish.

After exposure to vibration for one day a rapid rise in the ^{32}P turnover rate was observed in the lipid and nucleoprotein fractions of the central vervous system in guinea pigs. Exposure of three days caused the ^{32}P turnover rate to diminish, although it was still considerably higher than in the control group of animals. After six days a marked drop occurred to levels below the control group, accompanied by morphologic changes in the central nervous system. After a ten-day pause following six days of vibration no morphologic changes and normal ^{32}P turnover were observed. It was concluded that the morphologic changes as well as the changes in ^{32}p in the lipid and nucleoprotein fractions are transient. Disorders in cellular biochemistry preceded the appearance of the morphologic changes in the central nervous system.

A67-80549
EFFECT OF THE COMPOSITION OF ATMOSPHERIC AIR ON RESPIRATORY FUNCTION. I. GAS EXCHANGE DURING AND AFTER ANOXEMIC HYPOXIA [WPLYW SKLADU POWIETRZA ATMOSFERYCZNEGO NA CZYNNOSCI ODDECHOWE. I. WYMIANA GAZOWA W CZASIE I HIPOKSJI ANOKSEMICZNEJ].

Jerzy Lyszczarz and Maria Glogowska.

Acta Physiologica Polonica, vol. 17, no. 5–6, 1966, p. 795–802. 27 refs. In Polish.

Gas exchange was studied in anethetized rabbits in the course and after inhalation of a respiratory mixture containing about 7% O_2. The results were briefly discussed. The mixture was found to induce deep hypoxia accompanied by oxygen deficiency of the tissues. Gas exchange did not return to normal as long as 60 min. after inhalation with the oxygen-deficient mixture had been discontinued. As can be concluded from the high coincidence of the results, the present experiment may be used as a model of deep anoxemic hypoxia.

A67-80550
ADAPTATION OF THE BODY TO HIGH AMBIENT TEMPERATURES [PRZYSTOSOWANIE ORGANIZMU DO WYSOKICH TEMPERATUR OTOCZENIA ZMIANY CZUCIA TEMPERATURY U CZLOWIEKA].

Edward Ziobro.

Acta Physiologica Polonica, vol. 17, no. 5–6, 1966, p. 803–811. 19. refs. In Polish.

The sensation of temperature was studied in persons employed in an environment with a temperature of 50–55°C. and in persons working under normal climatic conditions (17–19°C). In a high temperature environment a shift in the range of thermal neutrality toward higher temperatures was observed. The upper limit of neutral temperature was 36.8°C., and the lower limit 30.9°C., i.e. more than 4° higher than in persons employed under normal climatic conditions. The number of active heat receptors per 1 $cm.^2$ of skin in the sacral region was 3.3. compared with smaller average numbers in workers in environments at temperatures of 17–19°, Only minimal differences were found in the numbers of active cold receptors: 14 per $cm.^2$ in persons employed at high temperatures, and 12 per $cm.^2$ in the control group. It was concluded that the dulled sensation of heat safeguards the body against excess of thermal sensations, and

that the large number of active cold receptors which initiate the sensation of cold during evaporation of sweat keeps the tone of the blood vessels within normal limits.

A67-80551
PHYSIOLOGICAL AND BIOCHEMICAL STUDY OF THE TAXONOMY OF THE GENUS CHLORELLA. II. INVESTIGATION OF MUTANTS [PHYSIOLOGISCHE UND BIOCHEMISCHE BEITRAGE ZUR TAXONOMIE DER GATTUNG CHLORELLA. II. UNTERSUCHUNGEN AN MUTANTEN].
Erich Kessler and Franz-Christian Czygan (U. Erlangen-Nürnberg, Botan. Inst., West Germany).
Archiv für Mikrobiologie, vol. 54, Jul. 4, 1966, p. 37–45. 17 refs. In German.

To check the stability of the biochemical character used in the taxonomy of the genus *Chlorella*, hydrogenase activity, formation of secondary carotenoids, and liquefaction of gelatin were studied in 31 mutants derived from the *Chlorella* strains. All 28 mutants of *Chlorella* C-1.1.10 (belonging to *Chlorella* II pyrenoidosa) were found like the wild type to contain hydrogenase. In contrast to the wild type, however, the 28 mutants have lost the ability to form secondary carotenoids in nitrogen-deficient cultures and to liquefy gelatin. Heterotrophic mutants of *Chlorella* C-1.1.10 in an inorganic culture medium containing chloramphenicol (10^{-4}M) show a stepwise reversion to the wild type (autotrophic, able to form secondary carotenoids and to liquefy gelatin). Several intermediate stages of this process have been isolated. Some of these algae are green and heterotrophic, whereas others are autotrophic, but unable to synthesize secondary carotenoids and to liquefy gelatin. In a few cases the reversion stops at one of the intermediate levels. The three mutants of *Chlorella* C-1.1.2 (belonging to the new species *Chlorella* II) contain hydrogenase like the wild type. The stability of hydrogenase against mutation demonstrates that this biochemical character is of special value in taxonomy. From the high degree of mutability of the other biochemical characters (formation of secondary carotenoids, liquefaction of gelatin) it follows that "biochemical species" in the genus *Chlorella* should be restricted to a small number.

A67-80552
OBSERVATIONS OF COCHLEAR MICROPHONIC RESPONSES TO PULSE-TYPE SIGNALS [OBSERVATION DES REPONSES MICROPHONIQUES COCHLEAIRES A DES SIGNAUX DE TYPE IMPULSIONNEL].
J. P. Legouix (France, Coll., Lab. of Gen. Neurophysiol., Paris).
Acustica, vol. 16, no. 3, 1965–66, p. 159–165. 16 refs. In French.

Cochlear responses to transient signals have been studied on the guinea-pig by observing the microphonic potential recorded at various locations along the cochlear spiral. The stimuli were step function signals mechanically transmitted to the ossicles with a rod connected to a transducer. The responses displayed a first excursion related to the signal, followed by free oscillations. The characteristics of these oscillations were different at the various locations. The damping was weaker and the natural frequency lower at the apex. These characteristics were attributed to the combined displacements of the basilar membrane and the cochlear fluids.

A67-80553
THE IMPORTANCE OF MODIFYING FACTORS DURING IRRADIATION OF BIOLOGICAL OBJECTS WITH IONIZING RADIATION FOR ARMY MEDICINE [WEHRMEDIZINISCHE BETRACHTUNG UBER DIE MODIFIZIERENDEN FAKTOREN BEI DER BESTRAHLUNG BIOLOGISCHER OBJEKTE MIT KERNSTRAHLUNG].
H. Mitschrich.
Wehrmedizin, vol. 4, no. 8, 1966, p. 144–149. In German.

The biological effect of primary radiation with nuclear explosions depends on the nature of the rays (especially the gamma/neutron ratio) and on the degree to which a biological object is exposed to or, resp., protected from the radiation. Two factors modify the radiation effect: Irradiating only part of the body and "pulse irradiation" (a very high dose of radiation over a very short period of time). In irradiating only parts of the body of the animal species, with constant experimental conditions, it was found that irradiating the lower half of the body is almost twice as effective as irradiating the upper half. With pulse irradiation in the reactor the test animals (Macaca Mulatta apes) showed a central-nervous pathological process. This is distinctly different from the effects of equally large doses of radiation which are not "pulsed". The intoxication (vomiting) which is observed in the first phase of radiation illness after a dose of 2000 rad/min. and which may still be observed after 3–4000 rad, does not occur with "pulse" irradiation. Within a few min. after irradiation with 1000 rad, given within a few milliseconds, a disturbance of judgment comes about; at 70,000 rad this is almost immediate. Up to 50,000 rad, judgment may temporarily return for several hours to one day, the final and fatal collapse follows shortly. The importance of these factors for the armed forces, especially regarding the problems of dosimetry, is discussed.

A67-80554
THE SIGNIFICANCE OF THE RESPIRATORY VOLUME FOR THE TIMELY APPLICATION OF RESPIRATORY PROTECTION [DIE BEDEUTUNG DES ATEMMINUTENVOLUMENS FUR DAS RECHTZEITIGE ANLEGEN DES ATEMSCHUTZES].
Ulrich Helm.
Wehrmedizin, vol. 4, no. 8, 1966, p. 158–165. In German.

The dependence of the time during which breath is held, on the respiratory minute volume was studied in 171 individual tests in 44 test persons of an average age of 21 years. The statistical evaluation of the experimental results reveals that the mean time of breathholding up to a respiratory minute volume of approximately more than 50 1./min. amounts, at a probability of 95%, to at least seven sec. This figure is considered the time standard for putting on the gas mask in the People's Army of the East Zone. On the basis of the experimental results, the author postulates a reduction of the time for putting on the gas mask to at least seven sec. and in the case of danger from chemical warfare agents a reduction of all activities during which the respiratory minute volume exceeds the value of 50 1./min. If it cannot be avoided that this limit is exceeded, the gas mask should already be worn on the face, as long as no other solution has been found.

A67-80555
BIOLOGICAL PHENOMENA REVEALED BY SATELLITES [LES EXPERIENCES BIOLOGIQUES REALISEES EN SATELLITES].
R.-P. Delahaye.
Revue de Medecine Aeronautique, vol. 5, no. 18, 1966, p. 58–59. In French.

A review of Russian space flight (Sputniks 2–5, Vostoks 1–6) experiences as revealed by Russian authors indicates that

five days of weightlessness does not affect the vital function of different organisms. Weightlessness is capable of modifying the mechanisms of mitosis. In general, space flight produced rearrangement of chromosomes, changes in the mechanisms of mitosis and growth in various biological specimens (microspores of transcantia, plant, yeast and bacterial cultures). The radiobiological problems encountered indicate the necessity to study the effect of each cosmic ray and heavy particle constituent.

A67-80556
STUDY OF THE EFFECTS OF GLUCOSIDES OF ANTHOCYANINE ON THE NIGHT VISION OF RADAR APPROACH CONTROLLERS [ETUDE DES EFFETS DES GLUCOSIDES D'ANTHOCYANE SUR LA VISION NOCTURNE DES CONTROLEURS D'APPROCHE D'AERODROME].
L. Belleoud, D. Leluan, and Y. Boyer.
Revue de Medecine Aeronautique, vol. 5, no. 18, 1966, p. 45–50. In French.

Fourteen air force airport radar approach controllers were given long-term, high-dose treatment with Difrarel 100 (anthocyanoside and beta carotene), and a study of night vision was made. The threshold of night vision decreased in all subjects and especially in those having mediocre night vision. The improvements found were extended for a month. Difrarel 100 decreased entirely the errors associated with glare. Visual fatigue was decreased in the subjects working under conditions of low illumination. Adaptation of scotopic vision seemed to be accelerated for some of the subjects. Appreciation was only subjective and may explain the divergence of results. Difrarel 100 appeared to be a rapid and effective means of providing excellent night vision for air force specialist personnel.

A67-80557
A DEVELOPMENTAL STUDY OF VISUAL SEARCH BEHAVIOR.
Eleanor J. Gibson and Albert Yonas (Cornell U., Ithaca, N. Y.).
Perception and Psychophysics, vol. 1, Jun. 1966, p. 169–171. Grant NIH MH-07226-02.

Children in second, fourth and sixth grades and college sophomores were compared on a visual search and scanning task under three experimental conditions. In Condition I, a single target letter was sought in a list of letters of low visual confusability. In Condition II, two target letters were sought but only one appeared in a given list. In Condition III, a single target letter was sought in a list of letters of high confusability. Search time decreased with age in all three tasks. Searching for two targets was no harder than searching for one. A highly confusable visual context increased search time at all age levels.

A67-80558
LOUDNESS AS A FUNCTION OF THE DURATION OF AUDITORY STIMULATION.
Gösta Ekman, Birgitta Berglund, and Ulf Berglund (Stockholm U., Psychol. Labs., Sweden).
Scandinavian Journal of Psychology, vol. 7, 1966, p. 201–208. 16 refs.
Contract AF 61(052)-878 and Swed. Council for Social Sci. Res. supported research.

The perceived loudness of a 1000 c.p.s. tone was measured by a direct scaling method under different conditions of intensity (19-35 db.) and duration (50–500 msec.) of stimulation. It was found that loudness grows as a logarithmic function of stimulus duration; the relation was verified for ten individual subjects and four levels of intensity. In addition, the relation between temporal threshold and level of intensity was tentatively described.

A67-80559
THE EFFECT OF HIGH ALTITUDE HYPOXIA ON ANTIHEART ANTIBODIES AND EXPERIMENTAL MYOCARDITIS.
Howard J. Zeft, Iowa W. Marable, Harold W. Casey, and William G. Glenn (School of Aerospace Med., Environ. Systems Branch and Immunobiol. Unit, Brooks AFB, Tex.).
Archives of Pathology, vol. 82, Nov. 1966, p. 434–442. 22 refs.

Rabbits immunized with repeated injections of beef-heart homogenate in aluminum hydroxide adjuvant, developed antiheart antibodies. Control and immunized rabbits were acclimatized to 18,000 ft. and remained at that simulated altitude in a low pressure chamber for 38 days. Control animals under the hypoxic stress did not develop significant titers of anticardial antibodies. Weekly booster antigen injections were given to sensitized rabbits at ambient and altitude conditions. There was no consistent difference in serum antiheart antibody levels between the two immunized groups, as measured by the tanned cell hemagglutination technique. Focal myocarditis developed to a slightly greater degree in the hypoxic animals. Eleven of twelve immunized rabbits had microscopic cardiac lesions, and in two of them marked inflammatory changes were associated with high terminal levels of circulating anti-rabbit-heart antibody.

A67-80560
SOME DETERMINANTS OF INDIVIDUAL DIFFERENCES IN PREDECISION INFORMATION-PROCESSING BEHAVIOR.
Joan E. Sieber (Stanford U., Calif.) and John T. Lanzetta (Dartmouth Coll., Hanover, N. H.).
Journal of Personality and Social Psychology, vol. 4, Nov. 1966, p. 561–571. 22 refs.
Contracts NONR 3897(07) and AF 49(638)-1614.

Individual differences in information processing before decision making were shown to be related to differences in the complexity of decision makers' conceptual structure. Two sets of process variables were postulated to underlie these individual differences: differences in the number and the distribution of response strengths of the decision alternatives (hence differences in response uncertainty), and differences in tendency to differentiate and encode information inherent in a decision problem and to produce controlled associations to this information. The relationship between these variables and style of decision making was examined in two ways: (a) Groups of individuals categorized on the basis of test scores as structurally complex or simple were compared with respect to the following measures-degree of subjective uncertainty experienced when making decisions, and degree of differentiation and encoding of aspects of decision problems and production of controlled associates to these differentiated categories; (b) groups of individuals categorized as structurally simple or complex were given two different training procedures, and their posttraining behavior on decision problems was compared with a control (no training) group and with each other. The training procedures were designed to increase subjective response uncertainty, and stimulus differentiation, encoding, and production of controlled associates, respectively, to this differentiated material. It was assumed that these training procedures would modify some of the initial differences in conceptual structure and thus change predecision behavior. The findings were generally in accord with the predictions advanced, but consistently favored the differentiation, encoding, and controlled associations processes as the variables along which decision makers vary most markedly.

A67-80561
EFFECT OF SIGNAL DURATION ON THE AUDITORY SENSITIVITY OF HUMANS AND MONKEYS (MACACA MULATTA).
T. Dean Clack (C.W. Shilling Auditory Res. Center, Inc., Groton, Conn.).
Journal of the Acoustical Society of America, vol. 40, Nov. 1966, p. 1140–1146. 15 refs.
NIH supported research.

The changes in absolute sensitivity of monkeys and humans are compared as a function of signal duration. Pure-tone thresholds, both monaural and binaural, were obtained from the two monkeys (Macaca mulatta) using a single-lever, go-no go, shock-avoidance conditioning procedure. The monaural thresholds for the seven women were determined under similar acoustic and behavioral conditions. The signal durations sampled were from 10 to 1500 msec. at frequencies between 250 and 8000 c.p.s. The results show that (1) the rate of change in threshold as a function of signal duration is linear with a slope dependent upon frequency-slope is highest below 1000 c.p.s. for both humans and monkeys; (2) although the integration rates for humans and monkeys are nearly identical at 2000 and 4000 c.p.s., they differ at the frequency extremes. An attempt is made to show that these results do not depend upon the critical-ratio differences of the ears but are related to long-term sensitivity.

A67-80562
MECHANICAL IMPACT: A MODEL FOR AUDITORY EXCITATION AND FATIGUE.
H. D. Crane (Stanford Res. Inst., Menlo Park, Calif.).
Journal of the Acoustical Society of America, vol. 40, Nov. 1966, p. 1147–1159. 27 refs.

An auditory model is developed in which hair-cell excitation is based on mechanical impact of the cochlear hairs against the tectorial membrane, and auditory fatigue is based on a relatively slow mechanical bending of the tectorial membrane to conform to the deflection envelope. In this model, the cochlear system is treated basically as a spatially distributed, mechanical, envelope-detection system. Some novel mechanical vibration and impact devices that led to the development of this picture of hair-cell excitation are discussed. It is shown that the model can explain, and is consistent with, a relatively wide range of auditory data such as pitch and threshold shifts with pure-tone fatigue, modulation of a steady high-frequency tone by a simultaneous low-frequency tone, and very rapid high-frequency cutoff in "tuning curves" recorded from single auditory fibers. The model leads to a reinterpretation of such features as pitch sharpening, mission fundamentals, and fatigue. No new data are presented, although new experiments are suggested by the model.

A67-80563
TASK EFFECTS ON GROUP INTERACTION.
Charles G. Morris (Ill. U., Urbana).
Journal of Personality and Social Psychology, vol. 4, Nov. 1966, p. 545–554. 35 refs.
Contract AF 49(638)-1291; NSF and Ill. U. supported research.

This study was a systematic investigation of the effects on group interaction of two task characteristics: task type (production, discussion, problem solving), and level of difficulty (high, medium, low). Evidence was also gathered on the effects of ordinal position. Analysis of transcripts from 108 three-man groups indicated that task type significantly affected the distribution of more than 60% of the group activity, with production (creativity) and discussion tasks being least alike. Task difficulty had less effect on group activity. Significant changes were found in group activity from the first to the fourth task sessions. The data were interpreted in terms of methodological implications for small-group research, and several research strategies were proposed to minimize these methodological problems.

A67-80564
BINARY ADDITION OF PEAK TIMES FOR ELECTROENCEPHALIC AUDIOMETRIC RESPONSES.
Hiroshi Shimizu (Johns Hopkins U., School of Med., Baltimore, Md.).
Journal of Speech and Hearing Research, vol. 9, Jun. 1966, p. 313–316.

A graphic binary addition technique for the detection of evoked responses in conventional sleep electroencephalography audiometry is described. The method displays the number of peaks of waves from all samples that meet amplitude criteria at any given latency from the stimulus. The technique is simple and easily executed. It does not show the waveform of evoked responses, but it clearly reveals the presence or absence of a response in sleep.

A67-80565
SUMMED EVOKED RESPONSES USING PURE-TONE STIMULI.
Geary A. McCandless and Lavar Best (Colo. U., Med. Center, Denver).
Journal of Speech and Hearing Research, vol. 9, Jun. 1966, p. 266–272. 6 refs.
Grant NINDB NB 05614-02.

Selected pure tones were used as stimuli in a study of evoked auditory responses in 25 adults. The effects of stimulus frequency, intensity, and duration on the evoked response were evaluated. Pure-tone stimuli appear to be as satisfactory as click stimuli in eliciting auditory evoked responses and have the additional advantage of providing more information relative to auditory function. Evoked response patterns were essentially the same for 500 Hz (c.p.s.), 2,000 Hz, and 4,000 Hz. Latencies were longer for the components of pure-tone-evoked responses than for click-evoked responses. Evoked responses may be influenced by (1) changes in stimulus parameters and (2) changes in subject's psychophysical state. These variables become a major consideration in the recognition of the evoked response at intensity levels near threshold.

A67-80566
ADAPTATION OF CARDIAC FUNCTION TO PHYSICAL EFFORTS OF DIFFERENT INTENSITY [ADAPTACJA PRACY SERCA DO WYSILKOW FIZYCZNYCH O ROZNEJ INTENSYWNOSCI].
R. Kubica and W. Goszcz.
Wychowanie Fizyczne i Sport, vol. 10, 1966, p. 73–79. 23 refs. In Polish.

Cardiac output (Qc) was investigated using acetylene method on untrained persons at different work loads on a bicycle ergometer. The stroke volume (Qc), cardiac output (Qc), and heart frequency were correlated with oxygen consumption per min. (VO_2). A linear relationship of heart frequency and minute oxygen consumption was observed. The stroke volume, however, increased somewhat with increasing energy expenditure during small work loads, while under more intense exercise it remained constant. Consequently the changes of cardiac output during small metabolic loads are proportional to heart frequency and stroke volume, and under greater efforts they are related only to heart frequency. Therefore, cardiac output is nonlinear function of VO_2.

The maximal values of stroke volume of several untrained subjects are above 180 ml.

A67-80567
VARIED AND CONSTANT INTERSIGNAL INTERVALS IN PSYCHOLOGICAL REFRACTORINESS.
Robert Gottsdanker and Thomas C. Way (Calif. U., Santa Barbara).
Journal of Experimental Psychology, vol. 72, Dec. 1966, p. 792–804. 19 refs.
Grants NIMH MH 10317-01 and 10447-01.

Choice responses to two successive signals were made by eight young men with both randomly varied and constant intersignal intervals, ranging from 50 to 800 msec. "Delay" interpretations of psychological refractoriness were disconfirmed by quantitative tests, and evidence was against grouping explanations of this failure. The extent to which refractoriness is related to time uncertainty was not established definitively. Although second reaction time was lengthened with short constant intervals, and less degree than with varied intervals, the values of second reaction time for the constant condition are suspect because of the marked variation of the first reaction time with interval. The "organization-persistence" prediction of higher second reaction time when opposite responses were required to the two signals was not realized, possibly because of expectation of reversals.

A67-80568
EFFECTS OF SENSORY DEPRIVATION ON INTROVERTS AND EXTRAVERTS: A FAILURE TO FIND REPORTED DIFFERENCES.
A. Michael Rossi and Philip Solomon (Boston City Hosp., Psychiat. Serv., Mass.).
Journal of Psychiatric Research, vol. 4, Nov. 1966, p. 115–125. 12 refs.
Contracts ONR 1866(29) and NR 142-115.

This study compared ten extraverts and ten introverts in their reactions to sensory deprivation (SD). Subjects were placed in a sound-deadened room with halved ping-pong balls covering their eyes and cardboard cuffs enclosing their lower arms and hands. The room was well-lighted and white noise was conveyed to subjects via headphones; however, subjects eye coverings diffused the light and the loudness of the white noise blocked out ambient sounds so that subjects received only unpatterned visual and auditory stimulation. Subjects were in SD for three hr. unless they requested early release. The two groups of subjects were compared on the following data: (a) numbers of each group who quit the experiment prematurely; (b) verbal reports given during SD; (c) observations and recordings of visible movements during SD; (d) self-ratings of well-being on a semantic differential type rating scale before and after SD; and (e) scores on the Minnesota multiphasic Personality Inventory. The results disclosed no statistically significant differences between extraverts and introverts on any of the measures employed.

A67-80569
TIME ESTIMATION, KNOWLEDGE OF RESULTS AND DRUG EFFECTS.
Jacques Rutschmann and Leo Rubinstein (N. Y. State Psychiat. Inst. and Columbia U., New York City).
(Psychonomic Soc., Chicago, Ill., Oct. 1965).
Journal of Psychiatric Research, vol. 4, Nov. 1966, p. 107–114. 11 refs.
Grants NIMH M-872 and MH 03616.

Knowledge of results can obscure the effects of a drug on time estimation, particularly when ten sec. is estimated. The effect of such knowledge on one sec. estimation differs from the effect on ten sec. estimation. Secobarbital was the only drug which produced significant directional effects when tested with a nonparametric technique of moderate power. The effects of alcohol were found to be variable. The performance under d-amphetamine could not be discriminated from the performance under placebo. Under the conditions of the present experiment, the one second estimation schedule appears more sensitive to drug effects than the ten sec. schedule. Timing responses were found to be sequentially dependent: within limits, successive interresponse times are positively correlated, a finding which warrants further study and elucidation.

A67-80570
CIRCADIAN PERIODICITY, ADRENAL CORTICOSTEROIDS, AND THE EEG OF NORMAL MAN.
Gilbert Frank, Frantz Halberg, Richard Harner, James Matthews, Eugene Johnson, Howard Gravem, and Virginia Andrus (Minn. U., Med. School, Divs. of Anesthesiol. and Biostatist., Dept. of Pathol., Div. of Neurol., Minneapolis and Stanford Med. School, Div. of Neurol., Calif.).
(Ross Conf. on Pediat. Res., 39th, Brainerd, Minn., Apr. 1961).
Journal of Psychiatric Research, vol. 4, Nov. 1966, p. 73–86. 39 refs.
NASA Grants NsG-517 and NsG215-62 81, Grants PHS 5-K6-GM-13,981-03, GM12527, and NB-04531-02.

Human electroencephalogram (EEG) activity in the conventional frequency range of 1–30 c.p.s. is a well-established entity. This paper illustrates a method for utilizing a conventional EEG frequency analyzer to demonstrate a considerably lower frequency, circadian (about 24-hr.) rhythm in the EEGs of a group of human volunteers. This periodicity persists even in a group of totally sleep deprived (50 hr.) subjects. Plasma cortisol levels from blood samples drawn simultaneously with the EEG data also demonstrate circadian periodicity, and EEG-cortisol temporal (phase) relationships are apparent by inspection of the data collected, but could not be confirmed statistically. Evidence for the statistical significance of circadian organization of the EEGs and adrenal cortices of healthy men is provided by a phase testing technique developed for this study and discussed further in the appendix. This technique is readily applicable to further studies of periodicity in physiological functions.

A67-80571
THE METABOLIC FATE OF MONOMETHYLHYDRAZINE AND UNSYMMETRICAL DIMETHYLHYDRAZINE.
F. N. Dost, D. J. Reed, and C. H. Wang (Ore. State U., Sci. Res. Inst. and Radiation Center, Corvallis).
Biochemical Pharmacology, vol. 15, Sep. 1966, p. 1325–1332. 15 refs.
Contract AF 33(657)-11757.

The respiratory and urinary excretion of intraperitoneally administered unsymmetrical dimethylhydrazine (UDMH) and monomethylhydrazine (MMH) and their metabolities by rates was studied by means of radiotracer techniques. Animals given a very low dose of UDMH-^{14}C metabolized almost 30% of the compound to respiratory $^{14}CO_2$ in ten hr. The conversion of a convulsive dose of UDMH-^{14}C to CO_2 amounted to slightly more than 13% at the end of 20 hr. At the various doses of UDMH-^{14}C used at least 50% of the administered radioactivity appeared in the urine in a two-day period. Rats given 0.12 m-mole MMH-^{14}C/kg i.p. respired approximately 45% of the ^{14}C during the following 24 hr. Of the respired radioactivity, 20% to 25% was $^{14}CO_2$; the remainder was $^{14}CH_4$. At the subconvulsive doses, 40% of the administered radio-

activity in MMH-^{14}C was excreted in urine. The percentage of urinary excretion of ^{14}C from higher doses of MMH-^{14}C was less, but the net amount excreted was slightly higher.

A67-80572
SPACE FLIGHT FEEDING SYSTEM: CHARACTERISTICS, CONCEPTS FOR IMPROVEMENT, AND PUBLIC HEALTH IMPLICATIONS.

Norman D. Heidelbaugh (USAF School of Aerospace Med., Physiol. Branch, Performance Physiol. Sect., Brooks AFB, Tex.).

Journal of the American Veterinary Medical Association, vol. 149, Dec. 15, 1966, p. 1662–1671. 20 refs.
USAF School of Aerospace Med. supported research.

Space flight feeding systems are characterized by their strict compliance to stringent requirements imposed by the biological, engineering, and operational constraints of space flight. Many special techniques have been combined to develop present methods for production and quality assurance of reliable foods for space flight feeding systems. The approach to development of these techniques has utilized concepts which evolved in the manned space flight industry. New concepts being developed for improving space feeding systems can be expected to introduce additional changes in methods of food production. These concepts in space food technology have implications for future public health standards in a modernizing food industry. The discipline of veterinary public health, along with other medical specialities engaged in food safety programs, will be required to furnish personnel with increasingly higher standards of training to cope with the increasing complexity of modern food technology.

A67-80573
PERMANENT ENCEPHALOPATHY FROM TOLUENE INHALATION.

J. William Knox and James R. Nelson (Calif. U., School of Med., Div. of Neurol., Los Angeles, and Harbor Gen. Hosp., Torrance, Calif.).

(Federation of Western Soc. of Neurol. Sci., Meeting, San Francisco, Mar. 3, 1966).
New England Journal of Medicine, vol. 275, Dec. 29, 1966, p. 1494–1496. 8 refs.

A case of permanent brain damage from chronic toluene inhalation is reported. The clinical findings of ataxia, tremulousness, emotional lability, a marked snout reflex and a Babinski sign on the right side were accompanied by diffuse electroencephalographic slowing and diffuse cerebral atrophy on pneumoencephalography. The central-nervous-system toxicology of toluene is reviewed, and a plea is made for greater investigation of the extent of chronic toluene habituation in adults.

A67-80574
REMEMBRANCE OF LINES PAST.

Anita R. Cunitz (Md. U., College Park) and Bruce M. Ross (Catholic U., Washington, D. C.).

Journal of Experimental Psychology, vol. 72, Oct. 1966, p. 558–563. 5 refs.
Grant NIH M-3196 and Catholic U. supported research.

Subjects saw a series of six consecutively presented vertical lines differing in length in increasing, decreasing, or random order and then were asked to recognize a seventh line as identical with a series line. In some conditions, to test for a frame-of-reference effect, the sixth line was usually long or short. Four increasing and four decreasing length conditions produced significantly less error than three random conditions. Frame-of-reference and discrimination-interference decrements were found for increasing length conditions, but only discrimination-interference decrements were found for decreasing length conditions. A related finding was that when the longest line was first in a series it had a retention advantage. A consistent memory bias suggests a readon for predominance of aftergradients in so-called "spread-of-effect" experiments.

A67-80575
RECALL AS A FUNCTION OF QUANTITY AND ENCODED CLUSTERING OF ITEMS ELICITED UNDER TWO METHODS OF PRESENTATION.

Jean Drevenstedt (Vanderbilt U., Nashville, Tenn.).

Journal of Experimental Psychology, vol. 72, Oct. 1966, p. 551–557. 10 refs.

Visual symbols in a 3×3 diagonal-shaped display were presented sequentially to 45 subjects, who were then cued to recall the entire set of stimuli or selected parts. Partial reports were varied both in size (three and six symbols) and degree of organization among the symbols. Main effects of both report size and sampling method were found significant ($p<.01$). As predicted, however, partial recall by temporally and spatially organized item clusters yielded higher retention estimates than either total recall or partial recalls of a comparable quantity of items, randomly selected or merely spatially grouped. Accuracy of recall increased as a positive monotonic function of decrease in the number of temporal-spatial clusters elicited. The data appeared to indicate that degree of clustering among symbols in a partial report has a more facilitative effect upon retrieval than mere size of the report. A second experiment ($N=41$), using a simultaneous presentation of items, yielded relative retention estimates which were lower than those of Experiment I, but generally consistent with the prior findings.

A67-80576
SOME EFFECTS OF PARTIAL ADVANCE INFORMATION ON CHOICE REACTION WITH FIXED OR VARIABLE S-R MAPPING.

L. H. Shaffer (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).

Journal of Experimental Psychology, vol. 72, Oct. 1966, p. 541–545. 5 refs.

Two experiments are reported on two-choice reaction with variable stimulus-response mapping. In the task a signal, I, designates a mapping relation between signal, M and response, R. Both I and M can be random variables in a trial sequence. In some conditions a value of I or of M or a neutral light was given in advance, with either 1/4- or 1/2-sec. foreperiod. Response time was examined as a function of the advance alerting and of the transition from the previous trial. Both were significant variables and there was an interaction between them indicating distinct phases in the choice process. It was also shown that with a neutral advance signal there is an optimal foreperiod in the interval 0-1/2 sec. with fixed mapping but not with variable mapping.

A67-80577
EFFECT OF PULSE RATE AND INTENSITY UPON VISUAL FLASH RATE.

William R. Mackavey (Boston U., Mass.).

Journal of Experimental Psychology, vol. 72, Oct. 1966, p. 528–531. Boston U. supported research.

The rate at which an intermittent visual target appears to be flashing is a function not only of its actual pulse rate, but

of its intensity as well. This was shown by having six observers match the flash rates of two contralaterally presented targets having various intensity relations. The standard target was set to pulse at 4, 8, 12, 16, 24, or 32 c.p.s. at intensity levels of 630, 63, 6.3, or .63 apparent ftc. The observer adjusted the pulse rate of the variable 630 apparent ftc., so that it appeared to blashing at the same rate as the standard. Flash rate and intensity were found to be independent at the lowest pulse rates used. At the higher values of pulse rate, a 30-db. reduction in intensity produced as much as a 100% increment in flash rate.

A67-80578
CHANGE OF ITEM FUNCTION IN PAIRED-ASSOCIATE LEARNING.
Robert K. Young and Troy R. Bickerstaff (Tex. U. Austin).
Journal of Experimental Psychology, vol. 72, Oct. 1966, p. 514–518. 11 refs.
Grants NSF GB-3629 and PHS HD-01062.

The effects of change of item function from one paired-associate list to another were studied by having each subject learn two lists composed of the same items. One-half the first-list stimuli became second-list responses and one-half the first-list responses became second-list stimuli. The arrangement of the second list was such that for each pair either two, one, or zero items changed function from stimulus to response or vice versa from the first to the second list. It was found that as the number of items in a pair changing function increased, difficulty of learning increased.

A67-80579
LEVEL OF RISK IN PROBABILITY LEARNING: WITHIN- AND BETWEEN-SUBJECTS DESIGNS.
John A. Schnorr, Stanley G. Kipkin, and Jerome L. Myers (Mass. U., Amherst).
Journal of Experimental Psychology, vol. 72, Oct. 1966, p. 497–500. 10 refs.
Grants NIH MH-03803-04 and NSF GS-386.

Human choice behavior in a two-choice situation involving risk was (a) invariant over two risk levels when each subject received only one risk level, (b) directly related to risk level when each subject was exposed to both risk levels. The major difference among groups was depression of performance on low-risk trials for subjects exposed to both risk levels (negative contrast). Negative contrast was slso observed in subjects' estimates of event probabilities (πs). Choice behavior and πs were significantly correlated within each experimental conditions.

A67-80580
TRANSFORMATIONS OF POSITIVE AND NEGATIVE INFORMATION IN A MODIFIED LEARNING-SET TASK.
Robert Weber (Kenyon Coll., Gambier, Ohio) and Addison Woodward, Jr. (Conn. Coll., New London).
Journal of Experimental Psychology, vol. 72, Oct. 1966, p. 492–496. 8 refs.

The relative effects on acquisition of positive and negative information were studied by using a modified learning-set task, two trials per problem. On the Trial 1's of each problem the subject did not respond, but the experimenter gave either positive or negative information to subjects. On Trial 2's the subject did respond, and the correct choice, depending on the condition, could be either a "recurrent" stimulus item that carried over from Trial 1, or a "transient" stimulus item that did not carry over from Trial 1. When the recurrent item was correct, positive Trial 1 information gave more rapid Trial 2 learning than negative information. But when the transient item was correct, negative Trial 1 information gave more rapid learning than positive information. In all cases there were learing-to-learning effects in the processing of positive and negative information.

A67-80581
LATENCY COMPONENTS IN TWO-CHOICE RESPONDING.
D. H. Taylor
Journal of Experimental Psychology, vol. 72, Oct. 1966, p. 481–487. 14 refs.
Sci. Res. Council supported research.

Donders' (1868) classical b- and c-reactions were compared with two similar conditions in which stimulus discrimination was reduced to the detection of perfectly detectable stimuli, so enabling the latencies associated with stimulus discrimination and response choice to be studied separately. An additive hypothesis of reaction time (RT) components would predict that these latency distributions should add together in the full two-choice situation. In each of the four conditions, eight subjects each gave 32 RTs. Latency distributions were described by their minima and first three moments. The data were consistent with the additive hypothesis. The component latency distributions could be fitted by a negative binominal function.

A67-80582
VISUAL PERCEPTION OF CAPITAL LETTERS: MULTIDIMENSIONAL RATIO SCALING AND MULTIDIMENSIONAL SIMILARITY.
Teodor Künnapas (Stockholm U., Psychol. Labs., Sweden).
Scandinavian Journal of Psychology, vol. 7, 1966, p. 189–196. 11 refs.
Swed. Council for Social Sci. Res. supported research.

The quantitative similarity of nine capital letters was studied (1) by the direct multidimensional ratio scaling method and (2) by the method of similarity analysis. Three factors, E, O and I, were found. Factor loadings were nearly identical in both methods. A previously proposed equation did not describe the relation between subjective similarity and angular separation of percept vectors.

A67-80583
OBJECTIVE AND SUBJECTIVE PERFORMANCE AS INFLUENCED BY DRUG-INDUCED VARIATIONS IN ACTIVATION LEVEL.
Marianne Frankenhaeuser and Birgitta Post (Stockholm U., Psychol. Lab. and Karolinska Inst. Lab. of Aviation and Naval Med., Stockholm, Sweden).
Scandinavian Journal of Psychology, vol. 7, 1966, p. 168–178. 19 refs.
Swed. Council for Social Sci. Res. supported research.

Performance was measured by seven sensorimotor and perceptual tests given to 30 students in six successive trials, spread over five hrs. before and after the intake of either 15 mg. dexamphetamine, 200 mg. Pentobarbitone, or a placebo. Subjective performance, level of aspiration, wakefulness, and mood were measured by a scaling method. A close agreement was found between the amount of objective impairment induced by Pentobarbitone was not reflected in the subjective measures. These results were examined in relation to the other indices of activation.

A67-80584
EFFECTS OF ISOMETRIC EXERCISES DONE WITH A BELT UPON THE PHYSICAL FITNESS STATUS OF STUDENTS IN REQUIRED PHYSICAL EDUCATION CLASSES.
James A. Baley (Conn. U., Storrs).
Research Quarterly, vol. 37, Oct. 1966, p. 291–301. 18 refs.
NSF supported research.

Students (N = 104) enrolled in four low fitness, one middle fitness, and one high fitness class in basic physical education classes at the University of Connecticut participated in a four-week program of isometric exercises done with an adjustable nylon belt which was stabilized against various body segments. Low, middle, and high fitness classes were compared in the amount of improvement made in the five items in which significant gains had been made. The MWF classes which did 30 min. of isometric exercises for 12 class meetings were compared to the TTh classes which met for eight class meetings and which did the same isometric exercise program and in addition did stretching exercises and ran a mile. When all groups were treated together, mean gains of 1.1 in. in the vertical jump, .74 sec. in the agility run, .17 sec. in the 30-yd. dash, 151.9 lb. in the leg lift, and 57.0 lb. in the back lift were made. These were all significant at the 0.005 to the 0.0005 level. Small but significant gains were made in right and left grip, the Fait endurance hang, and the 380-yd. run. The low fitness classes made greater improvements in the leg lift, the vertical jump, and the agility run than did the middle or high fitness groups. The high fitness class made greater improvements in the back lift and in the 30-yd. dash than did the low or middle fitness classes. The classes which did only isometric exercises for a half-hour three times each week for 4-1/2 weeks made greater mean gains in the vertical jump, the agility run, the 30-yd. dash and the back lift than did the classes which met for 60-min. periods twice each week for 4 1/2 weeks and did stretching exercises and running in addition to the isometric exercises. However, the latter made greater gains in the leg lift.

A67-80585
TRANSONIC FLIGHT.
A. H. E. Welch.
Ostomy Quarterly, vol. 3, Fall 1966, p. 12, 36–37.

A case history is reported of a Royal Air Force pilot with an ileostomy who engaged in high-speed, high-altitude flying while assigned to a jet refresher flying course. A special ileostomy bag and stoma protector was devised to withstand the stresses of high-speed flight and which could provide comfort when worn with flight equipment (ejector seat harness, life jacket, parachute harness, etc.). The pilot coped with the problem of skin allergy to normal plasters by attaching the bag with clear Fablon plastic and zinc oxide plaster. No problems were encountered in the functioning of the ileostomy during jet flight.

A67-80586
EFFECT OF INTERSTIMULUS INTERVALS AND REST-PERIOD LENGTH UPON HABITUATION OF THE ORIENTING RESPONSE.
James H. Geer (Pa. U., Philadelphia).
(Intern. Colloq. on Mech. of Orienting Reaction in Man, Bratislava, Czechoslovakia, Sep. 1965).
Journal of Experimental Psychology, vol. 72, Oct. 1966, p. 617–619. 5 refs.
Grant NIMH MH-08905-01.

The effects of three different interstimulus interval (ISI) lengths and two different rest-period lengths upon habituation of the orienting response (OR) were studied in a factorial design employing 84 subjects. Galvanic skin responses (GSRs) to a series of tones were employed as the measure of the OR. Rest-period length did not effect OR habituation, while increased ISI length was associated with an increase in resistance of the OR to habituation. Latency, duration, and amplitude measures of the GSR were employed with amplitude being the most-sensitive index of change. Spontaneous GSRs during rest were positively correlated with the number of ORs. It appeared that the relationship of the OR and spontaneous GSRs increased with lengthened ISI.

A67-80587
THE VON RESTORFF EFFECT IN SERIAL LEARNING: SERIAL POSITION OF THE ISOLATE AND LENGTH OF LIST.
John P. McLaughlin (N. Y. U., New York City).
(Eastern Psychol. Assn., Conv., Atlantic City, N. J., 1965).
Journal of Experimental Psychology, vol. 72, Oct. 1966, p. 603-609. 12 refs.

Nature of effects in serial learning of an isolated item I (I) were examined as list length and serial position of I were varied. One-hundred-eighty soldiers learned series of 3, 7, 11, and 15 items with single Is and corresponding control items (CC) in varying serial positions to three errorless repetitions. Significant facilitation (lower errors) of I relative to CC occurred, but did not vary in magnitude with independent variables. Items immediately following I and all other items in I's series were facilitated by penultimate Is. The concept of generalization interference reduction does not adequately account for isolation effects.

A67-80588
GRAMMATICAL INTRUSIONS IN THE RECALL OF STRUCTURED LETTER PAIRS: MEDIATED TRANSFER OR POSITION LEARNING?
Kirk H. Smith (Walter Reed Army Inst. of Res., Washington, D. C.).
Journal of Experimental Psychology, vol. 72, Oct. 1966, p. 580–588. 11 refs.
Grant NSF G. 18690.

Sets of letter pairs were constructed from four classes of letters, M, N, P, and Q to form MN and PQ sequences. In free recall, subjects produced more intrusions of the form MQ and PN than would be expected if intrusions were produced by randomly combining the letters appearing in the presented pairs. An adequate account of the intrusion data is provided by a theory of position learning proposed by Braine. An alternative proposal by Jenkins and Palermo (1964) based upon mediated transfer fails to predict the high proportion of MQ and PN intrusions.

A67-80589
PSYCHO-ENDOCRINE EFFECTS OF PERCEPTUAL AND SOCIAL ISOLATION.
Harold Persky, Marvin Zuckerman, Gopal K. Basu, and Doris Thornton (Albert Einstein Med. Center, Res. Labs., Div. of Endocrinol. and Reprod., Philadelphia, Pa.).
Archives of General Psychiatry, vol. 15, Nov. 1966, p. 499–505. 15 refs.
Grants PHS MH-06140, MH-07926, and 5-K3-MH-18,374.

This study investigated the effects of perceptual and social isolation relative to nonisolated control conditions using an adjective checklist, questionnaire, and body movement and endocrine measures. Ten male subjects completed three sessions; the order of the perceptual and social isolation sessions was counterbalanced. Several of the checklist and questionnaire measures indicated that the first session was subjectively

more stressful than the second session regardless of which condition was involved. These findings suggest that set and adaptation are important influences in response to isolation. The endocrine findings suggest that both perceptual and social isolation results in significant arousal relative to normal unconfined life conditions.

A67-80590
CARDIAC SIZE AND PULMONARY ARTERIOGRAPHY IN EXPERIMENTAL CHRONIC HYPOXIA.

Enrique Valdivia (Wis. U., Madison).

(Fourth World Congr. of Cardiol., Mexico City, Mexico, 1963). Angiology, vol. 17, Nov. 1966, p. 793–799. 13 refs.

Grant NIH HE-6523 and Wis. Heart Assn. supported research.

Guinea pigs submitted to simulated high altitude in low-pressure chambers developed right ventricular dilation that was followed by hypertrophy of the wall of that ventricle. These alterations are observed anatomically and in an increase in the size of the cardiac shadow. Injection of radiopaque material into the right ventricle has shown that dilation of the right ventricle is accompanied by dilation of the pulmonary artery and intrapulmonary arteries. After two weeks of exposure to simulated altitude, the right ventricle dilation subsides, but the dilation of the pulmonary artery system persists and becomes marked. The finer branches of the pulmonary artery system are not visualized after one week of exposure to simulated altitude. Microscopic observation of the injected lungs has determined that the experimental animals have no injection of the pulmonary capillary bed. This alteration may be secondary to partial obliteration of the pulmonary capillary bed, to a precapillary vaso-occlusion or vasoconstriction, to hematologic alterations or to any combination of these factors.

A67-80591
INFORMATION AVAILABLE IN BRIEF TACTILE PRESENTATIONS.

James C. Bliss, Hewitt D. Crane, Phyllis K. Mansfield, and James T. Townsend (Stanford Res. Inst., Menlo Park, Calif.).

Perception and Psychophysics, vol. 1, Aug. 1966, p. 273–283. 12 refs.

NASA Contract NAS2-1679, Contract AF 33(615)-1099, Grants NINDB NB 04738 and NB 06412-01.

Two experiments investigated characteristics of immediate recall for brief tactile stimuli applied to the 24 interjoint regions of the fingers of both hands (thumbs excluded). The obtained immediate-memory span varied from 3.5 to 7.5 stimulus positions correct after correction for guessing, similar to the results in analogous visual studies. Properties of any hypothetical tactile short-term memory were studied by requiring subjects to report only a specified portion of the stimuli presented, and by varying the time of occurrence of the marker specifying which portion of the stimuli to report. In this partial-report condition, subjects had more stimulus information available at the time of reporting than their immediate memory spans indicated, provided that the stimulus marker occurred within 0.8 sec. after stimulus termination. The data suggest that at least for the amount of training employed here, any tactile short-term memory has much less capacity than analogous visual short-term memory.

A67-80592
PARALLEL VERSUS SERIAL PROCESSES IN MULTIDIMENSIONAL STIMULUS DISCRIMINATION.

Howard E. Egeth (Mich. U., Ann Arbor).

Perception and Psychophysics, vol. 1, Aug. 1966, p. 245–252. 18 refs.

Contract AFOSR AF 49(638)-1235 and NSF supported research.

Although considerable effort has been devoted to the description of processes underlying discriminations along single dimensions, there have been few attempts to determine whether or how these elementary processes are combined when discrimination requires the consideration of more than one stimulus dimension. In the present experiment, subjects were required to indicate whether two simultaneously presented multidimensional visual stimuli were identical or different. The response measure was reaction time, and subjects had a monetary incentive to respond both quickly and accurately. It was concluded that the most appropriate model for this task is one that assumes that dimensions are compared serially, and that the order in which dimensions are compared varies from trial-to-trial. Further, when a pair differs along several dimensions, subjects do not necessarily examine every dimension before initiaing the response "Different."

A67-80593
COMPARISON OF MAGNITUDE ESTIMATION OF LOUDNESS IN CHILDREN AND ADULTS.

Donald D. Dorfman and Robert Megling (San Diego State Coll., Calif.).

Perception and Psychophysics, vol. 1, Aug. 1966, p. 239–241. 8 refs.

Grants NIMH MH 10449-01 and NSF G-6161.

This study compared children (mean age 10.9 yr.) and college students on the magnitude estimation of loudness. Both the 20 children and the 20 adults were unpracticed observers. In one condition, the standard tone was assigned the number 10, and in the other condition, the number 20. Under both conditions the power function was found to fit the data of the children quite well, and to give approximately the same exponent. Of particular interest was the similarity between the data of the children and adults.

A67-80594
INFORMATION AND THE MEMORY SPAN.

Lester M. Hyman (Stanford U., Calif.) and Herbert Kaufman (Conn. U., Storrs).

Perception and Psychophysics, vol. 1, Jul. 1966, p. 235–237. 11 refs.

Messages differing in number of symbols and symbol information load were presented tachistoscopically to four adult subjects. The messages were constructed by random drawing with replacement from an alphabet of eight black form symbols and an alphabet of 32 colored form symbols. The nuber of symbols recalled varied as a function of alphabet; however, the information in recall was constant for all conditions. The number of symbols recalled and the information in recall was independent of message length.

A67-80595
MEMORY FOR THE PITCH OF A TONE.

E. G. Aiken and A. W. Lau (U.S. Naval Personnel Res. Activity, San Diego, Calif.).

Perception and Psychophysics, vol. 1, Jul. 1966, p. 231–233. 9 refs.

Observers attempted to detect the presence of a pitch difference between two successive tones. The percentage of correct judgments was equivalent for tones separated by .95, 4.5, and 8.9 sec. There was a general increase in reports of a pitch difference with increased intertone interval, which is interpreted as arising from hypothesized shifts in the neural locus of the first stimulus during the intertone interval.

A67-80596
EFFECT OF DISPLAY MOVEMENT ON TACTILE PATTERN PERCEPTION.
James C. Bliss, Hewitt D. Crane, and Stephen W. Link (Stanford Res. Inst., Menlo Park, Calif.).
Perception and Psychophysics, vol. 1, Jul. 1966, p. 195–202. 10 refs.
NASA Contract NAS 2-1679 and Contract AF 33(615)-1099.

The effect of display movement on the ability of subjects to recognize alphabetic shapes tactually was investigated. The display consisted of a computer-controlled eight-by-six array of small airjet stimulators that could be physically translated in a small circle by means of a mechanical linkage. The experimental parameters were the stimulus duration, the angular velocity of the display, and the amplitude of the rotation. Recognition accuracy increased with stimulus duration between 100 and 400 msec. For a rotation amplitude of 0.8 cm., a maximum in recognition accuracy occurred at a velocity of 400 r.p.m. or 150 msec./revolution. The optimum angular velocity appeared to decrease as the amplitude of rotation increased. From these results and certain related neurophysiological evidence, a hypothetical model is suggested which qualitatively can account for the data.

A67-80597
VIBROTACTILE LOUDNESS ADDITION.
James C. Craig (Princeton U., N. J.).
Perception and Psychophysics, vol. 1, Jun. 1966, p. 185–190. 12 refs.
NIH and NSF supported research.

Subjects adjusted the intensity of vibration at a single locus on the right hand to a value equal in vibratory loudness to various patterns of vibration on the left hand. The patterns were created by one to five equated vibration generators, varied with respect to sensation level and distances among the vibrators. The results were: (a) increasing from one to five vibrators produced a doubling in vibratory loudness, (b) neither loudness level of the components nor distance among vibrators had any effect on the slope of the overall loudness growth function. Subjects also adjusted the intensity of a white noise to equal in magnitude the patterns of vibration presented (a) to the left hand as before and (b) to loci distributed over the surface of the body. The results were the same as those obtained using a single vibrator as standard. The specific loci stimulated did not appear to have any effect on vibrotactile loudness addition.

A67-80598
APPARENT HAPTIC MOVEMENT.
Carl E. Sherrick and Ronald Rogers (Princeton U., N. J.).
Perception and Psychophysics, vol. 1, Jun. 1966, p. 175–180. 9 refs.
Grants NSF GB-1020 and NIH NB-04755.

When subjects were presented with 150-Hz vibrotactile bursts at two loci on the skin of the thigh and permitted to adjust the time between burst onsets, they reported good apparent movement between the loci. The time between stimulus onsets for optimal movement was found to vary directly with the duration of the stimulus. Replication of the experiment with electrocutaneous stimuli at 1 KHz yielded similar results. Comparison of the data with results from a study of visual apparent movement revealed no difference between the two modalities for the relationship between stimulus onset intervals and stimulus duration. The significance of the results for hypotheses about the processes underlying perception of apparent movement is discussed.

A67-80599
VISUAL AND ACOUSTIC CONFUSABILITY IN A VISUAL SEARCH TASK.
G. A. Kaplan, A. Yonas, and A. Shurcliff (Cornell U., Ithaca, N. Y.).
Perception and Psychophysics, vol. 1, Jun. 1966, p. 172–174. 18 refs.
Grant U.S. OE 6–10-156.

Visual and acoustic confusability between a target item and background items was varied in a visual search task. Visual confusability was a highly significant source of difficulty while acoustic confusability had no effect. The results do not seem to be interpretable within a theory which assumes compulsory auditory encoding of visual information.

A67-80600
USE OF 150 GM OF DRY BIOLOGICAL BODIES CONTAINING UNICELLULAR ALGAE IN FOOD RATIONS OF MAN [ISPOLZOVANIE 150 G SUKHOI BIOMASSY ODNOKLETOCHNYKH VODOROSLEI V RATSIONAKH CHELOVEKA].
IU. I. Kondrat'ev, V. P. Bychkov, A. S. Ushakov, N. N. Boiko, N. S. Kliushkina, E. A. Abaturova, A. M. Terpilovskii, N. V. Korneeva, M. I. Beliakova, E. S. Vorob'eva, N. G. Demochkina, and A. G. Kasatkina.
Voprosy Pitaniia, vol. 25, Nov.–Dec. 1966, p. 14–19. In Russian.

The effect of a diet comprising 50 gm. of dry unicellular algae (a mixture of *Chlorella* and *Scenedesmus*) was studied on three volunteers for 23 days. A ration containing 100 gm. of the material was tested on four other volunteers for 22 days. The following values were determined: in the blood—residual nitrogen, urea, ammonia, cholesterol, phospholipids; in the urine–specific weight, pH, total nitrogen, urea, ammonia, creatine, creatinine, amino acid nitrogen, 17-21-dioxy-20-ketocorticosteroids; in the feces—total nitrogen, fat, ash and carbohydrates. From the analysis of the obtained data it follows that the metabolic indices under study changed but insignificantly in comparison with the initial figures (except for some figures characteristic of lipid metabolism) and remained within the limits of the physiological standard. Hence, it appears possible to include in the human diet up to 100 gm. of dry cellular algae over a period of 22 days.

A67-80601
COMPARATIVE STUDY OF THE ACTION OF ETHYL AMPHETAMINE ON VIGILANCE IN THE DOG AT SEA LEVEL AND ALTITUDE [ETUDE COMPARATIVE DE L'ACTION DE L'ETHYL AMPHETAMINE SUR L'ETAT D'EVEIL DU CHIEN AU SOL ET EN ALTITUDE].
M. Gullermin, P. Galban, M. Gouars, and R. Angiboust (Centre d'Expériences Aériennes Mil., Lab. d'Etudes Méd.-Physiol., Mont-de-Marsan, France).
Revue de Médecine Aéronautique, vol. 5, no. 18, 1966, p. 31–32. In French.

A vigilance study was made in two dogs at ground level and at a simulated altitude of 3,000 m. in a decompression chamber. The animals received orally a pill containing an amphetamine derivative (1 phenyl-2-ethyl aminopropane hydrochloride) one hour and thirty min. before the experiment. The level of vigilance was studied via the electroencephalogram. At ground level the drug produced a moderate effect on alertness and a slight decrease in cardiac frequency, whereas at altitude it induced a psychotonic effect manifested by complete disappearance of sleep and acceleration of cardiac frequency. These effects indicate that the drug may possibly be used in flying personnel following human experimentation under the same conditions.

A67-80602
USE OF 50 AND 100 GM OF DRY BIOLOGICAL BODIES CONTAINING UNICELLULAR ALGAE IN FOOD RATIONS OF MAN [ISPOL'ZOVANIE 50 I 100 G SUKHOI BIOMASSY ODNOKLETOCHNYKH VODOROSLEI V RATSIONAKH PITANIIA CHELOVEKA].

IU. I. Kondrat'ev, V. P. Bychkov, A. S. Ushakov, N. N. Boiko, N. S. Kliushkina, E. A. Abaturova, A. M. Terpilovskii, N. A. Korneeva, M. I. Beliakova, and A. G. Kasatkina.

Voprosy Pitaniia, vol. 25, Nov.–Dec. 1966, p. 9–14. 7 refs. In Russian.

The effect of a diet comprising 50 gm. of dry unicellular algae (a mixture of *Chlorella* and *Scenedesmus)* was studied on three volunteers for 23 days and 100 gm. of four other volunteers for 22 days. The following values were determined: in the blood—residual nitrogen, urea, ammonia, cholesterol, phospholipids; in the urine—specific weight, pH, total nitrogen, urea, ammonia, creatine, creatinine, amino acid nitrogen, 17-21-dioxy-20-ketocorticosteroids; in the feces—total nitrogen fat, ash and carbohydrates. From the analysis of the obtained data it follows that the metabolic indices under study changed but insignificantly in comparison with the initial figures (except for some figures characteristic of lipid metabolism) and remained within the limits of the physiological standard. Hence, it appears possible to include in the human diet up to 100 gm. of dry unicellular algae over a period of 22 days.

A67-80603
SEPARATION OF PROTEINS FROM UNICELLULAR ALGAE [VYDELENIE BELKOV IZ ODNOKLETOCHNYKH VODOROSLEI].

N. S. Kliushkina and V. I. Fofanov.

Voprosy Pitaniia, vol. 25, Nov.–Dec. 1966, p. 3–9. 18 refs. In Russian.

A simple method of destroying cellular membranes in protococcal seaweeds and separation of its protein are proposed. Metabolic investigations undertaken on rats kept for 4 months on a food ration whose only source of protein was *Chlorella* proteins, demonstrated high biological value of the latter.

A67-80604
EFFECTS OF INDUSTRIAL HAZARDS ON THE OPHTHALMOTONE [O VLIIANII NA OFTAL'MOTONUS VREDNOSTEI PROMYSHLENNOGO PROIZVODSTVA].

L. P. Kozlova (Gel'mgol'ts Moscow Sci.-Res. Inst. of Eye Disease, USSR).

Vestnik Oftal'mologii, vol. 79, Sep.–Oct. 1966, p. 57–60. 15 refs. In Russian.

The results of research demonstrated that the incidence of glaucoma among persons dealing with diestuffs, sulfur dioxide, sodium nitrite, butanol, and other chemicals did not exceed the usual figures of glaucoma among the population at large. No glaucomatous patients were detected among 101 cases exhibiting neuropathology of toxic origin. But in more than 50% of the instances they demonstrated the presence of a pathological elastotonometric curve, indicating a disturbance of the neurovascular reflex which regulates the ophthalmotonus. In most cases this pathology was combined with the anginopathy of the retina.

A67-80605
CONCERNING AN ISTHMIC LESION OF RARE LOCALITY OBSERVED IN A JET PILOT [A PROPOS D'UNE LYSE ISTHMIQUE DE LOCALISATION RARE OBSERVEE CHEZ UN PILOTE DE CHASSE].

R. P. Delahaye, R. Pannier, and H. Mangin.

Revue de Médecine Aéronautique, vol. 5, no. 18, 1966, p. 41–42. In French.

A student jet pilot, 25 years of age, with 250 hours of flying time was involved in a landing accident. Interrogation and clinical examination revealed no painful phenomena. However, compulsory radiographic examination after the aircraft accident demonstrated an abnormality at the level of the right isthmus of the second lumbar vertebra (L2) which was considered as a traumatic lesion and treated by plaster immobilization. Examination several months later revealed no signs of clinical pathology. Additional clinical and radiographic study showed the asymptomatic vertebral lesion to be of congenital rather than of traumatic origin. Examination of X-rays taken prior to the accident revealed the existence of an alteration of the L2 and permitted confirmation of the congenital nature of the lesion. This case indicates the excessive frequency of errors in the diagnosis of spinal fracture, errors that may impede the pilot's career.

A67-80606
DYNAMIC VENTILATORY WORK DURING PHYSICAL EXERCISE AT 2,000 [M.] ALTITUDE [LE TRAVAIL DYNAMIQUE VENTILATOIRE AU COURS DE L'EXERCICE MUSCULAIRE A 2,000 D'ALTITUDE].

C. Jacquemin, P. Varene, and J. Timbal.

Revue de Medecine Aeronautique, vol. 5, no. 18, 1966, p. 39–40. 9 refs. In French.

Three men performed muscular exercise eight times for twenty min. with four levels of five min. at 50, 100, 150, and 175 watts. Dynamic pulmonary work was studied during exercise at 85 m. (laboratory altitude) and at a simulated altitude of 2000 m. in a decompression chamber. Although pulmonary dynamic work underwent a certain reduction at altitude due to the decrease of barometric pressure, it increased with the level of muscular exercise performed. This was related to the increase in pulmonary ventilation caused by hypoxia at altitude.

A67-80607
INTRODUCTION TO MEDICAL STUDIES ON GLIDING: ELECTROCARDIOGRAMS DONE ABOARD GLIDER [INTRODUCTION A LA RECHERCHE MEDICALE EN VOL A VOILE: PRISE D'ELECTROCARDIOGRAMMES A BORD DE PLANEUR].

Schalow and Bourdinaud (Saint-Auban-sur-Durance, Centre Natl. de Vol-à-Voile, France).

Revue de Médecine Aéronautique, vol. 5, no. 18, 1966, p. 33–37. In French.

An electrocardiographic study was made using a portable French electrocardiogram (Cardette) on two glider pilots in a two-seater Bréguet 904 sailplane. Electrocardiograms were taken at 4000 m., and at approximately 7000 m. and 8000 m. At 3500 m. when the oxygen mask was first used a slight dyspnea and disturbance in writing was observed, at 5000 m. confusion between code names, and at 7800 m. the first sensation of cold noted. Pulse changes were also observed. After two hr. of flying, rapid descent was made with ECG registrations taken at about 8000 m., 6800 m., 4800 m. and 2800 m. Certain ECG registrations demonstrated significant sinusal tachycardia in both pilots.

A67-80608
METABOLIC CHANGES IN MICE IN THE COURSE OF EXPERIMENTAL HYPOXIA [MODIFICATIONS METABOLIQUES DU CERVELET AU COURS DE L'HYPOXIE EXPERIMENTALE].

R. Loubiere and A. Pfister.
Revue de Médecine Aéronautique, vol. 5, no. 18, 1966, p. 23–29. 102 refs. In French.

Mice were subjected to 8,000 m. of altitude in a decompression chamber for five hours. During the first hour they received injections of marked amino acids, either DL-phenylalanine ^{3}H or DL-methionine ^{35}S. During the fifth hour of hypoxia the animals were decapitated in the chamber. Hypoxia produced a highly significant decrease in protein synthesis in all cerebellar structures examined. The ratio of hypoxic to control optic densities was in the following averages: Purkinje cells, 0.847; grain layer, 0.703; and molecular layer, 0.741. The animals were found in the symptomatic phase of hypoxia where the organism could no longer completely compensate the decrease of oxygen. Protein decrease was remarkably homogenous for each structure considered and whatever amino acid the case. The decreased protein incorporation was less sensitive at the level of the Purkinje cells (15%) in comparison with the grain layer (30%) and molecular layer (24%). It was postulated that during the symptomatic phase of hypoxia, the body compensates as best it can and permits the essential cells (cerebellar Purkinje cells) to function at a preferential level. Once surviving the critical phase, the cells become damaged having worked so long at a high rate.

A67-80609
CHANGE IN ASPECTS OF THE E.E.G. DURING A VISUAL SURVEILLANCE TASK DONE AT NIGHT [EVOLUTION DES ASPECTS E.E.G. AU COURS D'UNE TACHE DE SURVEILLANCE VISUELLE EFFECTUEE DE NUIT].
R. Angiboust, P. Galban, M. Gouars, and R. Vedel (Centre d'Experiences Aeriennes Mil., Lab. d'Etudes Med.-Physiol., Mont-de-Marsan, France).
Revue de Medecine Aeronautique, vol. 5, no. 18, 1966, p. 13–18. 7 refs. In French.

In a visual surveillance task of brief and scanty signals executed at different hours of the night evolution of the level of estimated cortical activity, whether by continuous electroencephalographic registration during the task or by EEG registration during a two-minute period in standard closed eyes conditions, was totally parallel to the course of performance in the test. Previous rest retarded this course. During the surveillance task, wakefulness rhythms were progressively replaced by sleep rhythms. The latter were always more abundant when the task was done slower. Even at the end of night, sleep rhythms remained relatively sparse, and the frequency of rapid rhythms showed signs of a struggle against sleep. Standard EEG registrations with closed eyes revealed a parallel evolutive aspect. However, at the end of night they showed a percentage of more significant sleep rhythms, reflecting the subjects' clinical state. In one or another case, pure oxygen inhalation favored the onset of sleep, but this effect was not statistically significant. When tracing showed wakefulness rhythms, inability to detect the signal was not associated with short periods of sleep but with inattention. Electroencephalography remains the method of choice from the standpoint of accuracy and economy for studying the level of vigilance and may be used in numerous aeronautical situations.

A67-80610
OCULAR ATTACK AND SINUS TREATMENT BY OPERATION ON LIMA (CLINICAL CASE OF A PILOT) [ATTEINTE OCULAIRE ET SINUSITE GUERISON PAR OPERATION DE DE LIMA (CAS CLINIQUE CHEZ UN NAVIGANT)].
L. R. Bordes, P. Orsini, J. Blouzon, and G. Raynaud.
Revue de Medecine Aeronautique, vol. 5, no. 18, 1966, p. 11–12. In French.

A jet pilot, 29 years of age, suffered severe head and ear aches following barotrauma of the ears and sinuses during flight. The intensity of painful crises increased and ocular problems appeared (diagnosed as irido-motor disorder with paresis of III and II nerves with ophthalmic neuralgia). Various neurological and otorhyinolaryngological tests and electroencephalography revealed no abnormality. Surgery of the posterior sinus using the Pieitratoni-DeLima technique revealed right chronic hyperplasic mucous pansinusitis with cystic formations containing pus, indicating the existence of a latent infectious foyer. Postoperative recovery of the sinus-ocular syndrome was rapid, and the pilot resumed normal flight activity. Follow-up was maintained for more than four years after surgery, and the pilot accumulated more than 2,400 hours of flying time without barotraumatic incident. This case demonstrates that complete surgical curetage of all facial sinuses does not necessitate grounding the pilot.

A67-80611
INTEREST IN THE CAROTIDOGRAM IN THE STUDY OF LEFT VENTRICULAR EJECTION [INTERET DU CAROTIDOGRAMME DANS L'ETUDE DE L'EJECTION VENTRICULAIRE GAUCHE].
R. Carre, N. Vasile, and J. Pernod.
Revue de Medecine Aeronautique, vol. 5, no. 18, 1966, p. 7–9. In French.

The graphic registration of carotid pulsations (carotidogram) is described in terms of apparatus, technique, and interpretation of results. Study of the carotidogram depends on the chronology and morphology of various characteristics of the curve registered. The carotidogram is of diagnostic value in any disorder of left ventricular ejection, in cardiac research and physiology exploring left ventricular dynamics, and in pathology for the diagnosis of aortic stenosis, obstructive cardiomyopathy, and aortic insufficiency. Centers studying flying personnel may find the carotidogram useful for detection and as a complementary diagnostic means in left ventricular cardiopathies. The process is not bloody or injurious and is easily performed in slightly less time than that needed for electrocardiography.

A67-80612
PITCH OF A PERIODICALLY INTERRUPTED TONE.
Elca Swigart (Ohio State U., Columbus).
Journal of the Acoustical Society of America, vol. 40, Nov. 1966, p. 1180–1185. 11 refs.
ONR and NIH supported research.

A series of tone pulses was produced by periodically interrupting a 1000-Hz tone (carrier frequency). Each interruption was one msec. (one wavelength of the carrier frequency). The duration of the tone pulses was varied by increasing or decreasing the interruption rate. Listeners matched continuous tones to the interrupted tones under three conditions; (1) binaurally at a low intensity, (2) monaurally at a low intensity, and (3) monaurally at a high intensity. Results show that the stimuli that elicited responses corresponding to the carrier frequency contained individual pulses of longer duration than those stimuli which elicited matches to the interruption rate. Comparison of the duration of individual pulses of interrupted tones with the duration of tone "pips" in studies relating pitch to tonal duration revealed similarities in the stimulus duration necessary to detect the pitch of the carrier frequency. Order of presentation of stimuli significantly affected responses. Listeners receiving the stimuli in an ascending order (tone pulses of shorter to longer duration) required pulses of longer duration to respond to the carrier frequency than did listeners receiving the stimuli in a descending order.

A67-80613
DECISION RULES IN THRESHOLD DETERMINATION.
C. W. Stuckey, C. L. Hutton, and R. A. Campbell (Veterans' Admin. Hosp., Atlanta, Ga.).
Journal of the Acoustical Society of America, vol. 40, Nov. 1966, p. 1174–1179.

Threshold determination within the framework of the Block Up-and-Down, Two-Interval, Forced-choice (BUDTIF) method was investigated. A computerized Monte Carlo technique was used to permit varying certain procedural parameters while maintaining an invariant "listener." The basic approach involved a comparison of the threshold means and variances obtained for a representative set of parameter values. That set of parameters yielding minimum between-mean threshold variance and minimal bias was sought. Parameters considered and general results included (1) number of trials per run—inversely related to between-mean threshold variance, (2) number of trials per block—directly related, with a critical minimum size depending on target performance level, (3) number of blocks used in each level-change decision—directly related, (4) initial stimulus level—no effect, if reasonably close to true threshold, and (5) method of calculating thresholds—no clear effect. Parameters that yielded minimum variance within individual runs tended to yield maximum variance between successive threshold estimates.

A67-80614
INFLUENCE OF RISE-FALL TIME UPON SHORT-TONE THRESHOLD.
Peter J. Dallos and Kenneth R. Johnson (Northwestern U., Auditory Res. Lab., Evanston, Ill.).
Journal of the Acoustical Society of America, vol. 40, Nov. 1966, p. 1160–1163.
PHS supported research.

Thresholds for short-duration 1000-Hz tones were obtained from eight listeners. The rise-fall times of the trapezoid-shape tone pipes were varied between 0–40 msec., while the equivalent duration was held constant at a number of values. It was demonstrated that, as long as the equivalent duration was unchanged, the rise-fall time had no effect upon auditory threshold.

A67-80615
EFFECT OF PHYSICAL AGENTS ON MOTOR CONDUCTION VELOCITY OF THE ULNAR NERVE.
Harry T. Zankel (Veterans Admin. Hosp., Phys. Med. and Rehabil. Serv., Columbia, S. C.).
Archives of Physical Medicine and Rehabilitation, vol. 47, Dec. 1966, p. 787–792. 11 refs.
Grant VANR N1-63.

Conduction velocity of the ulnar nerve was significantly reduced from 53.4 m./sec. to 49.8 m./sec. by compression at the elbow to five min. by a cuff inflated to 200 mm. Hg. Lesser changes occurred with compression at 150 and 100 mm. Hg. Cooling with an ice pack for five min. produced a significant reduction from 53.6 to 50.6 m./sec. Ultrasound applied at the elbow did not significantly reduce the conduction velocity but when applied over the nerve in the forearm at 2 watts/cm^2 for 10 min. produced a more marked reduction. Hot packs applied to the elbow for 30 min. did not significantly affect the conduction velocity of the ulnar nerve. The author concludes that the effect of ultrasound is probably not due to heating.

A67-80616
RELATION BETWEEN SIGNAL DETECTABILITY THEORY AND THE TRADITIONAL PROCEDURES FOR MEASURING SENSORY THRESHOLDS: ESTIMATING d' FROM RESULTS GIVEN BY THE METHOD OF CONSTANT STIMULI.
Michel Treisman and T. R. Watts (Inst. of Exptl. Psychol., Oxford, Great Britain).
Psychological Bulletin, vol. 66, Dec. 1966, p. 438–454. 56 refs.
Med. Res. Council supported research.

The theory of signal detectability assumes that the central effect of a stimulus varies because of physical and neural noise; consequently, the detection of a signal requires a central statistical decision procedure. Similar assumptions have been made by psychophysicists to explain the results of traditional threshold measurement procedures. The interrelations between signal detectability and threshold measures are discussed in relation to psychophysical statistical decision theory, and it is shown that (a) the false positive rate should be related to the Crozier ratio $C = \Delta I / o\Delta I$, and (b) it should be possible to use responses given in the method of constant stimuli to predict the value of d' that will be assigned to a given stimulus by a signal detectability procedure. Evidence supporting both predictions is reported, and the relation between threshold measures and "personality tests" is discussed.

A67-80617
FIGURAL AFTEREFFECTS AS A FUNCTION OF HUE.
F. T. Crawford and Roger L. Klingaman (Fla. State U., Tallahassee).
Journal of Experimental Psychology, vol. 72, Dec. 1966, p. 916–918. 9 refs.

A previous experiment showed that chromatic stimuli generated figural aftereffects but failed to demonstrate differential effects due to differential hues. In this study 20 subjects observed gray, orange, and blue inspection figures equated for Munsell value and chroma. Observations were made with a viewing box housing an illuminant color source. The results indicated that the samples produced after-effects which were significantly different from each other, with the order of magnitude increasing from gray to orange to blue.

A67-80618
EFFECTS OF STIMULUS UNCERTAINTY AND S-R COMPATIBILITY ON SPEED OF DIGIT CODING.
Louis D. Costa, Morton Horwitz, and Herbert G. Vaughan, Jr. (Yeshiva U., Albert Einstein Coll. of Med., New York City, N. Y.).
Journal of Experimental Psychology, vol. 72, Dec. 1966, p. 895–900. 12 refs.
Grant PHS MH-06723.

One of eight digit-digit coding tasks varying in two levels of stimulus uncertainty (U_s) and four levels of stimulus-response (S-R) compatibility were administered to eight different groups of ten subjects each. Response speed was found to vary as a function of S-R compatibility and this effect increased as U_s was raised from one to three bits. S-R compatibility effects in these tasks, in which sets of stimuli were identical and mode of motor response was held constant, were ascribed to the availability of logical S-R translation rules as a function of preexperimental experience.

A67-80619
CORRELATION BETWEEN VISUAL AND KINESTHETIC SPATIAL AFTEREFFECTS.
A. A. Landauer, G. Singer (Sydney U., Australia), and R. H. Day (Monash U., Wellington Road, Australia).

Journal of Experimental Psychology, vol. 72, Dec. 1966, p. 892–894. 14 refs.

A kinesthetic and visual aftereffect in judgment of horizontality was found for 202 subjects in paired balanced trials using the method of adjustment. Adjustment times were also measured. The correlation between the two aftereffects was reduced but nevertheless significant after allowance had been made by partial correlation for adjustment times in the two tasks. This finding is contrary to that of earlier experiments in which allowance was not made for adjustment times.

A67-80620
ADAPTATION TO DISPLACED AND DELAYED VISUAL FEEDBACK FROM THE HAND.

Richard Held, Aglaia Efstathiou, and Martha Greene (Mass. Inst. of Technol., Cambridge).

Journal of Experimental Psychology, vol. 72, Dec. 1966, p. 887–891. 10 refs.
NASA Grant NsG-496, Grants AF-AFOSR 354-63 and NIMH M-7642.

A subject viewed an oscilloscope trace of a short bar which appeared at the position of his nonvisible right hand. The motion of the trace was equivalent to the movements of the hand, which were restricted to a frontal plane. The bar could be optically displaced by 20 diopter prisms, either to the left or right, and its motion could be made to lag behind that of the hand by one of six delay intervals ranging from 0.0 to 3.0 sec. Results show that the adaptation to displacement found with no delay is completely eliminated under all delay intervals, including the minimum of 0.3 sec.

A67-80621
EFFECT OF RATE OF CHANGE IN PHYSICAL INTENSITY ON BISECTION AND FRACTIONATION JUDGMENTS OF BRIGHTNESS.

Robert F. Fagot, Paul R. Eskildsen, and Manard R. Stewart (Ore. U., Eugene and Portland).

Journal of Experimental Psychology, vol. 72, Dec. 1966, p. 880–886. 15 refs.
Grant NSF G19210.

Eight subjects made bisection and fractionation judgments of brightness under four rates of change in luminance; four of the subjects bisecting first and the other four fractionating first. The effect of rate of change was significant for both disection and fractionation. The data indicated certain advantages of bisection compared to fractionation: First, fractionation judgments were influenced by prior experience with bisection (significant order effect), but bisection judgments were relatively independent of prior exposure to fractionation. Second, the variability of judgments was smaller for bisection than for fractionation.

A67-80622
EFFECT OF INSTRUCTIONS AND PERSPECTIVE-DRAWING ABILITY ON PERCEPTUAL CONSTANCIES AND GEOMETRICAL ILLUSIONS.

Julia A. Carlson.

Journal of Experimental Psychology, vol. 72, Dec. 1966, p. 874–879. 15 refs.

To test the hypothesis that geometrical illusions are examples of misplaced constancy scaling, two groups of 64 subjects, high and low in drawing skill, were administered size constancy, shape constancy, Muller-Lyer illusion, and Sander Parallelogram illusion tasks under two sets of instructions. No differences were found on the basis of skill. A difference as a result of instructions and an Instruction X Skill interaction were obtained for size and shape constancy. There was no correlation of an illusion with a constancy. The above findings weaken the proposition that illusions reflect misplaced constancy scaling.

A67-80623
CHANGES IN RESPONSE LATENCY FOLLOWING SHIFTS IN THE PITCH OF A SIGNAL.

William Bevan, Russell A. Bell, and Curtis Taylor (Kan. State U., Manhattan).

Journal of Experimental Psychology, vol. 72, Dec. 1966, p. 864–868.
Contract Nonr-3634-(01).

A set of three experiments, involving a total of 516 subjects, examined response latencies to a tone following an adaptation series of 20 tones. The results indicate response time to increase to a maximum as the pitch of the test tone differed from the pitch, or averaged pitch, of the preceding series. Larger differences resulted in a return of the response latency to the level of the series. Increases in latency were greater following a variable-pitch than following a constant-pitch series. In addition, changes in latency were found to be minimal when the pitch of the test signal coincided with the mean, as compared to the mode or midrange, of the adaptation series.

A67-80624
USE OF A DELAYED SIGNAL TO STOP A VISUAL REACTION-TIME RESPONSE.

Joseph S. Lappin and Charles W. Eriksen (Ill. U., Urbana).

Journal of Experimental Psychology, vol. 72, Dec. 1966, p. 805–811. 21 refs.
Grants PHS MH-1206 and K6-MH-22014.

In a visual reaction time experiment, five male subjects were each confronted with two lights and instructed to respond to one light but not respond when both lights occurred. The onset of the two lights was made asynchronous by 0, 12, 33, or 63 msec. Porbability of inhibiting the response declined markedly for each delay and increased with reaction time is correlated with the extent of the stimulus information processing and the duration of effective stimulation which has preceded initiation of the motor event.

A67-80625
STATISTICAL DETECTION THEORY OF PIPER'S LAW.

C. I. Howarth and G. Lowe (Nottingham U., Dept. of Psychol., University Park, Great Britain).

Nature, vol. 212, Oct. 15, 1966, p. 324–326.

For both incremental and absolute visual thresholds the relationship between threshold (ΔI) and area of a stimulus (A) can be fitted adequately to the equation: $\Delta I = \text{const } 2A$ for conditions when (a) the duration of the test flash is short; (b) the test flash falls on a relatively uniform region of the retina; (c) A is not too small and not too large. A statistical model was proposed to account for occurrence of the square root relationship assuming that the standard error of the estimate of mean stimulus intensity will be $\sigma I + \Delta I/2A$ where $\sigma I + \Delta I$ is the standard deviation of stimulus variation over the stimulus area. Two experiments evaluated the statistical model. In the first subjects were shown the area and position of the stimulus and told when it would occur before each sequence of threshold judgments. Results suggested that the statistical model can not be responsible for the square root relationship in visual threshold experiments. In the second the 200 possible stimulus combinations were randomized so that the subject, on any given trial, was uncertain about area, position and time of stimulus occurrence; and the results

showed (a) an approximate square root relationship between area and threshold intensity for both conditions, and (b) a slight but significant decrease in threshold for the stimulus uncertainty condition. During stimulus uncertainty, detection of threshold stimuli was as good as, if not better than, detection when the stimulus was specified. These results are in contradiction to prediction of the statistical detection theory and make it impossible to continue to explain Piper's law in this way.

A67-80626
RAPID EYE MOVEMENT SLEEP AND CORTICAL HOMEOSTASIS.

Harmon S. Ephron (N. Y. Med. Coll., Dept. of Psychiat., New York City) and Patricia Carrington (Columbia U., Teachers Coll., New York City, N. Y.).

(Assn. for Psychophysiol. Study of Sleep, Washington, D. C., Mar. 26–28, 1965).

Psychological Review, vol. 73, Nov. 1966, p. 500–526. 121 refs.

Findings indicate that under most conditions nonrapid eye movement sleep (NREMS) represents an indispensable condition for the onset of rapid eye movement sleep (REMS). The implications of this sequential relationship are explored. It is conceptualized that deepening REM sleep involves a progressive loss of cerebral vigilance which, nevertheless, must somehow be maintained within adaptively appropriate limits. A homeostatic interplay between sleep phases is then postulated. This involves two complementary tendencies; one tendency toward deepening NREM sleep, and organismic rest, which, when it reaches a preset level, triggers the release of another tendency toward REMS and organismic activation. REMS is seen as acting to increase cortical "tonus" through a process of "endogenous afferentiation."

A67-80627
ACCELERATION PROFILE ASSOCIATED WITH THORACIC VERTEBRAL COMPRESSION.

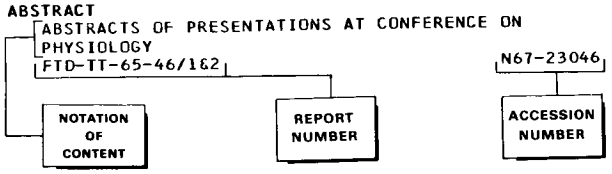
John H. Henzel, James W. Brinkley, and George C. Mohr (Aerospace Med. Res. Labs., Biodyn. and Bionics Div., Wright-Patterson AFB, Ohio).

Journal of Trauma, vol. 6, Nov. 1966, p. 756–766. 12 refs.

Although spinal compression injuries are incurred as a result of many different types of trauma, little information exists to quantify the static force required to cause in-vivo compression failure of the vertebral body. No data exist to precisely describe the effect of forces which vary as a function of time; i.e., dynamic forces. This report documents an acceleration environment which was associated with compression fractures of two dorsal-spine vertebrae.

Subject Index

Typical Subject Index Listing



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Corporate Source Index

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AEROSPACE MEDICAL DIV. AEROSPACE MEDICAL RESEARCH LABS. /6570TH/, WRIGHT-PATTERSON AFB, OHIO.
VISUAL FIXATION AND UNCERTAINTY EFFECTS ON HUMAN REACTION TIME AT CONTROL PANEL
AMRL-TR-65-149 N67-21110

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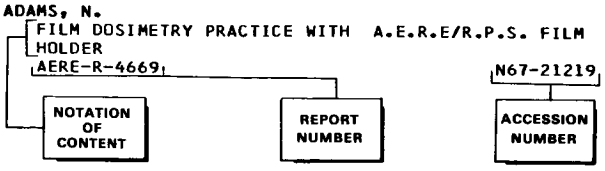

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