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VOLUME V

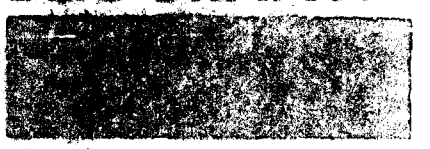
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AEROSPACE MEDICINE AND BIOLOGY



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AEROSPACE MEDICINE AND BIOLOGY

Formerly: Aviation Medicine

AN ANNOTATED BIBLIOGRAPHY

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Washington, D. C.
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This publication is available from the following sources:

Volume I: Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., as PB no. 121543, at $4.00 a copy.

Volume II: Aerospace Medical Association, 2642 University Avenue, St. Paul 14, Minnesota, at $5.00 a copy, postpaid in the United States and Canada.

Volume III: Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., as PB no. 171029, at $6.00 a copy.

Volume IV: Office of Technical Services, U. S. Department of Commerce, Washinton 25, D. C., as AD 258 191, at $5.00 a copy.

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Future volumes, each covering one year of literature, are scheduled to appear at semi-annual intervals. After Volume X, the series will be continued on a current basis. At present, a selection of about 85 abstracts is published monthly in Aerospace Medicine, and reprints are distributed free of charge to authorized agencies and institutions. An expansion of the current abstracts is under consideration. Inquiries regarding publication and distribution should be directed to

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Attn: Code AFET-SD

Library of Congress Catalog Card No. 56-60078

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PREFACE

The most obvious change in this fifth volume of the bibliography is the arrangement of the abstracts by subject categories. It is hoped that in this new form the bibliography will offer greater convenience to the reader desirous to gain information on broad subject matters by quick direct perusal. At the same time, the cumulated subject index has been maintained and expanded to serve those in need of detailed information on a given special subject. To compensate for the lack of author arrangement, an author index has been added, which includes the names of secondary authors. The corporate author index has been continued and expanded.

In all other respects, such as format and style, this volume is identical with the preceding ones. As far as subject scope and treatment are concerned, shifts of interest and new perspectives in contemporary research have been carefully considered in the selection of references, as a quick glance at the subject index will show.

Once more we take pleasure in gratefully acknowledging the counsel and cooperation of the many people who have helped in the complex task of putting this bibliography together, particularly the following: Brig. Gen. Don Flickinger, MC, USAF, (Ret.); Brig. Gen. Benjamin A. Strickland, MC, USAF; Dr. Harold Wooster and Mrs. Rowena Swanson of the Office of Aerospace Research, U. S. Air Force; Brig. Gen. Charles H. Roadman, MC, USAF, and Messrs. Melvin S. Day, Hubert Sauter, and Van A. Wente, of NASA; Mr. Howard B. Lawson, of the FAA; and Dr. Sam F. Seeley of the National Academy of Sciences. We also wish to express our thanks to the reference staffs of the National Library of Medicine and of ASTIA, as well as to the members of our own staff, Dr. Eugene Marrow, Miss May Faye Dunsmore, Mrs. Loretta Franklin, Mrs. Cathryn W. Mitchell, Miss Sally J. Hay, and Miss Cele Berman.

ABBREVIATIONS

A. JOURNAL TITLES

The abbreviations used herein for journal titles are intended to save space without sacrificing ready recognition. Minor words such as articles and prepositions, and occasionally parts of long titles have been omitted, and the words and names occurring most frequently in titles are abbreviated. The following is a key to the title word abbreviations used:

Acad.	Academy	Jour.	Journal
Acoust.	Acoustic		
Aeronaut.	Aeronautical	Lab(s).	Laboratory(-ies)
Amer.	America(n)	Laryngol.	Laryngology
Arch.	Archives		
Assoc.	Association	Mag.	Magazine
		Med.	Medicine, Medical
Bacteriol.	Bacteriology		
Brit.	British	Nat.	National
Bull.	Bulletin		
		Ophthalmol.	Ophthalmology
Canad.	Canadian	Otol.	Otology
Coll.	College	Otolaryngol.	Otolaryngology
Compar.	Comparative		
Corp.	Corporation	Pathol.	Pathology
		Physiol.	Physiology
Dept.	Department	Proc.	Proceedings
Dermatol.	Dermatology	Psychol.	Psychology
Div.	Division		
		Quart.	Quarterly
Elec.	Electrical		
Endocrinol.	Endocrinology	Rev.	Review
Eng.	Engineering		
Exper.	Experimental	Sci.	Science
		Scient.	Scientific
Gaz.	Gazette	Soc.	Society
Gynecol.	Gynecology	Surg.	Surgery
Hyg.	Hygiene	Tech.	Technical
Inc.	Incorporated	Univ.	University
Indus.	Industrial		
Inst.	Institute		

B. AVAILABILITY SYMBOLS

As in the preceding volume, availability of materials is indicated by library or report-collection symbols (in capital letters), followed by a control number. The symbols are as follows:

*AD	ASTIA Document: available at ASTIA (Armed Services Technical Information Agency), Arlington Hall Station, Arlington 12, Virginia.
DLC	Library of Congress, Washington 25, D. C.
DLC-Sci	Library of Congress, Science and Technology Division, Washington 25, D. C.
DNLM	National Library of Medicine, Washington 25, D. C. (formerly Library of the Surgeon General [DSG], then Armed Forces Medical Library [DAFM]).
DP	Patent Office Library, Washington, D. C.
PB	Publication Board: for sale by the Office Of Technical Services, Department of Commerce, Washington 25, D. C.

*) Available on loan to members and contractors of the Department of Defense only.

BIBLIOGRAPHY

I. GENERAL ASPECTS

a. General

5209
Crocco, A. G.
[BALLISTIC PILOTAGE] Il pilotaggio balistico. — Rivista aeronautica (Roma), 32 (5): 485-498. May 1956. In Italian. DLC (TL504.R54, v. 32)

Manned rocket flight is discussed from the standpoint of rocket launching, flight, and return to earth. Consideration is given to problems of speed, meteorites and cosmic rays encountered in extraterrestrial flight. The relationship of Earth, Mars, and Sun orbits during rocket flight is described and illustrated.

5210
Crocco, G. A.
[ONE-YEAR EXPLORATION TRIP: EARTH-MARS-VENUS-EARTH] Giro esplorativo di un anno: Terra-Marte-Venere-Terra. — Proc. International Astronautical Congress, VIIth (Rome, Sept. 12-22, 1956), p. 201-225. Roma, 1956. In Italian, with English translation (p. 227-252). DLC (TL787.I44, v. 7)

The possibility of an exploration trip to Mars and Venus having a duration of about one year is examined in terms of various astronautical calculations and illustrative drawings. Consideration is given to space flight piloting maneuvers and spaceship instrumentation.

5211
Errebo-Knudsen, E. O.
[AVIATION MEDICINE: WITH SPECIAL CONSIDERATION OF ITS ORGANIZATION IN DENMARK] Flyvemedicin: saerlig med henblik på organisationen i Denmark. — Ugeskrift for laeger (København), 118 (17): 495-499. May 10, 1956. In Danish. DNLM

Areas of research in aviation medicine and the experimental methods simulating flight conditions are described. The international status of aeromedical research and different agencies conducting this research are surveyed. A summary is presented of the historical development of aviation medicine in Denmark and the contemporary state of affairs.

5212
Hawkes, R.
AEROMEDICINE REINFORCES FRAIL MAN. — Aviation Week, 65 (6): 360-361, 363-365. Aug. 6, 1956. DLC (TL501.A8, v. 65)

An overall view is presented of the basic and applied research carried out by branches of the Aero Medical Laboratory. The current ideas in research and design of oxygen systems, pressure breathing devices, and pressure suits are noted. Studies of the effects of acceleration and deceleration have culminated in the requirement of an escape capsule in all designs capable of supersonic speeds or high-altitude flight. Further, studies in aviation psychology, bioacoustics, vision in an empty visual field, and flight feeding are mentioned.

5213
Jansen, M.
[TOWARDS INFINITE SPACE] Vers les espaces infinis. — 191 p. Namur: Editions du Soleil Levant, 1956. In French. DLC (TL789.J3)

This is a book on space flight and interplanetary travel designed for the layman. Included are illustrations, diagrams and tables.

5214
[Jongbloed, J.]
[ADDRESS PRESENTED AT THE OPENING OF THE EUROPEAN CONGRESS OF AVIATION MEDICINE] Rede uitgesproken door Prof. Dr. J. Jongbloed bij de opening van het European Congress of Aviation Medicine. — [No place, no date] 13 p., mimeographed. In Dutch, French, and English. DNLM

This address was delivered at the First European Congress of Aviation Medicine, 's-Gravenhage, Netherlands, October 3, 1956. The problems to be solved in aviation medicine in the future are summarized. The differential needs of civil and military aviation are pointed out in regard to crew

selection, design and equipment of the airplane, cabin environment, work-rest schedules, and retirement age. In space medicine physiological and psychological problems have to be anticipated and solved before the actual flight.

5215
Ley, W.,
and W. von Braun
THE EXPLORATION OF MARS. — x+176 p. New York: The Viking Press, 1956. DLC (QB641.L43)

This is a book on the exploration of Mars with multiple illustrations, written for the layman. Discussion deals primarily with launching, landing, and human aspects of expeditions to Mars, and with the various opinions, hypotheses, and theories concerned with the atmosphere and possible life conditions on Mars. (130 references)

5216
Miller, E. M.,
and H. Duncan
TO MARS AND BACK HOW SOON? — Air Force, 39 (12): 47-52. Dec. 1956. DLC (UG633.A65, v. 39)

This is an interview of Dr. J. G. Gaume and Capt. E. M. Roth on the possibility of space flight within this decade and the problems associated with space flight. Some of the aeromedical research reiterated are studies on the gas composition of sealed cabins, photosynthesis, weightlessness, space feeding, and tolerance of the thermal extremes.

5217
Natsubha, D. S.
[AVIATION MEDICINE]. — Royal Thai Air Force Med. Gaz. (Bangkok), 5 (1): 56-64; (2): 159-163; (3): 251-254. Feb.-June 1956. In Thai. DNLM

A general discussion of aviation medicine is presented with emphasis on the following topics: (1) altitude sickness; (2) the effects of decreased atmospheric pressure on the human body; (3) aircraft accidents; (4) protective devices (goggles, shark chaser, ear plugs, arctic suit, jungle and sea survival kits, crash helmet); (5) motion sickness; and (6) motion sickness therapy (dramamine, hyoscine, barbiturates).

5218
Shrinagesh, M. M.
MODERN TRENDS IN AVIATION MEDICINE. — Aero Med. Soc. Jour. (New Delhi), 3 (1): 17-23. April 1956. DNLM

The significance of the human factor in aviation is emphasized by a brief discussion of fields of interest of the Human Factors Division of the U. S. A. F. Air Research and Development Command, including human engineering, human resources (selection and classification of personnel), and the aero-medical sciences. The medical problems of space flight are briefly considered, such as the weightless condition, cosmic rays, collision with meteorites, and air conditioning.

5219
South, O. P.
MEDICAL SUPPORT IN A COMBAT AIR FORCE: A STUDY OF MEDICAL LEADERSHIP IN WORLD WAR II. — Air Univ. Research Studies Inst., Documentary Research Div., Maxwell Air Force Base, Ala. xi + 126 p. 1956. DNLM (WD700.S726m)

This study focuses attention on the combat flyer attached to the U.S. Air Force during World War II, and his problems, as seen through the eyes of flight surgeons and medical officers, such as weather, ditching, high altitude operations, medical policies and organization, protective flying equipment, lifesaving procedures (air/sea rescue, parachute techniques, emergency first air), efficiency in the air, diagnosis, and treatment and disposition of men suffering from emotional disorders, and common respiratory and related diseases.

5220
Strughold, H.
A SIMPLE CLASSIFICATION OF THE PRESENT AND FUTURE STAGES OF MANNED FLIGHT. — Jour. Aviation Med., 27 (4): 328-331. Aug. 1956. DLC (RC1050.A36, v. 27)

A simple classification is presented of present and future stages of manned flight in terms of global atmospheric flight, global space-equivalent flight, circumplanetary space flight and interplanetary space travel. These stages of flight are also classified by the physiological and mechanical properties of the environment, the speeds attained by rockets, the distances they travel over and away from the earth, and gravitational conditions.

b. History

5221
Cirone, M.
[THIRTIETH ANNIVERSARY OF AMUNDSEN-ELLSWORTH-NOBILE TRANSPOLAR FLIGHT: NOTES OF A PHYSICIAN] Ricorrendo il trentesimo anniversario del volo transpolar Amundsen-Ellsworth-Nobile: appunti di un medico. — Giornale di medicina militare (Roma), 106 (4): 545-558. July-Aug. 1956. In Italian. DNLM

On the basis of a physician's notes, the medical aspects of the Amundsen-Ellsworth-Nobile transpolar dirigible flight of April 10, 1926, are presented. Description is included of the aircraft and aircrew, local means of heating, personal equipment and clothing, food and medical supplies. Consideration is given to the etiology and pathogenesis of fatigue which occurred in the air crew and was related to mental tension, state of alertness, muscular fatigue, aircraft pitching and vibration, motor noise, low temperatures, restricted area for personal hygiene, persistent polar light, lack of reserve personnel, and lack of physical exercise.

5222
Kaplan, J.,
and H. K. Kallmann
PROGRESS IN UPPER ATMOSPHERE PHYSICS DURING THE LAST DECADE. — Jour. Aviation Med., 27 (4): 345-355. Aug. 1956. DLC (RC1050.A36, v. 27)

A brief account of the more important advances in high altitude research made during the past

decade along with a quantitative picture of atmospheric geophysics includes discussion of the following topics: (1) upper air pressure, density, and temperature; (2) air composition of the atmosphere; (3) electron density distribution in the ionosphere; (4) meteor observations; (5) the auroral phenomena; (6) cosmic rays; and (7) the future.

5223
Kratochvil, C. H.
THE CONTRIBUTIONS OF ALPHONSE JAMINET TO AN UNDERSTANDING OF DECOMPRESSION SICKNESS. — Jour. Aviation Med., 27 (1): 59-63, Feb. 1956. DLC (RC1050.A36, v. 27)

It was in 1871 that Jaminet published his treatise on the decompression sickness which affected the men who worked within the air chambers far below the surface of the Mississippi River upon the supports for the St. Louis bridge; 17 years before, Pol and Watelle had treated decompression sickness with recompression; however, their knowledge was not generally known. Jaminet described the bends with which many of the men were effected upon passing from the positive pressures of the underwater chambers into the ambient atmosphere without a period of slow decompression. He, himself, narrowly averted death when he descended into one of the air chambers beneath the river with the workers, and then, after three hours, returned to the surface without a proper decompression interval. Jaminet believed that the snydrome of decompression sickness resulted from a too rapid transition from the hot atmosphere of the compression chamber into the cooler ambient air, from a sudden increase in the arterial pressure in the brain and spinal cord due to the rapid decompression, and from too long a period in the compression chamber. He was responsible for shorter hours within the chamber for the workers, and longer periods of compression and decompression when entering or leaving the chamber.

c. Reviews, Treatises, Handbooks, etc.

5224
Burgess, E.
AN INTRODUCTION TO ROCKETS AND SPACE-FLIGHT. — 96 p. London: Hodder and Stroughton, 1956. DLC (TL789.B87, 1956)

This is a book dealing with the design and operation of space stations, rockets, and rocket probes into the atmospheres of Mars, Venus, and the moon. Consideration is also given to lunar expeditions, development of a space suit, and life in the universe.

5225
Chambers, B.
THE KEY TO INTERPLANETARY SPACE TRAVEL. — 66 p. New York: Stravon Publishers. 1956. DLC (TL789.C45)

A short, illustrated treatise is presented on interplanetary space travel, intended for the layman, including such topics as launching of a space vehicle, space station design, and trips to the moon and Mars. The medical problems encountered in space flight associated with charges in oxygen supply, atmospheric pressure, temperature and weightlessness are considered along with the hazards posed by solar and cosmic radiations, meteors, and comets. Mention is made of space flight feeding and garbage disposal, and of the development of a space suit.

5226
Davis, W. O.
FUNDAMENTAL BASIS OF SPACE FLIGHT. — Jour. Astronautics, 3 (1): 9-10, 25. Spring 1956. DLC

In addition to the engineering aspects of space flight, the psychological and physiological problems related to survival of the crew under the conditions of space (weightlessness, ultraviolet light, vacuum-type environment) are briefly considered. Mention is made of the problems of nutrition, sewage disposal and conversion, air conditioning and powering of auxiliary equipment related to the thermodynamic cycle.

5227
Evrard, E.
[PHYSIOLOGY OF FLIGHT; AVIATOR'S HEALTH: PRACTICAL GUIDE FOR THE USE OF FLYING PERSONNEL] Physiologie du vol; hygiène de l'aviateur: guide pratique à l'usage du personnel navigant. — xi+223 p. Bruxelles: Office de Publicité, 1956. In French. DNLM (WD700.qE93p)

A textbook dealing with the theory and practical aspects of the physiology of flight is presented for the instruction of aircrew members. Consideration is given to the atmosphere and related physiological problems, basic respiratory and circulatory physiology, the physiological effects of hypoxia, changes in barometric pressure, acceleration, and extreme temperatures, principles and techniques of the use of oxygen as protection against hypoxia, pressure cabins and pressure clothing, problems connected with escape from aircraft, the basic physiology and special phenomena of vision, sensory phenomena associated with flight, the problems of noise and vibration, air-sickness, medical aspects of survival, the problem of intoxication by vapors from aircraft, flight equipment, general rules of hygiene, and first aid.

5228
Gallet, G. H.
[ASSAULT ON SPACE] A assaut de l'espace. — 221 p. Paris: Editions de la Pensée Moderne, 1956. In French. DLC (TL789.G26)

This is a book on rockets and space flight intended for the layman. Pertinent chapters are titled: the human element; the dream takes shape; vehicle for space flight; life without weight; springboard in space; artificial satellite; and operation mouse.

5229
Gaul, A. T.
THE COMPLETE BOOK OF SPACE TRAVEL. — 159 p. Cleveland: The World Publishing Co. 1956. DLC (TL789.G35)

This is a book, intended for the layman, outlining the facts of space travel and the conditions expected in space and among the planets and stars. Chapters deal primarily with selection and train

ing of the space crew; design and operation of the space vehicle and space stations; navigation of the spaceship, and a spaceman's guide to the moon, Mercury, Venus, Mars, asteroids, Jupiter, Saturn, Uranus, Neptune, Pluto, and Sun. Included is a portfolio of early space ships (1638-1929) compiled by Sam Moskowitz.

5230
Livshits, G. SH.
[ON THE FEASIBILITY OF INTERPLANETARY FLIGHT] O vozmozhnosti mezhplanetnykh poletov. — 48 p. Alma-Ata: Kazakhskoe gosudarstvennoe izdatel'stvo, 1956. In Russian.
DLC (TL793.L58, 1956)

Space travel and problems connected with its realization are depicted in popular language to acquaint the layman with the tremendous difficulties of achieving space flight. A chapter entitled "Preparation for the Realization of Interplanetary Flight" reviews historical progress of astronautics from the first rocket flights to modern animal rocket experiments and sputniks. It also summarized the findings related to overcoming effects of acceleration and deceleration forces, weightlessness, creation of cabin atmosphere, solar and cosmic radiation, etc.

5231
Mallan, L.
SECRETS OF SPACE FLIGHT. — Fawcett book no. 298. 144 p. Greenwich, Conn.: Fawcett Publications, Inc., 1956. DLC (TL790.M25)

A photographic account is presented of rocketry and space flight. Subjects covered include studies in space medicine; escape capsules and rocket sleds; development of the space suit; launch into the stratosphere; training of space pilots, and research rocket takeoff.

5232
Mielke, H.
[THE WAY INTO THE UNIVERSE: FACTS AND PROBLEMS OF SPACE FLIGHT] Der Weg ins All: Tatsachen und Probleme des Weltraumfluges. — Berlin: Neues Leben, 1956. 234 p. In German.
DLC (TL789.M5, 1956)

The historical development of the ideas and technology of space flight is reviewed for the general reader. Among other space-technological problems the author discusses manned space stations, weightlessness, the mobility of men in space, radiation dangers, and rocket experiments with animals. A chapter entitled "Man and space flight" deals with the physiological effects of acceleration and deceleration, g-forces, experiments with human centrifuges, collapse in supergravity, permeability of the skin, the space-cabin atmosphere, weightlessness, cosmic rays, and the psychological effects of space flight, e.g., in regard to orientation.

5233
Moore, P.
EARTH SATELLITES. — 157 p. New York: W. W. Norton and Co., 1956. DLC (TL796.M6)

This is a book on space flight intended for the layman. Included are chapters dealing with the satellite program; high-altitude research; development of high-altitude rockets; orbital vehicles; project Vanguard; research with unmanned satellites; space travel; the moon; and future developments.

5234
Müller, B.
[FLIGHT MEDICINE: COMPENDIUM OF AVIATION MEDICINE] Flugmedizin: Kompendium der Luftfahrtmedizin. — Düsseldorf: Droste Verlag, 1956. 236 p. In German. DLC (HE64.N6A3, 1956)

This monograph surveys the field of aviation medicine and is intended for use by medical students, students of aerotechnology, physicians, engineers, and fliers interested in aeromedical problems. The chapters deal with the historical development of aviation and aviation medicine, high-altitude flight and the effects of altitude, acceleration and centrifugal forces, motion sickness, sensory organs and sensory illusions in flight, orientation as to the position in space and movement, psychophysiology of fliers, flight hygiene, flight accidents, physical and psychological examination of fliers, flying fatigue — symptoms and therapy, and some problems of space medicine. (97 references covering the period from 1930 to 1955)

5235
(Royal Canadian Air Force)
AEROMEDICAL HANDBOOK FOR AIRCREW. — Royal Canadian Air Force. Report no. AFA 69, [1956]. 103 p. DNLM (WD700.C212a)

This is a handbook designed to provide the aircrew with a better understanding of the human factors concerned in present-day flying. Included are chapters titled (1) physiology; (2) flying fitness; (3) physics of the atmosphere; (4) anoxia; (5) hyperventilation; (6) methods of increasing oxygen supply to the body; (7) oxygen equipment and its use; (8) standard diluter-demand system; (9) oxygen pressure-demand system and mask; (10) removal of oxygen mask at altitude; (11) decompression sickness; (12) effects of flight on the ears and sinuses; (13) expansion of gas in the abdomen; (14) effects of heat, cold, and noise; (15) explosive decompression; (16) vision; (17) care of personal equipment; (18) acceleration or g; (19) orientation, and (20) physiological aspects of escape from aircraft.

5236
Scarpelli, E. M.
PHYSIOLOGICAL TRAINING. — 2nd Ed. School of Aviation Medicine, Gunter Air Force Base, Ala. v+319 p. June 1956. DLC (RC1075.U54, 1956)

The first edition of this study reference for students of physiology has been entered in vol. IV (item no. 4908) of this bibliography. The following topics have been added to the text: Chapter 2: Introduction to the Nervous System; Chapter 8: Hypoglycemia; Chapter 9: Sensory Illusions of Flight; and Chapter 17: Space: The New Frontier. Also, additional revisions and discussions have been incorporated into already existing chapters. The chapter on the partial pressure suit and its accessories has been omitted because it is so extensively covered in A. F. Manual 50-6. (63 references)

5237
Shternfel'd, A. A.
[INTERPLANETARY FLIGHTS] Mezhplanetnye polëty. — 2nd ed. 48 p. (Nauchno-populiarnaia biblioteka, no. 83), Moskva: Gosudarstvennoe izdatel'stvo tekhniko-teoreticheskoi literatury, 1956. In Russian. DLC (TL793.S45, 1956)

This is a popular treatise on future astronautics discussing space ship design, space flight, and conditions on the space ship; construction and uses of artificial satellites; trips to the moon, Mars, Venus and other planets. In conclusion, the author states that there is no obstacle to interplanetary travel from the physiological point of view commenting on the effects of increased g forces during ascent and landing, weightlessness, and solar radiation. Meteorites and cosmic radiation are considered to be hazards to astronauts.

d. Miscellaneous Reference Materials

5238
(Dept. of Army)
SPACE TRAVEL: A SELECTED LIST OF TITLES FOR LECTURERS AND STUDENTS. — Dept. of Army. Adjutant General's Office, Washington, D. C. Special bibliography no. 2, March 26, 1956. 11 p. DLC (Z5064.S7U5)

This is a compilation of 107 books and periodical articles on space travel, with brief annotations, published mainly since 1954.

5239
Smith, Dale R.
SPACE TRAVEL: A BIBLIOGRAPHY OF ENGLISH-LANGUAGE TITLES. — Minneapolis, 1956. 15 p. (Published by the author) DLC (Z5064.S7S5)

This is a bibliography on space travel consisting of 83 English-language titles published between 1931 and 1956. It is arranged in three sections, by title, author, and year.

f. Organizational and Administrative Aspects

5240
Air Force (U. S.)
MEDICAL TREATMENT FACILITIES, ADMINISTRATIVE MANUAL USAF. — Dept. of the Air Force, Washington, D. C. AF Manual no. 160-20, June 1, 1956. vi+343 p. DLC (UG633.A3763)

This manual governs the administrative operation of Air Force medical treatment facilities. The procedures it describes are based on established operating policies. The following topics are discussed: (1) organization of the medical treatment facility; (2) persons eligible to receive medical care at Air Force medical treatment facilities; (3) outpatient service; (4) admission and disposition of hospital patients; (5) control of patients and beds; (6) medical records and reports; (7) ward administration; (8) ancillary medical services; (9) supply and maintenance services; and (10) medical service account. A subject index and an index to illustrations and charts are included.

5241
Carson, L. R.
LOOKING FOR THE LIMITS. — Aircraft (Toronto), 18 (8): 36, 39-40, 73. Aug. 1956. DLC (TL501.A56143, v. 18)

The Royal Canadian Air Force Institute of Aviation Medicine, Toronto, is divided into four branches: (1) The Bureau of Medical Statistics, which is responsible for the medical records of personnel, and can provide cross-country stations with the names of aircrew who are due for annual medical examinations. (2) The School of Aviation Medicine, which organizes courses and provides training for doctors, nurses, and other technical assistants whose duties require a knowledge of aviation medicine. (3) The Central Medical establishment, which handles borderline and special medical cases among the aircrew, and is engaged in studies dealing with the heart, assessment of fitness in older personnel for jet flying, motion sickness, and the use of brain waves in aircrew selection. (4) Research in human engineering, flying clothing requirements, high altitude pressure suits and anti-g suits, anthropometry, and decompression chamber studies are the concern of the Flying Personnel Medical Establishment.

5242
Huber, J.,
and P. Garsaux
[MEDICAL PROBLEMS CAUSED BY FLIGHT] Les problèmes médicaux causés par la navigation aérienne. — Bulletin de l'Académie nationale de médecine (Paris), 140 (3-4): 37-38. Jan. 24, 1956. In French. DLC (R45.P2, v. 140)

Mention is made of French and international associations, composed of physicians, physiologists and hygienists, concerned with the study and control of the problems arising from flight. Major problems deal with the effects of accelerations, the effects of altitude, climate and time changes, and flight disorders. Formulation of regulations for the required physical aptitudes of flight candidates, and determination of the maximum flying time for flight personnel are also considered.

5243
Lomonaco, T.
[CENTER OF STUDIES AND RESEARCH IN AVIATION MEDICINE OF ROME] Il Centro di Studi e Ricerche di Medicina Aeronautica di Roma. — Rivista aeronautica (Roma), 32 (8): 833-866. Aug. 1956. In Italian. DLC (TL504.R54, v. 32)

The mission of the Center of Studies and Research in Aviation Medicine, Rome, is to (1) engage in studies and experimental research dealing with the physiology, physiopathology, psychology, and psycho-technique of man in flight; (2) develop methods for increasing man's resistance to modern flight; (3) teach aviation medicine to medical officers, flight surgeons, and other physicians; and (4) train flying personnel in aviation physiology. The Center is divided into departments of physiology and physiopathology, aviation hygiene and biochemistry, and applied psychology. Also included are a library and documentation and statistical offices. Discussion is presented on the research programs of the Center, along with multiple illustrations on the apparatus (human centrifuge, decompression chamber, manometric and oximetric apparatus, etc.) utilized in research.

5244
(Office of Inspector General, USAF)
REPORT OF INSPECTION OF MEDICAL SERVICE ACTIVITIES WITHIN THE CONTINENTAL AIR COMMAND, 20-23 MARCH 1956. — Office of the Inspector General, Norton Air Force Base, Calif. 43 p. 1956. DNLM (UH390q. U55c)

Inspection of aeromedical services (preventive medicine, medicine and nursing care, dental service, veterinary service, organization and management, hospital food service, medical materiel) within the Continental Air Command revealed that the normal mission was being accomplished in a satisfactory manner. However, the effectiveness of the over-all medical mission was found to be limited by inadequate facilities and shortages of specialist personnel.

5245
Sheldon, P. C.
FUNCTIONS OF THE USAF TACTICAL MEDICAL CENTER. — In: Aviation medicine symposium, [article 11] 4 p. U. S. Air Force, [Unnumbered Report, no place, 1956?] DNLM (W3.AV16, 1956a)

The mission of the United States Air Force Tactical Medical Center is to organize, equip, train, and administer the forces assigned or attached in order to make improvements in the general field of medical services for tactical air operations. Of special importance is the development and testing of policies, systems, and techniques applicable to the employment of the tactical medical service, including aeromedical evacuation; the recommendation of qualitative operational requirements affecting aeromedical aspects of aircraft and equipment used in air operations; to indoctrinate and train tactical medical units and cadres; and to participate in disaster relief and other domestic emergencies.

g. Research and Research Methods

5246
THE ARCTIC AEROMEDICAL LABORATORY. — U. S. Air Force Medical Service Digest, 7 (12): 18-26. Dec. 1956. DNLM

The mission of the Arctic Aeromedical Laboratory is to initiate, organize, direct, and carry out a program of basic and applied research within the medical and related sciences which will lead to the solution of problems affecting the health and combat efficiency of military personnel in Arctic climates. The laboratory's research activities of interest to clinical medicine include studies of cardiovascular diseases, cold stress, echinococcosis, enteric disease, fat metabolism, frostbite, hypothermia, infectious hepatitis, thyroid activity, and water purification.

5247
Ehricke, K. A.
ASTRONAUTICAL AND SPACE-MEDICAL RESEARCH WITH AUTOMATIC SATELLITES. — In: Earth satellites as research vehicles (Proc. of the Symposium held in Philadelphia, Pa., April 18, 1956) p. 25-68. Jour. of Franklin Inst. Monograph no. 2, June 1956. DLC (TL796.F7)

The use of automatic satellites for the advancement of manned astronautics is discussed. Based on the systems and operations concept, both the technical and scientific aspects are included. Two principal areas are defined, astronautics and space medicine, the first encompassing the technological problems, the second one, the biological and biotechnical research. Consequently, a distinction is made between technological satellites and biosatellites. (Author's abstract, quoted in part)

5248
Miller, E. M.,
and H. Duncan
WINDOW INTO SPACE. — Air Force, 39 (12): 43-46. Dec. 1956. DLC (UG633.A65, v. 39)

This is a popular exposition of experiments in space flight physiology conducted by the Space Medicine Department of the School of Aviation Medicine. The experiments involve work with space flight simulators, weightlessness, and rocket flights of animals.

5249
(Office of Naval Research)
NAVY GETS BETTER ACQUAINTED WITH THE STRATOSPHERE. — Office of Naval Research, Reviews, 1956 (Sept.): 1-6. DLC

The high-altitude STRATO-LAB balloon gondola flight of August 10, 1956, carrying two naval observers is briefly described. Psychological and medical tests were carried out in flight to detect any deterioration in ability of the personnel.

5250
Ogle, D. C.
MEDICAL EDUCATION AND RESEARCH IN THE U. S. AIR FORCE. — U. S. Air Force Medical Service Digest, 7 (12): 2-7. Dec. 1956. DNLM

Research in aviation medicine is briefly discussed in terms of the requirement, and the application to aviation, national security, and everyday medical practice. Research currently sponsored by the Air Force deals mainly with the problems encountered in high altitude, high speed flight such as hypoxia, hyperventilation, decompression sickness, temperature and pressure control, g-forces, and solar radiations.

5251
THE SCHOOL OF AVIATION MEDICINE. — U. S. Air Force Medical Service Digest, 7 (12): 8-17. Dec. 1956. DNLM

Current research at the USAF School of Aviation Medicine is geared to the needs of the Air Force in a changing era. Studies continue on the problems of stresses in flyers; hearing disorders of personnel; motion sickness; air evacuation of patients; prevention of infections; cause and control of aircraft accidents; effects of altitude, and the selection of aircrews. Increasing attention is being given to new questions arising from conditions that will be encountered in supersonic, extreme high-altitude, atomic flight, such as the effects of radiations and weightlessness.

5252
Simons, D. G.,
and C. H. Steinmetz
THE 1954 AEROMEDICAL FIELD LABORATORY BALLOON FLIGHTS: PHYSIOLOGICAL AND RADIOBIOLOGICAL ASPECTS. — Jour. Aviation Med., 27 (2): 100-110. April 1956.
DLC (RC1050.A36, v. 27)

This is a review of the balloon flights conducted from Holloman Air Force Base, New Mexico, and from Sault Sainte Marie, Michigan, during 1954. Balloons and capsules for carrying the experimental animals were of types described in items no. 2868 and 3475, vol. III. Black mice, rats, hamsters, rabbits, and monkeys were used in the experiments, also, radish seeds were included in the flights. All tests which were designed to evaluate impairment of the physiological functions of the biological specimens were negative. The only physical change observed was an increase in the frequency of grey hairs on exposed black mice. The other tests included neuropathological studies at the Armed Forces Institute of Pathology, ocular studies for radiation opacities at the School of Aviation Medicine, psychological studies on monkey performance at the University of Wisconsin; and the study of black mice for depigmentation, which gave a positive result with a R.B.E. of 2 for the cosmic radiation, at Brown University.

2. BIOLOGY

a. General

5253
Kok, B.,
and C. J. P. Spruitt
HIGH INITIAL RATES OF GAS-EXCHANGE IN RESPIRATION AND PHOTOSYNTHESIS OF CHLORELLA. — Biochimica et biophysica acta (Amsterdam), 19 (2): 212-223. Feb. 1956. In English.
DNLM

With combined methods of volumetry, polarography, and potentiometry transitory phenomena were studied in Chlorella suspensions occurring upon changes in light intensity. High transitory rates as observed in the volumeter were shown to be caused by anomalous carbon dioxide exchange only. During the transitory stages, the photosynthetic quotient may therefore deviate largely from minus unity. This fact must be considered if short exposures to light and darkness are used for the computation of photosynthetic quantum yields. (Authors' summary)

b. Closed Ecological Systems

[Applied aspects under 11-h]

5254
Kok, B.
ON THE INHIBITION OF PHOTOSYNTHESIS BY INTENSE LIGHT. — Biochimica et biophysica acta (Amsterdam), 21 (2): 234-244. Aug. 1956. In English.
DNLM

In strong light destruction of the photosynthetic apparatus of the Chlorella algae occurs. This destruction is counteracted by restorative dark reactions. The time course of photo-inhibition of both the quantum yield and photosynthetic saturation rate has first-order character and is only slightly influenced by temperature. It was shown that a photochemical inactivation of the pigment complex is involved. (Author's summary)

5255
Kok, B.
PHOTOSYNTHESIS IN FLASHING LIGHT. — Biochimica et biophysica acta (Amsterdam), 21 (2): 245-258. Aug. 1956. In English.
DNLM

Kinetic studies of photosynthesis in Chlorella algae made in flashing and continuous light led to the following conclusions: If short, sufficiently bright flashes are alternated with long dark periods, the flash yield attains a finite, temperature-independent maximum value of one oxygen molecule per 1,500-4,000 chlorophyll molecules. From measurements in which both intensity and length of dark period were varied we concluded that during a short flash a long-living intermediate is formed photochemically in a one-quantum process. Extension of the flash period initially yields a marked temperature-dependent increase of the flash yield, which indicates the formation of an additional intermediate between light and oxygen. Its concentration is of the same order of magnitude as that of the primary photochemical product, formed in the very first moment of flash. If the flash period is increased beyond $\sim$0.03 sec., the flash yield increases with the rate observed in strong continuous light. (Author's summary)

5256
Spruitt, C. J. P.,
and B. Kok
SIMULTANEOUS OBSERVATION OF OXYGEN AND CARBON DIOXIDE EXCHANGE DURING NON-STEADY STATE PHOTOSYNTHESIS. — Biochimica et biophysica acta (Amsterdam), 19 (3): 417-424. March 1956. In English.
DNLM

A method is described for simultaneously recording carbon dioxide and oxygen concentrations in suspensions of algae. This method has been applied to the study of transitory rates of gas exchange in Chlorella suspensions during intermittent illuminations. A correlation was observed between high initial rates of oxygen evolution and partially anaerobic conditions. The photosynthetic quotient was found to deviate considerably from -1 during non-steady state conditions. (Authors' summary)

c. Biological Rhythms and Space Time Studies

5257
Brown, Frank A.,
J. Shriner, and C. L. Ralph
SOLAR AND LUNAR RHYTHMICITY IN THE RAT

IN 'CONSTANT CONDITIONS' AND THE MECHANISM OF PHYSIOLOGICAL TIME MEASUREMENT. — Amer. Jour. Physiol., 184 (3): 491-496. March 1956. DLC (QP1.A5, v. 184)

The spontaneous activity of one male rat under constant conditions was recorded for 120 consecutive days. During the first 70 days in constant illumination of 1 foot-candle the 12-hour daily period of activity occurred regularly about 1 1/4 hours later each day, with the period scanning the solar day about four times during the 70-day period. During the succeeding 25-day period in darkness the daily cycles averaged exactly 24 hours with the time of day of activity that of the last day in constant light. This was followed by 8 days in constant light followed by 18 days in constant darkness with completely comparable results. The daily running cycle randomized relative to the hours of the solar day exhibited a daily cycle of amount of activity at each hour of the solar day; randomizing both the daily activity period and the solar-day basic cycle revealed a cycle of lunar-day length, with a minimum at lunar zenith and a maximum at nadir. There were also strong suggestions in the mean daily activities of 27-day and synodic monthly cycles. (Authors' abstract)

5258
Brown, Herbert E.,
and T. F. Dougherty
THE DIURNAL VARIATION OF BLOOD LEUCOCYTES IN NORMAL AND ADRENALECTOMIZED MICE. — Endocrinol., 58 (3): 365-375. March 1956. DLC (QP187.A25, v. 58)

A study was made of diurnal changes in the absolute number and percentages of blood leucocytes in intact and adrenalectomized mice. Total blood leucocytes of intact mice showed a marked diurnal cycle characterized by high levels during the late morning and early afternoon (the least active period) and low levels during the late evening (the most active period). Only minor variations were observed in the percentages of total leucocytes of lymphocytes, neutrophils, and eosinophils. No diurnal variations were observed in adrenalectomized mice. Leucocyte counts after adrenalectomy were generally similar to those observed during the high period of the normal diurnal cycle; the eosinophil level was intermediate between normal high and low values. The results indicate the close correlation of adrenal activity with diurnal variations in blood leucocytes in mice.

5259
Brüschke, G.
and G. Volksheimer
[INVESTIGATIONS OF THE DIURNAL RHYTHMIC FLUCTUATIONS IN THE SERUM BILIRUBIN LEVEL] Untersuchungen zur Frage der tagesrhythmischen Schwankungen des Serumbilirubinspiegels. — Zeitschrift für die gesamte innere Medizin (Leipzig), 11 (17): 804-806. Sept. 1, 1956. In German. DNLM

The bilirubin level was measured in blood samples withdrawn at 3-hour intervals from 26 subjects. A typical diurnal curve was found in the first group of subjects, who received meals at 8:30 a.m., 12:00 noon, and 6:00 p.m. The peak values occurred in the early morning hours, then receded to the lowest values between 2:00-8:00 p.m. Bilirubin rose again late in the evening to reach the morning peak. In total food deprivation the diurnal variations in the plasma bilirubin level are absent. Instead, the bilirubin level rose to a plateau slightly above the initial values. Food deprivation until 2:00 p.m. was reflected by bilirubin stabilized at a plateau. The level fell after ingestion of a meal at 2:00 p.m. The authors conclude that gastrointestinal factors determine the presence of physiological diurnal variations of plasma bilirubin.

5260
Brunner, H.,
G. Kuschinsky, O. Münchow and G. Peters
[THE DIURNAL RHYTHM OF DIURESIS, ELECTROLYTE EXCRETION, AND CLEARANCE OF TRUE ENDOGENOUS CREATININE IN THE RAT] Der Tag-Nacht-Rhythmus der Diurese, Elektrolytausscheidung und Clearance des echten endogenen Kreatinins bei der Ratte. — Naunyn-Schmiedebergs Archiv für experimentelle Pathologie and Pharmakologie (Berlin), 229 (5): 482-494. In German, with English summary (p. 493). DNLM

Diuresis is considerably increased during night time in male rats only, although both sexes consume larger volumes of water at night. In rats deprived of food and water the differential rate of diuresis during day and night are even more pronounced with the same sex differential. Similarly the clearance of endogenous true creatinine and excretion of urinary sodium and chloride are increased in night time in the male rat. In the female rat there is no day-night difference in endogenous creatinine clearance and a very slight one in the urinary sodium and chloride excretion. (From the authors' summary)

5261
Buskirk, E. R.,
and P. F. Iampietro
VARIATION IN RESTING OXYGEN CONSUMPTION THROUGHOUT THE DAY [Abstract]. — Federation Proceedings, 15 (1, part I): 28-29. March 1956. DLC (QH301.F37, v. 15)

Eight men were studied for at least ten days under weather conditions ranging from hot-dry at Yuma, Arizona, to cold-dry at Fort Churchill, Manitoba, Canada. The subjects subsisted on standardized rations during each experiment. Oxygen consumption at 8 a.m. was significantly lower than that at any other hour. The noon and 4 p.m. values were not different from each other, but the 8 p.m. value was significantly higher than that at any other hour in each environment. A major portion of the elevation in metabolism during the day was associated with "Specific Dynamic Action." Thus, when men fasted and exercised moderately or fasted with no exercise, the daily elevation in metabolism was present but was significantly less than when food was given. Prior moderate exercise had little measurable effect on the resting oxygen consumption. The same pattern of results was observed in each environment. It is concluded that the diurnal pattern of oxygen consumption is little affected by environment within the range studied. (Quoted in part)

5262
Dingle, H.,
and W. H. McCrea
RELATIVITY AND SPACE TRAVEL. — Nature (London), 177 (4513): 782-785. April 28, 1956.
DLC (Q1.N2, v. 177)

A series of letters is presented concerning the application of Einstein's theory of relativity to the problem of time in space travel. Dingle states that the fundamental principle of relativity, in its application to two bodies in uniform relative motion, is that the motion is a relation between them rather than something which affects one body only, and that its effects must therefore apply equally to both. Thus two moving clocks which would have continued to agree if they had not separated cannot show different times on reunion. Einstein's original paper on the subject is paraphrased, and it is concluded that the traditional statement that a moving clock runs slowly refers to the error in judgments of simultaneity between space and terrestrial observers, which is eliminated upon reunion. McCrea, in refutation, states that an absolute, rather than a relative, distinction exists between a space traveler and an earth observer, which is exemplified by the space traveler's use of an engine, and that Dingle's assertion that the clocks must agree has therefore no validity. Einstein's theory of relativity is interpreted to show that the clocks must disagree because they travel on different world-lines, one of which is a geodesic, and one of which is not.

5263
Dingle, H.,
and W. H. McCrea
RELATIVITY AND SPACE TRAVEL. — Nature (London), 178 (4535): 660-662. Sept. 29, 1956.
DLC (Q1.N2, v. 178)

Concluding statements are presented in reply to correspondence received in response to item no.
Dingle refutes the applicability of the example of time dilatation presented by mesons to the problem of space travel, and examines the effect of accelerations on McCrea's interpretation of time relationships. He states that if accelerations are ignored, symmetry shows that clocks cannot differ on reunion, and if relevant they affect the later rate of uniformly moving clocks, invalidating astronomical deductions from Doppler effects. McCrea rejects Dingle's assertion of symmetry between space and terrestrial observers, and discusses the applicability of inertial frames and accelerations to measurements of time in space, the relation between biological and clock time, and the resolution of the clock paradox.

5264
Doe, R. P.,
E. B. Flink, and M. G. Goodsell
RELATIONSHIP OF DIURNAL VARIATION IN 17-HYDROXYCORTICOSTEROID LEVELS IN BLOOD AND URINE TO EOSINOPHILS AND ELECTROLYTE EXCRETION. — Jour. Clin. Endocrinol. and Metabolism, 16 (2): 196-206. Feb. 1956.
DLC (RC648.E45, v. 16)

Definite diurnal variations were observed in the eosinophil count, level of plasma 17-hydroxycorticoids, and urinary 17-hydroxycorticoids, sodium, and potassium. Diurnal rhythm in the eosinophil count followed that of plasma 17-hydroxycorticoids, and urinary potassium excretion was closely related with 17-hydroxycorticoid excretion. Urinary sodium excretion was not closely related in individual subjects with any variables measured, although it followed the same trend as potassium excretion when group figures were used. (Authors' conclusions, modified)

5265
Fábry, P.,
and Z. Hrůza
ON DIURNAL RHYTHMIC CHANGES IN THE LIVER GLYCOGEN AND PROTEIN RESERVES IN FASTING RATS. — Physiologia bohemoslovenica (Praha), 5 (2): 142-148. 1956. In English.
DLC (RP1.C417, v. 5)

A study was made of the diurnal rhythmic changes in the glycogen content, the amount of protein, and the concentration of non-protein nitrogen in the liver of rats deprived of food for 72 to 92 hours. Two significant increases were seen in the liver glycogen content of these animals: (a) the first at 8 a.m. accompanied by a simultaneous decrease of protein in the liver and an increase in non-protein nitrogen; (b) the second at 8 p.m., with no change in the amount of protein in the liver and at the same time a minimum of non-protein nitrogen. The first increase at 8 a.m., which was apparently due to gluconeogenesis from the liver protein, coincided with the maximum glycogen content found in previous work in the liver of animals on a non-carbohydrate diet. The second increase at 8 p.m. coincided with the increase in the glycogen content in the liver of animals fed on a mixed diet. (Authors' summary, modified)

5266
Giganté, A.,
G. Monaco, and A. Nigro
[VARIATION OF THE ELECTROENCEPHALOGRAM OF THE ADOLESCENT DURING THE DIURNAL HOURS] Variabilità dell'elettroencefalogramma dell'adolescente durante le ore diurne. — Biologia latina (Milano), 9 (3): 341-361. July-Sept. 1956. In Italian, with English summary (p. 361).
DNLM

Electroencephalograms were taken for 8 adolescents every two hours throughout the day, using front, parietal and occipital two-pole derivations from both hemispheres. The α-rhythm waves in occipital derivations reached a higher voltage during the period from 10 to 12 a.m., while their lowest level was attained at the time of the last reading of the day, i.e., at 7 or 9 p.m. (Authors' summary, modified)

5267
Hrůza, Z.
CYCLICAL CHANGES IN THE METABOLISM OF PROTEINS IN THE LIVER OF RATS. — Physiologia bohemoslovenica (Praha), 5 (1): 52-57. 1956. In English.
DLC (QP1.C417, v. 5)

Diurnal variations of the amount of protein and nonprotein nitrogen in the rat liver are described. The amount of protein in the liver varies during the day within the limits of 16%; this supports the concept of the formation of reserve protein. The

anabolic and catabolic phases of protein metabolism in the liver show a lag behind the analogous phases of the carbohydrate metabolism. The diurnal changes in the nonprotein nitrogen in the anabolic phase of the liver activity probably depend on changes in the intake of amino acids in the food; and in the catabolic phase on the breaking down of liver protein. A diet with high and low protein content does not alter the nonprotein nitrogen. Therefore, when determining the total protein content of the liver by measuring the total nitrogen content, it is not necessary at the same time to determine the nonprotein nitrogen. It is however, important to bear in mind the striking changes in the protein content of the liver during the 24-hour cycle. (Author's summary)

5268
Koehler, F.,
F. K. Okano, L. R. Elveback, F. Halberg, and J. J. Bittner
PERIODOGRAMS FOR THE STUDY OF PHYSIOLOGIC DAILY PERIODICITY IN MICE AND IN MAN: WITH A PROCEDURAL OUTLINE AND SOME TABLES FOR THEIR COMPUTATION. — Exper. Med. and Surgery, 14 (1): 5-23. 1956. DNLM

The computation of periodograms for analysis of physiologic time series consisting of discrete data is outlined and illustrated. Numerical (Schuster-periodogram) estimates are thus obtained for the description of the period and the amplitude of physiologic daily periodicity. Tables for saving time in computation are appended. Some physiologic uncertainty associated with the use of those techniques which are necessary for measurement are analyzed. For the segregation of the effects of repeated measurements form the underlying phenomena studied, the concomitant use of serially dependent and independent sampling procedures is suggested for studies on human beings and on mice. (From the authors' summary) (30 references)

5269
Lewis, P. R.,
M. C. Lobban, and T. I. Shaw
PATTERNS OF URINE FLOW IN HUMAN SUBJECTS DURING A PROLONGED PERIOD OF LIFE ON A 22-HOUR DAY. — Jour. Physiol. (London), 133 (3): 659-669. Sept. 27, 1956. DLC (QP1.J75, v. 133)

The excretory rhythms of eight normal subjects were investigated during a six-week period in which a 22-hour daily routine was maintained, with minimal diurnal variations in light and temperature. Only one subject showed an immediate adaptation in the pattern of renal flow to the daily experimental time advances. In other subjects the excretory rhythm tended to lag behind the experimental time advance and to maintain the inherent 24-hour rhythm. Interindividual variations were observed in the cyclic phase at which the inherent rhythm was most prominent. Data from most subjects suggest the existence of an internal cyclic mechanism, perhaps emanating from the hypothalamus, which influences kidney function.

5270
McCrea, W. H.
THE CLOCK PARADOX IN RELATIVITY THEORY. — Nature (London), 167 (4252): 680. April 28, 1956. DLC (Q1.N2, v. 167)

An example of asymmetric relative motion is treated by the special theory of relativity to show that the result of such motion will be an unambiguous difference in the time measurements of the two observers without a "clock paradox".

5271
Migeon, C. J.,
F. H. Tyler, J. P. Mahoney, A. A. Florentin, H. Castle, E. I. Bliss, and L. T. Samuels
THE DIURNAL VARIATION OF PLASMA LEVELS AND URINARY EXCRETION OF 17-HYDROXY-CORTICOSTEROIDS IN NORMAL SUBJECTS, NIGHT WORKERS AND BLIND SUBJECTS. — Jour. Clin. Endocrinol. and Metabolism, 16 (5): 622-633. May 1956. DLC (RC648.E45, v. 16)

A diurnal rhythm in the levels of blood 17-hydroxycorticosteroids was demonstrated. Maximum value was regularly observed during the later hours of sleep (5 to 8 a. m.); usually near 6 a. m. From 8 a. m. to midnight the levels followed a downward trend, the decrease being more rapid in the first few hours after the peak. Between 2 a. m. and 6 a. m. the concentrations rose rapidly. Urinary 17-hydroxycorticosteroid excretion followed the same general curve of variation as that of blood, but was delayed about two hours. In normal subjects and night workers blood iron concentrations manifested a periodicity like that of 17-hydroxycorticosteroids, but the cycle was two hours later. An inverse cycle, without statistical significance, appears to exist in eosinophil concentrations. (Authors' summary, modified)

5272
Pirttiken, R.
[THE 24-HOUR RHYTHM IN MEN AND THE VEGETATIVE NERVOUS SYSTEM] Über die 24 Std.-Rhythmik des Menschen und das vegetative Nervensystem. — Internationale Zeitschrift für angewandte Physiologie (Berlin), 16 (3): 198-211. 1956. In German. DNLM

Measurements of various sensory and nervous functions were made in 7 reclining healthy subjects at 1-2 hour intervals throughout a 24-hour period. The elastic resistance of the skin was observed to reach a maximum value between 10 A.M. and 4 P.M., and to decline thereafter to a minimum value between 4 and 8 A.M. Peripheral vessel pulsations were minimal from 11 A.M. to 4 P.M. and reached a maximal value at 2 A.M. Pulse frequency was fairly stable during the day and was depressed at night. An increase in the reflection of red light from the skin, indicating a widening of the vessels or an increase in O_2-saturated hemoglobin, was also observed at night. Flicker fusion frequency was highest between 6 A.M. and 3 P.M. and lowest between 5 and 9 P.M. The upper audible frequency limit showed a similar fluctuation. Administration of pervitin in the morning resulted in an earlier and more extended ergotropic orientation, with increased elastic resistance of the skin, while somnifene had a trophotropic effect. Somnifene produced a decrease in pulse frequency, while pervitin caused an increase in frequency during the day and a decrease at night.

5273
Stehling, K. R.
SPACE TRAVEL AND RELATIVITY OR HOW TO

KEEP FROM GROWING OLD. — Skyways, 26 (12): 1105-1108. Dec. 1956. DLC (TL501.S634, v. 26)

A review is presented of arguments concerning the question of time dilatation and space travel contained in various publications (see items no.

5274
Vermund, H.,
F. Halberg, C. P. Barnum, C. W. Nash, and J. J. Bittner
PHYSIOLOGIC 24-HOUR PERIODICITY AND HEPATIC PHOSPHOLIPID METABOLISM IN RELATION TO THE MOUSE ADRENAL CORTEX. — Amer. Jour. Physiol., 186 (3): 414-418. Sept. 1956. DLC (QP1.A5, v. 186)

An investigation was made of the effect of an adrenalectomy on the relative specific activity (RSA) of phospholipid phosphorus (PLP) in the liver cytoplasm of mice. Determinations were made at two times of day two hours after injection of radiophosphorus (P^{32}). Adrenalectomy produced an inhibition of day-night differences and a decrease in the RSA of PLP. Administration of 11, 17-oxycorticosteroids to adrenalectomized mice caused a return of the RSA of PLP to control sham-operated values.

d. Hibernation

[Hypothermia under 3-e]

5275
Aleksandrowicz, J.,
and B. Perkowske
[HEMO- MYELO- SPLENOGRAMS AND ECG TRACINGS FROM THE HEDGEHOG DURING HIBERNATION AND DURING CONTROLLED REFRIGERATION] Hémo-myelo-splénogrammes et courbes E.C.G. du hérisson en période du sommeil hivernal et pendant la réfrigération controlés. — Sang (Paris), 27 (5): 491-495. 1956. In French. DLC (QP91.S24, v. 27)

Hematological studies were conducted in hedgehogs during summer, during hibernation in winter, and during artificial cooling at a temperature of -2° to +4° C. for 12-30 hours. Hibernation produced a mild granulocytosis and an increase in granulocytes and eosinophils in bone marrow. No blood cell changes were observed in refrigerated hedgehogs. Electrocardiographic tracings from both hibernating and cooled animals showed a marked slowing of heart rate and ventricular complex activity.

5276
Aron, C.,
and C. Kayser
[HIBERNATION AND THE ENDOCRINE PANCREAS] Sommeil hivernal et pancréas endocrine. — Comptes rendus de la Société de biologie (Paris), 150 (2): 410-413. 1956. In French. DLC (QP1.S7, v. 150)

Histological studies were made of pancreatic tissue from marmots and hamsters sacrificed at the beginning of summer or during winter. The ratio of B to A islet cells was found to be slightly but significantly greater in marmots during summer, and in hamsters during winter. The ratio was greater in hamsters not in hibernation in October-December than in hibernating animals, while in February-March the ratio was greater in hibernating animals. The elevation of the B to A ratio in marmots during summer is attributed to stress imposed by travel.

5277
Björck, G.,
B. Johansson, and H. Schmid
REACTIONS OF HEDGEHOGS, HIBERNATING AND NON-HIBERNATING, TO THE INHALATION OF OXYGEN, CARBON DIOXIDE AND NITROGEN. — Acta physiologica scandinavica (Stockholm), 37 (1): 71-83. 1956. DNLM

Temperature, respiratory rate, heart rate, and electrocardiographic details were examined in hibernating and non-hibernating hedgehogs exposed to pure nitrogen and to mixtures of carbon dioxide and oxygen. Anoxia was tolerated by hibernating hedgehogs for 1 to 2 hours, and by non-hibernating animals for 3 to 5 minutes. Hibernating hedgehogs reacted with a decrease in heart and respiratory rates, an increase in P-R and QRS duration, and no change in Q-T. In non-hibernating animals respiratory and heart rates were rapidly decreased, P-R and QRS were unchanged, and Q-T was decreased. The QRS amplitude was decreased in both groups. Inhalation of 3% CO_2 in O_2 resulted in no significant increase in respiratory rate in either group, while 6% and 9.5% CO_2 provoked an increase in respiratory and heart rates, associated with no consistent electrocardiographic changes. The increase in respiratory rate in non-hibernating hedgehogs was greater, and in hibernating animals was somewhat lower, than that observed in guinea pigs.

5278
Björck, G.,
B. Johansson, and S. Veige
SOME LABORATORY DATA ON HEDGEHOGS, HIBERNATING AND NON-HIBERNATING. — Acta physiologica scandinavica (Stockholm), 37 (4): 281-294. 1956. DNLM

Biochemical studies were performed in hibernating hedgehogs in January and March and in non-hibernating hedgehogs in June. Red blood corpuscles, hemoglobin level, and hematocrit values were found to be lower in March than in either January or June. Hibernation produced a decrease in the number of blood leucocytes, eosinophils and reticulocytes, an increase in blood platelets and in the albumin fraction of blood, and decreases in blood sugar, protein-bound iodine, and β_1-, β_2-, and γ-globulins. No significant changes were observed in serum potassium or sodium. The magnesium content of the heart was decreased in winter, while cytochrome was unchanged. Sugar, acetone, and acetic acid were not observed in the urine, but albumin was demonstrated in all hibernating and some non-hibernating animals.

5279
Dawe, A. R.,
and B. R. Landau
SURVIVAL IN THE COLD OF A HIBERNATOR'S HEART [Abstract]. — Amer. Jour. Physiol., 187 (3): 595. Dec. 1956. DLC (QP1.A5, v. 187)

The heart rate of ground squirrels as a function of heart temperature was determined during hibernation, arousal from hibernation, and in the non-hibernating state in intact animals, after decapitation, or in the isolated heart. Characteristics noted which assist in making the survival of hibernating hearts possible in the cold are: (1) continuous beating to temperatures close to 0° C.; (2) beating for long periods of time in the cold and at slow rates; (3) a lower rate of change of heart rate at low temperatures (1 beat per 1° C. change) than at high temperatures (30 beats or more per 1° C. change); and (4) the presence of spontaneous rhythmic electrocardiographic activity after all visible heart movement has ceased.

5280
Eisentraut, M.
[ADVANCES IN THE STUDY OF HIBERNATION IN WARM-BLOODED ANIMALS] Fortschritte in der Erforschung des Winterschlafs der Warmblüter. — Naturwissenschaftliche Rundschau (Stuttgart), 9 (7): 251-255. July 1956. DLC (Q3.N823, v. 9)

The occurrence of hibernation among animal species, preparations of animals for hibernation, and the biological significance of hibernation are discussed. Brief consideration is given to the effects of hibernation on body temperature, metabolism, respiratory and heart rates, and nervous function. The role of hormonal (particularly adrenaline and insulin) and nervous regulation in the production of hibernation is discussed.

5281
Eisentraut, M.
[HIBERNATION AND ITS ECOLOGICAL AND PHYSIOLOGICAL ACCOMPANYING PHENOMENA] Der Winterschlaf mit seinen ökologischen und physiologischen Begleiterscheinungen. — 160 p. Jena: VEB Gustav Fischer Verlag, 1956. In German.
DLC (QL755.E5, 1956)

The phenomenon of hibernation is described for hibernating mammals and compared with the hypothermic state produced by cooling of homoiothermic mammals. Hibernation involves changes in respiratory rate, heart rate, circulation, nerve activity, resistance to toxic substances and other destructive influences, body weight, and metabolism. Exogenous and endogenous factors responsible for hibernation, and the biology of hibernation are discussed. 385 references.

5282
Erikson, H.
OBSERVATIONS OF THE BODY TEMPERATURE OF ARCTIC GROUND SQUIRRELS (CITELLUS PARRYI) DURING HIBERNATION. — Acta physiologica scandinavica (Stockholm), 36 (1-2): 79-81. March 24, 1956. DNLM

Observations of the body temperature of Arctic squirrels were made with a rectal thermocouple during hibernation. Insertion of the thermocouple was found to cause a marked rise in body temperature, with or without awakening, which was followed by a decline after 2-3 days to a level slightly higher than that of the environmental temperature.

5283
Farrand, R. L.,
G. E. Folk, and M. L. Riedesel
TYPES OF MAMMALIAN HIBERNATION. — Proc. Iowa Acad. Sci., 63: 724-728. 1956.
DLC (Q11.I55, v. 63)

Hibernation in the golden hamster, the thirteen-lined ground squirrel, and the bat was found to be characterized by differences in methods of preparation for hibernation, in the duration of dormancy in deep hibernation, and in survival during hibernation. The hamster was observed to rely on food store to provide nutrient during hibernation, while the bat and squirrel stored little or no food but accumulated an excess depot of fat. The fat in the hamster and the ground squirrel had a lower melting point during cold exposure than during exposure to warmer temperatures, while the fat depot of the bat, with a normally low melting point, did not change appreciably. Hamsters remained in a dormant state for 33% of the total cold exposure, ground squirrels for 50% of the exposure, and bats for more than 95% of the exposure period. In all three animals hibernation was associated with reductions in heart rate, respiratory rate, oxygen consumption, and body temperature, and an increase in serum magnesium.

5284
Folk, G. E.,
H. L. Riedesel, and R. J. Hock
SERUM MAGNESIUM CHANGES WITH HIBERNATION AND WINTER REST OF MAMMALS [Abstract]. — Anat. Record, 125 (3): 656-657. July 1956. DLC (QL801.A45, v. 125)

A consistent rise in the serum level of magnesium was observed during hibernation or winter rest in bats, squirrels, hamsters, and the black bear. Cold exposure without hibernation or winter rest did not elevate serum magnesium. Serum specific gravity and blood hematocrit were not consistently increased during hibernation, indicating the active nature of the rise in magnesium. It is suggested that elevated serum magnesium is as characteristic of hibernation as lowered body temperature and metabolism.

5285
Hock, R. J.
BODY TEMPERATURE VARIATIONS OF NON-HIBERNATING ALASKAN GROUND SQUIRRELS [Abstract]. — Federation Proceedings, 15 (1, part I): 94. March 1956. DLC (QH301.F37, v. 15)

This study reports observations on 77 Alaskan ground squirrels throughout four seasons 1951-54 from April 23 to Oct. 10, the entire period of

activity. There seem to be 4 phases in the annual body temperature cycle of ground squirrels: (1) the low temperature of hibernation, continuing from early October to about April 20 (poikilothermism); (2) a variable temperature from emergence until late June (heterothermism); (3) a period of relatively constant temperature, from late June through early September (homolothermism); and (4) a period of lowering temperature in late September and early October, preceding hibernation (heterothermism). (From the author's abstract)

5286
Mayer, W. V.,
and S. Bernick
COMPARATIVE HISTOCHEMISTRY OF SELECTED TISSUES FROM HIBERNATING AND ACTIVE ARCTIC GROUND SQUIRRELS, SPERMOPHILUS UNDULATUS [Abstract]. — Anat. Record, 125 (3): 577-578. July 1956. DLC (QL801.A45, v. 125)

Histochemical examination of Arctic squirrels killed during hibernation revealed an absence of glycogen granules in the liver and muscle, appearance of fat droplets in the cytoplasm of liver parenchymal cells, and a decrease in liver alpha amino acids. The liver of an animal awakened from hibernation before sacrifice showed zones of glycogen content ranging from abundance to complete absence. Supercooling of one animal to a body temperature of -4° C. before death caused a fatty degeneration of the liver, with concentration of glycogen around the peripheral portion of the liver lobule.

5287
Nicoletti, R.,
and L. Lison
[EFFECT OF ARTIFICIAL HIBERNATION ON THE ADRENAL OF THE RAT] Action de l'hibernation artificielle sur la surrénale du Rat. — Comptes rendus de l'Académie des sciences (Paris), 242 (1): 187-188. Jan. 4, 1956. In French.
DLC (Q46.A14, v. 242)

Artificial hibernation induced in rats for periods of two or three days by injection of drugs produced significant increases in the weight of both the cortex (110%) and medulla (68%) of the adrenal glands.

5288
Popović, V.,
and P. Popović
[ON THE TEMPERATURE LIMITS OF HIBERNATION] Sur les limites de température du sommeil hibernal. — Comptes rendus de la Société de biologie (Paris), 150 (7): 1439-1440. 1956. In French. DLC (QP1.S7, v. 15)

Non-hibernating marmots exposed during winter to varying ambient temperatures were found to enter hibernation at a minimum temperature of 0.5° - 2° C. and a maximum temperature of 30°. Body temperature was maintained at a level slightly above the ambient temperature at both cold and warm temperature extremes. Exposure of hibernating animals to a temperature of -0.5° C. resulted in death, with no attempt to awaken, in 19 of 22 animals. Animals hibernating at 30° showed the typical characteristics of hibernation, including low oxygen consumption.

5289
Riedesel, M. L.,
and G. E. Folk
SERUM MAGNESIUM CHANGES IN HIBERNATION. — Nature (London), 177 (4510): 668. April 7, 1956. DLC (Q1.N2, v. 177)

Serum electrolyte levels and specific gravities were investigated in bats of several species in the hibernating and non-hibernating conditions. Hibernation produced no significant change in serum potassium, a decrease in serum calcium with inconsistent increases in the cell/plasma ratio and the specific gravity of serum, and a 50% increase in serum magnesium. The increase in serum magnesium was observed after 1-2 hours of hibernation, at an esophageal temperature of 13° C., but not at 17-20° C. Serum magnesium was not reduced when body temperature was raised to 18° C., but was decreased one hour after arousal.

5290
Zimny, M. L.
METABOLISM OF SOME CARBOHYDRATE AND PHOSPHATE COMPOUNDS DURING HIBERNATION IN THE GROUND SQUIRREL. — Jour. Cellular and Compar. Physiol., 48 (3): 371-386. Dec. 1956.
DLC (QP1.W533, v. 48)

A decline in body temperature, heart rate, respiratory rate and body weight occurs during hibernation in the ground squirrel. A tendency was observed, biochemically and histochemically, toward decreased glycogen and phosphate levels for liver and cardiac and skeletal muscle. However, 40% of the animals stayed in the normal range. These variations may be relative to fluctuations in oxygen intake at lowered body temperature. The lactate content of cardiac and skeletal muscle decreased significantly during hibernation. Considering the relatively anaerobic state which exists at the time, it is likely that glycolysis occurs at a slower rate, thus producing lower lactate levels. Inorganic phosphate and adenosine polyphosphate both decreased, the latter significantly. However, phosphocreatine increased significantly. (Author's summary, modified)

5291
Zirm, K. L.
[CONTRIBUTION TO THE KNOWLEDGE OF NATURAL HIBERNATION AND ITS REGULATING ENZYMES. I] Ein Beitrag zur Kenntnis des natürlichen Winterschlafes und seines regulierenden Wirkstoffes. I. — Zeitschrift für Naturforschung (Tübingen), 11b (9-10): 530-534. Sept.-Oct. 1956. In German. DLC (Q3.Z39, v. 11b)

A decline of 2-3° C. was produced in the body temperature of mice by implantation of 50 mg. of brown fat from hibernating hedgehogs, while no effect was produced by fat from non-hibernating animals in winter or in summer. The temperature

decline in mice with hibernating fat was observed for four months, and was increased with increases in the amount of transplanted fat. Growing mice treated with hibernating fat showed a marked increase in body size; mature mice showed an increase in weight. Hibernating hedgehogs exhibited a low blood sugar, increased serum lipid content, low serum iodine, decreased lipid content of organs, a high lipid content of subcutaneous and intraabdominal fat, and a low lipid concentration of brown fat. It is concluded that the brown fat of hedgehogs is an organ which produces (or contains) enzymes controlling hibernation.

5292
Zirm, K. L.
[CONTRIBUTION TO THE KNOWLEDGE OF NATURAL HIBERNATION AND ITS REGULATING ENZYMES. II] Ein Beitrag zur Kenntnis des natürlichen Winterschlafes und seines regulierenden Wirkstoffes. II. — Zeitschrift für Naturforschung (Tübingen), 11b (9-10): 535-538. Sept.-Oct. 1956. In German. DLC (Q3.Z39, v. 11b)

Intraperitoneal injection of a green-yellow-colored substance extracted with acidified alcohol from the brown fat of hibernating hedgehogs was observed to produce marked decreases in the body temperature of mice. The magnitude of temperature decline was dependent on the amount of material injected. Injection of the substance in rats caused a significant fall of blood pressure. A substance extracted in a similar manner from the brown fat of nonhibernating hedgehogs or from the liver, lungs, spleen, or kidney of hibernating hedgehogs had no effect on body temperature or blood pressure. It is concluded that the substance represents an enzyme produced in the brown fat of hedgehogs for the regulation of hibernation.

e. Biological Orientation and Navigation

5293
Kramer, G.,
J. G. Pratt, and U. von St. Paul
DIRECTIONAL DIFFERENCES IN PIGEON HOMING. — Science (Washington), 123 (3191): 329-330. Feb. 24, 1956. DLC (Q1.S35, v. 123)

Pigeon releases were made simultaneously from four points north, east, south, and west of two different lofts at distances of 10 to 60 miles. Homing records for 558 of the short-distance flights and for 117 of the 53-60 mile flights showed that birds displaced to the south yielded a relatively larger number of returns and a very low number of losses, while birds displaced to the north made the smallest number of quick returns and had the greatest number of losses. The north-south contrast in homing was apparently not erased by practice (two flights from each point). The finding of directional differences in short-distance releases indicates that orientation is not primarily based on landmarks or on random searching.

f. Extraterrestrial Environments and Life Forms

5294
Faust, H.
[THE ATMOSPHERES OF EARTH AN. ARS] Erd- und Marsatmosphäre. — Naturwissenschaftliche Rundschau (Stuttgart), 9 (4): 158-159. April 1956. In German. DLC (Q3.N823, v. 9)

Corollaries are drawn between the nature of the atmospheres of Earth and Mars on the basis of common features of the behavior of planets. The atmosphere of Mars has high- and low-pressure areas which move from west to east, similar to the atmosphere on earth. Seasonal cycles, which depend on the axis of rotation, the rate of revolution, and the thickness and composition of the atmosphere, are also comparable to those on earth, but about twice as long and more intense. The similarity of the layers of the atmospheres of earth and Mars is likewise discussed.

5295
Gifford, F.
THE SURFACE-TEMPERATURE CLIMATE OF MARS. — Astrophys. Jour., 123 (1): 154-161. Jan. 1956. DLC (QB1.A9, v. 123)

The radiometric measurements of Martian surface temperatures obtained by Lampland between 1926 and 1941 were analyzed by the "method of water-cell transmissions". The data indicate an extreme diurnal temperature variation of 50° C., with midday temperatures above 0° C. in tropical latitudes. Poor atmospheric insulation is suggested by the 1 1/2 hour lag of maximum diurnal temperature behind the Martian local noon. The average date of the summer temperature curve lags 60 days behind the southern-hemisphere summer solstice, and that of the fall curve about 20 days behind the autumnal equinox.

5296
Hoppe, J.
[MARS OPPOSITION AND MARS CLIMATE] Marsopposition und Marsklima. — Urania (Leipzig), 19 (10): 374-377. Oct. 1956. In German. DLC (Q3.U4, v. 19)

Astronomical research on conditions on the planet Mars is summarized. The essential difference between Earth and Mars lies in the lower density of Martian atmosphere and the scarce supply of water and oxygen. Thermal conditions are presumably similar to Earth.

5297
Kopal, Z.
OUR NEIGHBOUR MARS. — New Scientist (London), no. 1: 41-43. Nov. 22, 1956. DLC (Q1.N52, no. 1)

Although nitrogen appears to be the principal constituent of the Martian atmosphere, the only gas whose presence has been established by its

power to absorb infra-red is carbon dioxide. Evidence for oxygen and water vapor is so far absent. Measurements indicate that the over-all Martian temperature is 30-40° C. cooler than that of the earth. White, blue, or yellow clouds hover near the surface of the planet. Three-quarters of the surface itself consists of reddish or yellow expanses, probably exposed solid rocks but mostly covered with dust or sand (so-called monotonous deserts). The remaining quarter, consists of "dark spots", faint and ill-defined during winter but turning dark with the advent of spring. The probable existance of vegetation is also discussed.

5298
Moore, P.
GUIDE TO MARS. — 124 p. London: Frederick Muller Ltd., 1956. DLC (QB641.M75)

Prominent theories and observations of the movements, polar caps, deserts, atmosphere, surface conditions, canals, and satellites of Mars are reviewed. From a brief discussion of the possibility of life on Mars, it is concluded that there is no conclusive evidence against the existence of low forms of vegetation, and considerable evidence to support the presence of life.

5299
Moore, P.
THE PLANET VENUS. — 132 p. London: Faber and Faber, 1956. DLC (QB621.M6)

The physical characteristics of Venus derived from telescopic, photographic, and spectroscopic data are described, including the orbit, velocity, atmosphere, period of rotation, and surface of the planet. It is concluded that, although reasonable temperature and atmospheric conditions probably are present on Venus, spectroscopic observations showing a lack of atmospheric molecular oxygen indicate an absence of life. The possibility is suggested that Venus may be in a Cambrian-equivalent stage in which primitive organisms capable of development into more advanced forms of life are present in oceans covering the surface of the planet. (155 references)

5300
Öpik, E. J.
THE SURFACE CONDITIONS ON VENUS. — Irish Astronom. Jour. (Armagh), 4 (2): 37-48. June 1956. DLC (QB1.I753, v. 4)

Evidence is presented which denies the watery nature of the Venusian clouds and the presence of noticeable amounts of water on Venus. It is postulated that the clouds of Venus consist of dust ground off the rocky surface of the planet. The color of the clouds is yellow, with a very low reflecting power in the violet, and gradually increasing to near unity in the red. The air mass above the Venusian clouds is estimated at 15% of the terrestrial at ground level, with at least 40%, and perhaps nearly 100%, of the atmosphere consisting of carbon dioxide. From radiometric observations of nocturnal cooling, and from the presence of the banded pattern which is indicative of the Coriolis force in atmospheric circulation, estimate of about 10 days is made for the period of rotation of Venus, and of a value nearly equal to the terrestrial for the mass of the atmosphere above ground level. A gray-body temperature of 44° C. for the surface of the Venusian clouds is postulated to reconcile three independent observations: (1) the radiometrically determined bolometric albedo; (2) the spectrophotometrically determined ratio of bolometric to visual albedo; and (3) the photometrically determined spherical visual albedo of Venus. It is suggested that Kuiper's hypothesis of a scattering atmosphere overlying a layer of constant reflectivity but of varying height gives an excellent explanation of the Venusian bands. (Quoted in part).

5301
Proell, W.
CHEMISTRY IN SPACE FLIGHT. II. THE DISTRIBUTION OF PLANETARY GASES. — Jour. Space Flight, 8 (10): 1-5. Dec. 1956. DLC (TL780.C413, v. 8)

The marked differences in the nature of the atmospheres and the chemical composition of different planets and their satellites are discussed. A theoretical model was evolved consisting of successive "black balls" at various temperatures poised above a hot sun, from which sublimes slowly a mixture of gases. It predicts in the solar system a series of belts: the fumarole belt (Mercury), the water belt (Earth), the ice-ammonia belt (Planet X, Jupiter) and the hydrogen belt (Uranus). Certain speculations are advanced in regard to the atmospheric composition of Mars, Neptune, and Venus.

5302
Randolph, J. R.
ARE PLANETS HABITABLE? — Ordnance, 40 (214): 608-610. Jan.-Feb. 1956. DLC (UF1.067, v. 40)

Although spectroscopic observations of Mars and Venus have indicated an absence of atmospheric oxygen, it is nevertheless possible that oxygen is actually present on these planets. It is suggested that the dark-line spectrum produced by oxygen may be balanced on Mars and Venus by a bright-line spectrum produced by absorption and reradiation of light. The cooler surface of Mars may explain the absorption of infrarer light by the blue-green areas, which is similar to that of shady earth plants.

5303
Sholto Douglas, J.W.E.H.
FARMING ON THE MOON. — Jour. Brit. Interplanetary Soc. (London), 15 (1): 17-28. Jan.-Feb. 1956. DLC (TL790.A1B7, v. 15)

Comparison of the climatic conditions of the moon with the requirements for the growth of green plants, fungi, and algae on earth indicates the necessity for large-scale hydroponics to provide food for human colonies. Farming would be conducted within a closed system provided with light, heat, and atmospheric control. It is sug-

gested that the water, nutrients, air, and aggregate necessary for farming could be obtained on the moon.

5304
Slater, A. E.
THE COLOURS OF MARTIAN "VEGETATION". — Spaceflight (London), 1 (1): 35-39. Oct. 1956. DLC

Theories attempting to explain the color changes on the surface of Mars are reviewed. Evidence in support of the theory of the vegetal origin of the color changes includes their spectral similarity to the color changes of green-leaved plants and lichens on earth, the absence of infra-red reflection both from the Martian dark areas and from fir trees, and the theoretical ability of vegetation (particularly lichens) to withstand the rigorous climate of Mars. The apparent absence of oxygen in the atmosphere of Mars, and the unlikelihood of an independent parallel development of the complex chlorophyll molecule contraindicate the presence on Mars of life similar to that on earth. Theories suggesting the geological origin of Martian color changes attribute the changes to moisture or to volcanic eruptions.

5305
Strughold, H.
THE ECOSPHERE IN THE SOLAR PLANETARY SYSTEM (HELIO-ECOSPHERE). — Proc. International Astronautical Congress, VIIth (Rome, Sept. 12-22, 1956), p. 277-288. Roma, 1956.
DLC (TL787.I44, v. 7)

Essentially the same as item no. 5027, vol. IV.

3. GENERAL PHYSIOLOGY
[Environmental Effects Under 6]

a. General

5306
Webb, W. B.
AN EXPERIMENTAL ANALYSIS OF ANTECEDENTS OF SLEEP. — U. S. Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 109 113, Report no. 1, Feb. 7, 1956. 12 p. AD 96 376 UNCLASSIFIED

Three experiments were conducted on rats in the study of the relationship between the sleep response and systematic manipulation of past sleep experience in a given environment, time of sleep deprivation, and an irrelevant hunger drive. Two major conclusions were drawn. In experimental conditions of these experiments the major determinants of sleep latency were within subject-consistent differences in contrast to the conditions imposed on these subjects. Further observations suggested that the time to sleep may be jointly determined by the development of wakefulness tendencies as well as sleep tendencies. (Author's abstract)

b. Cardiovascular Physiology

5307
McDowall, R. J. S.
THE CONTROL OF THE CIRCULATION OF THE BLOOD. — New edition. xv+619 p. London: W. Dawson and Sons. 1956 DLC (QP101.M33)

This is a review, with diagrams, of the physiology of the blood circulation in general, and specifically on its control. It includes a bibliography of 7000 references (literature up to 1938) and a detailed subject index. Of particular interest are the chapters dealing with the general physiological effects of anoxemia and high altitude and those concerned with the effects of temperature changes, sleep, mental activity, exercise, and posture on the circulation. [The stock of the first edition, published in 1938, was destroyed in the great fire of London in 1940; the present edition is a reprint of the earlier one.]

5308
McDowall, R. J. S.
THE CONTROL OF THE CIRCULATION OF THE BLOOD. — Supplemental volume. vii+257 p. London: W. Dawson and Sons, 1956.
DLC (QP101.M33, v. 2)

This is a supplemental volume compiled by various authors bringing up to date the original volume destroyed by the great fire of London on December 29, 1940. Pertinent articles are abstracted separately (see item nos. 5944 and 6098).

5309
McGuire, T. F. 1956
THE NORMAL HUMAN EKG AND ITS COMMON VARIATIONS IN EXPERIMENTAL SITUATIONS. — Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 6333). WADC Technical Report no. 56-309, June 1956. v+69 p. AD 106 751
PB 121 528

An attempt has been made to define as clearly as possible, within the limits of presently accepted knowledge, the boundaries of normal in electrocardiography. "Normal" having been defined, attention is turned to possible changes during experimental procedures. These changes include the following five basic modes or combinations thereof: positional effect, chemical effect, circulatory effect, nervous system effect, and temperature effect. Varying arrhythmias and conduction defects are discussed, as are cardiac chamber dilatation, cardiac strain,

myocardial hypoxia, and various EKG artefacts. (Author's abstract)

5310
Nahas, G. G.,
and H. L'Allemand
CIRCULATION IN DOGS AFTER RESPIRATORY ARREST INDUCED BY CURARE. — Jour. Applied Physiol., 8 (4): 468-472. Jan. 1956.
DLC (QP1.J72, v. 8)

Circulatory variables were investigated in dogs during 15-minute periods of "apneic oxygenation", in which the trachea was connected to a reservoir of 100% O_2, and "apneic hypoxia", in which the trachea was connected to room air. Respiratory arrest was induced by administration of d-tubocurarine. Apnea of both types produced a marked fall in heart rate and increases in systemic and pulmonary blood pressures. The increased blood pressures are attributed to a rise in cardiac output with little change in calculated peripheral resistance. During apneic oxygenation the arterial blood was fully saturated with oxygen, while in apneic hypoxia saturation varied from 25 to 75%. The CO_2 content of the blood and alveolar air was increased, and the pH of arterial blood was decreased.

5311
Ward, J. E.
THE TRUE NATURE OF THE BOILING OF BODY FLUIDS IN SPACE. — Jour. Aviation Med., 27 (5): 429-439. Oct. 1956. DLC (RC1050.A36, v. 27)

The general phenomenon of boiling liquids is discussed with particular emphasis on the factors influencing the vapor pressure of fluids, including the effects of temperature, volatile and nonvolatile solutes, and polymerized and colloidal suspensions as encountered in the body fluids. The relationships between hydrostatic and tension pressures, gravity free state, bubble formation, anatomic sites and the ebullism syndrome are discussed. Clinical implications derived from all the theoretical considerations are discussed from the viewpoint of the space flyer and the space flight surgeon. The term "ebullism" is introduced to describe the phenomenon of vaporization of body fluids at low atmospheric pressures and at body temperatures, thereby avoiding the use of the word "boiling" to describe a medical syndrome. (From the author's summary)

5312
Zipf, R. E.,
J. M. Webber, G. R. Grove, and T. F. McGuire
BLOOD VOLUME AND CARDIAC OUTPUT DETERMINATIONS USING RADIOISOTOPES. — Miami Valley Hospital, Dept. of Research, Dayton, Ohio (Contract AF 33(616)-2756); issued by Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project 7160, Task no. 71812). Report no. 56-574. Nov. 1956. vi+29 p. AD 118 056 PB 121 984

This report includes the methodology of measuring the blood volume and cardiac output with intravenous radioiodinated human serum albumin (RISA). The results and accuracy of both tests are submitted. (Authors' abstract) (39 references)

5313
Zuidema, G. D.,
and R. Edelberg
A DEVICE FOR THE INDIRECT RECORDING OF BLOOD PRESSURE. II. RESEARCH USES. — Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio. WADC Technical Note no. 55-427, Dec. 1956. iv+3 p. (Project no. 7216, Task no. 71712). AD 110 576 UNCLASSIFIED

Four modifications of a previously reported indirect blood pressure recorder are presented. These consist of four variations in the pulse-sensing unit and include: a strain gauge mounted over the brachial artery; a one-piece unit consisting of a fluid-filled rubber balloon and tubing connecting it to a pressure transducer; use of the Gauer miniature manometer; or application of a very simple carbon microphone. Their use in the high altitude - low pressure chambers, the human centrifuge, and psychophysiological test situations is described. (Authors' abstract)

c. Respiratory Physiology

[Effects of anoxia under 6-d; Respiratory metabolism under 3-d]

5314
Akawa, J. K.,
and F. D. Bruns
PULMONARY LESIONS IN EXPERIMENTAL OXYGEN POISONING. — A. M. A. Jour Diseases of Children, 91 (6): 614-620. June 1956. DNLM

Guinea pigs were given intravenous injections of tracer amounts of I^{131}-tagged γ-globulin and albumin, and were then exposed to 98% oxygen at 760 mm. of mercury until they died. The lungs were examined histologically and analyzed for total weight and water, electrolyte, and radioactivity content. All animals placed in oxygen showed pulmonary lesions characteristic of oxygen poisoning, and showed significantly higher mean values for total weight, water and sodium content, and for concentration and content of radioactivity. The potassium content was unaltered. The results suggest that the increase in lung weight is due to a local accumulation of water, sodium, and plasma proteins. The basic abnormal physiological process appears to be a localized increase in permeability of the capillary membrane to noncellular constituents of the vascular compartment. (Authors' summary, modified)

5315
Air Material Command
STUDIES IN HYPERVENTILATION. — Office of the Surgeon, Headquarters Air Material Command, Wright-Patterson Air Force Base, Ohio. Information Bulletin, no. 63: 4-6. April 1, 1956. DNLM

Results of hyperventilation studies to date reveal that (1) hyperventilation causes a decrease of psy-

chomotor performance in close correlation with the decrease in alveolar carbon dioxide tension; (2) severe tetany usually develops if about 3 liters of carbon dioxide per m^2 body surface above the metabolically produced carbon dioxide are removed by ventilation; and (3) tetany occurs most frequently during jet pilot training. An adaptation to frequently repeated voluntary hyperventilation was found, psychomotor performance being less affected and symptoms of hypocapnia markedly reduced.

5316
Astrup, P.
A SIMPLE ELECTROMETRIC TECHNIQUE FOR THE DETERMINATION OF CARBON DIOXIDE TENSION IN BLOOD AND PLASMA, TOTAL CONTENT OF CARBON DIOXIDE IN PLASMA, AND BICARBONATE CONTENT IN "SEPARATED" PLASMA AT A FIXED CARBON DIOXIDE TENSION (40 MM HG). — Scandinavian Jour. Clinical and Lab. Invest. (Oslo), 8 (1): 33-43. 1956.

A simple electrometric technique is described which permits the determination of carbon dioxide tension in plasma, the total content of carbon dioxide in plasma, and the bicarbonate content of "separated" plasma at a fixed carbon dioxide tension of 40 mm. Hg. The method is based exclusively on pH measurements and on the laws governing the relation between the pH and carbon dioxide tension of plasma. Agreement of results was found between electrometric and manometric methods. Normal values are tabulated for pH, carbon dioxide tension, and bicarbonate content in "separated" plasma in venous blood. (From the author's summary)

5317
Attinger, E. O.,
R. G. Monroe, and M. S. Segal
THE MECHANICS OF BREATHING IN DIFFERENT BODY POSITIONS. I. IN NORMAL SUBJECTS. — Jour. Clinical Investigation, 35 (8): 904-911. Aug. 1956. DLC (R11.J67, v. 35)

Pulmonary compliance (volume change brought about by one centimeter of water pressure) and mechanical resistance (resistance to air flow and tissue deformation) were measured in eight subjects during slow and rapid breathing in the supine, sitting and prone positions. Compliance was lowest in the supine and highest in the sitting position and did not change with change in respiratory rate. Mechanical resistance was usually highest in the supine and lowest in the sitting position, expiratory resistance being somewhat higher than inspiratory resistance in all positions studied. Intrapleural pressure differences were usually somewhat greater than intraesophageal pressures in different body positions. The significance of body position in pulmonary function testing is considered.

5318
Atwell, R. J.,
J. F. Tomashefski, and J. M. Ryan
FACTORS INFLUENCING ALVEOLAR-ARTERIAL OXYGEN PRESSURE GRADIENT: EFFECT OF VENTILATION AND ALVEOLAR OXYGEN TENSION. — Amer. Jour. Physiol., 186 (3): 501-504. Sept. 1956. DLC (QP1.A5, v. 186)

The alveolar-arterial oxygen pressure gradient was determined in anesthetized dogs in which pulmonary ventilation and alveolar oxygen tension were independently varied. The results suggest the following: (1) The magnitude of the alveolar-arterial oxygen pressure gradient correlates directly with the alveolar oxygen pressure. (2) In the anesthetized dog venous admixture seems to be constant and unrelated to the changes in ventilation produced by positive-negative pressure breathing. (3) Venous admixture is the most important factor in producing the alveolar-arterial gradient in the dog. (Authors' abstract quoted in part)

5319
Baldini, L.,
and Cavalieri
[ELECTROCARDIOGRAPHIC T-WAVE MODIFICATION DURING HYPOTHERMIA IN THE RAT] Su una modificazione dell'onda T (all'ECG) in corso di ipotermi. nell ratto. — Bollettino della società italiana di otologia sperimentale (Napoli), 32 (3-5): 229-231. March-May 1956. In Italian. DNLM

Rats cooled to a body temperature of 20° C. by immersion in water at 10° C. exhibited electrocardiographic T-wave modifications. As the time of hypothermia increased, a second elevation occurred which followed the peak of the T-wave. This characteristic remained for a long period of time and in one case was followed for 18 hours. It was particularly evident in D_2, D_3 and VF leads and reversible when the animal returned to normal temperature. The hypothesis is presented that a slight ischemic damage of the posterior cardiac wall occurs in order not to incapacitate myocardial activity for such a long period of time. This behavior is peculiar to the rat heart and is not seen in other species (dog, cat, opossum) in which the T-wave during hypothermia exhibits a different picture.

5320
Balke, B.,
and J. P. Lilleheі
EFFECT OF HYPERVENTILATION ON PERFORMANCE. — Jour. Applied Physiol., 9 (3): 371-374. Nov. 1956. DLC (QP1.J72, v. 9)

Experiments were conducted to investigate the effect of hypocapnia on psychomotor behavior. Six healthy subjects were tested on a SAM USAF Complex Coordination Apparatus before, during, and after a 30-minute period of passively induced hyperventilation. Psychomotor performance was observed to deteriorate to 85% of pre- and post-hyperventilation values at an average alveolar CO_2 tension of 20-25 mm. Hg, and to 70% at 14 mm. Hg. In some cases an apathetic state was developed in which the hyperventilating subject showed decreasing responsiveness to external stimuli, with only minor impairment of performance executed on command.

5321
Birath, G.,
and E. W. Swenson
A NOMOGRAPHIC SOLUTION FOR LUNG VOLUME DETERMINATIONS IN THE CLOSED SYS-

TEM HELIUM DILUTION METHOD. — Scandinavian Jour. Clinical and Lab. Invest. (Oslo), 8 (4): 329-332. 1956. DNLM

A labor-saving nomographic method is described for the calculation of the lungs' functional residual capacity in the closed system helium dilution technique. Because such a method depends on the characteristics of the individual spirometer, detailed mathematical derivations and directions for construction are presented. (Authors' summary, modified)

5322
Blasius, W.,
and G. Zimmermann
[THE EFFECT OF THE RESPIRATORY FREQUENCY AND AMPLITUDE OF ARTIFICIAL HYPERVENTILATION ON THE BLOOD PRESSURE OF RABBITS] Der Einfluss von Atemgrösse und Atemfrequenz künstlicher Hyperventilation auf den Blutdruck des Kaninchens. — Pflügers Archiv für die gesamte Physiologie (Berlin), 263 (2): 283-292. 1956. In German. DLC (QP1.A63, v. 263)

The blood pressure of artificially ventilated anesthetized rabbits decreased with independent increases in respiratory volume and frequency. The difference between systolic and diastolic pressure remained constant with changes in respiratory volume, but was decreased with increasing frequency as a result of the maintenance of diastolic pressure. Blood pressure was gradually increased to normal during apnea, indicating the dependence of the decline on blood constituent as well as respiratory factors.

5323
Boucot, N. G.,
G. A. Lumb, R. F. Mahler, and S. W. Stanbury
THE EXTRARENAL BUFFERING OF ACUTE RESPIRATORY ALKALOSIS IN MAN [Abstract]. — Jour. Physiol. (London), 132 (3): 63P. June 28, 1956. DLC (QP1.J75, v. 132)

Changes in plasma composition were studied in dogs during hyperventilation for periods up to 50 minutes. The initial fall in plasma carbon dioxide produced by hyperventilation had no effect on plasma lactate, but further declines were associated with an equivalent rise in lactate, an increase in plasma pyruvate, and a decrease in plasma phosphate. The plasma level of potassium increased slightly during the first minutes of hyperventilation and then fell to lower levels. The observed changes in plasma lactate, pyruvate, and phosphate are attributed to the glycolytic response to hyperventilation.

5324
Bühlmann, A.,
F. Schaub, G. Hossli, and P. Hösli
[HEMODYNAMIC INVESTIGATIONS DURING GENERAL AND UNILATERAL HYPOVENTILATION] Hämodynamische Untersuchungen bei allgemeiner und einseitiger Hypoventilation. — Helvetica medica acta (Basel), 23 (4/5): 545-552. Nov. 1956. In German. DNLM

Arterial blood gases, gas exchange, and hemodynamics were investigated by heart catheterization of eight curarized healthy subjects during normal ventilation and hypoventilation. During the latter, flow resistance of pulmonary circulation increased significantly in all subjects. In seven subjects there was also increase of flow resistance of the total circulation. In unilateral hypoventilation (bronchospirometry), circulation for that side was reduced significantly. A fall of the alveolar O_2 tension and a rise of CO_2 tension increases tone of the pulmonary arterioles.

5325
Cooper, D. Y.,
and C. J. Lambertsen
EFFECT OF CHANGES IN TIDAL VOLUME AND ALVEOLAR pCO_2 ON PHYSIOLOGICAL DEAD SPACE [Abstract]. — Federation Proceedings, 15 (1, part I): 39. March 1956. DLC (QH301.F37, v. 15)

Dead space changes, calculated from alveolar or arterial pCO_2, were determined during several levels of voluntary hyperventilation, exercise hyperventilation, and increase in tidal ventilation without alteration of alveolar pCO_2. Increase in tidal volume alone (alv. pCO_2 39 mm. Hg.) of 1 liter enlarged dead space 106 cc. With the same tidal volume change dead space increases were 100 cc. during exercise (art. pCO_2 39 mm. Hg.), 258 cc. during CO_2 breathing (art. pCO_2 51 mm. Hg.), and 56 cc. during voluntary hyperventilation (alv. pCO_2 30 mm. Hg.). With alveolar pCO_2 constant, dead space increased 11 cc./100 cc. increase in tidal volume. Deducting tidal volume effect from dead space in CO_2 breathing and voluntary hyperventilation indicated that, at constant tidal volume, hypercapnia enlarged dead space about 30 cc./mm. Hg, while hypocapnia diminished dead space about 3 cc./mm. Hg. It is suggested that a pharmacodynamic effect of altered pCO_2 is normally algebraically additive with a separate, mechanical effect upon dead space of altered tidal volume. (From the authors' abstract)

5326
Demange, J. M.
[CONTRIBUTION TO THE STUDY OF HYPEROXIA: ROLE OF HISTAMINE IN THE PRODUCTION OF PULMONARY LESIONS DUE TO HYPEROXIA] Contribution à l'étude de l'hyperoxie: rôle de l'histamine dans la production des lésions pulmonaires dues á l'hyperoxie. (Thesis, Faculté de médecine de Nancy.) 85 p. Bar-le-Duc: Du Barrois, 1956. In French.
DNLM (W6P3, Pamphlet vol. 6354)

It has been established by previous workers that oxygen inhalation causes pulmonary lesions in animals manifested by vasocongestion, microhemorrhage, edema, and morphological cellular changes. This combination of lesions is called "pneumonia caused by oxygen" and appears rapidly in the guinea pig, becoming complete in about six hours. The mechanism whereby these lesions appear is not known. On the basis of known neuroendocrine reactions, the role of local histamine intervention is suspected. From the experiments reported in this paper it was found that the histamine level in

guinea pig lung tissue increases after six hours in pure oxygen, along with an increase in the blood histamine content. It appears that the increase in pulmonary histamine content plays a role in the pathogenesis of pulmonary lesions. In addition, the physiopathological effects of exposure to hyperoxic atmospheres are reviewed. (70 references)

5327
Ellis, J. P.,
J. G. Wells, and B. Balke
ACID-BASE ALTERATIONS DURING HYPERVENTILATION [Abstract]. — Federation Proceedings, 15 (1, part I): 57. March 1956.
DLC (QH301.F37, v. 15)

Experimentation on untrained individuals revealed that a 4-fold increase of ventilation could be endured for 30 minutes, causing a 50% reduction in performance. The blood pH increased from 7.41 to 7.57. Reductions of 15, 13 and 7% were found for plasma bicarbonate, plasma buffer capacity and the alkali reserve, respectively. After 3 weeks of daily hyperventilation training, improvement of endurance and performance was obvious. Similar changes in blood were found for the first 30 minutes as described above. Continuation of the hyperventilation test for the additional 30 minutes, however, caused the pH to rise to 7.66, and reductions of 25, 15 and 10% of plasma bicarbonate, buffer capacity and alkali reserve, respectively. Eight weeks of physical training did not alter the latter pattern of results. Although absolute lactate, bicarbonate and buffer values were reduced after acclimatization to 14,160 feet, relative changes during hyperventilation tests were essentially reproduced. Tests made 2 and 8 weeks after descent from altitude indicated a gradual return of preacclimatization values. In all hyperventilation tests, blood lactate dropped slightly during the initial 15 minutes of hyperventilation, but returned to, or exceeded, the resting value within 60 minutes. Blood pyruvate increased throughout the test. (From the authors' abstract)

5328
Elwell, L. H.,
and J. W. Bean
SOMATIC REFLEXES AND BLOOD OXYGENATION UNDER POSITIVE INTRAPULMONIC PRESSURE. — Jour. Applied Physiol., 9 (3): 337-342. Nov. 1956. DLC (QP1.J72, v. 9)

Abrupt or gradual application of positive intrapulmonic pressure (20 cm. H_2O) in young men caused an augmentation of the patellar reflex, an increased respiratory minute-volume, and a shift from abdominal to thoracic breathing. During controlled ventilation and frequently in free breathing, continuous oximeter readings from the ear showed a predominant decrease, after a transient initial increase, in O_2 saturation of the blood in the tissues. Further studies showed that in dogs under constant ventilation, positive intrapulmonic pressure decreased oxygenation of the blood in the lungs. It is concluded that the augmentation of the knee-jerk induced by positive intrapulmonic pressure is due chiefly to the resultant diminished blood flow and decreased oxygenation of the blood in the lungs, and that the attendant hypoxia and increase in acid metabolites may potentiate the reflex through an anticholinesterase action on the neuromyal junction and possible on the central nervous structures. The increased respiration induced by positive intrapulmonic pressure is considered to be a counterpart of the augmentation of the patellar reflex. (Authors' abstract, modified)

5329
Ernsting, J.
THE EFFECT OF RAISED INTRA-PULMONARY PRESSURE UPON THE DISTENSIBILITY OF THE CAPACITY VESSELS OF THE UPPER LIMB. — R. A. F. Inst. of Aviation Medicine (Gt. Brit.), Farnborough; issued by Flying Personnel Research Committee (Gt. Brit.). Report no. FPRC 982, Nov. 1956. 12 p. AD 120 856 UNCLASSIFIED

Positive pressure breathing induces reflex constriction of the superficial forearm vein of man. This constriction is absent if trunk counterpressure is applied during pressure breathing. It is unaffected by occlusion of the circulation through the upper limb. At any given peripheral venous pressure the distension of the hand vessels produced by simple positive pressure breathing amounts to about 75% of the distension caused by local congestion. This reduction in the distensibility of the hand vessels during pressure breathing is abolished by trunk counterpressure and by a block of the nerves supplying the hand. The venoconstriction of positive pressure breathing is reflex in nature and is probably induced by the lung distension which occurs during this manoeuvre. (Author's summary)

5330
Errebo-Knudsen, E. O.
HYPERVENTILATION. — Meddelanden från Flyg- och Navalmedicinska Nämnden (Stockholm), 5 (4): 89-91. 1956. In Swedish, with English summary (p. 91). DNLM

A survey is given on the physiology and clinic of hyperventilation. The importance of hyperventilation in aviation medicine is discussed, especially for the beginning phases of flight training, and for pressure breathing. The question is raised as to what type of practical, verbal, and written instructions should be given to the flight personnel. (Author's summary)

5331
Fabre, H.,
R. Fabre, and Y. Linquette
[ELECTROCARDIOGRAPHIC CHANGES FOLLOWING VOLUNTARY APNEA WITH OR WITHOUT EFFORT] Modifications électrocardiographiques consécutives à l'apnée volontaire avec ou sans effort. — Journal de physiologie (Paris), 48 (3): 526-529. May-June 1956. In French. DNLM

Different types of voluntary apnea, with or without effort, produced electrocardiographic changes in the QRS complex which were related to changes in heart position following immobilization of the diaphragm and forced inspiration or expiration. Modifications characteristic of apnea with effort were essentially characterized by an exaggeration of the P wave and a decrease or diphasism of the

T wave. Apnea without effort showed similar electrocardiographic manifestations.

5332
Filocamo, G.,
V. Pennetti, G. Angrisani, and D. Dagianti
[CONTRIBUTION TO THE KNOWLEDGE OF THE CHANGES INDUCED BY VOLUNTARY APNEA ON THE PULMONARY ARTERY PRESSURE AND ON THE ARTERIAL OXYGEN SATURATION] Contributo alla conoscenza delle modificazioni indotte dall'apnea volontaria sulla pressione arteriosa polmonare e sulla saturazione arteriosa in O_2. — Bollettino della Società italiana di biologia sperimentale (Napoli), 32 (9): 1074-1076. Sept. 1956. In Italian. DNLM

Voluntary apnea was practiced by subjects after breathing environmental air. The duration of apnea varied from 24 seconds to 1 minute and 15 seconds. Pulmonary artery pressure exhibited a progressive increase in both systolic and diastolic values. No significant changes were observed in cardiac frequency. The progressive fall in pulmonary artery oxygen saturation and the progressive increase of pulmonary pressure indicate a possible relation between the type of hypoxemia and the pulmonary changes. In order to clarify this relationship, apnea was repeated by the same subjects after breathing 100% pure oxygen. The duration of apnea varied from 45 seconds to 1 minute and 20 seconds. The oxygen saturation curve did not exhibit any change during the apneic period but pulmonary artery pressure again showed a gradual increase. It is concluded that hypoxemia induced by apnea is not responsible for the pressure changes. Mention is made of the role of respiratory reflexes in the regulation of the pulmonary circulation.

5333
Gaasbeek, W. M. van
POSITIVE PRESSURE BREATHING. — Nederlands militair geneeskundig tijdschrift ('s Gravenhage), 9 (4): 114-126. April 1956. In Dutch.
DLC (RC971.N4, v. 9)

The chief drawback of continuous positive-pressure breathing in regard to respiration is the fatigue of the inspiratory muscles; while that of intermittent positive-pressure breathing is the ensuing hyperventilation. In regard to circulation the reduction of cardiac output becomes the limiting factor for both types of positive pressure breathing. The rise in the arterial oxygen partial pressure together with the fall in CO_2 partial pressure limits any gains in altitude tolerance. Additional means to raise altitude tolerance include administration of NH_4Cl and counterpressure applied to the extremities. However, in practice positive-pressure breathing is employed chiefly as an emergency measure in pressurization failure.

5334
Gerschman, R.,
D. L. Gilbert, S. W. Nye, and W. O. Fenn
THE EFFECTS OF COBALTOUS ION, GLUTATHIONE, AND THIOUREA ON THE SURVIVAL TIMES OF MICE SUBMITTED TO HIGH OXYGEN TENSIONS. — Univ. of Rochester School of Medicine and Dentistry, N. Y.; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. (Project no. 21-1201-0013), Report no. 56-43, June 1956. 8 p. AD 126 663 PB 126 045

When cobalt, glutathione, and thiourea were fed to mice submitted to 1 atmosphere of 100% oxygen it was found that only cobalt prolonged survival time by 17.7 hours over that of the control animals. Thiourea and glutathione exhibited a protective effect only at pressures above 1 or 1.5 atmospheres.

5335
Goren, S. B.,
and A. C. Krause
THE EFFECTS OF HYPOXIA AND HYPEROXIA UPON THE OXYGEN TENSION IN THE VITREOUS HUMOR OF THE CAT [Abstract]. — Amer. Jour. Ophthalmol., 41 (6): 1067-1068. June 1956. DNLM

The oxygen tension of the vitreous humor of cats was measured by the polarograph method under conditions of hypoxia and hyperoxia. Moderate hypoxia (114 mm. Hg O_2) decreased the oxygen tension in the vitreous humor from 53 mm. Hg to 28 mm. Hg. Increasing degrees of hyperoxia caused an exponential increase in the oxygen tension of the vitreous humor to a maximum of 175 mm. Hg at an inspired oxygen level (609 mm. Hg) well above that required for full blood hemoglobin saturation. Since the increased oxygen in solution in the blood plasma at high oxygen tensions was not sufficient to explain the difference in the oxygen tension of the vitreous humor at moderate and severe levels of hyperoxia, it is suggested that a greater quantity of oxygen diffuses into the vitreous humor as hyperoxia increases. The oxygen tension of the vitreous humor decreased exponentially, along with the blood hemoglobin saturation, after removal from hyperoxic to normal breathing conditions

5336
Heath, C.,
and E. B. Brown
POST-HYPERCAPNIC HEMODYNAMIC CHANGES IN DOGS. — Univ. of Minnesota, Minneapolis; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 57-16, May 1956.
UNCLASSIFIED

Arterial pressure was observed to fall precipitously in 19 of 20 dogs switched from breathing 30 percent CO_2 to 100 percent O_2 or to air. This fall in pressure is caused in part by a fall in cardiac output which occurs at the same time. Posthypercapnic resistance changes in intact dogs were variable. This would occur if the changes were the resultant of a decrease in resistance due to CO_2 and of an increase of reflex origin. In experiments in which blood flow was maintained constant, elimination of CO_2 resulted in a decrease in resistance which was reversed by readministration of CO_2. (Authors' abstract)

5337
Hempleman, H. V.
OXYGEN POISONING. — Jour. Royal Naval Med. Service (London), 42 (4): 143-148. 1956. DNLM

A brief review is presented of studies dealing with the effects of high oxygen pressures on mammals. Two principal manifestations of oxygen poisoning are distinguished. The first, chronic oxygen poisoning, consists of irritation of the lung surface and is the predominent form at oxygen pressures between 0.6 to 2.0 atmospheres. The second form, acute oxygen poisoning, is characterized by nervous symptoms and especially by epileptiform convulsions after sufficient time at pressure.

5338
Hickam, J. B.,
W. P. Wilson, and R. Frayser
OBSERVATIONS ON THE EARLY ELEVATION OF SERUM POTASSIUM DURING RESPIRATORY ALKALOSIS. — Jour. Clinical Investigation, 35 (6): 601-606. June 1956. DLC (RB1.J67, v. 35)

In normal subjects acute respiratory alkalosis induced by hyperventilation causes a transitory hyperkallemia. In 13 subjects the mean increase in arterial serum potassium was 1.2 milli-equivalents per liter after 2 minutes of hyperventilation. During early respiratory alkalosis, potassium is added to the circulating blood in the splanchnic region. This activity is not mediated by epinephrine or nor-epinephrine. During early hyperventilation the carbon dioxide dissociation curve of whole blood shifts to a more alkaline position, and, correspondingly, there is a modest increase in whole blood buffer base concentration. Hyperkallemia contributes toward this change.

5339
HYPERVENTILATION AS A CAUSE OF CARDIOVASCULAR SYMPTOMS. — Heart Bull., 5 (3): 52-53; 58. May-June 1956. DNLM

Hyperventilation drives off alveolar carbon dioxide until the amount in the blood decreases to a critical level. The central nervous system, vasomotor system, skeletal muscles, and circulation are profoundly affected by hyperventilation. Among the cardiac manifestations are included palpitations, tachycardia, skipped beats, and atypical chest pains. The concomitant decrease of the oxygen-carrying ability of blood because of oxyhemoglobin dissociation plus constriction of cerebral vessels accounts for such signs of cerebral anoxia as mental apathy, unconsciousness, and tetany. Hyperventilation is observed in aviators flying at high altitudes, and in others under emotional stress (embarrassment, fear, anger) or extreme exhaustion. Mention is made of associated diagnostic and therapeutic problems.

5340
Karbowitz, F.
[ON METHODS FOR QUANTITATIVE MEASUREMENT OF THE OXYGEN CONTENT IN THE HUMAN BLOOD AND A NEW MANOMETRIC METHOD OF MEASUREMENT] Über Methoden zur quantitativen Bestimmung des Sauerstoffgehaltes im menschlichen Blut und über eine neue manometrische Bestimmungsmethode. — Zeitschrift für die gesamte innere Medizin (Leipzig), 11 (1): 9-22. Jan. 1, 1956. In German. DNLM

Current methods for analysis of blood oxygen content are reviewed critically. A new method using Warburg manometers is described in detail. The withdrawn arterial or venous blood is deposited directly in the manometer container. The advantages of this method as compared to the van Slyke apparatus are: (1) the blood comes in contact with only the reacting solution and not with mercury; (2) the measurements are made at the gas-liquid equilibrium level; and (3) several determinations may be made simultaneously. In addition manometric methods for determination of the CO_2 content of the blood and bicarbonate content of the plasma are described. (Author's summary, modified)

5341
Kaufman, W. C.,
and J. P. Marbarger
PRESSURE BREATHING: FUNCTIONAL CIRCULATORY CHANGES IN THE DOG. — Jour. Applied Physiol., 9 (1): 33-37. July 1956.
DLC (QP1.J72, v. 9)

Circulatory responses to positive pressure breathing at 17 or 26 mm. Hg were studied in dogs without counterpressure or with counterpressure equal to breathing pressure applied by an inflatable vest. Systolic and diastolic blood pressures were observed to decrease, and venous pressure to increase, to a greater extent in dogs without counterpressure at breathing pressures of 17 mm. Hg, but not at 26 mm. Hg. Dogs with counterpressure showed a greater and more sustained increase in intracranial pressure, an increase in heart rate, and a constant respiration rate. In animals without counterpressure a slight decrease in heart rate and a period of apnea at the onset of pressure breathing were observed. Hematocrit determinations indicated hemoconcentration in both groups.

5342
Kay, R. H.,
and R. V. Coxon
SIMULTANEOUS RECORDING OF INSPIRED OXYGEN CONCENTRATION AND PERIPHERAL TISSUE OXYGENATION. — Nature (London), 177 (4497): 45-46. Jan. 7, 1956. DLC (Q1.N2, v. 177)

A method was developed for the simultaneous continuous measurement of inspired oxygen concentration by a magnetic instrument based on that of Naumann, and of peripheral tissue oxygenation by a method based on the polarographic techniques of Davies and Brink. Both measurements were recorded simultaneously on an Elliott six-channel potentiometer. Preliminary experiments indicated that (1) variation of the oxygen content of inspired gas between 21 and 100% was reflected in the recorded tissue electrode current within one minute; (2) the initial rates of change of both tissue and inspired oxygen content were usually similar, provided the latter changed less rapidly than one minute to half-total change; and (3) a rapid reduction (from 100%) of inspired oxygen concentration was more quickly reflected in the tissue response than was an increase (from 21%).

5343
Lalli, G.,
and F. R. Vece
[TECHNIQUE FOR THE SPECTROPHOTOMETRIC DETERMINATION OF CARBOXYHEMOGLOBIN IN THE PRESENCE OF HEMOGLOBIN AND OXYHEMOGLOBIN IN AN 0.01-CM. CUVETTE] Tecnica di determinazione spettrofotometrica della COHb in presenza di Hb ed HbO2 in cuvette da 0.01 cm. — Rivista di medicina aeronautica (Roma), 19 (2): 359-374. April-June 1956. In Italian, with English summary (p. 373).
DLC (RC1050.R56, v. 19)

A spectrophotometric technique is described for the determination of carboxyhemoglobin concentrations in hemolyzed blood. It is based on measurement (in cuvettes 0.01 cm. thick) of the absorption of light of two λ (wave length) at which hemoglobin and oxyhemoglobin have the same extinction coefficient, while carboxyhemoglobin has a different extinction coefficient. This technique requires very exact reproduction of the desired λ, and can be obtained with the proper instrumentation. (Authors' summary, modified)

5344
Lamarche, M.,
and J. M. Demange
[CHANGES IN THE HISTAMINE CONTENT OF BLOOD AND LUNGS DURING HYPEROXIA IN THE GUINEA PIG] Modifications des taux d'histamine sanguin et pulmonaire au cours de l'hyperoxie chez le Cobaye. — Comptes rendus de la Société de biologie (Paris), 150 (11): 1980-1982. 1956. In French. DLC (QP1.S7, v. 150)

Examination of guinea pigs exposed for six hours to an atmosphere of 95% oxygen showed no change in blood histamine, but revealed considerable increase in the histamine content of pulmonary tissue.

5345
Levy, L. M.,
L. M. Bernstein, D. Devor, S. L. Kirschner, J. E. Long, and J. Stadler
MODIFIED SCHOLANDER APPARATUS FOR ACCURATE ESTIMATION OF CARBON DIOXIDE IN SMALL SAMPLES OF EXPIRED AIR. — Medical Nutrition Lab., Fitzsimons Army Hospital, Denver, Colo. Report no. 189, Aug. 17, 1956. 2+5 p.
AD 108 838 UNCLASSIFIED

The original Scholander apparatus for the estimation of carbon dioxide in expired air was modified by elimination of the reservoir arm containing oxygen absorbent and by conversion of the carbon dioxide absorbent reservoir into an outpouching from the reaction chamber. Oxygen determinations were made by the Beckman oxygen analyzer. With the elimination of sources of leakage, the new apparatus permits the estimation of carbon dioxide in expired air with fewer errors, greater simplicity, and lower cost.

5346
Loeschcke, H. H.
[ON THE EFFECT OF CO_2 ON THE STANDING POTENTIAL OF THE MENINGES] Über den Einfluss von CO_2 auf die Bestandspotentiale der Hirnhäute. — Pflügers Archiv für die gesamte Physiologie (Berlin), 262 (6): 532-536. 1956. In German, with English summary, (p. 536).
DLC (QP1.A63, v. 262)

Simultaneous measurements were made of the arachnoid potential of the atlanto-occipital membrane and of the respiratory minute volume in rabbits during the inhalation of gas mixtures of 5% CO_2 in air and 7% O_2 in nitrogen. During 5% CO_2 breathing, increases were observed in the membrane potential and in respiration. After return to air breathing the respiratory minute volume fell sharply to a value below the normal level before returning to the normal range, while the membrane potential declined gradually to a normal level. During hypoxia, respiration showed an initial sharp increase and a gradual decline thereafter, while the arachnoid potential remained unchanged until a strong hyperventilation was established. Local application of 5% CO_2 to the atlanto-occipital membrane provoked an increase in the potential of the membrane but not in respiratory minute volume. It is concluded that the arachnoid potential of the atlanto-occipital membrane is directly responsible to the CO_2 concentration of the tissue, and that the respiratory volume is not directly controlled by the membrane potential.

5347
McIlroy, M. B.,
F. L. Eldridge, J. P. Thomas, and R. V. Christie
THE EFFECT OF ADDED ELASTIC AND NON-ELASTIC RESISTANCES ON THE PATTERN OF BREATHING IN NORMAL SUBJECTS. — Clinical Sci. (London), 15 (2): 337-344. May 1956. DNLM

The effects of externally added elastic and non-elastic resistances on the pattern of breathing were studied in normal subjects. With added elastic resistance, the respiratory rate increased and the respiratory level decreased. With added non-elastic resistance, the respiratory rate decreased and, in most cases, the respiratory level increased. With both elastic and non-elastic resistance, the change in rate was inversely proportional to the change in level. The existence of an optimal rate of breathing against both elastic and non-elastic resistances was confirmed by direct measurement. It is suggested that there may be an optimal respiratory level and that the optimal rate and optimal respiratory level may be interdependent. (Authors' summary)

5348
McKerrow, C. B.,
and A. B. Otis
OXYGEN COST OF HYPERVENTILATION. — Jour. Applied Physiol., 9 (3): 375-379. Nov. 1956.
DLC (QP1.J72, v. 9)

The oxygen consumption of maximal voluntary ventilation (obtained by an apparatus with very low air-flow resistance) ranged in five normal men from 2.13 to 0.71 liter/min. The consumption per unit of ventilation was found to increase with increasing ventilation, particularly at maximal levels.

5349
McKerrow, C. B.,
A. B. Otis, R. Bartlett, and B. Armstrong
SOME MECHANICAL FACTORS INFLUENCING INTRAPULMONARY DISTRIBUTION OF RESPIRED GAS. — Johns Hopkins Univ. School of Medicine, Baltimore, Md.; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-117, April 1956. 33 p. AD 108 299
PB 124 539

A theoretical analysis of a simple analog of a pulmonary pathway consisting of a compliance and resistance in series is presented. The behavior of a system consisting of two such pathways connected in parallel is predicted theoretically and illustrated by experiments with a mechanical model. It is shown that unless two such pathways have similar mechanical properties they will not only have differing tidal volumes but will also ventilate out of phase with each other to some degree. A few experiments with human subjects are also described. It is suggested that uneven pulmonary ventilation may have its basis in local differences in the mechanical properties of the lungs. (Authors' abstract)

5350
Mollaret, P.,
J. J. Pocidalo, J. Lissac, and C. Demongeot
[HUMORAL, CIRCULATORY, AND ELECTROCARDIOGRAPHIC CHANGES DURING ACUTE RESPIRATORY ACIDOSIS IN THE DOG SUBJECTED TO DIFFUSION RESPIRATION] Modifications humorales, circulatoires et électrocardiographiques au cours de l'acidose respiratoire aiguë chez le chien soumis à la respiration dite par diffusion. — Comptes rendus de la Société de biologie (Paris), 150 (12): 2168-2172. 1956. In French.
DLC (QP1.S7, v. 150)

Dogs ventilated with 100% oxygen by diffusion during drug-induced apnea for 35 to 60 minutes showed a progressive blood acidification produced by an accumulation of CO_2; a slight transitory increase in the concentration of bicarbonate; slight increases in plasma sodium and magnesium and a decrease in potassium; a transient decrease in arterial pressure followed by a return to normal levels; and a tendency to slowing of the heart rate. The oxygen saturation of hemoglobin was maintained at a high level, and death occurred in only one of 12 animals, presumably as a result of anesthesia.

5351
Morgan, W. L.,
J. T. Binion, and S. J. Sarnoff
SUPPORT OF THE CIRCULATION WITH ARAMINE DURING HIGH LEVELS OF POSITIVE PRESSURE BREATHING IN THE DOG [Abstract]. — Federation Proceedings, 15 (1, part I): 133. March 1956.
DLC (QH301.F37, v. 15)

Seventeen anesthetized dogs were subjected to intermittent positive pressure breathing (PPB) which resulted in marked hypotension. Seven dogs were partially protected by a counter-pressure suit, and ten dogs remained without counter-pressure. After the onset of PPB, aramine was given intramuscularly. In every instance the blood pressure rose to substantially higher levels enabling the animals to sustain the PPB for an average of 70 minutes compared to 10 minutes before the drug was given. Aramine provided significant circulatory support whether or not counter-pressure was used but was of somewhat shorter duration with counter-pressure perhaps because of the higher levels of PPB used. It is proposed that this vasopressor drug provides support to the circulation by a) constricting peripheral vessels, including veins, and thereby replacing displaced blood into the lung and b) elevating the ventricular function curves; this influence thereby counteracts the tamponad effect of high levels of PPB. (Authors' abstract, modified)

5352
Nahas, G. G.
HEART RATE DURING SHORT PERIODS OF APNEA IN CURARIZED DOGS. — Amer. Jour. Physiol., 187 (2): 302-306. Nov. 1956.
DLC (QP1.A5, v. 187)

Changes in systemic and central venous pressure, end expiratory CO_2, and arterial blood pH were studied in anesthetized dogs subjected to a 90-second period of apnea after substitution of the normal respiration with mechanical breathing of pure oxygen. A significant bradycardia, amounting to a 7% decline in heart rate after 90 seconds, was consistently observed during apnea, accompanied by a rise in systemic pressure and a fall in central venous pressure. End expiratory pCO_2 was increased by 16 mm. Hg., and blood arterial pH was slightly decreased. Similar changes were observed after bilateral cervical vagotomy and during apnea associated with moderate hypoxia. It is concluded that respiratory acidosis is the chief factor in the apneic bradycardia observed under these conditions.

5353
Otis, A. B.,
and C. B. McKerrow
THE OXYGEN COST OF HYPERVENTILATION. — Johns Hopkins Univ. School of Medicine, Baltimore, Md.; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-28, May 1956. AD 113 600 PB 121 674

A method is described for measuring the oxygen cost of hyperventilation. The results on five normal subjects show that the oxygen cost of maximum voluntary ventilation is variable, ranging from 2.13 to 0.71 liters per minute. Repeated observations at different rates on one subject indicated that the oxygen consumption increased disproportionately to the ventilation as the latter approached its maximum. Observations on two subjects with pulmonary tuberculosis and diffuse obstructive emphysema showed that their oxygen cost per unit of ventilation was much higher than that of the normal subjects. (Authors' abstract)

5354
Reed, E. A.
EFFECT OF POSITION UPON RESPIRATORY MINUTE VOLUME OF ANESTHETIZED DOGS

[Abstract]. — Federation Proceedings, 15 (1, part I): 149. March 1956.
DLC (QH301.F37, v. 15)

Respiration was recorded by a Peck-Waller tidal volume recorder in dogs anesthetized with nembutal. The average respiratory minute volume, tidal volume and rate varied with the position of the dog. When the supine, horizontal dog was tilted head downward 30°, the minute volume and rate increased while the tidal volume decreased. When tilted head upward, the reverse occurred. Immediately after the change in position, the change in each of these functions was most marked. This was followed by a return toward, but not to, the previous value. The initial changes and subsequent establishment of new equilibria are to be explained in terms of the Hering-Breuer reflex and pCO_2. (Author's abstract)

5355
Refsum, H. E.,
and S. L. Sveinsson
SPECTROPHOTOMETRIC DETERMINATION OF HEMOGLOBIN OXYGEN SATURATION IN HEMOLYZED WHOLE BLOOD. — Scandinavian Jour. Clinical and Lab. Invest. (Oslo), 8 (1): 67-70. 1956. DNLM

Hemoglobin oxygen saturation was determined both manometrically, using the method of Van Slyke and Neill, and spectrophotometrically, using two types of cuvette. Under the described analytical procedure good agreement was found among the results of 19 different blood samples. Sources of error in the spectrophotometric methods are also discussed. (From the authors' summary)

5356
Rossler, P. H.,
A. Buhlmann, and K. Wiesinger
[PHYSIOLOGY AND PATHOPHYSIOLOGY OF RESPIRATION] Physiologie und Pathophysiologie der Atmung. — Berlin: Springer Verlag, 1956. 330 p. In German. DLC (QP121.R68, 1956)

The physiological bases of respiration are considered under the following headings: pulmonary breathing, blood as a conveyer of respiratory bases, diffusion of respiratory gases from the alveoli into the blood stream, regulation of breathing, tissue respiration, and cyanosis. Tests of pulmonary function are discussed under spirometric techniques, non-spirometric techniques, measurement of blood gases, Rossler's oxygen test, methods for the study of diffusion disturbances, stress tests, and techniques of heart catheterization. Chapters dealing with the pathophysiology of respiration include classification of pulmonary insufficiency, disturbances of lung function, various forms of pulmonary hypertonus, diagnosis and therapy of pulmonary insufficiency, and diseases of the lung. In conclusion, respiration is considered in relation to special states of the body, anoxia, altitude, physical activity, and sports. A selected bibliography of approximately 2030 references is appended.

5357
Scholer, H.,
and H. Wannig
[MOVEMENTS OF OXYGEN AND CARBON DIOXIDE ACROSS ALVEOLI AND TISSUES AND THE POSSIBILITIES OF CLINICAL OXIMETRY] Die Bewegungen des Sauerstoffs und der Kohlensäure zwischen Alveolt und Gewebe und die Möglichkeiten klinischer Oxymetrie. — Helvetica medical acta (Basel), 23 (2): 128-184. May 1956. In German, with English summary (p. 182-183). DNLM

Intracellular respiratory processes may be investigated as a part of oxygen transport conditions by physical and spectrophotometric determination of the O_2 saturation. Methods for prolonged oximetry are described. Clinical uses of this process are: (a) routine investigation by arterial puncture; (b) exercise tolerance tests; (c) investigation of patient's condition before and after intrathoracic interventions; (d) during operation in case of major surgical interventions; and (e) during resuscitation and artificial hibernation.

5358
Schulz, H.
[STRUCTURAL CHANGE OF THE MITOCHONDRIA OF THE ALVEOLAR EPITHELIUM IN CO_2 AND O_2 BREATHING] Über den Gestaltwandel der Mitochondrien im Alveolarepithel unter CO_2- und O_2-Atmung. — Naturwissenschaften (Berlin), 43 (9): 205-206. 1956 In German. DLC (Q3.N7, v. 43)

Electron microscopic examination of the lung epithelium from rats exposed to an atmosphere of 3% CO_2 in air for 8 hours revealed an increase in the number of mitochondria, spreading of mitochondria throughout the cells, and the appearance in the mitochondria of sharply-defined bands varying in width between 600 and 700 angstroms. Pure O_2 breathing resulted in the formation of vesicles or vacuoles in the cells and the disintegration of the internal structure of the mitochondria.

5359
Shephard, R. J.
ELECTROCARDIOGRAPHIC CHANGES DURING PRESSURE BREATHING. — RAF Inst. Aviation Medicine (Gt. Brit.), Farnborough; issued by Flying Personnel Research Committee (Gt. Brit.). FPRC no. 969, Aug. 1956. 20 p. AD 120 856
UNCLASSIFIED

The present paper reports some measurements of the manifest electrical axis in electrocardiograms made during pressure breathing (with and without trunk counterpressure) and during venous occlusion. Findings are correlated with other circulatory and respiratory changes observed during pressure breathing. The concept of a "clockwise rotation" of the heart in the frontal plane is confirmed, and it is concluded the electrocardiograph may indicate at least the order of this change. (From the author's summary) (33 references)

5360
STUDIES IN RESPIRATORY PHYSIOLOGY. III. CHEMISTRY, MECHANICS AND CIRCULATION OF THE LUNG. — Ed. by H. Rahn. Univ. of Rochester. School of Medicine and Dentistry, N. Y. (Contracts AF 18(600)-17 and AF 33(616)-3503); issued by Wright Air Development Center. Aero Medical

Lab. Wright-Patterson Air Force Base, Ohio (Project no. 7160). WADC Technical Report no. 56-466, Oct. 1956. vii+78 p. AD 110 487 PB 121 803

This report consists of 7 papers, by various authors, dealing with different aspects of respiratory physiology: (1) Redistribution of alveolar blood flow with passive lung distension, by H. S. Bitter and H. Rahn (p. 1-20); (2) The effects of bilateral, sub-total occlusion of the pulmonary arterial system on hemodynamics and gas exchange, by M. T. Lategola (p. 21-27); (3) Arterial-alveolar gas pressure differences due to ventilation-perfusion variations, by R. E. Canfield and H. Rahn (p. 28-41); (4) The measurement of total gas pressure in blood, by E. G. Aksnes and H. Rahn (p. 42-53); (5) The rate of inert gas absorption from subcutaneous gas pockets while breathing O_2, by R. E. Canfield and H. Rahn (p. 54-59); (6) Oxygen and carbon dioxide tension of the tissues surrounding a gas pocket, by H. D. Van Liew (p. 60-69); and (7) The effects of curare on the elastic properties of chest and lungs of the dog, by W. H. Massion (p. 70-78). (71 references)

5361
Tala, P.,
A. Heinonen, and M. J. Karvonen
USE OF BRONCHOSPIROMETER FOR THE DETERMINATION OF THE OXYGEN DEFICIT. — Scandinavian Jour. Clinical and Lab. Invest. (Oslo), 8 (1): 26-29. 1956. DNLM

A method is presented for the determination of oxygen deficit in the lung by means of a "Lundia" bronchospirograph. The oxygen deficit is determined at rest and at a series of work loads. At each load the subject first works breathing air, then oxygen. The oxygen deficit is used as a measure of the functional capacity of respiration and circulation and may be quantitatively related to exercise tolerance.

5362
Wasserburger, R. H.,
K. L. Siebecker, and W. C. Lewis
THE EFFECT OF HYPERVENTILATION ON THE NORMAL ADULT ELECTROCARDIOGRAM. — Circulation, 8 (6): 850-855. June 1956. DLC (RC681.A1C5, v. 8)

In 350 normal adults, hyperventilation consisting of 10 to 15 seconds of forced, rapid respiration initiated a vagal reflex which resulted in an electrocardiographic T-wave inversion in two or more precordial leads. Respiratory alkalosis was excluded as the underlying mechanism by observing the pattern during forced breathing of high carbon dioxide atmospheres.

5363
Wells, J. G.,
B. Balke, and J. P. Ellis
EFFECTS OF CHRONIC HYPERVENTILATION UPON HYPOCAPNIC TOLERANCE [Abstract]. — Federation Proceedings, 15 (1, part I): 198. March 1956. DLC (QH301.F37, v. 15)

Hyperventilation training in six normal subjects resulted in an adaptation which permitted extension of testing time from 30 to 60 minutes with an elimination of hypocapnic symptoms. Initially psychomotor performance, as determined on a SAM multiple dimensional pursuitmeter, was reduced to 49%; however, in subsequent tests efficiency was above 70%. Respiratory data, ventilation (l/min.) and alveolar carbon dioxide tension (mm. Hg), presented a similar pattern in that following the period of daily exposures to hyperventilation the subjects tolerated an increased ventilation and a decreased arterial carbon dioxide tension without developing hypocapnic symptoms. (Authors' abstract, modified)

5364
White, C. S.,
L. C. Watkins, and E. E. Fletcher
EMISSION SPECTROSCOPY IN ANALYSIS OF RESPIRATORY GASES. II. CARBON DIOXIDE ANALYSIS USING THE CARBON DIOXIDE DOUBLETS NEAR 2896 Å. — Jour. Aviation Med., 27 (4): 332-344. Aug. 1956. DLC (RC1050.A36, v. 27)

The method of emission spectroscopy of Lilly and Anderson was adapted to carbon dioxide analysis. Small volume gas discharge tubes energized with radio frequency were used as light sources for activation of carbon dioxide emission doublets located near 2883 and 2895 Å spectral regions. At 2896 Å, the relation between emission intensity and carbon dioxide concentration proved linear whether the gas was present in air or oxygen. The curve of carbon dioxide in air was parallel to, but consistently above, that for carbon dioxide in oxygen.

5365
Williams, M. H.,
and C. R. Rayford
THE EFFECT OF VARIATION OF THE TIDAL VOLUME ON THE SIZE OF THE PHYSIOLOGICAL DEAD SPACE IN DOGS. — Walter Reed Army Inst. of Research, Washington, D. C. Report no. ARAIR-10-56, Jan. 1956. [7] p. AD 109 482 UNCLASSIFIED

Measurement of the size of the lung dead space in anesthetized dogs by substitution of arterial for alveolar CO_2 concentration in the Bohr equation indicated a direct variation of dead space with tidal volume. Simultaneous measurement of the dead space by Pappenheimer's isosaturation technique revealed a significant discrepancy between calculated alveolar CO_2 tension and arterial CO_2 tension. Since a linear relationship exists between expired CO_2 tension and the reciprocal of tidal volume, it is indicated that the dead space is equal to a constant plus an amount varying directly with tidal volume. (Quoted in part)

5366
Zechman, F. W.,
and E. G. Hall
THE EFFECTS OF GRADED IMPEDANCE TO TRACHEAL AIR FLOW ON THE PATTERN OF BREATHING AND ALVEOLAR GAS COMPOSITION OF MAN. — Duke Univ. School of Medicine, Durham, N. C.

(Contract no. AF 33(616)-: 77); issued by Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 7160). WADC Technical Report no. 56-280, July 1956. vi+42 p. AD 97 171 PB 121565

Experiments were conducted on eleven human subjects to determine the effects of four levels of air flow resistance when added independently or simultaneously to inspiration and expiration. Resistance ranged from 0.10 to 0.43 mm. H_2O/cc./sec. These studies demonstrated that: (1) the primary effect of resistance to air flow is a reduction in air flow velocity and an increase in duration of the impeded phase; (2) resistance on one phase may alter the pattern of air flow of the other phase as well. This alteration is generally an elevated maximal flow velocity; (3) the reduction in respiratory frequency, the increase in tidal volume and the increase in expiratory reserve, usually exhibited by individuals breathing in and out through resistance, is mainly associated with the impedance of expiratory flow; (4) the extra work associated with breathing through the spectrum of resistances studied, increases in a linear fashion; and (5) as a result of air flow impedance, pulmonary ventilation is reduced and alveolar carbon dioxide rises and oxygen tension falls. Levels of resistance used have only a slight respiratory effect when subjects are at rest but bring about dramatic changes in alveolar gas composition when ventilatory demands are increased by moderate exercise. (Authors' abstract) (32 references)

d. Metabolism

5367
Beickert, A.,
and W. Braun
[THE BEHAVIOR OF LACTIC ACID IN THE HUMAN LUNG DURING AIR AND OXYGEN BREATHING] Das Verhalten der Milchsäure in der menschlichen Lunge bei Luft- und Sauerstoffatmung. — Klinische Wochenschrift (Berlin), 34 (9/10): 246-248. March 1, 1956. In German. DNLM

Measurements of the lactic acid level in 28 individuals who underwent heart catheterization for various cardiac or lung diseases showed that: (1) Lactic acid concentration is significantly higher during air breathing in the arterial blood than in the blood of pulmonary artery; this differential is present also during hypoxia. (2) In breathing of pure oxygen the absolute values of lactic acid fall on both the venous and the arterial sides. A significant arterio-venous differential is not present. It is assumed that the human lung forms lactic acid under normal as well as hypoxic conditions and that oxygen breathing lessens this production. (Authors' summary, modified)

5368
Minard, D.,
T. H. Benzinger, and C. Kitzinger
FIRST PHYSIOLOGICAL OBSERVATIONS WITH THE HUMAN GRADIENT CALORIMETER [Abstract]. — Federation Proceedings, 15 (1, part I): 131. March 1956. DLC (QH301.F37, v. 15)

Continuous recordings of rapid changes in heat output were made by means of a human gradient calorimeter in subjects performing the following separate maneuvers at 29.5° C.: exercise using a spring expander, hyperventilation, and change in posture. Heat output rose from 31 g.cal./sec. at rest to 55 g.cal./sec. during 220 sec. of exercise. During recovery the output dropped rapidly from this peak for 5 min. and then more slowly in stepwise fashion to the resting level. Excess heat amounting to 9800 g.cal. appeared during work and recovery, 95% being evaporative. During 110 sec. voluntary hyperventilation and recovery, 2100 excess calories were measured. Again the major fraction was evaporative. The recovery curve was smooth thus differing from the curve in exercise. Reducing radiative surface area by changing posture from supine extension to flexion resulted in a prompt drop in calories measured by the main chamber. The ventilatory circuit (evaporative output) showed no change. During 5 min. in the flexed posture, 2200 cal. were stored and appeared as excess heat upon resuming the extended position. (Authors' abstract, modified)

5369
Taylor, H. L.,
F. Grande, E. Buskirk, J. T. Anderson, and A. Keys
WATER EXCHANGE IN MAN IN THE PRESENCE OF A RESTRICTED WATER INTAKE AND A LOW CALORIE CARBOHYDRATE DIET [Abstract]. — Federation Proceedings, 15 (1, part I): 185. March 1956. DLC (QH301.F37, v. 15)

After a control period of 21 days, 12 soldiers subsisted on 1000 calories of pure carbohydrate. The daily water ration was 900 cc. for Group I (6 men) and 1800 cc. for Group II (6 men). In Group I after 5 days of water restriction, there was an 8.5% loss of body weight, a 47% reduction in the rate of sweating during a treadmill walk of 1 hour, a 60% reduction of water loss during 8 hours of sleep and an average daily urine volume of 350 cc. Water balance calculated from weight loss, difference between excreted and ingested solids, and the weight of fuel burned showed a water loss of 1.6 liter during the 1st day and 0.4 liter during the 5th day. Group II, during a 10-day restriction of water, showed smaller but still significant decreases in sweating rates and appeared to be in water balance between the 4th and 10th day. It is concluded that substantial water conservation can be achieved by men on restricted water and calories. (From the authors' abstract)

e. Body Temperature

[Hibernation under 2-d]

5370
Adolph, E. F.
EFFECTS OF LOW BODY TEMPERATURE ON TISSUE OXYGEN UTILIZATION. — In: The physiology of induced hypothermia, p. 44-49. National Academy of Sciences-National Research Council, Publication 451. 1956. DLC (QP82.N34)

Five stages are considered (breathing, circulation, oxygen transport in blood, tissue oxygen

pressure, oxygen transfer in cells) in the delivery of oxygen to the energy-yielding processes upon which cells depend for continuance of their work. In all of these stages, and in oxygen consumption of the whole body, evidence was found of oxygen insufficiency. Reduction of oxygen consumption in deep hypothermia was itself dictated by the lessened demand for oxygen in every metabolizing cell. Cessation of breathing and of heartbeats, upon which oxygen delivery ordinarily depends, does not arise from inability of the medulla or the heart to metabolize oxidative energy. Cold death results from changes other than failure of oxidation. Far from producing anoxia, hypothermia prolongs the endurance of it. (Author's summary, modified) (24 references)

5371
Agersborg, H. P.,
G. Barlow, and R. R. Overman
IONIC AND HEMODYNAMIC ALTERATIONS IN HYPERTHERMIC DOGS [Abstract]. — Federation Proceedings, 15 (1, part I): 1-2. March 1956. DLC (QH301.F37, v. 15)

A mixture of T-1824 and Na^{24}, K^{42}, or P^{32} was administered intravenously to dogs subjected to an ambient temperature elevating the rectal temperature to 42.5°C. This temperature was maintained for one hour. Sodium disappearance rate, heart rate, respiratory rate, hematocrit, plasma protein concentration and plasma and cell potassium concentrations were significantly increased; cardiac output, plasma volume, and blood pressure were decreased. No change was seen in isotope "spaces", blood volumes, and potassium and phosphorus rates of disappearance. Electrocardiograms exhibited a strong similarity to those characteristic of hyperpotassemia.

5372
Andjus, R. K.
EFFECT OF HYPOTHERMIA ON THE KIDNEY. — In: The physiology of induced hypothermia, p. 214-220. National Academy of Sciences-National Research Council, Publication 451. 1956. DLC (QP82.N34)

In rats, hypothermia had a direct inhibitory effect on the reabsorption activity of the renal tubules. In the range of body temperatures below 18° and 23° C., sodium reabsorption was completely inhibited, while glomerular filtration and urinary flow were still present.

5373
Andjus, R. K.,
F. Knöpfelmacher, R. W. Russell, and A. U. Smith
SOME EFFECTS OF SEVERE HYPOTHERMIA ON LEARNING AND RETENTION. — Quart. Jour. Exper. Psychol. (Cambridge), 8 (1): 15-23. Feb. 1956. DLC (QP351.E95234, v. 8)

Rats subjected to hypothermia at body temperatures of either 0-1° C. or 13.4-18.5° C. were tested after rewarming for retention of a maze habit, speed of locomotion, and learning ability in a serial-problem-solving task. Rats cooled to 0-1° C. showed a consistent trend towards impairment of both learning ability and retention, but the differences were small and were significant only in the case of learning. The percentage of impairment was decreased as the interval between body cooling and testing was increased. No effect was observed on speed of locomotion. It is suggested that the slight impairment of learning and retention in cooled rats may be caused by the techniques employed to induce hypothermia.

5374
Axelrod, D. R.,
and D. E. Bass
ELECTROLYTES AND ACID-BASE BALANCE IN HYPOTHERMIA. — Amer. Jour. Physiol., 186 (1): 31-34. July 1956. DLC (QP1.A5, v. 186)

Plasma electrolytes were measured in dogs cooled in an ice-water bath to heart temperatures of 38°, 28°, and 25° C. Cold produced a progressive fall in heart rate, an increase in hematocrit, a progressive decline in plasma pH, and no change in plasma protein concentration, osmolarity, plasma potassium, and chloride concentration. Plasma calcium, magnesium, and carbon dioxide concentrations were slightly increased, and plasma sodium was slightly decreased. The decline in plasma pH is attributed both to physico-chemical factors (changes in the solubility of carbon dioxide, in the dissociation of carbonic acid, and in protein buffer systems) and to the physiological factor of depressed respiration and accumulation of carbonic acid. It is demonstrated that slight respiratory depression has a greater effect on plasma pH at lowered body temperature than at normal temperature.

5375
Badeer, H.
EFFECT OF HYPOTHERMIA ON OXYGEN CONSUMPTION AND ENGERGY UTILIZATION OF HEART. — Circulation Research, 4 (5): 523-526. Sept. 1956. DLC (RC681.A1A57137, v. 4)

In the denervated dog's heart doing constant work in a modified heat-lung preparation, hypothermia produced a decline in oxygen uptake. Between 36° and 26°C., the relationship appears to be logarithmic. The decrease in oxygen consumption is attributed to (1) the direct effect of cold on myocardial metabolic rate, and (2) bradycardia. The rise in mechanical efficiency during hypothermia under these conditions indicates that cold does not interfere with the conversion of aerobic energy into useful work done by the myocardium. (Author's summary, modified)

5376
Baker, P. T.,
and F. Daniels
RELATIONSHIP BETWEEN SKINFOLD THICKNESS AND BODY COOLING FOR TWO HOURS AT 15°C. — Jour. Applied Physiol., 8 (4): 409-416. Jan. 1956. DLC (QP1.J72, v. 8)

In 31 men exposed for 2 hours to an environmental temperature of 15° C., significant inverse correlations were observed between skin temperatures and both the nearby thickness of subcu-

taneous fat estimated by skinfold thickness, and the estimated total amount of fat in the body. The percentage of fat in the body was directly related to rectal temperature, while taller stature and greater fat-free weight were found to be associated with a tendency toward lower rectal temperatures. It is concluded that fat favors the maintenance of internal temperature at the expense of skin te peratures, but that rectal temperature may also be related to the size of the surface area exposed to the external environment. (Quoted in part)

5377
Barlow, G.,
H. P. Agersborg, and H. E. Keys
BLOOD LEVELS OF 17-HYDROXYCORTICOSTEROIDS IN HYPERTHERMIC DOGS. — Proc. Soc. Exper. Biol. and Med., 93 (2): 280-284. Nov. 1956. DLC (QP1.S8, v. 93)

Dogs exposed to heat sufficient to produce a body temperature of 42.5° C. for one hour showed increases in plasma 17-hydroxycorticoid and potassium levels, and no change in plasma sodium. Red blood cell Na and K levels were increased. Total circulating plasma K was unchanged, but total circulating Na was decreased, presumably by transfer into muscle and red blood cells. Possible mechanisms suggested for the pronounced increases in 17-hydroxycorticosteroid concentration include thermal stimulation of adrenal cortical function either directly or through ACTH, impairment of the rate of hormone destruction in the liver, and a decreased rate of utilization or destruction in the peripheral tissues of the body. The increase in plasma K is attributed to plasma concentration or to increased respiratory muscle activity.

5378
Baz, R.,
J. R. Monroy, M. García Cornejo, F. Maldonado, and G. Caballero
[EXPERIMENTAL HYPOTHERMIA] Hipotermia experimental. — Archivos del Instituto de cardiología de México (México), 26 (4): 449-467. July-Aug. 1956. In Spanish, with English summary (p. 465-466). DNLM

In one group of dogs the body temperature was lowered until the animals died, and in another group the temperature was lowered to different levels and rewarming begun in order to keep the animals alive. Changes were registered in the hypothermic animals in the pulse-rate, blood pressure, venous pressure, electrocardiographic tracings, and in ocular as well as tendinous reflexes. The manner in which the pupil responded to light was the most sensitive of all reflexes. The size of pupil myosis and mydriasis are of great prognostic value because if dilatation sets in early during hypothermia the chances of survival are limited.

5379
Beavers, W. R.,
and B. G. Covino
IMMERSION HYPOTHERMIA: EFFECT OF GLYCINE. — Proc. Soc. Exper. Biol. and Med., 92 (2): 319-322. June 1956. DLC (QP1.S8, v. 92)

Intravenous administration of 5% glycine to dogs resulted in a significant increase of 20-30% in the time required to lower the rectal temperature from 38°C. to 26°C. and a decrease of 30% in total rewarming time. The differences in cooling and rewarming rates were caused by an increase in heat production in glycine-treated animals. The thermogenetic effect of glycine is attributed to this high specific dynamic action.

5380
Beavers, W. R.,
B. G. Covino, and D. W. Rennie
MECHANISMS RESPONSIBLE FOR INCREASED HIND LIMB BLOOD FLOW IN HYPOTHERMIA [Abstract]. — Amer. Jour. Physiol., 187 (3): 585-586. Dec. 1956. DLC (QP1.A5, v. 187)

The vasodilatation observed in the hind limbs of dogs at a rectal temperature of 35° C. during immersion hypothermia was found to be eliminated and replaced by vasoconstriction by the administration of atropine before immersion or after vasodilatation had occurred. The vasodilator response was also reversed by unilateral lumbar sympathectomy and bilateral adrenalectomy. Administration of neostigmine after vasodilatation had appeared potentiated the dilator response. It is indicated that the peripheral vasodilatation observed during hypothermia is mediated by the sympathetic cholinergic vasodilator fibers. A secondary vasodilatation observed at a rectal temperature of 28-25° C. was found by atropinization to be unrelated to nervous or metabolic factors, and is attributed to the direct effect of cold on the tissue.

5381
Behman, F. W.
[REGULATION OF HEAT PRODUCTION IN COOLING OF HOMOIOTHERMIC ANIMALS] Die Regulierung der Wärmeproduktion bei Auskühlung homoiothermer Tiere. — Naunyn-Schmiedebergs Archiv für experimentelle Pathologie und Pharmakologie (Berlin), 228 (1/2): 126-128. 1956. In German. DNLM

The total heat generation of the organism equals the sum of exponentially decreasing basal heat production and the exponentially increasing counterregulatory heat generation in the cooling process. The curve of the total heat generation changes with differential sensitivity of the thermoregulatory system to anesthesia. The heat generation curve can be explained only by assuming a peripheral and a central effect on thermoregulation. Assumption of different types of peripheral receptors is not necessary. (From the author's summary)

5382
Behman, F. W.
[THERMAL BALANCE IN INDUCED HYPOTHERMIA: A CONTRIBUTION TO THE PROBLEM OF THE ECONOMY OF SHIVERING] Warmebilanzen bei kunstlicher Hypothermie: ein Beitrag zum Problem der Ökonomie des Kaltezitterns. —

Pflügers Archiv für die gesamte Physiologie (Berlin), 263 (2): 166-187. 1956. In German. DLC (QP1.A63, v. 263)

Dogs in which the shivering mechanism was suppressed by deep anesthesia showed a steady decline in heat production, skin temperature, and heat loss during progressive hypothermia induced by intravascular cooling. Lightly anesthetized dogs responded to cooling with a strong shivering before any apparent change in rectal or skin temperature occurred. Shivering was associated with an almost three-fold increase in heat production and an increase in body heat loss caused by increased respiratory volume, skin temperature, and conductive and convective heat loss (resulting from increased air turbulence). The ratio of evaporative heat loss to total heat production was increased during shivering from 10 to 18%. Heat conductance from the body core to the body surface showed a steady decline in non-shivering animals and an increase in shivering animals in direct proportion to heat production.

5383
Benjamin, H. B.,
M. Wagner, H. K. Ihrig, and W. Zeit
HYPOTHERMIA BY INTERNAL COOLING. — Science (Washington), 123 (3208): 1128-1129. June 22, 1956. DLC (Q1.S35, v. 123)

A procedure is described for inducement of hypothermia by extracorporeal cooling of blood and recirculation through the organism. in a series of experiments with 30 dogs the time needed to cool the organism from 100° F. to 80° F. amounted to 20 minutes. No cardiac fibrillation, shivering, or shock symptoms were observed. Rewarming was also achieved by warming the blood extracorporeally before returning it to the circulation.

5384
Benoît, O.,
M. Jouvet, and M. Tanche
[INCREASE AND DIFFUSION OF THE ELECTROCORTICAL RESPONSE TO AUDITORY STIMULI IN THE HYPOTHERMIC DOG] Augmentation et diffusion de la réponse electrocorticale à des stimuli auditifs chez le chien en hypothermie. — Journal de physiologie (Paris), 48 (3): 391-392. May-June 1956. In French. DNLM

An insignificant electrocortical response to auditory stimuli from a metronome was observed in normothermic curarized dogs. Under hypothermic conditions there appeared an increased amplitude of primary auditory cortical responses, which at 26° C. were four times the normal; a variation in voltage, and a diffuse response at the level of associated and sensory-motor thresholds.

5385
Bering, E. A.,
J. A. Taren, J. D. McMurrey, and W. F. Bernhard
STUDIES ON HYPOTHERMIA IN MONKEYS. II. THE EFFECT OF HYPOTHERMIA ON THE GENERAL PHYSIOLOGY AND CEREBRAL METABOLISM OF MONKEYS IN THE HYPOTHERMIC STATE. — Surgery Gynecol. and Obstetrics, 102 (2): 134-137. Feb. 1956 DLC (RD1.S8, v. 102)

Monkeys rendered hypothermic by being cooled in an ice-water bath at 3°C., and rewarmed in a 45°C. bath demonstrated a decrease in pulse rate, a slight decrease of mean blood pressure, and no change in venous pressure. A prolongation of the Q-T interval of the electrocardiogram was noted. At about 31°C, a progressive decrease in cerebral blood flow occurred with decreasing temperature which did not parallel the fall in blood pressure and was accompanied by a rise in cerebral vascular resistance. Cerebral oxygen consumption dropped sharply between 31 and 27°C. from a normal range of 2.5 to 4.7 cm^3 per 100 grams of brain to between 0.8 to 1 cm^3. There was little change below 27°C. Blood sugar level increased almost 66% above the normal resting levels. In addition, a progressive drop in arteriovenous cerebral blood sugar was found which suggests that below 30°C. glucose metabolism is markedly reduced. This observation reflects the decrease in oxygen consumption. (Authors' summary, modified)

5386
Berne, R. M.
CORONARY BLOOD FLOW DURING HYPOTHERMIA. — In: The physiology of induced hypothermia, p. 165-169. National Academy of Sciences-National Research Council, Publication 451. 1956. DLC (QP82.N34)

Lowering the temperature of the blood perfusing the left coronary artery of dogs produced an increase in flow which returned to control levels when the blood temperature was increased to normal values. Myocardial oxygen consumption was essentially constant, and potassium concentration was lower in the coronary sinus blood than in the arterial blood. When cooled blood entered the left coronary artery, 7 out of 11 normothermic dogs had ventricular fibrillation and a slight reversal of flow during systole, followed by a slight rise and fall; however, in diastole there was a gradual and continuous increase in coronary flow during ventricular relaxation. In hypothermia 66% of the coronary inflow occurred during isometric relaxation despite the decreasing perfusion pressure and the prolonged period of extravascular compression.

5387
Bernhard, W. F.
THE EFFECT OF HYPOTHERMIA ON THE PERIPHERAL SERUM LEVELS OF FREE 17-HYDROXYCORTICOIDS IN THE DOG, AND IN MAN. — In: The physiology of induced hypothermia, p. 175-181. National Academy of Sciences-National Research Council, Publication 451. 1956. DLC (QP82.N34)

Peripheral arterial plasma 17-hydroxycorticoid level was measured in laparotomized dogs before and during hypothermia and in patients subjected to surgery under hypothermia and compared with normothermic persons. Dogs and patients revealed constant peripheral corticoid levels during hypothermia. Hypothermia with the concomitant reduction of body metabolism simultaneously depresses production and configuration of steroid hormones

to a similar degree. The function of the liver conjugation of steroids during hypothermia is depressed. Immersion cooling did not provoke a stress response as measured by peripheral 17-hydroxycorticoids.

5388
Blair, E.,
A. V. Montgomery, and H. Swan
POSTHYPOTHERMIC CIRCULATORY FAILURE. I. PHYSIOLOGIC OBSERVATIONS ON THE CIRCULATION. — Circulation, 8 (6): 909-915. June 1956. DLC (RC681.A1C5, v. 8)

Dogs were cooled by immersion in ice water to a rectal temperature of 30°C., without ventilatory assistance, and rapidly rewarmed in warm water. The animals appeared to make an adequate cardiovascular adjustment to the lowered body temperature. Upon rewarming, however, each animal incurred an acute circulatory collapse, characterized by low cardiac output, diminished ventricular work, hypotension, hyperpnea, increased arteriovenous oxygen difference, and increased total oxygen consumption. It is uncertain whether this circulatory failure is central or peripheral in origin. (Authors' abstract, modified)

5389
Brebner, D. F.,
D. M. Kerslake, and J. L. Waddell
THE RELATION BETWEEN SWEAT RATE AND BODY TEMPERATURE WHEN HEAT LOSS IS SMALL [Abstract]. — Jour. Physiol. (London), 132 (1): 17P. April 27, 1956.
DLC (QP1.J75, v. 132)

Sweat rate was measured under conditions approaching zero thermal gradient and heat flux during immersion of subjects in a water bath at body temperature. A linear relation was observed between temperature and the rate of sweat secretion at small sample areas of the skin, with the (extrapolated) intercept for zero sweat rate constant for each subject. The relation was independent of prior heating or cooling and was observed over the range of 36.5-39° C.

5390
Brooks, C. M.
HYPOTHERMIA AND THE NERVOUS SYSTEM. — In: The physiology of induced hypothermia, p. 260-263. National Academy of Sciences-National Research Council, Publication 451. 1956.
DLC (QP82.N34)

Cooling below normal body temperatures (1) decreases the excitability of nerves; (2) initially causes hypoexcitability but also hyper-reactivity of the nervous system; (3) slows the speed of conduction in peripheral nerve and spinal pathways; (4) causes obscurity in the purity of reflexes; (5) produces tetanus; and (6) increases the polysynaptic reflexes more than the monosynaptic reflexes.

5391
Brooks, C. M.
HYPOTHERMIA AND THE PHYSIOLOGY OF CARDIAC EXCITABILITY. — In: The physiology of induced hypothermia, p. 287-301. National Academy of Sciences-National Research Council, Publication 451. 1956. DLC (QP82.N34)

A survey of studies of cardiac excitability reveals that hypothermia (1) causes arrhythmia, fibrillation, and a decrease in cardiac output; (2) affects pacemaker action, and (3) slows the process of excitatory depolarization and repolarizing reactions. If the cardiac cycle is considered to begin with the initiation of propagated activity (the Q wave of the electrogram) it is seen that: (a) there is a refractory period which in total duration is approximately identical with the phases of depolarization and repolarization, or the Q-T interval of the electrogram; (b) the refractory period is an irresponsive period in that a normally propagated response cannot occur until some time after completion of full repolarization; (c) recovery of excitability is a complicated process; and (d) the heart is vulnerable to fibrillation by strong simple electrical stimuli at specific intervals. (50 references)

5392
Brown, Douglas E. S.
SOME CONSIDERATIONS OF PHYSICOCHEMICAL FACTORS IN HYPOTHERMIA. — In: The physiology of induced hypothermia, p. 1-7. National Academy of Sciences-National Research Council, Publication 451. 1956 DLC (QP82.N34)

Basic physicochemical considerations in hypothermia relate to the laws governing the dependence of cellular activities and their enzymatic reactions on temperature, ions, metabolites, and drugs. Of particular importance are such cellular phenomena as excitability, rhythmicity and contractility. In regulating the oxygen transport these can act interdependently, since their specific rates are set at complementary levels. When the body temperature is lowered, the ratios are reduced in accordance with the temperature coefficients of the respective processes.

5393
Brown, E[rnest] B.
TOLERANCE OF THE HYPERTHERMIC DOG TO CARBON DIOXIDE. — Univ. of Minnesota, Minneapolis; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-81, July 1956. 5 p. AD 113 245 PB 124 604

Tolerance of the hyperthermic dog to elevated CO_2 tensions in the inspired air was determined, and the results were compared with those of similar experiments obtained on normothermic dogs. An elevation of body temperature of 2° to 3° C. produced by inhalation of warm, moist oxygen and by warming with infrared lamps decreased the tolerance of dogs to elevated CO_2. (Author's abstract)

5394
Brown, Theodore G.
HYPOTHERMIA: A REVIEW OF THE CARDIOVASCULAR EFFECTS OF HYPOTHERMIA. — Jour. South Carolina Med. Assoc., 52 (10-11): 365-373; 390-398. Oct.-Nov. 1956. DNLM

A review is presented of the literature dealing with the physiological effects of hypthermia in general and especially the cardiovascular effects. The salient features appear to be (1) fall in heart rate and blood pressure, (2) slowing of intracardiac condition, (3) drop in cardiac output, (4) rise in venous pressure, (5) increase in cardiac irritability in some form, and (6) decrease in myocardial oxygen consumption. All of these effects become particularly marked at body temperatures below 28°C. Consideration is given to the methods of cooling, and to ventricular fibrillation, electrolyte changes, renal function, electrocardiogram, and myocardial function during hypothermia. (178 references)

5395
Bruck, A.,
W. Gmichtel, B. Löhr, and W. Ulmer
[ANIMAL EXPERIMENTS ON THE PROCESSES LEADING TO ACIDOSIS IN PHARMACOLOGICALLY MAINTAINED HYPOTHERMIA DOWN TO 20° CORE TEMPERATURE] Tierexperimentelle Untersuchungen über die zur Acidose führenden Vorgänge bei pharmakologisch unterstützter Hypothermie bis 20° Kerntemperatur. — Zeitschrift für die gesamte experimentelle Medizin (Berlin), 127 (6): 587-596. Sept. 1956. In German. DNLM

An increase in acidosis of the arterial plasma parallel to the cooling is observed in pharmacologically supported hypothermia. This acidosis may be masked by the corresponding hyperventilation. The acidosis is caused by lowered tissue oxygen tension. Retention of CO_2 is excluded as a causal factor. The acidosis appears at a definite time during the cooling process.

5396
Bruck, A.,
B. Löhr, and W. Ulmer
[ANIMAL EXPERIMENTS ON THE REGULATION OF RESPIRATION IN PHARMACOLOGICALLY MAINTAINED HYPOTHERMIA TO 20° C. CORE TEMPERATURE] Tierexperimentelle Untersuchungen über die Regulation der Atmung bei pharmakologisch unterstützter Hypothermie bis 20° C. Kerntemperatur. — Zeitschrift für die gesamte experimentelle Medizin (Berlin), 127 (6): 597-604. Sept. 1956. In German. DNLM

Experiments conducted with dogs showed that CO_2 is not an active respiratory regulator at lower temperatures in hypothermia even though this is maintained with a lytic cocktail. The carbon dioxide tension approaches the paralytic threshold due to non-gas-evolving acidosis if the pharmacologic measures are carried out until counter-regulatory responses are inhibited. Regulation of respiratory minute volume is done primarily by the route of oxygen partial pressure whereby it is still unresolved to what extent the chemoreceptors participate and to what extent it is determined by the tissue needs. As oxygen breathing is required for the tissues, artificial respiration must be substituted to regulate the CO_2 tension. Maintenance of a slight acidosis is recommended to promote oxygen release to tissues. (From the authors' summary)

5397
Bullard, R. W.
MAINTENANCE OF ARTERIAL PRESSURE AND CARDIAC OUTPUT IN THE HYPOTHERMIC RAT [Abstract]. — Federation Proceedings, 15 (1, part I): 28. March 1956. DLC (QH301.F37, v. 15)

Unanesthetized rats were cooled in water to various temperatures between 36° and 14° C. The arterial pressure remained high while the cardiac output was decreasing, hence the calculated total peripheral resistance was increased in cold animals. The viscosity of the blood, as measured in a capillary tube, increased with lowered body temperature. This increase accounted for most of the increase of the total peripheral resistance. However, at all temperatures transient variations in mean arterial pressure and pulse pressure occurred which could be explained only by vasomotor activity. Therefore, the maintenance of arterial pressure despite the lowered cardiac output of the hypothermic rat depends upon increased peripheral resistance, most of which is due to the increase of blood viscosity and little to vasoconstriction. (Quoted in part)

5398
Cahn, J.,
and M. Herold
[CARDIAC METABOLISM IN HYPOTHERMIA] Métabolisme cardiaque sous hypothermie. — Comptes rendus de la Société de biologie (Paris), 150 (10): 1689-1693. 1956. In French.
DLC (QP1.S7, v. 150)

Drug-induced cooling of dogs from 38° to 28° C. was observed to produce a 62% reduction in the cardiac consumption of glucose, and a 50% decrease in consumption of pyruvate and lactate. The coefficient of myocardial extraction (arterial-venous difference/arterial concentration x 100) was decreased for glucose, increased for pyruvate, and unchanged for lactate. At 27° C., cardiac consumption of glucose and lactic acid was increased towards normal values. Cooling to 26° C. by refrigeration caused an 80% decrease in the myocardial consumption of lactate, a 75% decrease in pyruvate consumption, and a 25% decrease in glucose consumption. The coefficient of myocardial extraction was doubled for glucose, reduced 33% for pyruvate, and reduced 50% for lactate. It is concluded that hypothermia induced by neuroplegic drugs is characterized chiefly by a reduction in the cardiac utilization of glucose, while that induced by refrigeration results in a decreased utilization of lactate.

5399
Cahn, J.,
and M. Hérold
[CARDIAC METABOLISM DURING HYPOTHERMIA: EFFECTS OF SOMATOTROPIC HORMONE (STH)] Métabolisme cardiaque sous hypothermie: effets de l' hormone somatotrope (STH). — Comptes rendus de la Société de biologie (Paris), 150 (11): 1879-1881. 1956. In French.
DLC (QP1.S7, v. 150)

The effect of somatotropic hormone (STH) on the cardiac metabolism of dogs was investigated

at normal temperature and during hypothermia produced by the administration of drugs or by refrigeration. At 39° C., STH reduced cardiac consumption of glucose and pyruvate and essentially abolished consumption of lactate. At 26°, STH reduced the cardiac consumption of glucose and pyruvate and increased that of lactate. Administration of drugs at 37° and during cooling to 30° reduced glucose and pyruvate consumption more than lactate consumption, resulting in a lactate utilization greater than that of glucose. At 28°, cardiac glucose consumption was increased, while pyruvate and lactate consumption were decreased.

5400
Carlson, L. D.,
and D. C. Pearl
EFFECTS OF TEMPERATURE AND WORK ON METABOLISM AND HEAT LOSS IN MAN. — Proc. Soc. Exper. Biol. and Med., 91 (2): 240-244. Feb. 1956. DLC (QP1.S8, v. 21)

Skin temperature, heat loss, and oxygen consumption were measured in four male subjects clad in shorts and exercising in cooling (20° to 10° C. in 1/2 hour) and cool (10° C.) environments. Initiation of exercise during cooling resulted in a faster drop in skin temperature, a greater heat loss from the legs, and a smaller heat debt than that found during exercise begun after cooling. Rectal temperature was unchanged, and oxygen consumption was comparable to that required during exercise at 20°. When exercise was initiated after cooling, the rapid fall in rectal and skin temperatures was arrested, but skin temperature was not increased during 20 minutes of exercise. Heat loss by respiration was 20% greater than that observed in exercise during cooling; after 90 minutes of shivering, heat input was doubled, but skin and rectal temperatures continued to decline. It is concluded that the energy cost of exercise is greater after than during cooling.

5401
Cler, J. F.,
B. Drevon and M. Tanche
[CALCEMIA IN EXPERIMENTAL HYPOTHERMIA] La calcémie dans l'hypothermie expérimentale. — Journal de physiologie (Paris), 48 (3): 455-458. May-June 1956. In French. DNLM

Deep hypothermia (between 20° and 25° C.) induced in anesthetized dogs by cooling them in ice for approximately two hours failed to produce calcemia. On the other hand, hypothermic rats demonstrated an elevated level of blood calcium. The difference in behavior of blood calcium under hypothermic conditions is probably related to the species difference.

5402
Coraboeuf, E.,
C. Kayser, and Y. M. Gargouil
[THE REPOLARIZATION OF THE MYOCARDIUM DURING HYPOTHERMIA IN THREE MAMMALIAN SPECIES: GUINEA PIG, MARMOT (CITELLUS CITELLUS), AND WHITE RAT] La repolarisation du myocarde au cours de l'hypothermie chez trois espèces de Mammifères: Cobaye, Spermophile (Citellus citellus) et Rat blanc. — Comptes rendus de l'Academie des sciences (Paris), 243 (21): 1673-1676. Nov. 19, 1956. In French. DLC (Q46.A14, v. 243)

Electrocardiograms and intracellular electrograms of the heart muscle of hypothermic guinea pigs, rats, and marmots were obtained at heart temperatures from 37° to 12° C., produced by irrigation of the open thoracic cage with physiological liquid at varying temperatures. A typical slowing of the electrocardiogram was observed with declining heart temperatures. In hypothermic rats, in marmots at 22° C., and in guinea pigs below 20° C., a division of the slow wave of the electrocardiogram occurred simultaneously with formation of a plateau in the descending wave of the intracellular potential. The new electrocardiographic wave formed by division of the slow wave was similar to that observed by Osborn in hypothermic dogs. It is suggested that the Osborn and T waves, referring to the rapid and second phases of repolarization, respectively, coincide at normal body temperatures and are separated only during hypothermia.

5403
Cottle, W. H.,
and L. D. Carlson
REGULATION OF HEAT PRODUCTION IN COLD-ADAPTED RATS. — Proc. Soc. Exper. Biol. and Med., 92 (4): 845-849. Aug.-Sept. 1956. DLC (QP1.S8, v. 92)

A study was made of the effect of cold adaptation on the non-shivering thermogenetic activity of curarized rats exposed to cold. All curarized rats exposed to a temperature of 5° C. increased their heat production, but only cold-adapted animals prevented a marked decline in body temperature. Adrenomedullation reduced the ability of cold-adapted rats to increase heat production, but had no effect on unadapted animals. Non-shivering thermogenesis is attributed to the release of both adrenal and extra-adrenal epinephrine or exposure to cold. It is suggested that cold adaptation increases sensitivity to epinephrine.

5404
Couves, C. M.,
R. C. Overton, and W. L. Eaton
HEMATOLOGIC CHANGES IN HYPOTHERMIC DOGS. — Surgical Forum, 6 (Proc. Forum Sessions, Clinical Congress of the Amer. Coll. of Surgeons, 41st (Chicago, Ill., 1955)), p. 102-106. 1956. DLC (RD1.A363, v. 6)

The body temperature of dogs was reduced to 18° or 25° C. The animals were kept at these temperatures for 1 to 4 hours. Since both the coagulation time and prothrombin estimation in the plasma were unaffected, hypothermia was not considered to seriously affect the over-all coagulation mechanism. The importance is stressed of the prolonged bleeding times and reduced platelet counts at lowered temperatures, since bleeding time is a measure of the capillary response to trauma. The increase may be due to altered cap-

illary response as a result of cold, to the increase in venous pressure, and the reduced platelet count. (Authors' discussion, modified) (20 references)

5405
Covino, B. G.,
W. R. Beavers, and D. W. Rennie
HIND LIMB BLOOD FLOW DURING IMMERSION HYPOTHERMIA [Abstract]. — Amer. Jour. Physiol., 187 (3): 593. Dec. 1956.
DLC (QP1.A5, v. 187)

Femoral arterial blood flow, arterial pressure, and electrocardiographic tracings were recorded simultaneously during progressive immersion hypothermia in anesthetized dogs. During the initial cooling phase (to 35° C.) the average femoral arterial flow increased significantly, while blood pressure and peripheral resistance were decreased. Throughout the remainder of the cooling period the blood flow and pressure showed a gradual decline. Since skin temperature rapidly approximated the bath temperature (5° C.), the increased volume flow was apparently handled by skeletal muscle vessels. Measurement of femoral artertovenous oxygen and temperature differences during cooling revealed a minimal differential at the point of maximal flow, suggesting the opening of arteriovenous shunts in skeletal muscle. (Quoted in part)

5406
Crosby, W. H.
SOME PROBLEMS OF HEMATOLOGY IN HYPOTHERMIA: AN INTRODUCTION. — In: The physiology of induced hypothermia, p. 183-185. National Academy of Sciences-National Research Council, Publication 451. 1956. DLC (QP82.N31)

The following hematological findings were observed in dogs surface-cooled to a body temperature of approximately 20° C.: (1) the platelet count fell to quite low levels and returned to normal levels upon rewarming; (2) the leukocytes disappeared and then reappeared upon rewarming; (3) changes in the coagulation mechanism occurred, which may possibly be attributed to thrombocytopenia; and (4) the hematocrit increased in most of the animals, and recovered more slowly than the previously observed changes.

5407
Cunningham, D. J. C.,
and J. L. H. O'Riordan
RESPIRATORY EFFECTS OF RAISING THE BODY TEMPERATURE IN MAN [Abstract]. — Jour. Physiol. (London), 131 (3): 14P-15P. March 28, 1956.
DLC (QP1.J75, v. 131)

The respiratory effects of increased body temperature produced by high environmental wet-bulb temperatures were investigated in five subjects. The decline in alveolar CO_2 pressure and the increase in ventilation observed at elevated temperatures were often greater when the temperature was rising than when it was at a steady elevated value. Below the normal alveolar CO_2 level, sensitivity to increased ventilatory CO_2 was reduced by increased temperature while at and above the normal level, sensitivity was doubled.

5408
D'Amato, H. E.
CARDIOVASCULAR FUNCTIONS IN DEEP HYPOTHERMIA. — In: The physiology of induced hypothermia, p. 146-160. National Academy of Sciences-National Research Council, Publication 451. 1956
DLC (QP82.N34)

Hypothermic dogs at a body temperature of 20° C. exhibited cardiac output and work per minute about 15% of normal, with stroke volume remaining normal. Systemic arterial pressure was 60-70 mm. Hg. The reduction of these functions is referable to the extreme bradycardia which occurs at this temperature.

5409
Fedor, E. J.,
M. Levine, C. Russ, and B. Fisher
THE EFFECT OF PROLONGED HYPOTHERMIA ON OXYGEN CONSUMPTION OF THE LIVER SLICE. — Surgical Forum, 6 (Proc. Forum Sessions, Clinical Congress of the Amer. Coll. of Surgeons, 41st (Chicago, Ill., 1955)), p. 143-146. 1956.
DLC (RD1.A363, v. 6)

Anesthetized dogs were immersed in a cold water bath at 10° C. until the rectal temperature read 28° to 29° C. At this time the animals were placed in an air conditioned room and body temperature was maintained at 22°-24° C. for 1-5 or for 6-10 hours. Studies of excised liver tissue showed that the oxygen uptake was not altered by 1-5 hours of hypothermia, but was significantly decreased after 6-10 hours of cooling. Significant alterations of liver glycogen, protein nitrogen, protein, and nonprotein nitrogen occurred. In the 1-5 hour hypothermic group a significant decrease in fatty acids was found. Rewarming the animals to pre-cooling levels restored the oxygen uptake to normal or above normal and liver composition to normal. The oxygen consumption of liver slices was not affected by the glycogen content of the liver or by blood glucose.

5410
Ferguson, L. D.,
A. B. Hertzman, A. J. Rampone, and M. L. Christensen
MAGNITUDES, VARIABILITY AND RELIABILITY OF REGIONAL SWEATING RATES IN HUMANS AT CONSTANT AMBIENT TEMPERATURES. — St. Louis Univ., Mo. (Contract AF 18(600)-96); issued by Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 7155). WADC Technical Report no. 56-38, Feb. 1956. [67] p. AD 95 418
UNCLASSIFIED

Observations of sweating rate by the desiccating capsule technique were made on 10 regions of the body surface in six male nude subjects in Saint Louis University School of Medicine during the summer of 1955. The subjects were exposed to accurately controlled climates of 90°, 100°, 110° and 115° constant dry bulb temperatures, with one constant vapor pressure. The magnitudes of regional sweating rates are described. The ratio of regional sweating to total sweating never tends to approach unity, nor is it possible to use one regional sweating rate to predict another. Topographical differences in variability of regional

sweating rates alter as sudomotor drive is increased. Prediction of sweating rates from one region to another on the body surface was not possible. In any one experiment, two determinations of the regional sweat rate gave adequate and reliable results and the use of this observation should significantly reduce the labor involved in future similar experiments. The reported results, especially in regard to the location of the most variable and least variable body sweat areas; the shift in sweating pattern dominance from lower to upper body regions with increasing heat load; and the absolute magnitude of sweating responses obtained in various body regions have important applications in the optimal design and use of ventilated clothing. (Authors' abstract)

5411
Fisher, B.,
E. J. Fedor, S. H. Lee, W. K. Weitzel, R. Selker, and C. Russ
SOME PHYSIOLOGIC EFFECTS OF SHORT- AND LONG-TERM HYPOTHERMIA UPON THE LIVER. — Surgery, 40 (5): 862-873. Nov. 1956. DLC (RD1.S78, v. 40)

A study of the liver in dogs exposed to short (6 hours) and prolonged (12 hours) hypothermia (22.5° to 23.5°C.), followed by rewarming, revealed that although the bile volume was markedly decreased, cholic acid concentration was not similarly depressed. The length of time required for their return to normal levels was dependent upon the length of hypothermia. A significant increase occurred in the liver nonprotein nitrogen fraction, and a marked decrease in the glycogen content. The latter failed to return to normal following rewarming. No decrease in liver oxygen consumption was seen in up to 6 hours of hypothermia. Longer periods of cooling produced a significant decrease. A decrease in hepatic blood flow was noted, which promptly returned to normal following rewarming even after hypothermia up to 12 hours. It is concluded that hypothermia maintained for as long as 12 hours produces no irreversible changes in the liver insofar as biliary secretion, oxygen consumption, composition (excepting glycogen), and hepatic blood flow are concerned. (Authors' summary and conclusions, modified)

5412
Gentile, M.,
G. Allegra, and L. Tonelli
[DEFINITION OF THE ELECTROCARDIOGRAM CHARACTERISTIC OF INDUCED DEEP HYPOTHERMIA: SYSTEMATIC STUDY DURING COOLING TO 19°-18° IN 16 EXPERIMENTS FOLLOWED BY SURVIVAL OF THE ANIMAL] Definizione dell'ECG caratteristico dell'ipotermia profonda provocata: studio sistematico nella fase del raffreddamento fino a 19°-18° in 16 esperienze seguite dalla sopravvivenza dell'animale. — Archivio di chirurgia del torace (Firenze), 13 (4): 787-809. Oct.-Dec. 1956. In Italian, with English summary (p. 807). DNLM

The following electrocardiographic changes were observed in dogs subjected to body cooling to 19°-18° C., that survived without permanent damage of some type: (1) a progressive decline of frequency, paralleling drop in temperature; (2) no important change in rhythm, except for bradycardia; (3) frequent but unsteady variations of the voltage, of the amplitude, and of the shape of P; (4) premature lengthening of the P-R interval; (5) limited variations of the QRS segment; (6) progressive lengthening, with changes of the level of S-T and deep premature and steady alterations of the T; and (7) remarkable lengthening of the T-P (or T-Q) segment. (Authors' summary, modified)

5413
Gerbode, F.,
I. A. La Costa, and J. W. Ratcliffe
LIVER CIRCULATION IN GENERAL HYPOTHERMIA. I. EFFECT OF COOLING UPON OXYGEN SATURATION AND ELECTROLYTES IN HEPATIC BLOOD. — Stanford Med. Bull. 14 (1): 57-59. Feb. 1956. DNLM

In a study of the efficiency of hepatic circulation in hypothermia, 10 dogs were subjected to a body temperature of 25° C. under general anesthesia, and were examined with regard to changes in oxygen saturation and in sodium and potassium concentrations in blood samples from the aorta, inferior vena cava, portal vein, and hepatic vein. The livers utilized oxygen and did not manifest hepatocellular hypoxia if hyperkalemia in hepatic vein blood is a reliable sign of the phenomenon. The oxygen saturation of the hepatic vein blood was higher at a body temperature of 25° C. than at normal temperature. Serum sodium changes appeared to be insignificant. (Authors' summary, modified)

5414
Ghinozzi, G. P.
[EFFECT OF PREDNISONE ON BODY HYPOTHERMIA INDUCED BY COLD] Influenza del prednisone nell'ipotermia corporea provocata da freddo. — Rivista di medicina aeronautica (Roma), 19 (3): 476-485. July-Sept. 1956. In Italian, with English summary (p. 484). DLC (RC1050.R56, v. 19)

Rabbits exposed to cold (+20° C.) in a specially constructed chamber showed a decrease of 5.75° C. in rectal temperature, and a decrease of approximately 0.045 mg. in blood ketosteroid content. Prednisone-treated rabbits exposed to cold showed a slight decrease in rectal temperature (0.30° C.), and an insignificant increase (0.005 mg.) in blood ketosteroid content. Prednisone stimulates fat, sugar, and protein metabolism, thereby increasing caloric production, a factor of great importance to a subject at low temperatures. The administration of prednisone is recommended for the protection of flying personnel under hypothermic conditions.

5415
Glaja, J.,
and J. Radulović
[THE CARDIAC STIMULATING EFFECT OF BLOOD FROM THE ORGANISM IN DEEP HYPOTHERMIA] De l'action stimulante cardiaque du sang de l'organisme en profonde hypothermie. — Comptes rendus de l'Académie des sciences (Paris), 243 (20): 1465-1467. Nov. 12, 1956. In French. DLC (Q46.A14, v. 243)

Injection of blood from hypothermic rats was found to stimulate the hearts of fatigued frogs and to prolong the duration of beating in open-chested rats. A transient restoration of the heartbeat of cooled rats killed during hypothermia was accomplished daily for more than ten days after death by bathing of the heart with warm Ringer's solution. It is concluded that hypothermia exerts a beneficial effect on the heart.

5416
Giaja, J.,
and L. Marković-Giaja
[ON THE METABOLIC LEVEL AND REACTION TO COLD IN ANIMALS MADE HYPOTHERMIC BY DIFFERENT METHODS] Sur l'intensité des échanges et la réaction au froid dans différentes hypothermies. — Comptes rendus de la Société de biologie (Paris), 150 (1): 9-11. 1956. In French.
DLC (QP1.S7, v. 150)

A study was made of the effect of various methods of induction of hypothermia on the respiratory exchange level and thermogenetic sensitivity of rats. Oxygen consumption at an ambient temperature of 15°C. was increased in rats made hypothermic (rectal temperature 30°) by cold or by confinement, decreased in rats made hypothermic by the administration of harmine or insulin, and unchanged in animals made hypothermic by largactil. Brief immersion in an ice bath provoked a thermogenetic response in all hypothermic animals except those treated with insulin.

5417
Giaja, J.
[METABOLISM IN PROFOUND HYPOTHERMIA] Le metabolisme dans la profonde hypothermie. — XX^e Congrès International de Physiologie (Brussels, 1956), p. 103-125. In French.
DLC (QP1.I57, v. 1956a)

The general physiological effects of hypothermia are reviewed, and methods are considered for the experimental production of this state (cold baths, controlled anoxia, chemical anti-thermoregulators, etc.). DiMacco's concept of "biological zero" is discussed in relation to the progressive decrease in general metabolic rate which accompanies hypothermia. The succession of functional cessation with increased hypothermia is usually: (1) arrest of renal secretion, (2) arrest of intestinal absorption, (3) respiratory arrest, and (4) cardiac arrest. Oxidation and circulation are recognized as the primary combatants of hypothermia. (57 references.)

5418
Giaja, J.,
and J. Radulović
[THE WORK OF THE HEART FOLLOWING DEEP HYPOTHERMIA] Sur le travail du coeur à la suite d'une profonde hypothermie. — Comptes rendus de l'Académie des sciences (Paris), 242 (16): 2039-2041. April 16, 1956. In French.
DLC (Q16.A14, v. 242)

Rats spontaneously reawakening from a state of hypothermia (15°C.) induced for one to three hours by restraint and hypercapnic hypoxia showed an increase over control values in the frequency and amplitude of heart contractions and in the duration of heart beating during terminal anoxia produced by suspension of respiration. A similar but lesser effect was produced by hypothermia induced by refrigeration, and no effect was observed after asphyxia without hypothermia. It is concluded that the increased activity and resistance to anoxia of the hearts of animals cooled immediately after rewarming results from the functional and metabolic rest imposed by hypothermia.

5419
Gillespie, J. A.
THE EFFECT OF LOWERED BODY TEMPERATURE ON HISTAMINE-INDUCED GASTRIC SECRETION. — Quart. Jour. Exper. Physiol. (London), 41 (3): 290-294. July 1956. DNLM

The administration of histamine to hypothermic cats induced a decrease in both acidity and volume of gastric juice. A 15° C. reduction in rectal temperature (initial temperature varied from 37° to 40° C.) reduced the acid secretion by about three-quarters. The free acid content of the juice was reduced to a greater extent than the volume. It is probable that the decreased gastric response to histamine in the hypothermic animal is a non-specific effect of the progressive depression of tissue metabolism. This process is reversed by rewarming.

5420
Giustina, G.,
and G. Meschia
[pH REGULATION IN THE HYPOTHERMIC BODY] La regolazione del pH nell' organismo in ipotermia. — Archivio di fisiologia (Firenze), 56 (2): 173-181. July 10, 1956. In Italian. DNLM

Measurements were made of blood pH and total carbon dioxide concentrations in anesthetized guinea pigs cooled to a body temperature of 38° and 21° C. by immersing them in water of 4° C. Succinylcholine was administered to the animals in order to inhibit muscular activity. Blood pH did not exhibit any significant change, and alveolar blood carbon dioxide concentration remained the same. Total blood carbon dioxide and bicarbonate concentrations were increased. Hypothermic guinea pigs without succinylcholine administration showed a decrease in blood pH with no significant variation of bicarbonate concentration.

5421
Goldzveig, S. A.,
and A. U. Smith
THE FERTILITY OF MALE RATS AFTER MODERATE AND AFTER SEVERE HYPOTHERMIA. — Jour. Endocrinol. (London), 14 (1): 40-53. Aug. 1956. DNLM

Male rats exposed to a combination of hypoxia, hypercapnia and cold, and in which body temperature had fallen to between +15° and +20° C., showed reduced sex drive and fertility during the

subsequent 1-2 weeks. Male rats further cooled until respiration and circulation had been arrested for 1 hour, and until the body temperature was between 0° and +1.5° C., showed reduced sex drive and fertility for 8 weeks after reanimation. In rats exposed to severe hypothermia, developing spermatozoa and spermatids were damaged, but not the spermatogonia and spermatocytes in the majority of seminiferous tubules. Recovery was well advanced by the 8th week. During the first week after cooling a high proportion of the epididymal spermatozoa became decapitated. Their acrosomes were distorted and their mid-pieces and tail sheaths disrupted. (Authors' summary)

5422
Collan, F.
ELECTROLYTE TRANSFER DURING HYPOTHERMIA. — In: The physiology of induced hypothermia, p. 37-41. National Academy of Sciences-National Research Council, Publication 451. 1956. DLC (QP82.N34)

Tracer isotopes of potassium, sodium, and bromine were injected into 20 dogs for each isotope. After 18 hours under anesthesia, half of each group were cooled by ice immersion to 23° C. Major changes did not take place in the plasma but in the tissues. The resting skeletal muscle lost some potassium and maintained its sodium and bromine concentration, whereas the working heart muscle gave up potassium and took up bromine. In both normo- and hypothermic animals subjected to acute anoxia by stopping the respirator for 3 minutes, the change from good oxygenation to hypoxia did not alter the plasma concentration of sodium and bromine, but was accompanied by a slight rise in potassium. Electrolytes of skeletal muscles were not affected by anoxia. In the heart muscle, however, anoxia caused a marked loss of potassium in normothermic and a less pronounced loss in hypothermic dogs; this loss was accompanied by an increase in sodium content in the normothermic animal only.

5423
Grandjean, E.
[THERMOREGULATION AND PHYSICAL EFFORT] Thermorégulation et effort physique. — Schweizerische Zeitschrift für Sportmedizin (Genève), 4 (3): 65-80. 1956. In French. DNLM

The physical factors which affect the heat exchange of man with his environment are the temperature, the movement and water vapor partial pressure of the air, and the heat radiation conditions. The heat regulatory centers in the diencephalon regulate the thermal balance primarily by the vasomotricity of skin, and secondarily by sweat secretion. In addition to the immediate adaptational mechanisms there are slow acclimatization processes which become effective during a long sojourn in hot or cold climates to increase heat or cold tolerance and performance under extreme climatic conditions. In view of the present knowledge of heat physiology, the author offers basic suggestions for men working in hot environments. (Author's summary, modified)

5424
Hansen, A. T.,
B. F. Haxholdt, E. Husfeldt, N. A. Lassen, O. Munck, H. R. Sørensen, and K. Winkler
MEASUREMENT OF CORONARY BLOOD FLOW AND CARDIAC EFFICIENCY IN HYPOTHERMIA BY USE OF RADIOACTIVE KRYPTON 85. — Scandinavian Jour. Clinical and Lab. Investigation (Oslo), 8 (3): 182-188. 1956. DNLM

A method is described for the measurement of coronary blood flow by means of radioactive krypton 85. Observations of coronary blood flow and myocardial oxygen metabolism were performed in dogs at two levels of hypothermia induced with ice bags. Coronary arteriovenous oxygen difference and cardiac mechanical efficiency remained essentially unchanged from the normothermic state. Coronary blood flow, left ventricular oxygen consumption, cardiac output, cardiac work, and total body oxygen uptake showed a proportional decrease to one third of control values at 28° C. and to one fourth at 23.5° C. No indication was found of the heart being less able to accomplish the work demanded of it during hypothermia. (From the authors' summary)

5425
Hegnauer, A. H.,
and B. G. Covino
REAPPRAISAL OF VENTRICULAR THRESHOLDS IN HYPOTHERMIA. — Amer. Jour. Physiol., 186 (3): 511-512. Sept. 1956. DLC (QP1.A5, v. 186)

Earlier results indicating that the ventricular threshold is radically reduced during systole in acidotic hypothermic dogs, were obtained with an experimental stimulating technique now known to be inadequate for the purpose. The conclusions based on these experiments are therefore invalid. The problem of ventricular thresholds in hypothermia is currently being reinvestigated with results which indicate relatively slight deviations from the normal. (Authors' abstract)

5426
Hendler, E.,
and J. D. Hardy
HIGH SENSITIVITY RADIOMETER FOR SKIN TEMPERATURE MEASUREMENTS DURING EXPOSURE TO THERMAL RADIATION [Abstract]. — Federation Proceedings, 15 (1, part I): 90. March 1956. DLC (QH301.F37, v. 15)

A radiometric method for measuring rapid changes in skin and surface temperature during exposure to thermal radiation (far infrared) is described. The method allows for accurate measurements of surface temperature without actual contact with the surface during long or short exposure durations. Surface temperature changes can be continuously measured within 0.005° C. Measurements of the $k\rho c$ product (k = thermal conductivity, ρ = density, c = heat capacity) can be made for bare unblackened skin using the above method under various environmental conditions. In addition, the method is sufficiently sensitive for investigations of skin temperature changes

accompanying thermal sensations. (From the authors' abstract)

5427
Hong, S. K.
RENAL TUBULAR FUNCTIONS IN HYPOTHERMIA [Abstract]. — Amer. Jour. Physiol., 187 (3): 605. Dec. 1956. DLC (QP1.A5, v. 187)

Tubular processes of urine formation were studied in rats by intravenous administration of solute loads during hypothermia. The ratio of hypothermic (20° C.) to control urine flow was found to be 0.5, 1.1, and 3.1 after infusion of water, 0.05 M NaCl, and 0.5 M NaCl, respectively. The greater diuresis after 0.5 M NaCl was accompanied by a diminution of chloride concentration in the urine. The blood plasma clearance and urine plasma concentration ratio of phenolsulfonephthalein were greatly reduced in hypothermia. Injected pitutrin failed to produce antidiuresis. The results suggest that the reabsorption of chloride in the renal tubules is quantitatively inhibited during hypothermia, and that the unabsorbed chloride retards water reabsorption by osmotic action.

5428
Horvath, S. M.,
and G. B. Spurr
EFFECTS OF HYPOTHERMIA ON GENERAL METABOLISM. — In: The physiology of induced hypothermia, p. 8-25. National Academy of Sciences-National Research Council, Publication 451. 1956. DLC (QP82.N34)

A review is presented of the literature concerned with the metabolic processes during the development and maintenance of the state of hypothermia. Available data are found to be too conflicting to merit much assurance as to validity of the conclusions. A profound reduction in metabolic processes is agreed to occur. In order to obtain more specific details of the relationship of temperature to metabolic processes, a more precise experimental approach is recommended and outlined. (67 references)

5429
Horvath, S. M.,
G. B. Spurr, B. K. Hutt, and L. H. Hamilton
METABOLIC COST OF SHIVERING. — Jour. Applied Physiol., 8 (6): 595-602. May 1956.
DLC (QP1.J72, v. 8)

Nine nude subjects were observed to begin shivering in less than two minutes and to establish generalized shivering in four minutes during exposure to an ambient temperature of -3° C. The average rectal temperature was increased, and skin and body temperatures were decreased progressively during exposure to cold. Generalized shivering occurred after a mean increase of 0.2° C. in rectal temperature and at a skin temperature of 27.1° C. Oxygen consumption, respiratory minute volume, and the respiratory quotient were increased, the latter as a result in part of an increase in the oxidation of carbohydrate. From consideration of the temperature gradients between the body surface and the environment, and of the payment of the heat debt following exposure, it is concluded that the relative body heat weights commonly given to various skin areas may not be applicable to periods of rapid temperature change. It is also suggested that the relative weights assigned to the mean skin and rectal temperatures in the calculation of mean body temperature may be in error for periods of cold exposure and rewarming. It is estimated from evaluation of the heat produced above the basal rate during shivering and from the total heat debt developed during cold exposure that shivering provided 11% protection against over-all heat loss.

5430
Huertas, J.,
A. Portera, and E. A. Massullo
EFFECTS OF HYPOTHERMIA ON THE ELECTRICAL ACTIVITY OF THE CENTRAL NERVOUS SYSTEM. — Bulletin, Georgetown Univ. Med. Center, 9 (4): 135-141. March 1956. DNLM

Dogs were cooled by packing either the completely shaved thorax and abdomen, or the head and face in chipped ice until a rectal temperature of 0° C. was reached, and then rewarmed. Body cooled animals received an intravenous injection of either neostigmine, prostigmine, or acetylcholine. Despite greater declines in mean arterial pressure and heart rate than the control group, neostigmine- and acetylcholine-treated animals survived lower temperature better than the control group. A decline in the frequency and amplitude of the electroencephalogram was observed in both control and drug-treated hypothermic animals. Electroencephalographic activity ceased in the range of 21.5-24° C. in both groups. Mean decrements in EEG amplitude and frequency between 36-27° C. were larger in the drug-treated animals. In contrast to both control and drug treated groups, the decline in cortical activity in the head-cooled group was much more rapid. It is concluded that electrical activity of the nervous system is impaired by low temperature, but this inactivation is reversible by rewarming the animal. Electrical inactivity is due directly to the action of cold over the neuron and not due to the generalized reduction in body metabolism.

5431
Hume, D. M.,
R. H. Egdahl, and D. H. Nelson
THE EFFECT OF HYPOTHERMIA ON PITUITARY ACTH RELEASE AND ON ADRENAL CORTICAL AND MEDULLARY SECRETION IN THE DOG. — In: The physiology of induced hypothermia, p. 170-174. National Academy of Sciences-National Research Council, Publication 451. 1956.
DLC (QP82.N34)

Trauma produced marked increases in the pituitary ACTH and adrenal corticoid secretion of anesthetized dogs. Induction of hypothermia greatly depressed the output of these hormones (which was restored again to pre-hypothermia levels after rewarming). Adrenal sensitivity to exogenous ACTH was likewise reduced, apparently as a direct effect of lowered temperature on the adrenal cortical cells. Adrenal medullary secretion of epinephrine and norepinephrine was sharply reduced.

By contrast, cold exposure without the development of hypothermia did not alter adrenal responsiveness to ACTH. The induction of hypothermia per se under anesthesia, but in the absence of trauma, did not act as a stimulant to pituitary-adrenocortical secretion. (Authors' conclusions, modified)

5432
Lampietro, P. F.,
E. R. Buskirk, and M. J. Fregly
RATES OF COOLING OF RATS IN THE COLD [Abstract]. — Federation Proceedings, 15 (1, part I): 98-99. DLC (QH301.F37, v. 15)

Rats were cooled in cold air (5° C.) until the colonic temperature fell to 22.5° C. In normal animals a relationship between body weight and the colonic cooling rate (CCR) was found. Adrenalectomized rats cooled 60% faster than sham-operated controls. Propylthiouracil-treated rats cooled 35% faster. When rats were both adrenalectomized and treated with propylthiouracil, CCR was increased 77%. The effects of adrenalectomy and adrenalectomy and propylthiouracil administration on CCR do not appear to be quantitatively additive. Dead animals cooled 152% faster than controls. (Authors' abstract, modified)

5433
Jude, J. R.,
L. M. Haroutunian, and R. Folse
CORONARY BLOOD FLOW AT 20° C. [Abstract]. — Federation Proceedings, 15 (1, part I): 103-104. March 1956. DLC (QH301.F37, v. 15)

Coronary blood flow and other functions were measured in 11 anesthetized dogs first at normal body temperature and in 9 of these animals after cooling to 20° C. Average measurements at 20° C. expressed as percentage of the values at normal temperature are as follows: coronary blood flow 30%, coronary arterio-venous oxygen difference 82%, myocardial oxygen consumption 26%, calculated left ventricular work 16%, systemic A-V oxygen difference 100%, total body oxygen consumption 24%, cardiac output 21%, peripheral and pulmonary vascular resistances 300%, coronary vascular resistance 200%. Since the coronary arterio-venous oxygen difference is diminished in the cold even though the calculated myocardial efficiency is less, we conclude that the coronary blood flow is sufficient to maintain an adequate supply of oxygen to the myocardium. (Authors' abstract, modified)

5434
Kanter, G. S.
HEAT AND HYPOGLYCEMIA IN DOGS [Abstract]. — Federation Proceedings, 15 (1, part I): 104. March 1956. DLC (QH301.F37, v. 15)

Exposure of 12 dogs to 120° F. for four hours without access to water resulted in an average fall in whole blood glucose of 19% and plasma glucose of 13%, in spite of an average final dehydration of 5.6% body weight. In additional experiments, exposing dogs to heat but maintaining water balance by stomach-tube administration, hypoglycemia again resulted. It appears that the fall in glucose concentration is associated with the increase in deep body temperature, for when dogs are exposed to milder air temperatures (100° F.), dehydration but only a slight elevation in rectal temperature occurs with no fall in glucose levels. (Author's abstract, quoted in part)

5435
Kao, F. F.
THE GAS TRANSPORT SYSTEM IN HYPOTHERMIA. — In: The physiology of induced hypothermia, p. 58-60. National Academy of Sciences-National Research Council, Publication 451. DLC (QP82.N34)

The adequacy of the adjustment of the gas transport system during hypothermia can be evaluated by correlating ventilation and cardiac output with oxygen consumption. During hypothermia the ventilatory equivalent for oxygen ($\dot{V}E_{O_2}$) and circulation equivalent for exygen ($\dot{C}E_{O_2}$) change as a function of oxygen consumption. The relationship between ventilation and oxygen consumption in twelve hypothermic dogs (with and without shivering) was tabulated in which ventilation was curvilinearly related to oxygen consumption. Cardiac output increased in hypothermic dogs when shivering occurred, but decreased in the absence of shivering. The circulatory equivalent for oxygen was also curvilinearly related to oxygen consumption.

5436
Kao, F. F.,
and B. B. Schlig
IMPAIRMENT OF GAS TRANSPORT AND GAS EXCHANGE IN DOGS DURING ACUTE HYPOTHERMIA. — Jour. Applied Physiol., 9 (3): 387-394. Nov. 1956. DLC (QP1.J72, v. 9)

Respiratory and circulatory responses to hypothermia produced by exposure to cold air were studied in anesthetized dogs. Cooling with shivering caused a temporary increase in body temperature, ventilation, and cardiac output, increases in ventilation and circulation as functions of oxygen consumption, and a respiratory alkalosis. Cooling without shivering decreased body temperature and ventilation, and decreased cardiac output by a reduction in heart rate. Stroke volume increased precipitously when heart temperature dropped below 30° C. The decrease in total ventilation in nonshivering dogs was produced by a decrease in tidal volume and respiratory rate, and resulted in an increase in arterial CO_2 tension and hydrogen ion concentration (respiratory acidosis). Death was marked in both groups by a primary respiratory failure followed by circulatory failure at an average heart temperature of 24.8° C.

5437
Kayser, C.,
E. Coraboeuf, and Y. Gargouil
[RESEARCHES ON THE REPOLARIZATION OF THE MYOCARDIUM IN DIFFERENT MAMMALIAN HOMEOTHERMS AND HIBERNATORS DURING HYPOTHERMIA] Recherches sur la repolarisation du myocarde chez différents Mammifères homéo-

thermes et hibernants en hypothermie. — Comptes rendus de la Société de biologie (Paris), 150 (10): 1789-1792. 1956. In French.
DLC (QP1.S7, v. 150)

Electrocardiographic examination of rats at normal body temperature revealed the absence of a distinct T wave corresponding to the end of repolarization, and its replacement by a wave described by Richards and observed by Osborn in the hypothermic dog. Cooling to a body temperature below 28.5° C. resulted in the appearance of the T wave; the critical thermal increment of the S-T interval was found to be similar to that observed in other homeotherms and in hibernators.

5438
Keller, A. D.
HYPOTHERMIA IN THE UNANESTHETIZED POIKILOTHERMIC DOG. — In: The physiology of induced hypothermia, p. 61-79. National Academy of Sciences-National Research Council, Publication 451. 1956. DLC (QP82.N34)

Dogs were rendered partially or completely poikilothermic by destruction of part of the hypothalamus. Such animals had a lowered basal metabolism. When cooled, they showed a reduction of glomerular filtration rate and renal plasma flow; a prolongation of the P-R and Q-T intervals, with a broadened QRS, in the electrocardiogram; there was little disturbance of central and neuromuscular functions at body temperatures as low as 28° C.; and functions associated with cerebration, central and peripheral synaptic conduction, and muscle contraction were not eliminated or materially impaired even at a body temperature of 10° C. Staggering and "catching" of the body was interpreted as the beginning disturbance of the postural reflexes, presumably at the central synapse.

5439
Kleinerman, J.
EFFECTS OF CHANGES IN ARTERIAL pCO_2 ON CEREBRAL BLOOD FLOW AND METABOLISM DURING HYPOTHERMIA. — In: The physiology of induced hypothermia, p. 251-252. National Academy of Sciences-National Research Council, Publication 451. DLC (QP82.N34)

The reactivity of the cerebral vasculature to alterations in arterial carbon dioxide tension under hypothermic conditions was studied in dogs and monkeys. The arterial carbon dioxide tension was varied by inhaling various mixtures of carbon dioxide (2% and 5%). At hypothermic levels the cerebral flow increased with increasing arterial carbon dioxide tension values. Animals with the highest carbon dioxide tension appeared to have the lowest cerebral oxygen consumption.

5440
Kordecki, R.
[THE EFFECT OF HYPOTHERMIA ON RESPIRATORY FUNCTION] Wpływ oziębiania na czynność oddechową. — Acta physiologica polonica (Warszawa), 7 (1): 45-50. 1956. In Polish, with English summary (p. 50) DNLM

Anesthetized, hypothermic cats with intact cervical vagus nerves exhibited an increase in respiratory intensity rather than in respiratory frequency. As body temperature was lowered to 22° C., respiratory insufficiency developed which was unable to maintain body requirements. Respiratory changes appear to be central rather than peripheral in origin, and of the Cheyne-Stokes and Kussmaul respiratory types. Death results from damage to the respiratory centers and not to paralysis of the nerve endings in the respiratory muscles. In another experiment the cervical vagus nerves were dissected in the hypothermic animals. Exclusion of vagal activity made possible a decrease in body temperature to 15° C., without disturbances in respiratory rhythm or function. (Author's summary, modified)

5441
Laborit, H.,
and P. Huguenard
[EXPERIMENTAL STUDY OF IONIC CONDITIONING AT LOW TEMPERATURES] Etude expérimentale du conditionnement ionique aux basses températures. — Comptes rendus de la Société de biologie (Paris), 150 (1): 145-147. 1956. In French.
DLC (QP1.S7, v. 150)

The ventricular fibrillation commonly observed in hypothermic dogs below a body temperature of 27°C. was effectively eliminated above 20°C. by the withdrawal of extracellular fluid from the peritoneum and the intravenous injection of a hypertonic glucose solution rich in potassium. The treatment resulted in a normal cellular pressure differential to temperatures of 20° or lower, and maintenance of spontaneous respiration and reflex activity. It is suggested that the hypothermic animal requires an ionic medium containing a high intracellular concentration of potassium and low extracellular concentrations of potassium and sodium.

5442
Leonard, C. A.,
and J. W. E. Harrison
EFFECT OF HYPERTHERMIC SHOCK ON "FREE AND BOUND" POTASSIUM LEVELS. — Jour. Amer. Pharmaceut. Assoc. (Scientific Ed.), 45 (2): 116-120. Jan. 1956. DNLM

A study of the levels of "free and bound" potassium in whole blood, plasma, and erythrocytes obtained from mice in hyperthermic shock (water bath at 60°C.) was made using an ultrafiltration method for the separation of "free" and "bound" potassium. A statistically significant increase in the percentage of free potassium was observed in whole blood and erythrocytes but not in the plasma. Total potassium content was increased in the plasma. In addition, more hemolysis was found in the exposed groups than in the control groups. (Authors' summary, modified)

5443
McMurrey, J. D.,
W. F. Bernhard, J. A. Taren, and E. A. Bering
STUDIES ON HYPOTHERMIA IN MONKEYS. I. THE EFFECT OF HYPOTHERMIA ON THE PROLONGA-

TION OF PERMISSIBLE TIME OF TOTAL OCCLUSION OF THE AFFERENT CIRCULATION OF THE BRAIN. — Surgery Gynecol. and Obstetrics, 102 (1): 75-86, Jan. 1956. DLC (RD1.S8, v. 102)

Hypothermia was induced in monkeys by immersion in an ice-water bath at 3°C., and rewarming accomplished in a warm water bath maintained at 45°C. Electroencephalographic changes occurring with cooling and during single and multiple periods of afferent cerebral vascular occlusion under hypothermia were studied. Serial EEG's in control hypothermic monkeys under pentobarbital demonstrated a decrease in amplitude of all frequencies with cooling. Follow-up electroencephalograms and observations of behavior in these animals revealed no evidence of cerebral damage. Cerebral afferent vascular occlusion produced with clamps at the origin of the vessels from the aortic arch resulted in disappearance of EEG activity within one minute irrespective of temperature. After 20-22 minutes, cerebral damage was evident and death followed within 48 hours. Fifteen minutes of occlusion was tolerated by monkeys at temperatures from 23-26°C. (Authors' summary, modified)

5444
McQueen, J. D.
EFFECTS OF COLD ON THE NERVOUS SYSTEM. — In: The physiology of induced hypothermia, p. 243-250. National Academy of Sciences-National Research Council, Publication 451. 1956. DLC (QP82.N34)

A review is presented of the literature concerned with experiments dealing with the effects of cold on the nervous system. Above the common level of ventricular fibrillation, the absence of gross damage to the central nervous system has been demonstrated along with a state of narcosis for a period of several hours. Below this level, definite and presumably irreversible injury was found in the peripheral and central nervous systems. (41 references)

5445
Malméjac, J.,
G. Neverre, and M. Montero
[EFFECT OF INDUCED HYPOTHERMIA ON ADRENAL MEDULLARY ACTIVITY] Action de l'"hypothermie provequée" sur l'activité médullo-surrénale. — Comptes rendus de la Société de biologie (Paris), 150 (5): 974-977. 1956. In French. DLC (QP1.S7, v. 150)

Local cooling of the adrenal glands and kidneys of dogs was found to result in constriction of the kidney and elimination at 22-23°C. of the secretion of adrenaline. Occlusion of the carotid arteries had no vasomotor effect on the cooled organs and did not induce adrenaline secretion. After 15 minutes at 37° following cooling at 20-21° for 30 minutes, the adrenal secretory reaction to carotid occlusion was still absent, but the renal vasomotor reaction was observed. It is suggested that cold inhibits both ganglionic synaptic transmission and the adrenal medullary innervation, and that the chromaffin cells are more susceptible to cold than are the postganglionic nerves.

5446
Malméjac, J.,
and P. Plane
[CARDIOVASCULAR EQUILIBRIUM DURING INDUCED HYPOTHERMIA AND ADRENALINE] Equilibre cardio-vasculaire en "hypothermie provoquée" et adrénaline. — Comptes rendus de la Société de biologie (Paris), 150 (5): 978-980, 1956. In French. DLC (QP1.S7, v. 150)

The extreme bradycardia often observed in dogs and monkeys below a body temperature of 20°C. was partially eliminated by continuous venous infusion of L-epinephrine in doses of 1-2 γ/kg./minute. Epinephrine increased heart rate from around 7 pulsations/minute (in one dog) to a level compatible with the maintenance of arterial blood pressure at 4-5 cm. Hg.

5447
Malméjac, J.,
P. Plane, and E. Bogaert
[RESISTANCE OF THE HIGHER NERVOUS STRUCTURES TO "ARTIFICIAL HYPOTHERMIA": EXPERIMENTAL STUDY IN THE DOG AND THE APE] Résistance des formations nerveuses supérieures à l'"hypothermie provoquée": étude expérimentale chez le Chien et le Singe. — Comptes rendus de l'Académie des sciences (Paris), 242 (17): 2171-2174, April 23, 1956. In French. DLC (Q46.A14, v. 242)

Dogs cooled to a temperature of 20-22°C. for one hour by immersion in ice showed no impairment in conditioned salivary reflex activity 10-12 hours after rewarming. Cooling below this point (to 17-18° C.) caused a decreased response, particularly in older animals, which was corrected in 3-8 days. Young apes showed a similar lack of cortical impairment in the performance of a test involving recognition of geometric figures and colors 12-14 hours after cooling to a temperature of 19-21°C. Performance of the test after suspension of testing for three weeks showed no impairment of memory by cooling. Full recovery of adult apes cooled to a minimum of 17°C. was not observed until nearly a week after exposure. It is concluded that hypothermia of 20-22°C. for one hour has only a transient detrimental effect on cortical activity when cooling and rewarming are rapid, but that functional recovery is delayed by cooling to 17-18°C.

5448
Malméjac, J.,
P. Plane, and C. Malméjac
[HIGHER NERVOUS ACTIVITY AFTER INDUCED HYPOTHERMIA: STUDY IN THE DOG BY MEANS OF THE CONDITIONED SALIVARY REFLEX] Sur l'activité nerveuse supérieure après hypothermie provoquée: étude chez le chien à l'aide du réflexe salivaire conditionné. — Journal de physiologie (Paris), 48 (3): 632-634. May-June 1956. In French. DNLM

Higher nervous activity after recovery from hypothermia was investigated by means of the salivary reflex conditioned to music in trained dogs. The animals were placed in an ice bath at 4° C. until the rectal temperature decreased to 24° C. or lower for 40-45 minutes before being rewarmed

in a bath between 30-40° C. Cooling to body temperatures of 22° C. produced no modification in the conditioned salivary reflex. Below 22° C., reflex activity ceased or was greatly diminished. These results indicate that after cooling to 22° C. higher nervous activity returns to normal in about twelve hours; however, this function is temporarily altered by hypothermia below 22° C. At 18° C. the changes are reversible in several days.

5449
Marggraf, W.
[EFFECTS OF THE HYPOTHERMIA PROCESS ON THE BLOOD COAGULATION SYSTEM] Einwirkungen des Unterkühlungsvorganges auf das Blutgerinnungssystem. — Langenbecks Archiv für klinische Chirurgie (Berlin), 284: 245-249. 1956. In German. DNLM

Hypothermia shifts the organism into a predominantly parasympathetic phase with a lowered tendency to blood coagulation. Rewarming stimulates sympathetic processes and accelerates the clotting action. During cooling and partly in rewarming, heparin enters the venous circulation from the mast cells, increasing the antithrombin content. The antithrombin content falls after the blood has passed through the lungs, which indicates the importance of the lungs in the metabolism of coagulation factors.

5450
Morin, G.
[RECENT EXPERIMENTAL DATA CONCERNING INDUCED HYPOTHERMIA AND ITS EFFECT ON THE CENTRAL NERVOUS SYSTEM] Données expérimentales récentes relatives à l'hypothermie provoquée et à son action sur le système nerveux central. — Marseille chirurgical (Paris), 8 (5): 551-567. Oct.-Dec. 1956. In French. DNLM

Following a general discussion of induced hypothermia, its principles, methods, and effects on various organs, consideration is given to its effect on the central nervous system, and especially the brain. Hypothermia exercises specific effects on ganglion transmissions (ganglioplegic effect), the spinal cord, and various brain centers. Mention is made of the reversibility of the effects of hypothermia on the nervous centers.

5451
Moyer, J. H.,
G. C. Morris, and M. E. DeBakey
RENAL FUNCTIONAL RESPONSES TO HYPOTHERMIA AND ISCHEMIA IN MAN AND DOG. — In: The physiology of induced hypothermia, p. 199-213. National Academy of Sciences-National Research Council, Publication 451. 1956. DLC (QP82.N34)

On the basis of laboratory experiments in dogs and human patients it was found that, as the body temperature is reduced, there occurs a progressive reduction in mean blood pressure, glomerular filtration rate, and renal blood flow. These returned to or towards control levels with normothermia.

5452
Mroziński, S.,
and M. Waśniowska
[ELECTROCARDIOGRAM IN EXPERIMENTAL TRANSIENT HYPOTHERMIA] Obraz elektrokardiograficzny w okresowej hipotermii doświadczalnej. — Acta physiologica polonica (Warszawa), 7 (4): 393-404. 1956. In Polish, with English summary (p. 402-403). DNLM

Electrocardiograms of anesthetized rabbits cooled by a stream of water for one hour to a rectal temperature of 20°C. demonstrated the following: (1) cardiac changes of a transient nature which subsided upon return to normal temperature; (2) a slower heart rhythm; (3) lengthening of all waves and intervals of the cardiac electrical cycle; (4) an increased voltage of the QRS complex, particularly in the precordial lead; and (5) changes in the ST-T complex, from slight to severe, resembling a picture of recent myocardial infraction, particularly in the precordial lead. (Authors' summary, modified)

5453
Nardone, R. M.,
and L. L. Caravaggio
RELATION BETWEEN LETHAL COLD TEMPERATURE AND RESPIRATION OF EXCISED TISSUES. — Jour. Exper. Zool., 131 (1): 163-171. Feb. 1956. DNLM

The oxygen consumption of excised tissues from guinea pigs cooled to 25° C. or to 18° C. was measured by the Warburg manometric technique. Oxygen consumption at the lethal temperature of 18° C. (at which survival after rewarming was 50%) was decreased 42% in muscle tissue, 67.4% in liver, and 79.3% in brain. A comparison of the inhibition of respiration by cold in guinea pig and rat tissues revealed no inter-species correlation between lethal cold temperature and per cent inhibition.

5454
Niazi, S. A.
PROFOUND HYPOTHERMIA IN NON-HIBERNATING MAMMALS. — Publication no. 18,944. iv+120 p. Ann Arbor: Univ. Microfilms, 1956. DLC

Adult rats survived cooling to +4° C., and cardiac standstill for four hours. Eighty-three percent of adult rats survived cooling to 0° C., and 67% were long-term survivors. These animals had two hours and fifty minutes of cardiac standstill. Dogs were cooled to body temperatures as low as 2° C., with survival, while monkeys withstood cooling down to 4° C., and survived after intervals of cardiac standstill as long as two hours. Man (51 years of age) survived cooling to a body temperature of 9° C., with cardiac standstill for one hour. (114 references)

5455
Niazi, S. A.,
and F. J. Lewis
PROFOUND HYPOTHERMIA IN THE DOG. — Surgery Gynecol. and Obstetrics, 102 (1): 98-106. Jan. 1956 DLC (RD1.S8, v. 102)

Dogs of various ages were cooled to body temperature levels below 10°C. with survival. This was achieved by producing cardiac standstill at low temperature levels through a technique of shifting the blood hydrogen ion concentration to an alkaline level below 20°C. Blood flow was arrested in 30 adult dogs for periods of 20-30 minutes at a body temperature of 18°C. All except 4 tolerated this procedure and lived normally for periods of 1 week or longer. A lower incidence was noted of ventricular fibrillation when carbon dioxide was added to the respiratory mixture during cooling than when oxygen alone was used. Changes in blood chemicals and hydrogen ion concentration levels occurring during profound hypothermia are discussed. (Authors' summary, modified)

5456
Otis, A. B.,
and J. Jude
EFFECT OF BODY TEMPERATURE ON PULMONARY GAS EXCHANGE. — Johns Hopkins Univ. School of Medicine, Baltimore, Md.; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 57-12, Dec. 1956.
AD 126 590 UNCLASSIFIED

The effect of decreased body temperature on pulmonary gas exchange was determined on anesthetized dogs. Comparisons between the arterial and alveolar carbon dioxide tension gradient showed no significant nor consistent differences at body temperatures between 37° and 16° C. It is concluded that cooling dogs to body temperatures as low as 16° C. produces no significant barrier to the transfer of carbon dioxide from blood to lung. The pulmonary diffusing capacity showed a considerable decrease with the lowering of body temperature, but because the metabolic requirements for gas exchange are decreased by at least as great a degree, it appears that no physiologic handicap results. (Authors' abstract)

5457
Otis, A. B.,
J. R. Jude, and R. Folse
PULMONARY GAS EXCHANGE IN HYPOTHERMIA [Abstract]. — Federation Proceedings, 15 (1, part I): 139-140. March 1956.
DLC (QH301 F37, v. 15)

End tidal and arterial carbon dioxide tensions were measured in dogs at various body temperatures down to 16° C. No increase in the arterial-alveolar gradient was found, and it was concluded that hypothermia introduced no physiologically significant barrier to the transfer of carbon dioxide between blood and lungs. As measured by the steady-state carbon monoxide method, a decrease in the diffusing capacity of the lungs was found in four dogs at body temperatures of 37° and 25° C. It is suggested that a major factor involved may be a reduction in area of the pulmonary vascular bed available for diffusion. This hypothesis was supported by measurements on two of the dogs, both of which showed an increase in pulmonary vascular resistance at the lower temperature. (Authors' abstract, modified)

5458
THE PHYSIOLOGY OF INDUCED HYPOTHERMIA. — Edited by R. D. Dripps. National Academy of Sciences-National Research Council, Publication 451. 1956. xiii+447 p. DLC (QP82.N34)

This is an account of the proceedings of a symposium on the physiology of induced hypothermia convened by the Division of Medical Sciences of the National Academy of Sciences and the National Research Council on October 28-29, 1955, in Washington, D. C. The following pertinent papers are abstracted separately: Items no. 5370, 5372, 5386, 5387, 5390, 5391, 5392, 5405, 5408, 5422, 5428, 5431, 5435, 5438, 5439, 5444, 5451, 5467, 5473, and 5475.

5459
Pirlet, K.
[INDIVIDUAL PHYSIOLOGICAL STUDIES OF THERMOREGULATION] Individual physiologische Studien des Wärmehaushaltes. — Archiv für physikalische Therapie Balneologie und Klimatologie (Leipzig), 8 (3): 162-169. May-June 1956. In German. DNLM

Individual differences in thermoregulation were studied in 15 healthy subjects exposed in a climatic chamber to indifferent ambient temperature and, unclothed, to 20° C. ambient temperature at 50 cm./sec. wind velocity, 50% relative humidity for three hours. Each subject was classified as to his body type according to Kretchmer, vagotonic or sympathotonic cardiovascular condition according to Wezler and Hoff, and reaction type A or B according to Lampert. Leptosomes showed more intense physical and chemical thermoregulatory reactions; however, they did not succeed in maintaining the internal core temperature constant because of the greater conductivity of the skin with a thinner subcutaneous fat layer. It is concluded that the ability to maintain a constant core temperature without excessive peripheral vasoconstriction is limited by individual differences in subcutaneous fat deposits.

5460
Reissmann, K. R.,
and R. L. Van Citters
OXYGEN CONSUMPTION AND MECHANICAL EFFICIENCY OF THE HYPOTHERMIC HEART. — Jour. Applied Physiol., 9 (3): 427-430. Nov. 1956.
DLC (QP1.J72, v. 9)

Cardiac oxygen consumption in canine heart-lung preparations was compared at 37°C. and 27°C. in relation to equal cardiac work per unit of time and per beat. Per unit of time the hypothermic heart used less oxygen than the normothermic heart at equal work performance, and the absolute difference in oxygen consumption remained nearly constant over a wide range of work loads. A pronounced positive correlation between mechanical efficiency and increasing output loads of the hypothermic heart was found, providing an explanation of the observed relatively high cardiac oxygen demands in the intact hypothermic animal. At equal work levels per beat, the hypothermic heart used slightly less oxygen per beat than the normothermic, in spite of its greater diastolic volume. The lower oxygen consumption of the hypothermic heart is attributed to slower rate and depressed resting cardiac metabolism. (Authors' abstract, modified)

5461
Richards, J. B.,
and R. H. Egdahl
THE EFFECT OF ACUTE HYPERTHERMIA ON ADRENAL 17-HYDROXYCORTICOSTEROID SECRETION IN DOGS. — Naval Medical Research Inst., Bethesda, Md. (Project no. NM 007 081.22). Research Report no. 11 (Vol. 14, p. 287-296), April 9, 1956. AD 100 790 UNCLASSIFIED

Dogs immersed to the shoulders in 50° C. water responded initially with a rapid increase in rectal temperature (42° C. in 15 to 20 minutes), a marked (two- to seven-fold) increase in adrenal corticoid output, and a slight (10 to 20 percent) increase in adrenal venous blood flow. When a rectal temperature of 44° to 45° C. was attained, circulatory failure occurred and a concomitant decrease in adrenal corticoid output and venous blood flow ensued. Dogs subjected to a gradual increase in body temperature had increased adrenal 17-hydroxycorticosteroid secretion in the rectal temperature range of 39° to 40° C., but this stimulatory response subsided as body temperature was further increased. Hypophysectomy abolished the adrenocortical response to hyperthermia, thus showing that the increased secretory activity of the adrenal cortex in hyperthermia is mediated via the pituitary gland. (From the authors' abstract)

5462
Rosomoff, H. L.
THE EFFECTS OF HYPOTHERMIA ON THE PHYSIOLOGY OF THE NERVOUS SYSTEM. — Surgery, 40 (2): 328-336. Aug. 1956 DLC (RD1.S78, v. 40)

Hypothermia (25° C.) was induced in ten dogs by immersing them to the shoulders in ice water. During hypothermia there was (1) a decrease in cerebral blood flow; (2) a corresponding decline in cerebral metabolism; (3) a compensated hypotension; (4) a decrease in brain volume; (5) a diminution of intracranial pressure, and (6) a depression of electrical and reflex activity. (Author's summary, modified) (27 references)

5463
Russell, R. W.
SOME EFFECTS OF SEVERE HYPOTHERMIA ON BEHAVIOUR. — Brit. Jour. Animal Behaviour (London), 4 (2): 75. April 1956.
DLC (QL750.B7, v. 4)

Rats subjected to hypothermia (deep body temperature, of 0-1° C.) showed a significant impairment in problem solving performance after rewarming, while animals cooled to 13.4-18.5° C. showed no effect. A consistent but slight trend towards poorer retention of a maze habit was also observed after hypothermia. It is suggested that the suppression of electrical signs of brain activity and of physiological processes such as heartbeat, circulation, and respiration during hypothermia impairs the performance of later tasks, but has little or no effect on memory.

5464
Sarajas, H. S. S.
EVIDENCE FOR HEART DAMAGE IN ASSOCIATION WITH SYSTEMIC HYPOTHERMIA IN DOGS. — Amer. Heart Jour., 51 (2): 298-305. Feb. 1956. DLC (RC681.A1A58, v. 51)

Twenty-four dogs were subjected to systemic hypothermia. Nine dogs were autopsied at the onset of fatal cardiac irregularities or at the termination of moderate (26° to 27.5° C.) or deep (21° to 22.5° C.) hypothermia of one to four hours' duration. In all cases the myocardium showed foci of necrotic muscle fibers with an occasional cellular reaction. Fifteen dogs were sacrificed and autopsied three days to three years after survival of moderate or deep hypothermia of the same duration. In thirteen of fifteen cases distinct areas of necrosis showing various stages or organization were detected. The nature and the etiology of the lesions as well as their functional significance are discussed. (Author's summary)

5465
Scavo, R.
[HISTOLOGICAL AND HISTOCHEMICAL OBSERVATIONS ON THE PITUITARY OF THE HIBERNATING DOG] Osservazioni istologiche ed istochimiche sulla ipofisi del cane ibernato. — Anatomia e chirurgia (Roma), 1 (1): 69-86. July-Sept. 1956. In Italian, with English summary (p. 84-85) DNLM

The histological and histochemical picture of the pituitary gland was studied in hypothermic dogs maintained at a rectal temperature of 28°C. Increased pituitary activity was evidenced by changes in cytoplasmic granules, nucleolar apparatus, colloidal content, and cytoplasmic ribonucleic content. It is postulated that hypothermia induces a rapid discharge into the blood of hormones involved in the regulation of body metabolism. This suggests an adaptation on the part of the pituitary to hypothermia.

5466
Segar, W. E.,
P. A. Riley, and T. G. Barila
URINARY COMPOSITION DURING HYPOTHERMIA. — Amer. Jour. Physiol., 185 (3): 528-532. June 1956. DLC (QP1.A5, v. 185)

Chemical analyses of the blood and urine of anesthetized dogs were made during cooling with hyperventilation to a body temperature of 22° C. and during rewarming. Cooling produced an increase in blood pH, a decrease in serum potassium, and little change in hematocrit, serum sodium and chloride, and total CO_2 concentration. Urine flow was increased and the urine concentrations of sodium, potassium, and chloride were increased to values approaching their concentrations in serum. The urine/plasma ratio of creatinine was reduced from 150 to 8, urine pH was increased, and the production of ammonia was decreased. It is suggested that in cooled animals the urine is essentially glomerular filtrate which has undergone isosmotic reabsorption but which has remained unaltered by further renal tubular activity.

5467
Severinghaus, J. W.,
and M. Stupfel
RESPIRATORY PHYSIOLOGIC STUDIES DURING HYPOTHERMIA. — In: The physiology of induced

hypothermia, p. 52-57. National Academy of Sciences-National Research Council, Publication 451. 1956. DLC (QP82.N34)

Hypothermia leads to an increased anatomic dead space through bronchodilatation. No evidence of difficulty in elimination of carbon dioxide was observed when the known changes in blood gas tension were considered.

5468
Spurr, G. B.,
S. M. Horvath, L. H. Hamilton, and B. K. Hutt
TEMPERATURE GRADIENTS IN THE HYPOTHERMIC DOG. — Amer. Jour. Physiol., 186 (1): 47-51. July 1956. DLC (QP1.A5, v. 186)

Temperature gradients were studied in 15 anesthetized dogs during progressive body cooling produced by exposure to cold of -5° to -10° C., and during stable hypothermia (25° C.) for up to 34 hours. Muscular tissue was observed to lose the greatest amount of heat to the environment during early cooling, with little extraction of heat from the skin. As hypothermia progressed, the amount of heat flow from the deep central regions was increased, and heat loss from the muscular tissues was reduced. During stable hypothermia the temperature gradient between the core (rectum) and the muscular tissue of the thigh was significantly greater than that observed during the control period, suggesting that the flow of heat depended primarily on conduction. The values for the thermal circulation index of the hind footpad, thigh, and foreleg were decreased by hypothermia, while those for the ear and chest were unchanged. The constancy of the index for the chest indicates that a relatively great proportion of heat loss occurred from the surface of the trunk. It is suggested that induced hypothermia results in an increased volume of the body shell and a reduced core volume.

5469
Stickney, J. C.,
D. W. Northup, and E. J. Van Liere
HYPERTHERMIA AND INTESTINAL MOTILITY IN RATS [Abstract]. — Federation Proceedings, 15 (1, part I): 180. March 1956. DLC (QH301.F37, v. 15)

In two groups of experimental rats, body temperature was elevated by keeping the rats in the field of a diathermy machine. The elevation was produced during 5 minutes before gastric intubation and was maintained until killing for removal of the small intestine. In the first experimental group the preintubation body temperature averaged 40.1° C., or 1.9° above that of the control group. No statistically significant difference was seen in the 9 pairs of control and experimental rats in which 61 and 53% of the small intestine was traversed respectively. In the second experimental group the body temperature averaged 41.8° C., or 3.7° above that of the control group. The percentage of the intestine traversed in the 8 control rats was 51 as compared with 24 in 9 experimental rats. The difference of 27% is statistically significant at less than the 0.1% level and is evidence that severe elevations of body temperature depress motility in the rat. (From the authors' abstract)

5470
Stone, H. H.,
C. Donnelly, and A. S. Frobese
THE EFFECT OF LOWERED BODY TEMPERATURE ON THE CEREBRAL HEMODYNAMICS AND METABOLISM OF MAN. — Surgery Gynecol. and Obstetrics, 103 (3): 313-317. Sept. 1956. DLC (RD1.S8, v. 103)
Also published in: Surgical Forum, 6: 129-134, 1956. DLC (RD1.A363, v. 6)

Direct measurements of cerebral hemodynamics and metabolism were made in anesthetized hypothermic subjects. In the absence of shivering, cerebral oxygen consumption was sharply reduced at body temperatures of 83 to 85° F. Within this temperature range, cardiac arrhythmias were infrequent. Shivering produced an increase in cerebral metabolism of over 100% even at body temperatures of 82.6° F. Cerebral blood flow decreased at hypothermic levels. Without the use of controlled respiration, respiratory acidosis developed during hypothermia. Cerebral vascular resistance increased in spite of a consistent rise in carbon dioxide tension. Hemoconcentration and generalized vasoconstriction in response to hypothermia may cause this increase. (Authors' summary, modified)

5471
Stupfel, M.,
and J. W. Severinghaus
INTERNAL BODY TEMPERATURE GRADIENTS DURING ANESTHESIA AND HYPOTHERMIA AND EFFECT OF VAGOTOMY. — Jour. Applied Physiol., 9 (3): 380-386. Nov. 1956. DLC (QP1.J72, v. 9)

Large thermal gradients between the rectum or colon and the heart were noted in dogs during hypothermia. The lower esophagus was found to be a satisfactory index of heart temperature during both surface and blood stream cooling and rewarming. During surface cooling and rewarming in conscious and anesthetized dogs, the rectum was cooled and warmed more rapidly than the heart, while in blood stream cooling, the reverse was true. During immersion hypothermia in humans, cooling of the rectum was slower than in the esophagus, and gradients of more than 4° C. were observed.

5472
Suda, I.,
K. Koizumi, and C. M. Brooks
EFFECTS OF COOLING ON CENTRAL NERVOUS SYSTEM RESPONSES [Abstract]. — Federation Proceedings, 15 (1, part I): 182. March 1956. DLC (QH301.F37, v. 15)

Studies were made of the effects of cooling on the electrocorticograms and evoked potentials recorded from the sensory-motor cortex and from the cerebellum. Cooling of the blood reaching the brain and cooling of the brain surface alone or in conjunction with blood cooling produced a phase of augmented response within a temperature range of 34°-24° C. During this period the negative phase of the evoked potentials was augmented and the duration was much prolonged. The changes occurring in evoked potentials recorded from the cere-

bellum suggest that there is an augmentation of cellular discharge. EEG records show that there was an increase in amplitude between 37°-24° C., though the wave frequency remained the same. Below this temperature range depression predominated in all recordings and desynchronization of evoked responses occurred. (From the authors' abstract)

5473
Swan, H.
MYOCARDIAL BALANCE OF POTASSIUM. — In: The physiology of induced hypothermia, p. 42-43. National Academy of Sciences-National Research Council, Publication 451. 1956.
DLC (QP82.N34)

In dogs cooled to 30° C. with no support of respiration, there was observed a decreased rate in respiration with a consistent fall of pH as respiratory acidosis developed. The positive myocardial potassium balance increased and was still raised an hour later. On rewarming, the animal maintained the positive balance but not as great. A similar positive balance was observed for phosphorus.

5474
Thomas, H. D.,
W. H. Frederick, A. R. Pappas, J. D. Real, and E. E. Eddleman
THE EFFECTS OF MODERATE GENERALIZED HYPOTHERMIA ON THE BALLISTOCARDIOGRAM OF THE DOG. — Amer. Heart Jour., 51 (4): 562-567. April 1956. DLC (RC681.A1A58, v. 51)

Moderate generalized hypothermia was induced in anesthetized dogs by immersing them in a bin of chipped ice until a rectal temperature between 26° and 30°C. was attained. Hypothermia produced a marked differential prolongation of the K-L interval of the ballistocardiogram and the interposition of slow headward movement during this period. This indicates that the rapid L-M downstroke resulted from cardiovascular forces, rather than after-vibrations.

5475
Villalobos, T. J.,
E. Adelson, and P. Riley
THE EFFECT OF HYPOTHERMIA ON PLATELETS AND WHITE CELLS IN DOGS. — In: The physiology of induced hypothermia, p. 186-198. National Academy of Sciences-National Research Council, Publication 451. 1956. DLC (QP82.N34)

The decrease in platelet count and probably white cell count in hypothermic dogs is due to the sequestration of platelets and white cells, and not to their destruction. Catheterization studies indicate that some of the sequestration occurs in the liver and probably also in the spleen. However, since hepatectomy and splenectomy did not completely abolish the platelet and white cell drops, it is postulated that other sinusoidal organs such as bone marrow may also play a role in the sequestration. (Authors' summary, modified)

5476
Werner, A. Y.,
D. Dawson, and E. Hardenbergh
SPONTANEOUS REWARMING OF THE HYPOTHERMIC CURARIZED DOG. — Science (Washington), 124 (3232): 1145-1147. Dec. 7, 1956.
DLC (Q1.S35, v. 124)

Nine dogs were anesthetized briefly with sodium pentothal and then heavily curarized to insure complete inactivity of the skeletal muscles. Respiration was maintained by a positive-negative phase pressure pump. When the blood pressure had returned to normal, the animals were cooled by immersion in an ice bath until the rectal temperature fell to approx. 29° C. Then the dogs were removed from the ice bath, dried, wrapped in a blanket, and allowed to rewarm at a room temperature of 24° C. Spontaneous rewarming took place after a slight drop in rectal temperature. These findings suggest the existence of a thermogenic mechanism other than increased activity of striated muscle. This mechanism is not operative if the animal is depressed by barbiturate anesthesia.

5477
Westin, B.,
A. Parentela, D. Ziliotto, and E. Odeblad
NA^{24} CLEARANCE IN HYPO- AND HYPERTHERMIC RATS. — Acta chirurgica scandinavica (Stockholm), 110 (4): 316-318. 1956 DNLM

Hypothermia was found to produce a depression in the subcutaneous clearance of injected radiosodium in rats. At elevated body temperatures both high and low clearance values were observed. The depression in clearance during hypothermia is attributed to a depressed circulation, a respiratory depression causing hypoxia, and a reduction in the physical diffusion of sodium ions.

5478
Westin, B.,
A. Parentela, D. Ziliotto, and E. Odeblad
ON THE SUBCUTANEOUS AND INTRAHEPATIC CLEARANCE OF RADIOBROMIDE IN NORMO - AND HYPOTHERMIC RATS. — Acta chirurgica scandinavica (Stockholm), 112 (1): 28-31. 1956
DNLM

The subcutaneous and intrahepatic clearances of radiobromide were observed to decrease significantly in hypothermic rats during air or pure oxygen breathing. The rate of subcutaneous bromide clearance was similar to that for sodium ions in both normal and hypothermic animals.

5479
Wynn, V.
THE METABOLISM OF FRUCTOSE DURING HYPOTHERMIA IN MAN. — Clinical Sci. (London), 15 (2): 297-304. May 1956. DNLM

Intravenous fructose tolerance tests during hypothermia (28.5°-30.5° C.) show that fructose disappearance from the blood is greatly inhibited. It is suggested that hypothermia reduces the rate of fructose penetration into the cells. A subsequent

rise in plasma glucose was seen, possibly due to the conversion of infused fructose to glucose within the liver which was then extruded from the cells. A large injection of insulin had little effect on the apparent conversion of fructose to glucose. It is postulated that an impairment of hexose metabolism occurs below the level at which fructose enters the glycolytic cycle, and possibly there is deficient formation of hepatic glycogen as well. Fructose metabolism during hypothermia is accompanied by changes in plasma potassium and inorganic phosphate concentration (Author's summary, modified)

5480
Zsóter, T.,
and M. Szabó
[VASCULAR REACTIONS TO POTENTIATED ANESTHESIA AND TO HYPOTHERMIA] Érreakciók potenciált narkosis és hypothermiában. — Kísérletes orvostudomány (Budapest), 8 (3): 237-242. May 1956. In Hungarian, with German summary (p. 242). DNLM

Vasomotor responses to induced hypothermia and to potentiated anesthesia were studied in the rat's mesoappendix. There was no inhibition of vasomotor activity in hypothermia even at rectal temperatures of 25° C. Other vascular areas presumably respond similarly to the splanchnic area as inferred from blood pressure responses. (Authors' summary, modified)

g. Endocrinology

5481
Elmadjian, F.,
E. T. Lamson, and R. Neri
EXCRETION OF ADRENALINE AND NORADRENALINE IN HUMAN SUBJECTS. — Jour. Clin. Endocrinol. and Metabolism, 16 (2): 222-234. Feb. 1956. DLC (RC648.E45, v. 16)

An increase was found in the urinary excretion of adrenaline and noradrenaline in the waking state compared with that during sleep; the percentage increase was greater for adrenaline. When sympathico-adrenal function (adrenaline and noradrenaline excretion) and pituitary-adrenal function (17-ketosteroid excretion) were measured in the same samples, both showed increases for the waking state compared to the values obtained during sleep, but no quantitative relationships were apparent. In an adrenalectomized patient, no detectable adrenaline was present in the urine, but an increase was observed in noradrenaline excretion in the waking state over that during sleep. An increased excretion of both adrenaline and noradrenaline was found in subjects during the psychomotor stress of performing on the Hoagland-Werthessen-pursuitmeter. When the stress included hypoxia (breathing a mixture of 10% oxygen for 2 hours) a significant increase was observed in urinary adrenaline excretion but not in noradrenaline. (Authors' abstract, modified)

4. NEURO AND SENSORY PHYSIOLOGY

[Environmental effects under 6]

a. General

5482
O'Hare, J. J.
INTERSENSORY EFFECTS OF VISUAL STIMULI ON THE MINIMUM AUDIBLE THRESHOLD. — Jour. Gen. Psychol., 54 (2): 167-170. April 1956. DLC (BF1.J64, v. 54)

With the primary incidental factors controlled, measurements were made of the influence of four colors (yellow, green, blue, and red) on the intensive limens of as many pure tones (200, 700, 2000, and 6000 c.p.s.). Comparisons were made between auditory thresholds in a dark or "no-color" situation and in a particular color situation. Significant auditory threshold shifts were observed, from which it is inferred that chroma can be of importance in intersensory effects. (Author's summary).

5483
Wulffen Palthe, P. M. van
[BIOLOGICAL ASPECTS OF ELECTROENCEPHALOGRAPHY] Aspects biologiques de l'electroencéphalographie. — Médecine aéronautique (Paris), 11 (1): 45-54. 1956. In French. DLC (TL555.M394, v. 11)

Essentially the same as item no. 3665, vol. III.

b. Vision

[Eye-examinations under 8-f]

5484
Baker, C. A.,
A. Debons, and D. F. Morris
DARK ADAPTATION AS A FUNCTION OF THE INTENSITY AND DISTRIBUTION OF LIGHT ACROSS THE PREADAPTATION FIELD. — In: Symposium on Air Force human engineering, personnel, and training research, p. 10-16. Air Research and Development Command, Baltimore, Md. ARDC Technical Report 56-8, 1956. DLC (UG633.A377163, no. 56-8, 1956)

Also published in: Jour. Optical Soc. Amer., 46 (6): 401-404. June 1956. DLC (QC350.06, v. 46)

Dark-adaptation functions for three subjects were measured after preadaptation to luminances of 2500, 500, 100, 20, 4, and .8 mL. The distribution of light across the preadapting field was varied so that 100%, 20%, 4%, or .8% of the total field area was luminous. The data suggest that different combinations of intensity and area in the preadapt-

ing conditions, if the total amount of light is held constant, produce no important changes in the subsequent dark-adaptation functions. Some applications of these data to equipment design are discussed. (Authors' summary)

5485
Best, W.,
and K. Bohnen
[COMPARATIVE STUDY OF THE BREAK IN THE DARK ADAPTATION CURVE EMPLOYING THE ELECTRORETINOGRAM AND THE SUBJECTIVE THRESHOLD FOR LIGHT INTENSITY] Vergleichende Untersuchung ueber dem Knick in der Dunkeladaptationskurve bei Verwendung des Elektroretinogramms und der subjektiven Schwellenreizleuchtdichte. — Documenta ophthalmologica ('s-Gravenhage), 10: 351-363. 1956. In German, with English summary (p. 362-363). DNLM

The process of dark adaptation after preliminary light adaptation was investigated with one subject. A total of 48 electroretinograms were taken with light stimuli of different intensities. The subjective dark adaptation curves to brief light stimuli of decreasing intensity were measured for the same subject. The familiar break in the course of the dark adaptation curve was present in the amplitude curves of the b-wave during dark adaptation. This break occurs earlier than in the subjective dark-adaptation curve and appears faster with higher intensity light stimuli. The authors believe that the scotopic mechanism is stimulated progressively earlier with higher light intensities. The curve of "light sensitivity of b-wave" in the course of dark adaptation also showed a break which almost coincided with the break in the subjective dark adaptation curve. Under special conditions a second break appeared in the dark adaptation curve. (Authors, summary, modified)

5486
Biersdorf, W. R.,
and J. C. Armington
LONG-TERM LIGHT ADAPTATION OF THE HUMAN ELECTRORETINOGRAM [Abstract]. — Amer. Psychologist, 11 (8): 394. Aug. 1956. DLC (BF1.A55, v. 11)

Psychophysical studies of the light adaptation process using the differential threshold have revealed a two stage process, the different stages of which have been given neural and photochemical interpretations. In the present experiment, light adaptation was followed for 15 minutes, using the electroretinogram as a physiological response measure. When both adaptation and test fields were large in area, the magnitude of the electroretinograms showed a systematic increase during light adaptation. When both were small, however, the electroretinograms became somewhat reduced during light adaptation. These results are relevant to current theoretical interpretations. (Quoted in full)

5487
Biersdorf, W. R.,
and J. C. Armington
RESPONSE OF THE HUMAN EYE TO SUDDEN CHANGES IN THE WAVELENGTH OF STIMULATION. — Walter Reed Army Inst. of Research, Washington, D. C. (Project no. 6-60-10-016, Subtask no. 3). Report no. WRAIR-159-56, Sept. 1956. 18 p. AD 124 371 UNCLASSIFIED

Changes in the human electroretinogram were elicited by a sudden replacement of a chromatic adaptation stimulus with a long-duration test stimulus. The resulting spectral sensitivity curves were found to be strongly dependent upon the color and luminance of the adaptation stimulus, with definite evidence for two spectral processes with maxima at 500 and 620 m. There was evidence for other possible processes in the green and blue but their maxima were not well defined. (Authors' abstract, modified)

5488
Bleichert, A.,
and R. Wagner
[EXPERIMENTS INTERPRETING THE PLAY OF PUPIL AS A REGULATORY PROCESS] Versuche zur Erfassung des Pupillenspiels als Regelungs-Vorgang. — Zeitschrift für Biologie (München), 109 (1): 70-80. 1956. In German, with English summary (p. 80). DNLM

The function of the pupil as a regulator of retinal illumination adjusting the nominal value through adaptation was demonstrated by the fact that the pupil size depends on the illumination, the duration of adaptation, and the transition-function. The regulator factor and the time of adjustment correspond to a poor regulator in the technical sense. Only with the help of adaptation is accuracy of the regulator sufficiently increased to guarantee constancy of stimulus for a wide range of light intensities. Such a regulating system requiring a longer period for adjustment is viewed as very suitable for the eye in that it makes the transition into various ranges of light intensity more clearly perceptible. (Authors' summary, modified)

5489
Brown, John L.
ROD-CONE INTERACTION IN THE DARK-ADAPTED EYE. — Naval Air Development Center. Aviation Medical Acceleration Lab., Johnsville, Pa. Report no. NADC-MA-5604, April 25, 1956. v+32 p. (Project no. NM 001 110 300, Report no. 1). AD 94 769 PB 125 186

The amount of light required to identify correctly the orientation of a pattern of parallel lines was measured with a series of colored lights ranging from blue to red. Subjects were dark adapted and measurements were based on short flashes of light. The situation was analagous to one in which a pilot must read illuminated instruments in short glimpses while most of the time his gaze is directed toward regions illuminated at levels much below that of the instruments. The results indicate that the relative effectiveness of different wavelength distributions of light depends on the fineness of the lines in the test pattern. With a transition from coarse lines to fine lines, there is a change in the relative effectiveness of different colored lights which corresponds to a change from the rod to the cone receptors. For lines of intermediate thickness,

correct identification of line orientation appears to depend on the combined function of rods and cones. (Author's abstract)

5490
Brown, R[obert] H.
THE EFFECTIVENESS OF A COLLIMATED RETICLE AS AN AID TO VISUAL DETECTION OF AIRCRAFT AT HIGH ALTITUDE. == Naval Research Lab., Washington, D. C. NRL Report no. 4863, Nov. 21, 1956. ii+12 p. AD 116 063 PB 121 429

To study the effects of a collimated reticle superimposed on an empty visual field on visual accommodation and target detection, subjects identified a target dot (varied in size and position) seen at optical infinity within an otherwise uniformly illuminated field. The cues for near vision were such as a plane's cockpit and the windshield framework might provide. It was found that (1) use of a collimated reticle does not significantly improve detection under the conditions studied. (2) There are significant differences between observers. (3) The threshold size of the target decreases from the outer part of the visual field to its center. And (4) at a given distance from the center, position of a target has no effect on its detection.

5491
Chin, N. B.,
and R. E. Horn
INFRARED SKIASCOPIC MEASUREMENTS OF REFRACTIVE CHANGES IN DIM ILLUMINATION AND IN DARKNESS. == Jour. Optical Soc. Amer., 46 (1): 60-66. Jan. 1956. DLC (QC350.O6, v. 46)

Same as the report, item 3955, vol. IV.

5492
Cohen, W.
PERCEPTION OF COLOR IN THE CHROMATIC GANZFELD [Abstract]. == Amer. Psychologist, 11 (8): 398. Aug. 1956. DLC (BF1.A55, v. 11)

The purpose of this study is to evaluate the role of stimulus gradients in the perception of color. Two photometer spheres were connected in order to produce either a uniform Ganzfeld or a Ganzfeld containing a differentiated area. Sixteen observers, using monocular vision, described and compared the various fields. The uniform chromatic Ganzfeld was reported as poorly saturated or neutral. The introduction of a spot differing only in intensity did not alter saturation of the field. When differentiation resulted from chromatic gradients alone, high saturation was reported. The addition of an intensity gradient to a chromatic gradient reduced saturation. (Quoted in full)

5493
Comberg, W.,
and G. Hager
[METHOD AND FINDINGS IN INVESTIGATIONS WITH A COMPLEX TECHNIQUE OF EYE EXAMINATION CONDUCTED WITH DRIVERS, FLIERS AND OTHER OCCUPATIONS] Technik und Ergebnisse bei Untersuchungen mit einem Komplexverfahren zur Augenprüfung von Autofahrern, Fliegern und anderen Berufen. = Deutsche ophthalmologische Gesellschaft, Bericht über die Zusammenkunft, 59 (Heidelberg 1955), p. 348-350. München, 1956. In German. DNLM

Test apparatus and test methods are described which allow to measure color vision, total visual field seen with head and eye movements, and visual acuity to the degree necessary for city driving, within 5 to 6 min. examination time per individual.

5494
Corbin, H. H.,
E. P. Reese, T. W. Reese, and J. Volkmann
EXPERIMENTS ON VISUAL DISCRIMINATION, 1952-1955. == Mount Holyoke College, Hadley, Mass. (Contract AF 18(600)-344); issued by Operational Applications Lab., Air Force Cambridge Research Center, Mass. AFCRC Technical Report no. 56-52, April 1956. v+55 p. AD 106 812 PB 125 077

The results of approximately twenty experiments investigating various psychophysiological aspects of visual discrimination include the following: (1) When subjects search a broad, blank, horizontal field for point-stimuli, they often miss those appearing at the sides. When subjects judge position stimuli in any number of categories they choose, multi-modal distributions of stimuli transmit more information than rectangular distributions. Subjects can bisect visual position with relatively small constant errors, a finding which supports the distinction between substitutive and additive discriminable aspects in psychophysics. A new method of scaling psychological magnitudes (first suggested by S. S. Stevens) seems to be superior to the familiar 7-point scale, especially in the spreading out of high ratings which are negatively skewed when the older rating scale is used. (2) Subjects can judge the mean, median, and range of distributions of position stimuli with considerable accuracy. When instructed to judge the relative frequency of two values of a single aspect for series which also contain values of another aspect which is not to be judged, the precision of the judgment decreases as the percentage of "distracting stimuli" increases. (3) The task of identifying a group of converging dots ("enemy planes") is extremely difficult. The speed of identification increases as the number of dots in the converging group increases. Display size, viewing distance, location of the point of convergence with respect to the center of the display, and angular dispersion of the converging group do not affect performance. (4) When subjects are required to locate a point of light after the light has disappeared and must delay their response for varying intervals of time, error and variability increase as the enforced delay in response time increases. Two anchoring agents, one at either end of the stimulus range, reduce error and variability of the judgment. A single anchoring agent shifts the apparent position of the lights away from the anchor. (From the authors' abstract)

5495
Crampton, G. H.
EFFECT OF GLARING LIGHT SOURCE ON THE HUMAN ELECTRORETINOGRAM. == Walter Reed

Army Inst. of Research, Washington, D. C. Report no. WRAIR-3-56, Jan. 1956. 2+13 p. AD 109 435
UNCLASSIFIED

The effects of a small glare adapting beam on the human electroretinogram and psychophysical visual thresholds were compared with those of light from a large white screen. Glare produced a depression in retinal electrical sensitivity which was the same for several loci of the glare image, including the optic disk. It is suggested that stray light is effective in the adaptation of nonfocal areas of the retina. Light from a weakly illuminated screen resulted in a greater reduction in retinal sensitivity, presumably because of the greater effectiveness of direct light.

5496
Crannell, C. W.,
and J. M. Christensen
A STUDY OF PERIMETER TRAINING WITH DIVERSIFIED STIMULI. — Miami Univ., Oxford, Ohio ((Contracts AF 18(600)-25 and AF 33(616)-2844)); and Wright Air Development Center. Aero Medical Lab., Wright-Patterson Air Force Base, Ohio. WADC Technical Report no. 56-63, June 1956. iv+16 p.
AD 107 273 PB 121 521

This report considers the third in a series of experiments designed to examine the possibility of increasing the size of the visual form field by specialized training. In the present experiment an attempt was made to control subjects' learning to respond to the unique qualities of stimuli by including a greater diversity of stimuli. In addition, the effect of training predominantly one eye was investigated. There was no evidence of transfer to stimuli different from the training stimuli; in fact, the results support the writers' earlier contention that much, if not all, of the improvement on training stimuli in the first two experiments was due to the subjects learning to respond to reduced cues. No differences in results could be traced to the proportion of training administered to each eye. No evidence was adduced to support the contention that improvement would follow a period of "setting in" of the training effects. (Authors' abstract)

5497
David, A. B.
DARK ADAPTATION STUDIES WITH THE GOLDMANN-WEEKERS APPARATUS. — (Dissertation, Medical Faculty of the University of Zürich.) 22 p. Zürich: Juris Verlag, 1956. DNLM

A total of 113 subjects between 15 and 69 years of age were examined. These subjects possessed normal vision, no errors of refraction, and demonstrated no ocular pathology. Dark adaptation became progressively worse with age; persons under 20 years showed the best readings, those over 60 years the poorest. Multiple examinations on the same individual demonstrated no uniform decline of dispersion from the beginning to the end of the examination. The absolute values of dispersion, however, were definitely lower at the termination of the examination than at the beginning. In general, interindividual dispersions in all age groups were approximately the same as the dispersion demonstrated by repeated examinations of the same individuals. Dispersion was lowest in the younger age brackets and highest in the older age categories. No uniform decline in dispersion from the beginning to the end of the examinations was evident. Terminal dispersions however were in all cases lower than the values obtained at the beginning of the examination. (From the author's summary)

5498
De Valois, R. L.,
and O. T. Law
STUDIES OF ALLEGED D-C ELECTROSENSITIZATION OF NIGHT VISION. — Univ. of Michigan, Engineering Research Inst., Vision Research Labs., Ann Arbor, ((Contract DA36-039-SC-52654)). Report no. 2144-56-T, Jan. 1956. viii+31 p. ((DA Project no. 3-99-10-024, Signal C, no. 102 D)). AD 104 026
PB 130 590

Visual thresholds at low luminances were compared before, during, and after the passage of direct currents of 0.05-1.00 milliamperes through the eye. Both anodal and cathodal polarization, and temporal and infraorbital electrode placements were employed. Experiments were conducted during the course of dark adaptation and after adaptation was complete. No beneficial effect of the application of current on visual threshold was observed.

5499
Doehring, D. G.,
W. D. Ward, and W. C. Hixson
THE DEVELOPMENT AND STANDARDIZATION OF A GROUP TEST FOR CRITICAL FLICKER FREQUENCY. — Central Institute for the Deaf, St. Louis, Mo. (Contract Nonr-1151(02))); and Naval School of Aviation Medicine, Pensacola, Fla. (Project no. NM 001 102 502)). Report no. 4, Dec. 12, 1956. 11 p. UNCLASSIFIED

A group test of critical flicker frequency was developed and standardized on a sample of 100 Naval aviation cadets and 174 Naval enlisted men. The subjects were tested in groups of ten-five trials to each group. A method of "constant descent" was employed for stimulus presentation. There was no consistent trend in group response level during the five trials. Intra-individual variability in response over the five trials tended to be relatively small. There was a decrease in intra-trial variability from the first to the second trial, and no change in variability over the remainder of the trials, indicating that stability of response is reached after the first trial. The test was shown to discriminate significantly between two different populations, the Naval aviation cadets and the Naval enlisted men. (Authors' summary, modified)

5500
Doesschate, G. ten,
and J. ten Doesschate
ELECTRONYSTAGMOGRAPHY AND THE STEADY POTENTIAL OF THE EYE. — Practica oto-rhino-laryngologica (Basel), 18 (5): 306-308. Sept. 1956. In English. DNLM

Essentially a condensation of item no. 4065, vol. IV.

5501
Doesschate, G. ten,
and J. ten Doesschate
THE INFLUENCE OF THE STATE OF ADAPTATION ON THE RESTING POTENTIAL OF THE HUMAN EYE. — Ophthalmologica (Basel), 132 (5): 308- . . Nov. 1956. In English. DNLM

Same as item no. 4065, vol. IV.

5502
Doesschate, G. ten,
and J. Kylstra
THE PERCEPTION OF PARALLELS. — Ophthalmologica (Basel), 131 (1): 61-65. Jan. 1956. In English. DNLM

Same as item no. 4066, vol. IV.

5503
DYNAMIC VISUAL ACUITY. — Contact (Pensacola), 14 (1): 29-30. 1956. DNLM

An examination of a series of experiments involving the testing of visual acuity during ocular pursuit (a visual function labeled dynamic visual acuity) revealed that visual acuity does not deteriorate markedly as the angular velocity of the test object relative to the eye is increased from 10°/second to 170°/second. Individuals with substantially the same static acuity may differ markedly and significantly in their dynamic visual acuity. The latter is not dependent upon whether the motion of a test object is in a vertical or horizontal plane. It was also found that learning (practice) plays an important role in the testing of dynamic vision. Mention is made of the possible relationship between dynamic visual acuity and success or failure as a naval aviation cadet, and of the possible use of a dynamic vision test as a means of modifying the visual standards required for pilot training.

5504
Emerson, G. O.,
R. D. Metcalf, and H. C. Glover
THE INADEQUACY OF VISUAL SEARCH IN AVOIDING MID-AIR COLLISIONS. — Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio. WADC Technical Note 56-145, March 1956. iii+7 p. (Project no. 7157). AD 94 601 PB 121 130

Visual search is inadequate for the certain detection of other aircraft in sufficient time to avoid collision. Monocular and binocular blind areas as produced by aircraft structural members are described and illustrated. Graphs are presented which illustrate comparative danger from various azimuthal positions expressed as a function of time to collision. It is concluded that in the development of collision warning devices to augment visual search, priority is given to the forward position in either frequency of scan or in detection range, or in both. Aircraft designers are urged to minimize as much as possible, opaque structures in the first 40 degrees of each side. Visual search should be performed almost continuously in approximately the first 30 degrees to each side, with occasional glances to 90 degrees. (From the authors' abstract and conclusions)

5505
Ettlinger, G.
THE FUSION FREQUENCY OF FLICKER IN THE CENTRAL AND PERIPHERAL FIELD WITH PHOTOPIC LEVELS OF SURROUND LUMINANCE. — Quart. Jour. Exper. Psychol., 8 (4): 172-181. Nov. 1956. DLC (QP351.E95234, v. 8)

Critical flicker-fusion frequencies (CFF) in the central visual field and at angles of 15° or 35° with the optic axis were compared in 47 subjects. Central CFF exceeded peripheral values in just over half of all quadrants tested with photopic surrounds, although smaller threshold differences were found in the center than in the periphery on a test of brightness discrimination. The pattern was generally the same in at least three quadrants of any one visual field and was apparently dependent on the size and luminance of the test object. When CFF was determined against a dark surround, a majority of the quadrants having a higher CFF in peripheral than in central vision showed a reversed response pattern. The higher peripheral CFF's remained after the photo-pupillary reflex had been abolished. It is suggested that the contrasting types of flicker response may be related to individual differences in the effect of stimulus size on flicker pattern.

5506
Falk, J. L.
THEORIES OF VISUAL ACUITY AND THEIR PHYSIOLOGICAL BASES. — Psychol. Bull., 53 (2): 109-133. March 1956. DLC (BF1.P75, v. 53)

This is a review of the problem of visual acuity in the light of the current knowledge of the physiology of the eye, neural pathways, and visual cortex. Intensity discrimination theories of Hecht and Hartridge, Weymouth's acuity theory, and the Marshall-Talbot theory are evaluated and discussed in reference to contradictory experimental findings. 84 references.

5507
Fitts, P. M.,
M. Weinstein, M. Rappaport, N. Anderson, and J. A. Leonard
STIMULUS CORRELATES OF VISUAL PATTERN RECOGNITION: A PROBABILITY APPROACH. — Jour. Exper. Psychology, 51 (1): 1-11. Jan. 1956. DLC (BF1.J6, v. 51)

Two experiments were conducted using samples of metric figures constructed in accordance with probability concepts. The perceptual task was one demanding speed in recognizing a particular pattern when it was presented as one of a set of alternative patterns. Figures generated by a random process were found to be recognized much more rapidly than were constrained figures generated by sampling contour details without replacement. This result is interpreted as indicating a detrimental effect on recognition performance of a particular form of redundancy rather than a detri-

mental effect of a decrease in information per se. At the end of a period of training the symmetrical figures and the vertically oriented figures were identified more rapidly than were single- or double contour asymmetrical figures, or horizontally oriented figures of equal complexity. Theoretical implications of these results are discussed. (Authors' summary, modified)

5508
Fobes, L. M.,
and F. A. Mote
A COMPARISON OF THE VARIABILITY OF BINOCULAR AND MONOCULAR THRESHOLD MEASUREMENTS DURING DARK ADAPTATION IN THE HUMAN EYE. — Jour. Compar. and Physiol. Psychol., 49 (5): 431-436. Oct. 1956. DLC (BF1.J57, v. 49)

The two subjects were each given 54 binocular pre-exposures to an intensity of 1870 mL. for 4 min. Afterward, thresholds were measured for the right eye, left eye, and both eyes at 20-sec. intervals for 20 min. for one subject and for 30 min. for the other. The order of measurements for the three eye conditions was counterbalanced. On the whole, there was no difference between the variances of binocular measurements as compared with monocular. Late in the course of dark adaptation, when the eyes were approaching a state of stable and maximum sensitivity, binocular variability was more frequently smaller than monocular. The frequency with which the binocular mean threshold lay below those for both monocular mean thresholds was highly significant and pointed to the existence of some sort of summative effect. When the binocular-monocular mean threshold values were analyzed at three times (early, middle, and late) during the course of dark adaptation, it was found that, although the binocular values were consistently lower, in only one out of six cases were they significantly so. (Authors' summary, modified)

5509
Gogel, W. C.
RELATIVE VISUAL DIRECTION AS A FACTOR IN RELATIVE DISTANCE PERCEPTIONS. — Psychol. Monographs, 70 (11): 1-19. 1956. DLC (BF1.P8, v. 70)

Same as the report, item no. 2812, vol. III.

5510
Gordon, J. J.
DO THE EYES HAVE IT? — U.S. Navy Med. News Letter, 27 (12): 39-40. June 22, 1956. DNLM

The problems confronting a medical officer during ocular examination of flight applicants wishing to enter into a particular program and previously coached to pass the examination are discussed. This occurs most often during photometric and Snellen Chart tests. Objective procedures for subjective phoria examinations are described which involve harmless trickery of the subjects while keeping in mind the factors of fatigue, eye strain, or indulgence in alcohol the night before, which may affect true phoria values.

5511
Green, B. F.,
and L. K. Anderson
COLOR CODING IN A VISUAL SEARCH TASK. — Jour. Exper. Psychol., 51 (1): 19-24. Jan. 1956. DLC (BF1.J6, v. 51)

Two experiments were reported in which search times for colored symbols (two-digit numbers) on a visual display were measured as a function of the relative number of symbols of each color, and the number of different colors used. When observers know the color of the target, the search time is approximately proportional to the number of symbols of the target's color. There is also a slight increment in search time due to the presence of the wrong-colored targets. When observers do not know the target's color, search time depends primarily on the total number of symbols on the display. However, search times are slightly longer for multicolored displays than for comparable single-colored displays. (Authors' summary)

5512
Green, B. F.,
B. W. White, and A. K. Wolf
VISUAL PATTERN DETECTION IN RANDOM NOISE [Abstract]. — Amer. Psychologist, 11 (8): 422. Aug. 1956. DLC (BF1.A55, v. 11)

Patterns formed by configurations of black and white dots in a 25 x 25 dot matrix were distorted by establishing some fixed probability that the color of a dot would be reversed. Accuracy of pattern detection was measured at five noise (probability) levels by a two-alternative forced choice procedure. The results show that simple patterns are very resistant to masking by random visual noise, but slight changes in the noise level near the detection threshold have large effects on the accuracy of detection. (Quoted in full)

5513
Haberich, F. J.
[IMPORTANCE OF BLINKING IN OUR VISION] Die Bedeutung des Lidschlags fur unser Sehen. — Berliner Medizin (Berlin), 7 (1): 7-8. Jan. 1956. In German. DNLM

The role of blinking in the visual act is manifold, e.g., it causes shift of retinal image, lowers the light sensitivity threshold by permitting dark adaptation while the eye is closed, etc. However, since a blink lasts on the average 0.2-0.3 sec., it occludes vision and may become a problem at high speeds in ground and air travel.

5514
Hake, H. W.,
and C. W. Ericksen
ROLE OF RESPONSE VARIABLES IN RECOGNITION AND IDENTIFICATION OF COMPLEX

VISUAL FORMS. — Jour. Exper. Psychol., 52 (4): 235-243. Oct. 1956. DLC (BF1.J6, v. 52)

Subjects were given prior practice in the use of sets of irrelevant labeling responses before learning to associate them with a set of unfamiliar nonsense forms. Although previous practice in the use of the labels did significantly increase the number of correct labeling responses achieved by subjects in labeling the nonsense forms, it did not increase their ability to recognize the forms later when seen together with new forms of similar construction. Previous practice did affect the size of within-subject correlations. It was suggested that verbal labeling practice can have a double function. It has the function first of forcing subjects to differentiate the stimulus set, as well as the set of responses used, and can provide also a denotative process whereby subjects organize and identify the stimulus aspects differentiated by practice. The latter process occurs only with the use of larger sets of practiced responses. (Authors' summary, modified)

5515
Herrick, R. M.
FOVEAL LUMINANCE DISCRIMINATION AS A FUNCTION OF THE DURATION OF THE DECREMENT OR INCREMENT IN LUMINANCE. — Jour. Compar. and Physiol. Psychol., 49 (5): 437-443. Oct. 1956. DLC (BF1.J57, v. 49)

Essentially the same as the report, item no. 2922 (vol. III).

5516
Howarth, C. I.,
and M. G. Bulmer
NON-RANDOM SEQUENCES IN VISUAL THRESHOLD EXPERIMENTS. — RAF Inst. of Aviation Medicine (Gt. Brit.), Farnborough; issued by Flying Personnel Research Committee (Gt. Brit.). Report no. FPRC 974, Sept. 1956. 10 p. AD 112 728 UNCLASSIFIED

In a series of visual threshold determinations, responses (i.e "seen" or "not seen") to a repeated stimulus of constant intensity were grouped in runs of the same response. It is suggested that there are only two possible explanations of this nonrandomness: spontaneous fluctuations of threshold and the direct influence of a response on succeeding responses. Experiments designed to distinguish between these two explanations have shown that the latter is the more important and that a response affects directly, though with diminishing intensity, the three immediately following responses. (Authors' summary)

5517
Iarbus, A. L.
[PERCEPTION OF AN IMMOBILE RETINAL IMAGE] Vosprilatie nepodvizhnogo setchatochnogo izobrazhenila. — Biofizika (Moskva), 1 (5): 435-437. 1956. In Russian. DLC (QH505.A1B53, v. 1)

A method was developed for the study of perception of an immobile retinal image. The apparatus consists of a special lens arrangement which is mounted by a suction cup on the eyeball and moves along with it. Experimental results show the importance of eye movements in the visual process. An image which is immobile with respect to the retina ceases to be perceived by the subject after a few seconds. Once it has disappeared, perception of the image does not return as long as illumination and retinal position remain unchanged.

5518
Jayle, C. E.,
R. Camo, R. Boyer, and A. Filippi
[INVESTIGATION OF NIGHT VISION IN THE COLOR-BLIND] Exploration de la vision nocturne chez les daltoniens. — Médecine aéronautique (Paris), 11 (1): 21-28. 1956. In French. DLC (TL555.M394, v. 11)

Marked increases in the threshold for gross perception of light, in the differential threshold (perception of shades of light), and in the threshold of identification were observed in a subject with achromatopsia, and slight increases were noted in 91 dichromatic subjects. The average threshold for the perception of form was similar to the normal average in both cases. The impairment of scotopic vision in the subject with defective color vision is attributed to rod dysfunction.

5519
Johannsen, D. E.,
P. I. McBride, and J. W. Wulfeck
STUDIES ON DARK ADAPTATION. I. THE PRE-EXPOSURE TOLERANCE OF THE DARK-ADAPTED FOVEA. — Jour. Optical Soc. Amer., 46 (1): 67-71. Jan. 1956. DLC (QC350.06, v. 46)

An investigation was made of the effect of brief exposures (1 to 100 seconds) to light of varying brightness (0.1 to 100 foot-lamberts) on the foveal dark adaptation of the previously dark-adapted eye. The course of dark adaptation was determined with a modified Crozier-Holway discriminometer by monocular measurements of absolute brightness sensitivity to light flashes. The extent of dark adaptation (instantaneous threshold level and steepness of adaptation curve) following light pre-exposures was observed to increase as combinations of pre-exposure duration and brightness were increased above 100 foot-lambert-seconds. Brief pre-exposure brightnesses in the range through which the acuity-brightness function is steep had little or no apparent effect on the sensitivity of the dark-adapted fovea.

5520
Johannsen D. E.,
P. I. McBride, and J. W. Wulfeck
STUDIES ON DARK ADAPTATION. II. THE PRE-EXPOSURE TOLERANCE OF THE HUMAN FOVEA ADAPTED TO DIFFERENT BRIGHTNESS LEVELS. — Jour. Optical Soc. Amer., 46 (4): 266-269. April 1956. DLC (QC350.06, v. 46)

The effect of foveal dark adaptation of pre-exposure for 1 to 100 seconds to light of 1 to 100 foot-lamberts brightness was investigated in the eye

previously adapted for 10 minutes to varying illumination levels. The extent of dark adaptation (instantaneous threshold level, steepness of curve, time required for curve to level off) after pre-exposure was observed to decrease as the adaptation level was decreased from 10 to 1, but not from 1 to 0.1 foot-lamberts. In most cases light pre-exposure superimposed upon adaptation level produced more subsequent adaptation than adaptation level alone only when the product of pre-exposure brightness and duration exceeded 100 foot-lambert-seconds. It is suggested that throughout the lower range of adaptation levels and pre-exposure brightnesses and durations, adaptation level determines the state of sensitivity of the eye and the amount of subsequent dark adaptation. Above a critical value of superimposed pre-exposure brightness and duration (100 foot-lambert-seconds), light pre-exposure becomes more effective than adaptation level in determining subsequent adaptation.

5521
Jones, T. G.,
and B. Bhatia
STUDIES ON RETINAL SENSITIVITY SHORTLY AFTER TAKE-OFF IN DARKNESS. — Aero Med. Soc. Jour. (New Delhi), 3 (1): 24-31, April 1956. DNLM

The effect of exposure to light during taxiing on the brightness threshold of the dark-adapted eyes of pilots was determined by measurement of the threshold after 15 or 45 minutes of dark adaptation and after 5, 10, or 15 minutes of dark adaptation following taxiing. Adaptation for 45 minutes produced significantly lower thresholds than adaptation for 15 minutes or for 5 to 15 minutes after taxiing. The brightness threshold 15 minutes after taxiing was lower, however, than that obtained after 15 minutes of dark adaptation following exposure to normal crew lighting. Scores obtained 15 minutes after the start of taxiing were similar to those observed after 15 minutes of dark adaptation following light exposure. It is concluded that taxiing has the same effect on dark adaptation as exposure to darkness for a similar period.

5522
Kinney, J. A. S.
CALCULATED EFFECT OF THE COLOR TEMPERATURE OF THE STIMULUS ON SCOTOPIC THRESHOLDS. — Jour. Optical Soc. Amer., 46 (12): 1093-1094. Dec. 1956. DLC (QC350.06, v. 46)

It is suggested that a major source of the variation in final thresholds obtained in different investigations of dark adaptation may be the color temperature of the lamps used in the measurements. It is stated that measurements of test stimuli are commonly made with photopic instruments which do not reflect the change of spectral sensitivity found in the dark-adapted eye, and which therefore do not properly evaluate the energy required for scotopic vision. An analysis is presented of the changes which can be expected in scotopic thresholds when light sources are equated or measured photoptically.

5523
Lewis, D. H.,
and T. D. Duane
ELECTRORETINOGRAM IN MAN DURING BLACK-OUT. — Jour. Applied Physiol., 9 (1): 105-110, July 1956. DLC (QP1.J72, v. 9)

Same as item no. 4532, vol. IV.

5524
Lockard, R. B.,
and J. L. Fozard
THE EYE AS A CONTROL MECHANISM. — Naval Ordance Test Station, Instrument Development Division, China Lake, Calif. Report no. NOTS 1546, Aug. 13, 1956. v+47 p. AD 105 843
PB 124 121

An experiment was performed to help establish the tracking accuracy of the eye. The subject tracked with his eye a target having difficult trajectory, resembling the movements of a missile seen through a tracking telescope. The target was tracked against both a clear and cluttered background. The results of this experiment indicate that, regardless of clutter in the visual field, the standard deviation of the error in eye tracking is on the order of 1°. This degree of accuracy, when divided by the magnification of whatever optical device the target is viewed through, is believed sufficient to warrant the use of the eye as an error-sensing and control device. (From authors' summary)

5525
Miller, J. W.
THE EFFECT OF ALTERED ILLUMINATION ON VISUAL ACUITY MEASURED DURING OCULAR PURSUIT. — Kresge Eye Inst., Detroit, Mich. (Contract Nonr-586(00)); issued by Naval School of Aviation Medicine, Pensacola, Fla. Project no. NM 001 110 501, Report no. 12, Sept. 20, 1956. ii+15 p. AD 119 592 UNCLASSIFIED

The dynamic visual acuity of six male subjects was tested at six different levels of target illumination while they were being rotated at various constant angular velocities. In contrast to static acuity, dynamic acuity was found to be aided considerably with increases in brightness at levels exceeding 100 footcandles. It was pointed out that the faster a target is moving the greater the brightness must be in order to maintain a given threshold. It was also found that the semi-empirical equation $y=a+bx^3$, which had been used previously to describe satisfactorily the data obtained throughout the entire range of brightnesses examined. (Authors' abstract)

5526
Miller, J. W.
THE MEASUREMENT OF DYNAMIC VISUAL ACUITY WHILE THE OBSERVER IS ROTATING. — Kresge Eye Inst., Detroit, Mich. (Contract Nonr-586(00)); and Naval School of Aviation Medicine, Pensacola, Fla. Joint Project NM 001 110 501, Report no. 11, Sept. 10, 1956. ii+12 p. AD 119 603
UNCLASSIFIED

The dynamic visual acuity of six subjects was tested during rotation at various constant angular velocities. These results were compared with those obtained previously at which time the subjects remained stationary and the test objects were moved. It was found that visual acuity deteriorates in much the same fashion with an increase in the relative angular velocity of the target, regardless of whether it is the observer or target which is moved. (Author's abstract)

5527
Miller, J. W.,
and E. Ludvigh
THE RESULTS OF TESTING THE DYNAMIC VISUAL ACUITY OF 1000 NAVAL AVIATION CADETS. — Kresge Eye Inst., Detroit, Mich. (Contract Nonr-586(00)); and Naval School of Aviation Medicine, Pensacola, Fla. Joint Project Report no. 10, Aug. 10, 1956. ii+15 p. (Project no. NM 001 110 501). AD 119 606 UNCLASSIFIED

An earlier study has shown that visual acuity deteriorates as the angular velocity of the test object relative to the observer's eye is increased. The results of testing the dynamic visual acuity of 1000 naval aviation cadets are presented and some aspects of the data are analyzed. It is found that the parameters employed to describe dynamic vision are not distributed normally. Some possible causes for this non-normality are considered. It is demonstrated that it is possible to place individuals into statistically distinguishable categories on the basis of their dynamic visual acuity. The possible application of this with regard to the future selection of pilots is considered. (Authors' abstract)

5528
Nadell, M. A.
THE EFFECT OF VARIOUS LUMINANCE LEVELS AND TARGET CONFIGURATION ON THE REFRACTIVE STATE OF THE EYE: AN INVESTIGATION OF NIGHT MYOPIA AND SKY MYOPIA USING THE INFRARED SKIASCOPE. — Los Angeles Coll. of Optometry, Calif. (Contract no. AF 33(616)-2372); issued by Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 7157). WADC Technical Report no. 56-61, Feb. 1956. vi+30 p.
AD 90 912 UNCLASSIFIED

An investigation was made of some factors of sky myopia and night myopia. An infrared skiascope was used to measure the refractive state of the eye at increasing luminance levels from 0.05 foot-lamberts to 300 foot-lamberts. Various target configurations were used in the first phase of the study to determine their relative efficacy in eliciting an accommodative response. In the second phase, a Snellen "E" and flat white, homogeneous, unmarked wall were selected as targets. At the lower level of luminance, 0, 0.001 and 0.01 foot-lamberts, there is about 0.50 diopters more accommodation in play (range, about 0.25 to 0.75 diopters). This is also true for the highest level of luminance, 300 foot-lamberts. The least accommodation occurs between 1 and 100 foot-lamberts. The advisability of prescribing spectacle lenses for the correction of night myopia is discussed. (Author's abstract and conclusions, modified)

5529
Neely, K. K.
EFFECT OF VISUAL FACTORS ON THE INTELLIGIBILITY OF SPEECH. — Jour. Acoust. Soc. Amer., 28 (6): 1275-1277. Nov. 1956.
DLC (QC221.A4, v. 28)

An experiment was conducted to quantify in terms of angle and distance from speaker to listener the contribution of visual cues to speech intelligibility in a high intensity noise environment. It was found that the intelligibility of multiple-choice word lists was significantly greater when listeners saw the speaker than when they did not. Increases from 0 to 90 degrees in the angle between the faces of speaker and listeners produced slight decreases in intelligibility. Distance between speaker and listeners (3 to 9 feet) had no significant effect on intelligibility.

5530
Nižetić, B.
[MODERN ASPECTS OF AVIATION OPHTHALMOLOGY] Savremeni aspekti vazduhoplovne oftalmologije. — Vojnosanitetski pregled (Beograd), 13 (11-12): 573-580. Nov.-Dec. 1956. In Serbo-Croatian. DLC (RC970.V63, v. 13)

An outline is given of various phases of ophthalmology concerning aviation medicine, specifically the effects of hypoxia and acceleration on visual perception.

5531
Novikova, L. A.,
and E. I. Sokolov
[ON THE METHOD OF INVESTIGATION OF THE HUMAN RETINOGRAM] K metodike issledovaniia retinogrammy u cheloveka. — Zhurnal vysshei nervnoi deiatel'nosti (Moskva), 6 (1): 170-174. Jan.-Feb. 1956. In Russian.
DLC (QP351.Z65, v. 6)

A simple method is proposed for derivation of the human electroretinogram (ERG), which opens the possibility for a wider use of retinography in the study of the visual analyzer. Simultaneous registration of the ERG and the electrogram of ocular muscles makes it possible to discern retinal oscillations induced by eye movements and blinking. Application of rhythmic light stimuli facilitates the registration and analysis of the ERG. (Authors' summary, modified)

5532
Ogle, K. N.
STEREOSCOPIC ACUITY AND THE ROLE OF CONVERGENCE. — Jour. Optical Soc. Amer., 46 (4): 269-273. April 1956. DLC (QP350.O6, v. 46)

The role of convergence in depth perception was investigated by comparison of methods for the estimation of the relative distances of two needles from the observer with (1) only the immobile reference target visually fixated, and with (2) the reference and moveable test needles fixated in turn. Stereoscopic precision was found to be considerably better for the same separation of objects

with alternating fixation eye movements. It is suggested that the underlying physiologic basis of the results is the peripheral visual acuity of the two eyes, since if only one target is fixated, the image of the other will fall on retinal regions with increased stereoscopic threshold. It is postulated that with alternating eye fixations, images fall on retinal areas of equal and therefore maximal acuity at an intermediate position of convergence, giving rise to maximum stereoscopic acuity. Thus eccentricity is halved and stereoscopic thresholds are half as large as those in the condition of one target fixation. It is suggested that a stereoscopic depth sense from convergence change cannot occur, since disparity thresholds at small distances are considerably lower than the threshold from the muscle sense.

5533
Perdriel, G.
[ACQUIRED DYSCHROMATOPSIA IN THE AVIATOR] Les dyschromatopsies acquises de l'aviateur. — Médecine aéronautique (Paris), 11 (1): 33-39, discussion p. 39-40. 1956. In French.
DLC (TL555.M394, v. 11)

Possible causes of color-blindness in aviators are discussed, including eye contusions, head injuries, retinal lesions resulting from exposure to bright light, carbon monoxide inhalation, and alcohol and tobacco intoxication. It is suggested that aviators be tested regularly for the presence of color blindness by Haitz' stereoscope method.

5534
Polinsky, D. M.,
and F. A. Young
EFFECT OF HUE DURATIONS ON ADAPTATION TO DARKNESS. — Jour. Optical Soc. Amer., 46 (2): 118-121. Feb. 1956. DLC (QC350.06, v. 46)

An investigation was made of the effects of exposure to red, green, or blue filtered light and of the duration of exposure from 2 to 10 minutes on the course of dark adaptation. Dark adaptation was determined by measurement of the time required to see light flashes at 15 predetermined luminance levels after exposure to hues. A trend analysis of the resulting curves of dark adaptation indicated that only the curves following exposure to blue for various durations or following exposure to any color for 2 minutes were parallel. Blue had the least favorable and red the most favorable effect on dark adaptation. Green light was similar in effectiveness to red at the lowest luminance values. Exposure to either red or green light for 3 1/2 to 5 minutes was found to be the most effective procedure for dark adaptation to the lowest luminance values.

5535
Posada, E.
[LIGHT SENSE] Sentido luminoso. — Revista aeronáutica (Bogotá), 10 (50): 20-22. June-July 1956. In Spanish. DLC (TL504.R5143, v. 10)

Following a brief review of the anatomy and physiology of the eye, a discussion is presented on the adaptometric investigation of changes in light sensitivity occurring in military pilots. Hemeralopia is the most frequent defect found. Aside from ocular lesions, this condition is attributed to vitamin A deficiency or flying during the day without ocular protection from the sun. Persons not having a normal adaptometric curve cannot serve as pilots. Anoxia at high altitudes produces adaptation disorders in normal persons and increases the abnormality in persons with a deficient curve. This examination is also of value in the diagnosis of other retinal disorders and glaucoma.

5536
Quinnell, R.
VISUAL DEMANDS OF HIGH PERFORMANCE AIRCRAFT. — In: Aviation medicine symposium: the aging pilot, p. 5-9. U.S. Air Force. [Unnumbered report], 1956. DNLM (W3. AV16, 1956)

Current Air Force visual standards are, for the most part, adequate even for high-performance aircraft. However, recommendations are made that more emphasis be placed on the accommodative power and perception and reaction times. The increasing demand for good cockpit vision brings with it the requirement for insuring against near tropias. Diplopia and borderline phorias when reading instruments, particularly in multiengine aircraft, can easily lead to untoward events. Visual acuity less than 20/20 can be acceptable only if it is not too severe in degree, is corrected with proper lenses, and does not require the use of bifocals. (From the author's summary)

5537
Ríos Sastain, M.
[PROBLEMS OF AERONAUTICAL OPHTHALMOLOGY] Problemas de oftalmología aeronáutica. — Clínica y laboratorio (Zaragoza), 61 (359): 91-100. Feb. 1956. In Spanish. DNLM

Hypoxemia, low barometric pressure, accelerations, brilliance, and sunlight are among the factors responsible for the visual problems encountered during high altitude, high speed flight. Consideration is given to protection of the eye during flight by means of filters (colored, neutral, reflective, polaroid), and glasses.

5538
Schweitzer, N. M. J.
THRESHOLD MEASUREMENTS ON THE LIGHT REFLEX OF THE PUPIL IN THE DARK ADAPTED EYE. — Documenta ophthalmologica ('s-Gravenhage), 10: 1-78. 1956. DLC (RE14.D6, v. 10)

An infrared-image converter was employed to determine the pupillomotoric threshold of the dark-adapted eye in response to light stimuli of varying field area, eccentricity, and color. The total energy required to evoke the pupillomotoric response was found to be constant for green or red light stimuli over a large range of field areas. At high field-area levels, the total energy requirement was increased, so that the pupillomotoric threshold was never lower than the visual threshold. The duration and wave length of the light

stimulus were similar for both the pupillomotoric and visual thresholds. The peripheral retina showed a greater sensitivity to a green test stimulus at a certain distance from the focal point, while the foveal region was more sensitive to red. It is suggested that both the rods and cones of the dark-adapted eye are adequate receptors for the light reflex of the pupil. (103 references)

5539
Silva Fuentes, J.
[NIGHT MYOPIA AND ITS IMPORTANCE IN THE SELECTION OF PILOTS FOR NIGHT FLYING] Miopia nocturna y su importancia en la selección de pilotos de vuelo nocturno. — Revista de la Fuerza aérea (Santiago de Chile), 16 (62): 27-29. July-Sept. 1956. In Spanish.
DLC (UG635.G5A32, v. 16)

Normal subjects are suited for diurnal flight, and subjects with simple hypermetropia of 1.50 to 2 diopters are most suited for night flying. Ideal pilots for both diurnal and night flying are young hypermetropic persons (less than thirty years of age) with hypermetropia less than 1.5 diopters. Aside from diseases and injuries, ocular refraction, environmental illumination, and the subject's health are considered in the etiology of nocturnal myopia of pilots, and also play an important role in ocular accommodation.

5540
Sloan, L. L.,
and A. Habel
RECOGNITION OF RED AND GREEN POINT SOURCES BY COLOR-DEFICIENT OBSERVERS. — Jour. Optical Soc. Amer., 45 (8): 599-601. Aug. 1955. DLC (QC350.O6, v. 45)

Determinations were made of the minimal illuminances in mile-candles at which color-deficient observers could distinguish red and green point sources falling within or just outside the chromaticity limits proposed by Judd and shown to be satisfactory for instrument-panel lights. The results indicate that: (1) red and green signals within these chromaticity limits are confused by many color-deficient subjects when the signals are of very small angular subtense; (2) the scores on the AF Color Threshold Test are closely related to the minimal intensity at which these colors can be distinguished. When slightly yellower greens were included, the task was more difficult for the color-deficient observer. The practical application of these findings to aviation situations is discussed.

5541
Steffen, D.
[INVESTIGATIONS CONCERNING THE THEORY OF COLOR VISION] Untersuchungen zur Theorie des Farbensehens. — Zeitschrift fur Biologie (Munchen), 108 (3): 161-177. Feb. 1956. In German, with English summary (p. 177). DNLM

The author examines a theory for color vision proposed by W. Franz, which is based on the principles of Helmholtz. It assumes that there is a structure of three components for sensation of hue --- with the basic sensations of red, yellow, and blue in addition to the sensation of brightness and darkness. Different phenomena of normal and defective color vision are interpreted within the framework of Franz's theory.

5542
Stegeman, J.
[THE PHYSICAL CAUSES OF GLARE] Die physikalischen Ursachen der Blendung. — Zentralblatt für Verkehrs-Medizin Verkehrs-Psychologie und angrenzende Gebiete (Alfeld/Leine), 1/2 (3): 184-189. Feb. 1956. In German. DNLM

The physical factors responsible for production of glare are reviewed in relation to (1) the scattering of light rays passing through the cornea, anterior chamber, lens, and vitreous humor (Tyndall effect); (2) the repeated reflection of light rays in the eye (Ulbricht sphere effect); and (3) the transparence of the sclera of the eye. Attempts to influence susceptibility to glare by pharmacological stimulation of the dark adaptation process have remained without much success. It is suggested that glare may be best prevented by technological means.

5543
Westheimer, G.
RESPONSE OF THE ACCOMMODATION MECHANISM TO VISUAL STIMULI. — Ohio State Univ. Research Foundation, Columbus (Contract no. Nonr-495(09), Project no. NR 140-105). Technical Report 1, Nov. 1956. 23 p. AD 115 628
UNCLASSIFIED

To study the accommodative responses to various visual stimuli, an apparatus was constructed in which two visual stimulus beams, independently controllable with respect to luminance, chromaticity, size, shape detail, and accommodative level, may be presented separately or simultaneously to one eye of a subject. Accommodation is measured by flashing into the same eye a beam whose configuration indicates whether the subject's eye is over-accommodated, under-accommodated, or correctly accommodated for the measuring level. The first visual stimulus to be studied was an empty field, both a completely dark one and one with a bright central area without sharp contours; the eye responds by a fluctuating level of accommodation, with an average level of slightly over 1 D and with a peak to trough amplitude of the oscillations of up to 1 D, the most prominent period of the fluctuations being about two minutes. Harmonic analysis reveals that, while individual accommodation/time curves show strong frequency bands, there are no characteristic frequencies either for an observer or for a stimulus situation. (From the author's abstract)

5544
Wilcox, L. R.
PROBABILITY OF SEEING FUNCTIONS FOR NEAR-INSTANTANEOUS FOVEAL THRESHOLDS. — Rome Air Development Center, Griffiss Air Force Base, New York. RADC-TR-56-104, Sept. 1956. iv+19 p. AD 97 769 PB 124 642

Probability of seeing as a function of stimulus intensity was measured for a circular stimulus area, 30 minutes in diameter, presented to the fovea. Measurements were made following adaptation to luminances ranging from near cone threshold to 10,000 millilamberts. In Experiment I three subjects were run at 14 adapting luminances, using a test flash duration of 50 msec for a group of 7, 9, or 11 test flash luminances; each flash was presented 20 times. In Experiment II one subject was employed and the number of test flashes at each adapting intensity was reduced to 3-5. In Experiment III the procedure of Experiment II was used with a test flash duration of six msec. The function relating the average threshold to adapting luminance is of the same general form as shown by earlier experiments in the literature. The maximum slope of the probability of seeing functions increases as the adapting luminance increases. Changes in adapting luminance beyond a value of approximately 10 mL have relatively little effect on the slope of the psychophysical function, and there is some indication that the slope decreases at high adapting luminances. The changes in slope that accompany the change in threshold at low adapting luminances are considered in relation to a "quantal" type of theory of the threshold effect. (From the author's summary and conclusions)

5545
Zeidner, J.,
and L. G. Goldstein
EVALUATION OF EXPERIMENTAL PERCEPTUAL SPEED TESTS. — Adjutant General's Office (Army). Personnel Research Branch, Washington, D. C. (Project no. 29560000). Technical Research Note no. 61, Oct. 1961. [2]+17 p. AD 126 903
UNCLASSIFIED

Three experimental perceptual speed tests (Identical Pictures Test, PT 2500; Perceptual Speed Test, Form 1, PS-1, PT 2642; and Perceptual Speed Test, Form 2, PS-2, PT 2644) were assessed for optimal testing time and scoring formula and evaluated as to their reliability, inter-correlation, correlation with tests in the Army Classification Battery (ACB), and 'rutial validity information. The tests were concluded to offer promise of improving the differential efficiency of the ACB because of their low correlation with other tests in the CRB and relative validity. In view of the relative interchangeability of these tests, it is probable that one only needs to be further developed. The Perceptual Speed Test, Form 2, is favored because of its slightly higher validity and shorter testing time.

c. Hearing

[Ear protectors under 10-b. Hearing tests under 8-i]

5546
Angeluscheff, Z. D.
SONOCHEMISTRY AND THE ORGAN OF HEARING. — Acta oto-laryngologica (Stockholm), 46 (5): 386-397. Sept.-Oct. 1956. In English.
DNLM

Progressive deafness is the sequel of sonic-ultrasonic impact (from wailing sirens, screetching cars, blasting radios, and roaring jet planes) upon the ear. Chemical reactions in the labyrinth can be initiated by infinitesimal amounts of vibratory energy. If sonic impact is of limited capacity and duration, auricular damage is temporary and reversible; however, if it is sustained, the enhanced damage becomes irreversible and leads to a progressive failure of hearing. The ultrasonic components of sound produce intense agitation in the labyrinthine fluid. The temperature is raised and this thermokinetic effect accelerates the rate of chemical reactions within the ear. (From the author's summary) (56 references)

5547
Békésy, G. von
CURRENT STATUS OF THEORIES OF HEARING. — Science (Washington), 123 (3201): 779-783. May 4, 1956. DLC (Q1.S35, v. 123)

In summing up the current status of the hearing theories, it may be said that each of the vibration patterns of the basilar membrane postulated by the four major theories of hearing can be obtained by varying two elastic properties of the membrane – namely, the coupling between adjacent parts and the absolute value of the elasticity. If these two variables are adjusted to their numerical values in the cochlea of a living animal or a fresh preparation of the human ear, traveling waves are observed along the membrane. These traveling waves have a flat maximum that shifts its location along the membrane with a change of frequency – the place of the maximum determining the pitch. An enlarged dimensional model of the cochlea in which the nerve supply of the sensory organs on the basilar membrane was replaced by the skin of the arm indicates that the inhibitory action in the nervous system can produce quite sharp local sensations, which shift their place with changes in the frequency of the vibrations. (Author's summary)

5548
Broadbent, D. E.
GROWING POINTS IN MULTICHANNEL COMMUNICATION. — Jour. Acoust. Soc. Amer., 28 (4): 533-535. July 1956. DLC (QC221.A4, v. 28)

From a review of experiments on multichannel listening it is theorized that the listening process involves the ability to discard part of presented information, without sensory masking, by rejection of sounds sharing certain physical characteristics which the desired signals do not have. Three fields of communications research suggested by this evaluation of listener capacity are: (1) consideration of the information presented in messages rather than sound as the filtering cue; (2) study of events at the instant when two sounds arrive and of the effects of timing change; and (3) detailed analysis of the cues used in the differentiation of voices.

5549
Camp, R. T.
THE EFFECT OF A NOISE ENVIRONMENT UPON SPEAKER INTELLIGIBILITY. — Ohio State Univ.

Research Foundation, Columbus (Contract N6onr 22525); and Naval School of Aviation Medicine, Pensacola, Fla. Project no. NM 001 104 500). Joint Project Report no. 63, June 30, 1956. ii+10 p. AD 119 599 UNCLASSIFIED

The effect upon speech intelligibility of a person speaking words in a quiet environment was compared with the effect upon the intelligibility of the same person speaking in the presence of 108 db. of noise when listeners heard both conditions at the same sound pressure levels and in the presence of 114 db. of noise. The speech influenced by the noise was more intelligible to listeners than the speech that was influenced by a quiet environment and a normal airborne side-tone. (Author's abstract)

5550
Carhart, R.
AUTOMATIC AUDIOMETRY FOR INDUSTRY? — Amer. Indus. Hyg. Assoc. Quart., 17 (4): 381-387. Dec. 1956. DNLM

The question as to whether automatic audiometry should be integrated into industrial programs for hearing conservation of employees working in noisy areas is discussed. Audiometry can (1) furnish a record of pre-employment hearing acuity; (2) indicate whether hearing has shifted since employment began; (3) help isolate the noise-susceptible person; (4) aid in the diagnosis of ear disease, and in determining legal responsibility for any impairment which may appear; and (5) supply the basis for legal computation of auditory disability.

5551
Carterette, E. C.
LOUDNESS ADAPTATION FOR BANDS OF NOISE. — Jour. Acoust. Soc. Amer., 28 (5): 865-871. Sept. 1956. DLC (QC221.A4, v. 28)

Loudness adaptation for bands of noise was measured by median plane localizations of dichotically presented acoustic stimuli. Loudness adaptation for a wide-band noise of uniform spectral level (100-5000 c.p.s.) was found to be an increasing function of sound pressure level from 40 to 105 db. Individual variability was high, and distributions for the different adapting levels tended to be skewed toward greater adaptation. Comparison of adaptation for a 1500 c.p.s. tone at 50, 70, or 90 db. with that for bands of noise at a similar over-all sound pressure level (SPL) whose centers (mel scale) were at 1500 c.p.s. showed that (1) loudness adaptation for 1500 c.p.s. is 8.5 db. greater than the maximum adaptation for any noise band at any SPL; (2) adaptation is small (4.5 db.) for all bands of noise, is complete within one minute, and is approximately equal for all band widths; (3) as SPL increases it becomes evident that the wider the band, the greater the degree of adaptation and the longer the time required to attain maximum adaptation. (Quoted in part)

5552
[Central Inst. for the Deaf]
HEARING CONSERVATION DATA AND PROCEDURES. — [Central Inst. for the Deaf, St. Louis, Missouri (Contract no. Nonr 1151(01))]; issued by Armed Forces-National Research Council Committee on Hearing and Bio-Acoustics (Project NR 140-061, CHABA Memorandum Report no. 2, June 195[illegible] 18 p. DNLM (W2A1, A94ch)

Instructions are presented on the use of the audiometric data card. Material on the hearing conservation data card is divided into six major categories: (1) identification of individual; (2) current noise exposure; (3) previous noise exposure; (4) medical history and status; (5) most recent noise exposure; and (6) hearing loss. Included are instructions for key-punching the data card.

5553
Ceypek, T.,
A. Epkowski, and K. . Szymczyk
[SENSITIVITY TO ACOUSTIC TRAUMA AND PNEUMATIZATION OF THE MASTOID] Wrażliwość na urazy słuchowe a pneumatyzność wyrostka sutkowego. — Otolaryngologia Polska (Warszawa), 10 (3-4): 329-334. 1956. In Polish, with English summary. (p. 334). DNLM

A group of foundry workers were examined by means of an audiometer in regard to impairment of air and bone conduction of sound; and by X-rays as to the pneumatization of the mastoid. The latter was classified as I, poor; II, average; and III, rich. In the group with poor pneumatization, hearing losses were more frequent and severe. The results of the examination of the air conduction were the same as for bone conduction in this group. Groups II and III were similar to each other on the examinations and differed significantly from Group I. The authors conclude that the type of pneumatization of the mastoid is one of the factors which may influence sensitivity to acoustic trauma and that this is probably associated with an increased amount and compactness of the osseous tissue in the mastoid. (Authors' summary, modified)

5554
Chambers, A. H.,
and G. G. Lucchin
REVERSIBLE FREQUENCY-SELECTIVE REDUCTION BY COLD OF ROUND WINDOW POTENTIALS [Abstract]. — Federation Proceedings, 15 (1, part I): 33. March 1956. DLC (QH301.F37, v. 15)

Potentials were recorded by an amplifier and oscilloscope from a gold foil electrode on the round window of an anesthetized cat. The ear was stimulated by diffuse sound. The tip of a copper wire was pressed against the cochlea near the apex of the angle formed by the bony partition and the edge of the bulla anteromedial to the round window. The cup was filled with alcohol cooled by dry ice to colder than -40° C. Reduction of potentials was observed within 2 minutes. In one instance potentials evoked by tones of 500 and 1000 cycles were reduced to 50% of control values within 6 minutes; in contrast, those evoked by 3000 and 4000 cycles were reduced by less than 10% of control. Potentials returned to control values (±10%) within 20 minutes following removal of the cold alcohol. (From the authors' abstract)

5555
Chew, H. F.,
and S. Deutsch
EFFECT OF AMBIENT NOISE ON TRAINING IN DOPPLER DISCRIMINATION. — Navy Electronics Lab., San Diego, Calif. Research and Development Report no. 677, April 5, 1956. 12 p. AD 112 779
UNCLASSIFIED

A study was made of the effects of different noise conditions on the efficiency of training of helicopter sonar operators in doppler (pitch difference) recognition. The greatest improvement in operator proficiency was found to occur when students were trained under sustained low ambient noise conditions averaging 60-70 db. Lesser improvement was observed when training was conducted in low ambient noise for two-thirds of the training period, and in 110 db. noise for one-third of the program. Poorest training results were obtained when training was conducted entirely under conditions of sustained full noise, or under conditions of progressively increasing noise. It is recommended that basic training in doppler recognition be conducted in a relatively quiet environment.

5556
Christiansen, E.
AUDITORY FATIGUE AND WHITE NOISE: AN ATTEMPT AT WORKING OUT A PREDICTIVE TEST. — Acta oto-laryngologica (Stockholm), 46 (2): 99-106. March-April 1956. In English.
DNLM

In order to prevent workers in noisy industries from developing hearing disorders, an attempt was made to formulate a predictive test using white noise as the fatigue producing factor. Auditory fatigue was measured by determining the threshold shift at 4000 c.p.s. and by measuring recovery time. The intensity and duration of the fatigue-producing factor was fixed at 105 decibels for three minutes. The limits to what were termed susceptible ears were chosen arbitrarily and fixed with a certain probability as follows: threshold shift 1/2 minutes after noise ceased ≥25 decibels; threshold shift 15 minutes after noise ceased ≥15 decibels, and recovery time ≥15 minutes. (From the author's summary)

5557
Cramer, R.,
and L. Zeitlin
FREQUENCY DISCRIMINATION OF PURE AND COMPLEX TONES. — Army Medical Research Lab., Fort Knox, Ky. (AMRL Project no. 6-95-20-001). Report no. 223, April 6, 1956. 11+9 p. AD 92 228
UNCLASSIFIED

The ability of subjects to differentiate small changes in pitch of tones in the middle and low frequency range was significantly better with complex tones than with pure tones. This difference exists with the three frequencies 190, 490, and 990 c.p.s. used in this experiment. A marked difference in individual ability to discriminate frequency changes was noted. (From authors' conclusions and abstract)

5558
Doehring, D. G.
CHANGES IN PSYCHOPHYSIOLOGICAL RESPONSES PRODUCED BY DELAYED SPEECH FEEDBACK. — Central Inst. for the Deaf, St. Louis, Mo. (Contract Nonr-1151 (02)); issued by Naval School of Aviation Medicine, Pensacola, Fla. Project no. NM 001 102 502, Report no. 1, Oct. 28, 1956. [15] p.
UNCLASSIFIED

Certain responses to the stress of speaking with delayed feedback were compared with responses to the lesser stress of speech with direct feedback. Response measures were forearm and forehead tension, galvanic skin response, heart rate, respiration rate, and blink rate. Both experimental conditions were found to produce changes in response in the direction of a stress reaction, with delayed feedback producing a significantly larger change in heart rate, blink rate, and galvanic skin response, as compared with the direct feedback measures. (Author's abstract)

5559
Egan, J. P.,
H. Gerjuoy, and E. J. Thwing
CORRELATION BETWEEN ARTICULATION SCORES FOR SPEECH MASKED BY NOISE AND FOR SPEECH MASKED BY SPEECH. — Indiana Univ. Hearing and Communication Lab., Bloomington (Contract AF 18(600)-571); issued by Air Force Cambridge Research Center, Operational Applications Lab., Bolling Air Force Base, D. C. Technical Report no. AFCRC-TN-56-52, May 1, 1956. 9 p.
AD 100 348 UNCLASSIFIED

Exploratory research was conducted to determine the degree of relationship between the ability to receive speech in a background of similar speech and the ability to receive speech in a background of noise. Measurements by articulation tests were obtained of the reception of speed in noise (noise masked reception or NMR), and similar measurements on the same listeners were made of the reception of speech in a background of similar speech (speech masked reception or SMR). The product moment correlation obtained by articulation tests between the 2 abilities was about 0.50. The reliabilities obtained are of the same magnitude as those reported by J. W. Black. The low reliabilities of the articulation tests set limitations on their use for selection purposes. (AD abstract)

5560
Fairbanks, G.,
A. S. House, and J. Melrose
AUDITORY DETECTION OF THE PRESENCE AND ABSENCE OF SIGNALS IN NOISE. — Jour. Acoust. Soc. Amer., 28 (4): 614-616. July 1956.
DLC (QC221.A4, v. 28)

Experiments were conducted to determine variation in signal detection as the signal level varied around threshold and to compare the effects of set to detect the absence of a signal with set to detect the signal. As signal detection varied over the threshold range, null detection (correct identification of no-signal samples) showed relatively little change. No-signal responses were more numerous and more often incorrect than signal responses at

all levels. Statistical signal detection thresholds were approximately 2 decibels lower in observers with set to detect absence of signal.

5561
Fairbanks, G.
EXPERIMENTAL STUDIES OF TIME COMPRESSION OF SPEECH [Abstract]. — Jour. Acoust. Soc. Amer., 28 (4): 591. July 1956.
DLC (QC221.A4, v. 28)

Psychophysical experiments were conducted to investigate the effects of speech compression controlled by a technique for automatic time-frequency compression-expansion. The results indicate that the time dimension of speech is elastic and that the listener is able to withstand substantial time compression. A specified probability of word identification was reached at a duration shorter than the average speaker can produce, and listeners preferred rates of connected speech which were faster than commonly used or recommended. Intelligibility was considerably less affected by time compression than by frequency compression or expansion by the same factor. (Quoted in part)

5562
Fournier, E.
[OCCUPATIONAL PATHOLOGY OF NOISE: TRAUMATIC DEAFNESS] Pathologie professionnelle du bruit: surdité traumatique. — Bulletin médical (Paris), 70 (1): 29-30. Jan. 1956. In French.
DNLM

A brief discussion is presented on occupational deafness caused by noise (intensity of 120 decibels), including that produced by aircraft (130-140 decibels as produced by jet aircraft). Workers may remain in a noisy environment for many hours without fatigue, headache, and general malaise, but after several months or years temporary deafness may occur, during which period recuperation is possible with proper treatment. Deafness becomes irreversible after several years of noise exposure. In a noisy environment, workers also exhibit signs of fatigue, irritability, loss of weight, difficulty in comprehension, difficulty in thinking, and anxiety.

5563
Harris, J. D.,
H. L. Haines, and C. K. Myers
A NEW FORMULA FOR USING THE AUDIOGRAM TO PREDICT HEARING LOSS FOR SPEECH. — Naval Medical Research Lab., New London, Conn. (Project Report no. NM 003 041.56.07). Research Report no. 273 (vol. 15, no. 2), Feb. 24, 1956. iii+28 p. AD 99 142 UNCLASSIFIED

Previous systems for predicting hearing loss for speech were examined, and their defects noted. A new system based upon the statistic known as the Multiple Regression Prediction Equation was developed; weights are assigned to hearing loss at each of the audiometric frequencies 500, 1000, 2000, 4000, and 6000 c.p.s., and a predicted score for speech hearing loss is obtained. This score will be within five decibels of the hearing loss which would be obtained if an actual speech test were given. A series of 197 partially-defective ears, with fairly complete diagnostic information was used to compare the several systems for predicting speech from the pure tone audiogram. A remarkably good predictor was the simple average of hearing losses at the frequencies 500, 1000, and 2000 c.p.s. It was shown that no predictive system could always be superior to other systems, and it was concluded that the most stable method for predicting speech hearing loss was an average of the Multiple Regression Equation Prediction plus the three average prediction. (Authors' abstract)

5564
Hoffman, H. S.
THE DETECTION OF SIGNALS AND THEIR ATTRIBUTES. — Naval Medical Research Lab., New London, Conn. Report no. 277 (vol. 15, no. 6), Sept. 25, 1956. iii+6 p. (Project no. NM 003 041.55.02). AD 128 700 UNCLASSIFIED

A series of noise-like signals was presented against a background of noise. Listeners were required to detect these signals and to specify their separate attributes. One attribute (chopping) was produced by periodically interrupting the signal. The second attribute (modulation) consisted of a periodic change in signal bandwidth. A given signal was either chopped, modulated, chopped and modulated, or steady. It was found that though the four signals were equally detectable, the detectability of the separate attributes varied as a function of their nature and number. Listeners differed in the extent to which modulation detection was adversely affected by the presence of chopping. In all other respects, differences among listeners were small. (Author's abstract)

5565
Iriarte, D. R.
[OCCUPATIONAL DEAFNESS OF AVIATORS] La sordera profesional de los aviadores. — Ciencia aeronáutica (Caracas), 2 (15): 24-25. Feb. 1956. In Spanish.

Occupational deafness in pilots is related to the number of flying hours, exposure to intense or prolonged noises, age, and barotraumatic tympanosclerosis. Mention is made of the prevention of deafness by modifying aircraft cabin construction, providing protective ear plugs, muffs, and helmets for pilots, and reducing the flying time.

5566
Jankowski, W.,
W. Birecki, S. Iwanklewicz, and Z. Ziemski
[REMARKS ON THE MECHANISM OF RECOVERY FROM HEARING LOSS AFTER STIMULATION OF THE HEARING ORGAN WITH PURE TONE] Uwagi w sprawie wyrównywania się ubytku słuchu po obciążeniu narządu słuchu tonem czystym. — Otolaryngologia polska (Warszawa), 10 (11): 145-148. 1956. In Polish, with English summary (p. 147).
DNLM

The authors describe studies on the differential recovery times from temporary hearing loss caused by two methods of presentation of a pure-tone stimulus. The recovery time for temporary

hearing loss due to exposure to a constant stimulus is several times longer than the recovery time from hearing loss due to an intermittent stimulus. An explanation of this phenomenon is based on the discoordination of the sensory cells in the organ of Corti. (Authors' summary, modified)

5567
Jeffress, L. A.,
H. C. Blodgett, T. T. Sandel, and C. L. Wood
MASKING OF TONAL SIGNALS. — Jour. Acoust. Soc. Amer., 28 (3): 416-426. May 1956.
DLC (QC221. A4, v. 28)

A critical analysis was made of experimental observations of the phenomena of auditory masking. Predictions of the behavior of pure-tone masking were made from study of a monaural model consisting of a narrow band-pass filter followed by a detector responsive to changes in output level, and a binaural model consisting of a series of coincidence detectors associated with a delay network capable of matching a delay in stimulus with a delay in the neural path. Observations showed the following: (1) Subjects are more sensitive to a decrease in the level of a pure tone than to an increase. (2) The transient responses of a narrow filter are paralleled in subjects' responses to short signals. (3) A large masking-level-difference (MLD) results from reversing the phase of a signal tone when it is added 90° out of phase with a tone of the same frequency. (4) Substantial MLD's are found with pure-tone maskers when the interaural phase of the signal is reversed, provided the signal is short. (5) Substantial MLD'S are found when a binaural signal is used with uncorrelated noise at the two ears, provided the signal is short. (6) The threshold for the binaural detection of a change in the masker when a signal is added antiphasically is approximately 100 seconds for a noise masker, and 60 seconds for a pure tone. (7) There is apparently no evidence for "binaural inhibition". (Quoted in part)

5568
Jerger, J. F.
THE EFFECT OF STIMULUS INTENSITY ON THE PATTERN OF RECOVERY FROM AUDITORY FATIGUE. — Northwestern Univ., Evanston, Ill.; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-143, Jan. 1956. 6 p. AD 95 325 UNCLASSIFIED

The pattern of recovery of the auditory threshold following intense stimulation is characterized by a secondary maximum, or "bounce", occurring approximately two minutes after cessation of the fatiguing stimulus. The present study investigated the effect of the intensity of the fatiguing stimulus on this bounce phenomenon. Results are interpreted in terms of their significance for the problem of predicting susceptibility to permanent, noise-induced hearing loss. (Author's abstract)

5569
Jerger, J. F.,
and R. T. Carhart
TEMPORARY THRESHOLD SHIFT AS AN INDEX OF NOISE-SUSCEPTIBILITY. — Northwestern Univ., Evanston, Ill.; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-55, May 1956. 5 p. AD 116 538
PB 127 296

Temporary threshold shift after fatigue was measured in 345 ears prior to their placement in an environment of high-level noise. In addition, two audiograms were made on each ear: one, prior to the noise-exposure period; the second, eight weeks after its termination. Results indicated that ears showing hearing losses at 3000 and 4000 c.p.s. eight weeks after the noise exposure tended to show longer recovery times on the pre-noise-exposure fatigue test than ears with no change. (Authors' abstract)

5570
Kiang, N. Y.,
and M. H. Goldstein
RESPONSES FROM AUDITORY CORTEX TO REPEATED BURSTS OF NOISE [Abstract]. — Federation Proceedings, 15 (1, part I): 110. March 1956. DLC (QH301.F37, v. 15)

Responses to repeated clicks and bursts of noise were recorded with gross electrode from the auditory cortex and from a location near the round window of the cochlea in anesthetized cats. The repetition rate was varied from less than 1/sec. to beyond 1000/sec. As the repetition rate increases the evoked cortical responses decrease in size and become visually undetectable at approximately 20/sec. Summated neural potentials from the peripheral location "follow" to rates of at least several hundred clicks or bursts/sec. (Authors' abstract)

5571
Kidd, D. J.
AUDIOGENIC FATIGUE DUE TO HIGH NOISE LEVELS IN A WARSHIP. — Canadian Services Med. Jour. (Ottawa), 12 (10): 915-925. DNLM

Up to 84% hearing loss was found in watch-keeping personnel exposed unprotected for more than two hours to high levels of machinery noise of up to 122 decibels in a diesel electrically driven ship. Recovery to normal threshold hearing levels required up to 180 hours following the last exposure. Mention is made of protective devices such as ear muffs and protective booths for noise-exposed personnel.

5572
Kletz, H.
[MEASUREMENTS AND REFLECTIONS ON THE SUBJECT OF LOUDNESS PERCEPTION] Messungen und Überlegungen zum Thema der Lautstärkenempfindungen. — Zeitschrift für Laryngologie Rhinologie Otologie (Stuttgart), 35 (11): 747-757. Nov. 1956. In German. DNLM

A study was conducted on the adaptation processes in the ear to sound stimuli and subsequent readaptation to the rest state after cessation of stimuli. The length of the readaptation process is

influenced frequently by the degree of auditory fatigue. The author suggests that the adaptation process in the ear is not related to the stimulation of sensory end organs, but is due to purely mechanical processes. An attempt is made to prove that electrical stimulation of the sensory end organs does not result in measurable tory fatigue; therefore the effect of fatigue on re- ptation is also due to mechanical distortions in the ear. (From the author's summary)

5573
Kovář, M.
[ON EXPERIMENTAL AUDITORY FATIGUE] O experimentální dočasné únavé sluchu. — Pracovní lékařství (Praha), 8 (3): 182-184, June 1956. In Czech, with English summary (p. 184). DNLM

Auditory fatigue was studied in 220 volunteers with normal and impaired hearing. The subjects were exposed to various intensities of sound or noise for 15 minutes. A properly conducted hearing fatigue test is suggested as a prophylactic measure before hiring personnel for noisy occupations. Subjects who exhibited increased auditory fatigue in the experiment are supposedly more susceptible to hearing impairment in noise. Increased auditory fatigue was found in conditions of presbyacusis, heredodegenerative cochlear hearing defect, Ménière's disease, and in 10% subjects with normal hearing. In subjects with defective conductivity, auditory fatigue was less than normal. Fatigue was induced by sound or noise from an earpiece for airborne conduction. (Author's summary)

5574
Lightfoot, C.,
R. Carhart, and J. H. Gaeth
MASKING OF IMPAIRED EARS BY NOISE. — Jour. Speech and Hearing Disorders, 21 (1): 56-70. March 1956. DNLM

Pure-tone and spondee thresholds, in quiet and in two levels of white noise, were obtained from a number of normally hearing and hypacusic subjects with a view of evaluating the hypothesis that such noise will produce the same amount of masking (M) in an ear which is impaired, whether conductively or perceptively, as it will produce in a normal ear, provided that the effective level (Z) of the masking noise is the same for the two ears. The number of abnormal M-Z relationships found in the data obtained for hypacusic subjects tended to invalidate the hypothesis. The direction of such abnormality appeared to be related to the spectral characteristics of the signal. When the signal was a low-frequency tone or a series of words, M was frequently less than it would be for a normal ear masked by noise of the same Z level. When a signal was a tone of 3 or 4 k.c.p.s., M was frequently greater than normal. The degree of M-Z abnormalities appear to be influenced by the type of hearing loss. (From the authors' summary)

5575
McCroskey, R. L.
SOME EFFECTS OF ANESTHETIZING THE ARTICULATORS UNDER CONDITIONS OF NORMAL AND DELAYED SIDE-TONE. — Ohio State Univ. Research Foundation, Columbus (Contract N6onr 22525); and Naval School of Aviation Medicine, Pensacola, Fla. Joint Project Report no. 65, July 15, 1956. ii+12 p. (Project no. NM 001 104 500). AD 119 605 UNCLASSIFIED

The effect of loss of tactile cues from speech articulators on normal and delayed airborne side-tone with respect to rate of progress of speech, articulatory accurateness, and intelligibility was measured in 900 subjects. Six speakers recorded three forms of the multiple-choice intelligibility tests under four conditions of side-tone: normal, delayed airborne side-tone (0.18 second), disrupted tactile feedback (articulators anesthetized), and delayed side-tone plus loss of specified tactile cues. There was no significant difference between normal side-tone and disrupted tactile feedback with regard to rate of progress of speech. A significant increase in the rate of speech progress was observed during delayed auditory side-tone. There were significantly fewer words correctly articulated under the condition of disrupted tactile side tone than were correctly articulated under conditions of normal and of delayed auditory side tone. Listener scores indicated that the loss of tactile cues in the monitoring of a speaker's voice had a more deleterious effect upon intelligibility than a 0.18 second delay in auditory side-tone when the listeners were in quiet. (Authors' abstract and summary, modified)

5576
Martin, D. W.,
R. L. Murphy, and A. Meyer
ARTICULATION REDUCTION BY COMBINED DISTORTIONS OF SPEECH WAVES. — Jour. Acoust. Soc. Amer., 28 (4): 597-601. July 1956. DLC (QC221.A4, v. 28)

A study was made of the effect on word articulation of individual and combined speech wave distortions consisting of gross attenuation of high-frequency components, multiple echoes of amplitude equal to the original signal, random amplitude modulation, and gross irregularity of response-frequency characteristic. Individual speech wave distortions produced little or only moderate losses in word articulation, while distortion pairs produced significant loss. A combination of random amplitude modulation, multiple echoes, and high-frequency attenuation yielded word articulation scores as low as 20%.

5577
Moody, J. A.,
E. A. Jerome, J. P. Flynn, and T. J. Connor
AN AUTOMATIZED TECHNIQUE OF INVESTIGATING DIFFERENTIAL SENSITIVITY TO AUDITORY INTENSITIES. II. THE INFLUENCE OF CATCH TESTS. — Naval Medical Research Inst., Bethesda, Md. (Project Report no. NM 000 019.02.03). Research Report (Vol. 14, p. 789-794), Oct. 22, 1956. UNCLASSIFIED

The report supplies data relevant to an evaluation of the influence of "catch tests" on measures of auditory sensitivity obtained with an automatized stimulus schedule controlled by the subject's responses. The use of the catch test raised the

threshold of detection about 7 percent. The subjects responded to about 2 percent of the catch tests. (Authors' abstract)

5578
Moody, J. A.,
E. A. Jerome, J. P. Flynn, and T. J. Connor
AN AUTOMATIZED TECHNIQUE OF INVESTIGATING DIFFERENTAL SENSITIVITY TO AUDITORY INTENSITIES. III. THE INFLUENCE OF RANDOMIZING THE STARTING POINT OF THE STIMULUS SERIES. — Naval Medical Research Inst., Bethesda, Md. (Project Report no. NM 000 019.02.04). Research Report (Vol. 14, p. 803-808), Oct. 22, 1956. UNCLASSIFIED

Measures of differential sensitivity to auditory intensities were compared under two conditions using an automatized version of the method of limits. In one case the magnitude of the initial stimulus of an ascending or descending series was determined by the magnitude of the terminal stimulus in the immediately preceding series. In the other case, series were started with stimulus magnitudes either 0, 1, 2, or 3 steps beyond the terminal stimulus magnitude. The subjects were run twice under each of these conditions at rates of 20, 30, and 60 stimulus presentations per minute. The results indicated that no differences in sensitivity or variability occurred between the experimental conditions. (Authors' abstract)

5579
Nesswetha, W.
[INVESTIGATIONS ON THE NOISE TOLERANCE OF THE INNER EAR AND ITS RELATION TO SOME PSYCHOSOMATIC SYMPTOMS] Untersuchungen über die Lärmtoleranz des Innenohres und ihre Beziehungen zu einigen psychophysischen Symptomen. — Zeitschrift für Laryngologie Rhinologie Otologie (Stuttgart), 35 (3): 213-218. March 1956. In German. DNLM

Audiograms were taken of 380 workers with chronic occupational exposure to noise levels between 95 and 99 phon. Two groups were differentiated on the basis of a relatively fast or relatively slow recovery of normal hearing function after the end of the working day. The first group included 32% of the subjects. This percentage remained constant even after consideration of other variables such as age and length of employment. The findings suggest that noise tolerance is constitutional and to a certain extent independent of chronic noise factors. Psychosomatic symptoms of ear sensations, subjective and objective visual disturbances, and vegetative disturbances appeared on the average twice as frequently in people with lowered noise tolerance as in the group with good noise tolerance.

5580
Noble, R.
EFFECT OF NOISE ENVIRONMENT OF AN ENGINE TEST LABORATORY ON AUDITORY ACUITY. — Jour. Aviation Med., 27 (5): 452-455. Oct. 1956. DLC (RC1050.A36, v. 27)

Comparison of quartile threshold data obtained in monaural tests over a period of time indicates no apparent change in auditory acuity which could be attributed to exposure to the high intensity noise environment of an engine test laboratory. Within the limits of the data, the acuity of the personnel who are exposed to these environments follows the trend of the general population. (Author's summary)

5581
Palva, T.
ABSOLUTE THRESHOLDS FOR CONTINUOUS AND INTERRUPTED PURE TONES. — Acta oto-laryngologica (Stockholm), 46 (2): 129-136. March-April 1956. In English. DNLM

Using the method of adjustment, auditory thresholds were measured for continuous and interrupted tones with a repetition rate varying from 1 to 12/second and with a constant on-off ratio of 0.5. The results showed that the differences in threshold attained some significance only for repetition rates of 8 and 12/second, where they seemed to be slightly poorer than the continuous tone thresholds. It is concluded that the audibility of a tone is mainly a function of its duration until a full loudness value is obtained and that after this point the thresholds are independent of the repetition value. (Author's summary, modified)

5582
Pescetti, V.
[EAR DISORDERS CAUSED BY NOISE AND CONCEPTS OF AUDIOLOGY] Le otopatie da rumore e nozioni di audiologia. — (Collana di studi sulla prevenzione, 9) xii + 96 p. Roma: Ente Nazionale per la Prevenzione Infortuni, 1956. In Italian. DNLM (WV270.P4730)

This is a handbook concerned with noise-induced hearing disorders including a discussion on the hearing apparatus, sound and noise, and audiometry and interpretation of the audiogram. Special consideration is given to concepts of experimental physiopathology and pathological anatomy, etiology and pathogenesis, symptoms, diagnosis, prevention, and psychomotor, neuropsychiatric and neurovegetative reactions to sound stimulation of noise-induced hearing disorders.

5583
Pestalozza, G.,
and H. Davis
ELECTRIC RESPONSES OF THE GUINEA PIG EAR TO HIGH AUDIO FREQUENCIES. — Central Inst. for the Deaf, St. Louis, Missouri (Contract N6onr-272). 1+23 p. AD 108 307 UNCLASSIFIED
Also published in: Amer. Jour. Physiol., 185 (3): 595-600. June 1956. DLC (QP1.A5, V. 185)

Cochlear microphonic (CM), action potential (AP), and summating potential (SP) were recorded from the round windows of anesthetized guinea pigs in response to tone bursts with a nearly linear rise and fall of 1 millisecond at frequencies of 8 kc. and higher. Thresholds at 48 kc. were nearly identical for all responses, but at 12 kc. the SP threshold was higher and the AP threshold much lower than that for CM. SP was a prominent feature of the normal electric response of the cochlea

at high frequencies; at high intensities its voltage often exceeded that of AP or CM. The latency from CM to the foot of AP was diminished with increases in the intensity and frequency of tone bursts. The threshold of stimulus duration (measured for a given ratio of stimulus intensity to the usual threshold intensity) was decreased with increasing intensity ratios, but was independent of frequency at a given ratio. (Authors' summary, modified)

5584
Peters, R. W.
LISTENER RESPONSES TO VOICE MESSAGES AS A FUNCTION OF SIGNAL-TO-NOISE RATIO AND EXPERIENCE WITH SIMILAR MESSAGES. — Ohio State Univ. Research Foundation, Columbus (Contract N6onr 22525); and Naval School of Aviation Medicine, Pensacola, Fla, Joint Project Report no. 64, July 1, 1956. ii+9 p. AD 119 607 UNCLASSIFIED

The hypothesis that learned messages interfere with the reception of non-learned messages differentially, depending upon the noise level under which the non-learned messages are received, was tested experimentally. Groups of listeners were exposed to training messages either not at all, 4 times, or 12 times before being tested on messages highly similar to the training messages. The training messages were heard at a 0 db. S/N ratio. The test messages were heard at one of four signal/noise (S/N) ratios, -10 db., +5 db., 0 db., or -5 db. Listener responses to test messages were scored to yield the number of correct responses for both test and training messages. Twelve groups of listeners, with 18 persons in each group, served as experimental subjects. Both the training and test messages were multiple-choice intelligibility test word groupings. The results indicate that an increased amount of exposure to training messages does not decrease the listeners' reception of test messages for the various S/N ratios. However, with increased exposure to training messages and a decreased S/N ratio there was a significant increase in the occurrence of responses which were correct for the training messages but were among the error responses to the test messages. (Author's summary)

5585
Peters, R. W.
STUDIES IN EXTRA-MESSAGES: THE EFFECT OF VARIOUS MODIFICATIONS OF THE VOICE SIGNAL UPON THE ABILITY OF LISTENERS TO IDENTIFY SPEAKERS' VOICES. — Ohio State Univ. Research Foundation, Columbus (Contract N6onr 22525); and Naval School of Aviation Medicine, Pensacola, Fla. (Project no. NM 001 104 500). Joint Project Report no. 61, May 1, 1956. ii+14 p.
AD 105 717 UNCLASSIFIED

Evaluations were made of the effect of various modifications of the voice signal upon listeners' ability to identify speakers' voices. Listener identification facility was significantly decreased (1) when the voice signal was modified by either a six db. increase or decrease in sound pressure level, (2) when the voice signal was interrupted at five rates of from one to twelve per second, or (3) when increased portions of the voice signal were rejected through either high-pass or low-pass filtering. The adding of octave frequency bands, especially the band of 75 to 150 c.p.s., significantly increased listener identification. The effect of ASA white noise was not adequately tested because all levels employed limited the listeners' identification of voices too severely. (Author's abstract)

5586
Pickett, J. M.
EFFECTS OF VOCAL FORCE ON THE INTELLIGIBILITY OF SPEECH SOUNDS. — Jour. Acoust. Soc. Amer., 28 (5): 902-905. Sept. 1956.
DLC (QC221.A4, v. 28)

Measurements were made of the intelligibility of speech heard in noise and produced by amounts of vocal force ranging from the weakest voiced whisper to a very heavy shout. The results show less than 5% deterioration in intelligibility over the range from a moderately low voice to a very loud voice (55 to 78 db. in a free field at one meter from the lips). Beyond these points intelligibility decreased abruptly and in a linear relation to decibel change in vocal intensity. Analysis of listeners' errors by different parts of the syllable showed that: (1) Shouting degrades primarily the intelligibility of the releasing (initial) and arresting (final) parts of the syllable. (2) Weak vocal effort degrades the intelligibility of all parts of the syllable. (3) The degradation of vowel intelligibility by shouting is slightly greater for open vowels than for closed vowels. (Quoted in part)

5587
Pickett, J. M.
PREDICTING SPEECH COMMUNICATION IN NOISE. — In: Symposium on Air Force human engineering, personnel, and training research, p. 204-210. Air Research and Development Command, Baltimore, Md. ARDC Technical Report 56-8, 1956. DLC (UG633.A377163, no. 56-8, 1956)

Essentially a condensation of the report, item 4797 (vol. IV).

5588
Pollack, I.
THE IDENTIFICATION AND DISCRIMINATION OF COMPONENTS OF ELEMENTARY AUDITORY DISPLAYS. — In: Symposium on Air Force human engineering, personnel, and training research, p. 211-220. Air Research and Development Command, Baltimore, Md. ARDC Technical Report 56-8, 1956. DLC (UG633.A377163, no. 56-8, 1956)

Six subjects participated in a series of sound-level discrimination and identification tests which were carried out over a wide range of conditions. In the discrimination tests, subjects attempted to detect differences in sound levels between two members of a pair of tones when the reference signal for discrimination was varied over the range of sound levels examined. In the identification tests, they attempted to assign numerals to the tones. The major findings were: (1) The discrimination threshold increases as the range of sound levels available to the reference signals for discrimination increases; (2) the information transmitted in the identification situation increases

as the range of sound levels available for identification increases. The net effect of these two findings is that the information transmission associated with both the discrimination and identification experiments is roughly equivalent over a moderate range of sound levels, at least for medium discrimination criteria. (Author's summary)

5589
Poulton, E. C.
LISTENING TO OVERLAPPING CALLS. — Jour. Exper. Psychol., 52 (5): 334-339. Nov. 1956. DLC (BF1.J6, v. 52)

Two competing calls were presented simultaneously from different loud-speakers. Each call contained a three-figure number, and the subject had to write down the number if it was preceded by his particular call sign. In one of the experiments all the loud-speakers were idle. In the other experiment one loud-speaker was busy all the time. On this loud-speaker the interval between calls was occupied by conversations, which resembled the calls in certain respects. In the experiment with conversations, it was found that a call from an idle loud-speaker tended to capture subject's attention. This occurred even when the call was irrelevant, and the subject knew he was being called by the busy loudspeaker. When the conversations had to be followed, calls from idle loudspeakers tended to be missed. In the experiment without conversations, there were more errors when two numbers synchronized, than when a number was masked by a name. Over half the errors were confusions between the two numbers. There were more errors when the numbers from both competing calls had to be recorded, than when only one of the numbers had to be recorded. (Author's summary, modified)

5590
Pražić, M.,
and B. Salaj
[AUDIOLOGIC ANALYSIS OF WORKERS IN THE SHIPYARD "3rd MAY" IN RIJEKA] Audiološka analiza radnika brodogradilišta "3. Maj" na Rijeci. — Arhiv za higijenu rada i toksikologiju (Zagreb), 7 (3): 161-224. 1956. In Croatian, with English summary (p. 224). DLC (RA421.A6z, v. 7)

Audiologic analysis of 439 workers in the shipyard was performed. The workers worked under 13 different noise conditions. The analysis was done in three ways: the intensity and quality of noise in different places was measured; afterwards the tape-recorded noise was spectroscopically analyzed; and all workers were audiometrically examined. 50% of them were found to have severe hearing losses. Fresh acoustic trauma was found in only three cases and complete unsusceptibility to noise in 4 cases. The analysis of the composite audiograms and spectroscopic pictures shows great variability in the severity of hearing losses and reveals a close connection between the hearing loss and the frequencies and intensity of noise in different working places. It is suggested that deaf people be employed in particularly noisy places. (Authors' summary, modified)

5591
Robert, P.
[HEARING AND THE AVIATOR] L'audition et l'aviateur. — Médecine aéronautique (Paris), 11 (3): 314-329. 1956. In French, with English summary (p. 328-329). DLC (TL555.M394, v. 11)

Methods practised by the French Air Medical Service for the treatment of hearing difficulties include the injection of placental extract for cochlear lesions; radiotherapy, use of aerosols, and iontophoresis for blockage of the Eustachian tube; iontophoresis and heparinization for middle ear difficulties; simple medication for acute catarrh; and iontophoresis for chronic catarrh. Treatment of cochlear lesions has resulted in a significant improvement of hearing in the 1000-2000 c.p.s. range. Satisfactory improvement has been observed in cases of catarrh and Eustachian tube blockage.

5592
Rosica, S. J.
THE MECHANICS OF AN INDUSTRIAL HEARING CONSERVATION PROGRAM. — Amer. Indus. Hyg. Assoc. Quart., 17 (1): 39-43. March 1956. DNLM

The importance is stressed of pre- and periodic post-employment audiometry in an industrial hearing conservation program. In addition, a complete noise survey should be made throughout the plant and corrective measures considered in terms of (1) controlling the noise at its source; (2) controlling the surrounding area where noise is present; and (3) providing ear protectors for employees working in the noisy areas.

5593
(School of Aviation Medicine)
AVIATION OTOLARYNGOLOGY. — School of Aviation Medicine, Randolph Field, Tex. [Project 303, 1956] viii+172 p. DNLM (WD700.U59a)

This is a manual intended to provide the aviation medical examiner and the flight surgeon with information concerning the otolaryngological problems encountered in aviation medicine. Emphasis is placed on proficiency of examination and knowledge of pathology of the ear, nose and throat, which are necessary to the understanding of associated physiologic and pathologic effects of flying.

5594
Schubert, E. D.
SOME PRELIMINARY EXPERIMENTS ON BINAURAL TIME DELAY AND INTELLIGIBILITY. — Jour. Acoust. Soc. Amer., 28 (5): 895-901. Sept. 1956. DLC (QC221.A4, v. 28)

Same as item no. 4925, vol. IV, with one chapter omitted.

5595
Sedláček, M. K.
[PRINCIPLES OF AUDIOLOGY] Základy Audiologie. — Praha: Státní zdravotnické nakladatelství, 1956. 421 p. In Czech, with English summary (p. 385-396). DNLM (WV270 S449Z, 1956)

This monograph on hearing is divided into a theoretical and an applied part. The former includes chapters on basic acoustics and physiological acoustics essential for understanding of the function of the auditory analyzer in parts as a whole. The part on applied audiology delineates basic types of hearing disorders; methods for examination and their use; tests of hearing by means of speech and tuning forks; methods for quantitative measurement of hearing in liminal and supraliminal values, their practical use and examples; and rehabilitation of defective hearing. Occupational hearing loss is discussed in detail, its significance for compensation, preventive measures prophylaxis in selection of personnel for noisy occupations, and various forms of ear defenders, including Czechoslovak makes.

5596
Stevens, S. S.
THE DIRECT ESTIMATION OF SENSORY MAGNITUDES: LOUDNESS. — Amer. Jour. Psychol., 69 (1): 1-25. March 1956. DLC (BF1.A5, v. 69)

These studies undertake to develop and refine a method for the quantitative estimation of sensory magnitudes in the field of audition. One form of the method of magnitude estimation utilizes a standard stimulus and a set of variable stimuli. The standard is assigned some convenient modulus, and the observer's task is to assign numbers to the variables in a manner that reflects the magnitude of the ratio between standard and variable. Consistent results have been obtained with this method over wide ranges (90 db.). Another form of this method involves assigning appropriate numbers to a series of tones of varying loudness. The median magnitude estimations obtained with both procedures were consistent with a loudness-scale that is a power function of physical intensity: $L = kI^{0.3}$. (Author's summary, modified)

5597
Stevens, S. S.,
and E. C. Poulton
THE ESTIMATION OF LOUDNESS BY UNPRACTICED OBSERVERS. — Jour. Exper. Psychol., 51 (1): 71-78. Jan. 1956. DLC (BF1.J6, v. 51)

These experiments tested the ability of 65 observers to make consistent quantitative judgments of the relative loudness of tones on their first trials. They also explored some of the biasing factors that enter such experiments. The method of adjustment and the method of magnitude estimation were used. (Authors' summary)

5598
Tolhurst, G. C.,
and R. W. Peters
EFFECT OF ATTENUATING ONE CHANNEL OF A DICHOTIC CIRCUIT UPON THE WORK RECEPTION OF DUAL MESSAGES. — Jour. Acoust. Soc. Amer., 28 (4): 602-605. July 1956.
DLC (QC221.A4, v. 28)

Same as item no. 3553, vol. III.

5599
Tolhurst, G. C.
THE EFFECTS OF DISRUPTING THE SIMULTANEITY OF VISUAL-AURAL COMMUNICATION CHANNELS TO A SPEAKER. — Ohio State Univ. Research Foundation, Columbus (Contract N6onr 22525); and Naval School of Aviation Medicine, Pensacola, Fla. Joint Project no. NM 18 02 99, Subtask no. 1. Report no. 66, Dec. 20, 1956. ii+9 p.
LC (Sci.) UNCLASSIFIED

Forty-eight speakers received the messages they were to impart to listeners in a face-to-face situation. For 24 of them the aural-channel was delayed 0.23 second from that of the visual. The effect of dissynchrony of the aural-visual signals upon the speakers was not to change the intelligibility of speech or the sound pressure level of voice. There was a significant change, namely, lengthening the time of phrase duration. (Author's abstract)

5600
Vatshaug, T. O.
EFFECTS OF JET AIRCRAFT NOISE ON HEARING: A LIST OF REFERENCES. — National Library of Medicine, Washington, D. C. Oct. 24, 1956. 7 p.

This is a bibliography of 57 references dealing with the effects of jet noise on human hearing. The references pertain primarily to the pathological effects of actual jet noises, the probable effects of jet noises, jet noises as a factor in communications, and the results of experiments with sirens especially designed to simulate jet noise.

5601
Wallner, C.
[ADAPTATION TO ELECTRIC STIMULATION OF HEARING] Die Adaptation bei der elektrischen Reizung des Gehörs. — Zeitschrift für Laryngologie Rhinologie Otologie (Stuttgart), 35 (5): 306-314. May 1956. In German. DNLM

Elevation of the auditory threshold due to auditory adaptation was investigated by means of electrical stimulation of the ear with sinusoidal alternating frequency. The electrodes for most experiments were fastened on the skin behind the mastoid, and in the external meatus close to the eardrum. The adaptation curves of four subjects in the range of 1500 c.p.s. obtained with a stimulus frequency of 900 c.p.s. were similar to those obtained by acoustical measures. It is concluded that an electrical stimulus applied at the place of acoustical excitation has the same effect as the acoustical stimulus. The transformation of the electrical stimulus to nerve excitation occurs distally to the cochlear nerve.

5602
Yantis, P. A. 1956
AUDIOLOGIC EXAMINATION OF THE INNER EAR: THE AURAL-OVERLOAD TEST. — Jour. Speech and Hearing Disorders, 21 (3): 303-312. Sept. 1956. DNLM

Some of the audiometric applications of the exploring-tone technique for measuring the thresholds of aural overload in the human ear are reviewed and discussed. This test may be employed to detect malfunctioning of the inner-ear sensory structures.

d. Proprioception (Including Vestibular Functions)

5603
Beickert, P.,
and H. Wist
[VERIFICATION OF VEGETATIVE LABILITY WITH THE METHOD OF WEAK ROTATORY STIMULI USING MEGAPHEN] Die Objektivierung vegetativer Labilität mit einer Drehschwachreizmethode unter Anwendung von Megaphen. — Archiv für Ohren-Nasen- und Kehlkopfkunde (Berlin), 168 (6): 461-465. 1956. In German. DNLM

Fifty healthy subjects were given a modified rotatory deceleration test and a pendulum test (turning back and forth through 180° angle). Twenty-one of the subjects responded abnormally to the latter test, i.e., with an inhibited course of nystagmus. A Schellong test confirmed that vegetative instability may be characteristic of the hypo-reactors. In the second part of the study 50 mg. of Megaphen [chlorpromazine] were given to each subject prior to repetition of the vestibular tests. After Megaphen the vegetatively stable subjects responded to vestibular tests with fewer oscillations and narrower amplitude; the vegetatively instable subjects exhibited an increase in the number of oscillations and a widened amplitude. It is concluded that the pendulum test measures minimal changes in the vestibular response. Disturbances of the autonomic nervous system may be determined by comparison of the pre-Megaphen and post-Megaphen curves on the pendulum test. The inhibitory reactions originate supposedly from the central regulatory areas of the brain stem.

5604
Caldwell, L. S.
THE ACCURACY OF CONSTANT ANGULAR DISPLACEMENT OF THE ARM IN THE HORIZONTAL PLANE AS INFLUENCED BY THE DIRECTION AND LOCUS OF THE PRIMARY ADJUSTIVE MOVEMENT. — Army Medical Research Lab., Fort Knox, Ky. (Project no. 6-95-20-001, Subtask AMRL S-1). Report no. 233, April 27, 1956. ii+16 p.
AD 97 657 UNCLASSIFIED

The accuracy of 10° angular displacements of the arm was found to be a function of both the direction and locus of movement. Movements toward the side were most accurate in the side (50° - 90°) region, and movements toward the front were most accurate in the front (0° - 40°) region. (0° represents the intersection of the horizontal and medial planes passing through the shoulder joint and 90° represents the intersection of the horizontal and lateral planes). Adjustments toward the side were more accurate than those toward the front. (Author's abstract)

5605
Cawthorne, T.
THE INVESTIGATION OF VESTIBULAR FUNCTION. — Brit. Med. Bull. (London), 12 (2): 131-142. May 1956. DLC (R31.B925, v. 12)

Test methods for inducing manifestations of vestibular dysfunction are reviewed. These test procedures include: (1) rotational tests and caloric tests of semicircular canal function; (2) positional tests of otolith function; (3) tests for optokinetic nystagmus. The rotational tests seem to be the most useful tests of vestibular function. (43 references.)

5606
Fischer, J. J.
THE LABYRINTH: PHYSIOLOGY AND FUNCTIONAL TESTS. — New York: Brune and Stratton, 1956. xi+206 p. DLC (QP471.F55, 1956)

This book was written with emphasis on the clinical aspects of labyrinthine function, relating them to a theoretical background. The chapter on general physiology of the labyrinth discusses also various theories, functions of the cristae ampullares, maculae, reactions to linear acceleration, function of the saccule, separation of macula and crista functions, influence of the labyrinth on the striated musculature and the autonomic nervous system. The chapter on applied physiology considers phenomena of vertigo, spontaneous disturbances of equilibrium and coordination, nystagmus, convergence spasm, etc., and various induced reactions. In addition to functional tests for spontaneous manifestations, others described are: tests of falling reaction and past-pointing, optokinetic test, caloric tests, bilateral calorization, turning tests, mechanical tests, galvanic tests, tests of tonic reflexes and reactions. The concluding part deals with the evaluation of abnormal reactions and with peripheral and central lesions. (Many references)

5607
Frenzel, H.
[CONSTRUCTION OF NYSTAGMOID VESTIBULAR COMPLEX] Zum Bauplan des nystagmogenen Vestibulariskomplexes. — Archiv für Ohren-Nasen- und Kehlkopfheilkunde (Berlin), 168 (4): 271-278. 1956. In German. DNLM

An attempt is made to differentiate the centers of function for the individual nystagmus directions. While the appearance of the horizontal and the rotational nystagmus is regulated by tonus differences between right and left, the development of vertical nystagmus is based on the differences in tonus within the region of the vestibular nucleus on each side, i.e. between the center for the upward vertical nystagmus and the center for the downward vertical nystagmus within each of the vestibular nuclei. (Author's summary)

5608
Groen, J. J.
THE SEMICIRCULAR CANAL SYSTEM OF THE ORGANS OF EQUILIBRIUM. I. — Physics in Med. and Biol. (London), 1 (2): 103-117. Oct. 1956. DLC (QH505.P47, v. 1)

The basic anatomy and physiology of the vestibular organs is described, and various tests of vestibular function, including cupulometry, subjective cupulometry, and nystagmography are discussed.

5609
Mann, C. W.,
and J. Ray
ABSOLUTE THRESHOLDS OF PERCEPTION OF DIRECTION OF ANGULAR ACCELERATION. — Tulane Univ., New Orleans, La. (Contract Nonr-475-05); and Naval School of Aviation Medicine, Pensacola, Fla. Joint Project Report no. 41, May 25, 1956. ii+15 p. (Project no. NM 001 110 500) AD 119 602 UNCLASSIFIED

The threshold of perception of angular acceleration was defined in this experiment in terms of a component of angular acceleration applied for a given time of exposure and judged correctly as to direction at a 75 per cent level of confidence. The results indicate that the curve of best fit describes a hyperbolic relationship between acceleration and exposure time. The maximum time of exposure of 30 seconds was determined by previous experiments on adaptation, and at this maximum the defined angular threshold acceleration was of the order of 0.035°/sec^2. (Authors' abstract)

5610
Mann, C. W.,
and C. J. Canella
AN EXAMINATION OF THE TECHNIQUE OF CUPULOMETRY. — Tulane Univ., New Orleans, La. (Contract Nonr-475-05); and Naval School of Aviation Medicine, Pensacola, Fla. Joint Project Report no. 42, May 30, 1956. ii+21 p. (Project no. NM 001 110 500). AD 119 600 UNCLASSIFIED

Sensation and oculogyral illusion (OGI) cupulograms were obtained for 9 normal, 8 seasick-prone individuals, and 3 aviators to test cupulometry as a tool for psychological and clinical analysis of the vestibular apparatus. The cupulograms were analyzed with respect to linearity, slope, intercept, Bárány effect, correlation of sensation and OGI cupulograms, and variability of aftereffects. The following results were obtained: A positive linear relationship was established between the logarithm of the chair velocity and the duration of the aftereffect. Linearity of regression was shown for all cupulograms of normal subjects. In cases of seasickness, three sensation and four OGI cupulograms did not meet the criteria for linearity. In sensation cupulograms, seasick subjects had significantly steeper cupulograms than did normal subjects; in OGI cupulograms, significance at the five per cent level could not be shown. Differences in slopes were very marked between seasickness-prone subjects as compared with individuals who were hardened seasickness-resistant, such as aviators and sailors. The mean intercept for seasick subjects indicated greater sensitivity than for normal subjects. The Bárány test significantly increased the threshold response to vestibular stimulation.

e. Complex Preceptive Phenomena (Including Spatial Orientation, Sensory Illusions, etc.)

5611
Arnoult, M. D.
A COMPARISON OF TRAINING METHODS IN THE RECOGNITION OF SPATIAL PATTERNS. — Air Force Personnel and Training Research Center. Skill Components Research Lab., Lackland Air Force Base, Tex. (Project no. 7706, Task no. 77119). Research Report no. AFPTRC-TN-56-27, Feb. 1956. vi+13 p. AD 98 197 PB 123 456

Groups of subjects were trained to recognize one of ten visual patterns (meaningful and nonmeaningful) by one of five training methods (unstructured reproduction, structured reproduction, general questions (oral), general questions (written), and specific questions) before being presented with a criterion test. Control groups were required merely to observe the patterns. In general, there was no difference between the groups trained on meaningful and nonmeaningful patterns, either during the training period or in their performance on the criterion task. The control group performed at a level significantly better than chance on the criterion test.

5612
Arnoult, M. D.
FAMILIARITY AND RECOGNITION OF NONSENSE SHAPES. — Jour. Exper. Psychol., 51 (4): 269-276. April 1956. DLC (BF1.J6, v. 51)

Nonsense shapes were presented with frequencies varying from 0 to 25 to subjects who were later required to rate the same stimuli on a five-point scale of familiarity. For different groups of subjects the delay between the familiarization and rating sessions was 0, 1, 2, 3, or 5 hrs. A measure of recognition was obtained as well by dichotomizing the ratings into "Familiar" and "Unfamiliar" categories. A total of seven groups of 100 subjects each was used in two separate experiments. The conclusions were: (1) There were no significant differences in familiarity as a function of delays of as much as 5 hr. between the two sessions. (2) There were no differences in recognition as a function of the various amounts of delay. (3) Familiarity of nonsense shapes was found to be a monotonic, negatively accelerated function of the frequency of experience. (Author's summary, modified)

5613
Arnoult, M. D.
RECOGNITION OF SHAPES FOLLOWING PAIRED ASSOCIATES PRETRAINING. — In: Symposium on Air Force human engineering, personnel, and training research, p. 1-9. Air Research and Development Command, Baltimore, Md. ARDC Technical report 56-8, 1956.
DLC (UG633.A377163, no. 56-8, 1956)

Following pretraining the subjects, 400 male basic trainees were given a recognition test composed of 16 items, each item consisting of 4 nonsense

shapes. Eight items contained a shape which had been used in pretraining. The subject indicated whether or not he recognized any shapes, and the proper name for each shape. For all groups, performance on the recognition test was a monotonic, negatively-accelerated function of the number of pretraining trials, which reached an asymptote at eight trials. Rejection of new shapes increased as a function of meaningfulness. Gross recognition and fine recognition were unrelated to the meaningfulness of the responses. For the latter there was a significant interaction between the training method and the amount of pretraining. The ability of subjects to recall the responses learned in the pretraining was a function of the meaningfulness of the responses. (Author's summary, modified)

5614
Aso, J.
ANALYTIC OBSERVATIONS ON THE LABYRINTHINE NYSTAGMUS BY ELECTRONYSTAGMOGRAPHY: THE INTERPLAY OF THE ROTATIONAL NYSTAGMUS AND THE OPTOKINETIC NYSTAGMUS. II. — Acta medica et biologica (Niigata), 4 (2): 93-112, Nov. 1956. In English. DNLM

A comparison of rotational nystagmus with eyes open or closed in a lighted room with rotational nystagmus in a dark room showed that the former was produced by the overlapping of optokinetic and vestibular nystagmus, the principal component being optokinetic. Hitherto it was postulated that labyrinthine nystagmus was facilitated by the optic impulse. From a consideration of the intensity of the optic and labyrinthine impulses during rotational nystagmus with open eyes in a lighted room, it was confirmed that the optic impulse was more powerful than the vestibular since the rotational impulse with concentrated gaze could hardly produce nystagmus. Also in the case of the rotating chair at various speeds, the optokinetic nystagmus was visible regardless of the speed of rotation.

5615
Brandt, [U.]
[VERTIGO IN AVIATORS] Le vertige des aviateurs. — Médecine aéronautique (Paris), 11 (1): 97-99, 1956. In French. DLC (TL555.M394, v. 11)

The hazards of spatial disorientation produced by flight maneuvers are discussed, and the following measures for the training of pilots are recommended: (1) indoctrination in the physiology of spatial orientation, (2) instruction in the classical illusions produced by various accelerations and the effects of deficient organs of equilibrium, (3) practical demonstration of the phenomena of equilibrium in a Link trainer, a Bárány chair, and on a human centrifuge, and (4) instruction in the physiological causes of accidents due to errors of the senses.

5616
Brown, Robert H.
THE UPPER SPEED THRESHOLD FOR THE DISCRIMINATION OF VISUAL MOVEMENT AS A FUNCTION OF STIMULUS LUMINANCE. — Naval Research Lab., Washington, D. C. NRL Report no. 4862, Nov. 26, 1956. ii+14 p. AD 116 062
PB 124 542

The problem of the present report was to determine how stimulus luminance affects the upper speed threshold. The observer viewed the center of a circular black area surrounded by a dimly illuminated area. The moving spot of white light traversed the path of a horizontal line centered in the circle. At high speeds, the observer reported a stationary line and could not indicate the direction of movement. At slow speeds, he indicated the direction (right or left). Two subjects made 50 responses, one 26 responses, to each of several combinations of luminance and speed of the moving spot. The speed and luminance were systematically varied in a counterbalanced order. The results may be summarized as follows: (1) For a given excursion, the threshold luminance of visibility increases directly with speed when the exposure time is less than a critical duration determined by the sensory excitation time of the retina. (2) The threshold luminance for discrimination of motion also increases directly with speed but approaches a limiting asymptotic velocity at high speeds. (3) The upper speed threshold increases directly with luminance at moderate luminances. And (4) at intense luminances, the upper speed threshold is approximately constant. The results are interpreted in terms of previous research and certain similarities and dissimilarities in the functioning of the eye to that of a camera. (Author's abstract)

5617
Christman, R. J.
THE PERCEPTION OF DIRECTION AS A FUNCTION OF BINAURAL TEMPORAL AND AMPLITUDE DISPARITY. — In: Symposium on Air Force human engineering, personnel, and training research, p. 82-89. Air Research and Development Command, Baltimore, Md. ARDC Technical Report no. 56-8, 1956.
DLC (UG633.A377163, no. 56-8, 1956)

Combinations of binaural time delay and amplitude disparity which will provide a perception of the apparent direction of the source of an acoustic signal have been determined by experimental means. Within the limitations prescribed by the conditions of the experiment and the stimulus materials used, these various combinations will insure a perception of direction of a signal source to any reasonable degree of certainty. Any equipments which are designed to make use of this auditory ability should take into consideration the minimal amplitude disparities and the useful limits of temporal delay which can be utilized, either singly or in combination. Use of signals other than short-duration, high-peak amplitude pulses, and conditions other than high sound/noise ratios and low ambient-noise levels, may result in effects not in accordance with the data of this report.

5618
Clark, B.,
and A. Graybiel
VERTIGO AS A CAUSE OF PILOT ERROR IN JET AIRCRAFT. — San Jose State Coll., Calif.; and Naval School of Aviation Medicine, Fla. Research Project NM 001 110 100, Report no. 44, Aug. 15, 1956. ii+20 p. DLC (Sci)
UNCLASSIFIED

One hundred and thirty-seven jet pilots were studied to obtain information regarding their vertigo experiences in jet aircraft. Individual interviews and a check list of vertigo experiences were used. It was found that 96 per cent of the pilots had experienced vertigo while flying jet aircraft and that the nature of vertigo was essentially the same as that found during flight in propeller driven aircraft. The most frequent illusory experience was found to involve confusions with regard to the attitude and motion of the aircraft. The jet pilots believe that certain unique aspects of jet flight may contribute to difficulties in spatial orientation. (Authors' abstract)

5619
Clark, W. C.,
A. H. Smith, and A. Rabe
THE INTERACTION OF SURFACE TEXTURE, OUTLINE GRADIENT, AND GROUND IN THE PERCEPTION OF SLANT. — Canad. Jour. Psychol., 10 (1): 1-8. March 1956.
DLC (BF1.C3, v. 10)

Twelve observers viewed monocularly six stimuli of varied complexity in terms of surface texture gradient, outline gradient, and ground. Judgments of slant, objective shape, and perspective shape were made. Slant was found to be a function of the first two gradients, but the effects of ground were unclear owing to unidentified interaction with figure. Outline was a more effective cue than surface texture, but the two did not jointly produce better perception than either alone. The data on the relation between slant and shape failed to accord with the invariance hypothesis and with traditional views of the nature of constancy. (Authors' summary)

5620
Clark, W. C.,
A. H. Smith, and A. Rabe
RETINAL GRADIENTS OF OUTLINE DISTORTION AND BINOCULAR DISPARITY AS STIMULI FOR SLANT. — Canad. Jour. Psychol., 10 (2): 77-81. June 1956.
DLC (BF1.C3, v. 10)

Sixteen observers viewed monocularly and binocularly a film-field and a surface-field (both without outline), a film-form, and a surface-form, all circular stimuli inclined 40 degrees from the frontal-parallel plane, under conditions which generally offered only retinal cues. Perception of slant was a function of gradients of surface texture and of outline distortion, as required by the theory of psychophysical correspondence. These gradients did not interact to make perception more accurate, but retinal disparity interacted with both of them. Outline and circles were better cues for slant than surface texture and rectangles, respectively. The latter comparison was based partly on data from a previous experiment. (Authors' summary)

5621
Crook, M. N.,
and J. Jaffe
THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS: DIRECTION OF CONTRAST AS A FACTOR IN THE RECOGNITION OF FAMILIAR FORMS. — Tufts Univ. Inst. for Applied Experimental Psychology, Medford, Mass. (Contract DA-49-007-MD-536). Interim Report no. 6, Oct. 31, 1956. 1+10 p. AD 215 553 UNCLASSIFIED

The effect of contrast direction on recognizability of forms degraded by visual noise was investigated, using silhouettes of light and dark objects printed both as black forms on a white ground and as white forms on a dark ground. Results showed no evidence that a natural contrast direction in the test copy (e.g., white on black for a light form) favored recognition. A definite tendency was found for recognition to be favored by test copy in black on white, regardless of type of form. (Authors' abstract)

5622
Deese, J.
COMPLEXITY OF CONTOUR IN THE RECOGNITION OF VISUAL FORM. — Johns Hopkins Univ., Baltimore, Md. (Contract AF 33(038)-22642); issued by Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio. WADC Technical Report no. 56-60, Feb. 1956. iv+22 p. AD 94 610 UNCLASSIFIED

The influence of complexity of contour upon the accuracy of recognition of visually presented forms was investigated in two experiments. No simple relation was observed between contour complexity and accuracy of identification. For regular forms, complex contours were more accurately identified than simple contours; for irregular forms, there was no difference. This suggests that complexity of contour per se may be important under only certain limited conditions. Some of the factors and the conditions under which they affect form recognition and identification are discussed.

5623
Gogel, W. C.,
B. O. Hartman, and G. S. Harker
THE RETINAL SIZE OF A FAMILIAR OBJECT AS A DETERMINER OF APPARENT DISTANCE. — Army Medical Research Lab., Fort Knox, Ky. Report no. 235, May 9, 1956. ii+25 p. (Project no. 6-95-20-001). AD 94 659 UNCLASSIFIED

Several retinal sizes of a familiar object were presented one-at-a-time in an otherwise dark field of view. The subjects threw darts to the apparent distance of the familiar object. The analysis of the results from the first presentations of the stimuli offers no evidence that the retinal size of the familiar object determined the absolute distance at which the object was seen. Changes in the results between successively presented stimuli are interpreted as indicating a relation between relative retinal size and the perception of relative distance. (Authors' abstract)

5624
Gogel, W. C.
THE TENDENCY TO SEE OBJECTS AS EQUIDISTANT AND ITS INVERSE RELATION TO LATERAL

SEPARATION. — Psychol. Monographs, 70 (4): 1-17. 1956 DLC (BF1.P8, v. 70)

Same as the report, item no. 2813, vol. III.

5625
Goldstein, A. G.,
and L. K. Williams
JUDGMENTS OF VISUAL VELOCITY AS A FUNCTION OF LENGTH OF OBSERVATION TIME. — Army Medical Research Lab., Fort Knox, Ky. Report no. 239, May 24, 1956. ii+15 p. (Project no. 6-95-20-001). AD 109 299 UNCLASSIFIED

An arm-movement response was utilized by subjects to indicate the perceived velocity of a moving parallel-band pattern after varying durations of stimulus exposure. Increases from 8 to 30 seconds in the duration of exposure to the constant-velocity (2.4-14.3 cm./sec.) stimulus resulted in decreases in apparent velocity; increases from 2 to 8 seconds or 30 to 60 seconds had little effect. A relationship is suggested between the effect of moving stimulus duration on perceived velocity and the phenomenon of the apparent movement of stationary objects in a direction opposite that of a prior moving stimulus.

5626
Gottsdanker, R. M.
THE ABILITY OF HUMAN OPERATORS TO DETECT ACCELERATION OF TARGET MOTION. — Psychol. Bull., 53 (6): 477-487. Nov. 1956. DLC (BF1.P75, v. 53)

The experimental literature on responses to acceleration of target motion was reviewed. One significant observation was that smoothly accelerated motion is generally responded to as if the velocity were constant. Suggestions were made of a basic approach toward obtaining thresholds of acceleration. Examples of studies on constant velocity motion were included in order to develop a systematic graphic method of describing experiments on motion. The phenomenon of velocity constancy of a single moving target was identified and generalized. (Author's summary)

5627
Gray, R. F.
RELATIONSHIPS BETWEEN OCULOGYRAL ILLUSIONS AND NYSTAGMUS. — Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pa. Report no. NADC-MA-5609, Aug. 24, 1956. iv+14 p. AD 107 773 UNCLASSIFIED

Four human subjects were exposed to various angular accelerations during 228 runs on a human centrifuge. It was observed that nystagmus (oscillatory eye movements of a sawtooth waveform) occurred at times when no oculogyral illusions (visual illusions of rotation) were reported, and oculogyral illusions occurred at times when no nystagmus could be distinguished. It is concluded that not all nystagmus causes oculogyral illusions.

5628
Gruber, H. E.
THE SIZE-DISTANCE PARADOX: A REPLY TO GILINSKY. — Amer. Jour. Psychol., 69 (3): 469-476. Sept. 1956. DLC (BF1.A5, v. 69)

The author cites experimental evidence which contradicts a mathematical theory of space perception by showing that perceived distance does not approach a limit as physical distance increases, nor is physical distance always underestimated. Errors in size-judgment are not positively correlated with errors in distance-judgment. (Author's summary, modified)

5629
Klopp, H. W.
[THE DEVELOPMENT AND DISINTEGRATION OF THE VERTICAL IMAGE: COMPARATIVE STUDIES ON OPTICAL LOCALIZATION OF UP AND DOWN AND ITS RELATION TO THE SENSE OF GRAVITY] Über die Entwicklung und den Abbau des aufrechten Bildes: eine vergleichende Untersuchung zur Frage der optischen Lokalisation von oben und unten und ihre Beziehung zum Schwereinn. — Fortschritte der Neurologie Psychiatrie und ihrer Grenzgebiete (Stuttgart), 24 (1): 27-41. Jan. 1956. In German. DNLM

Comparative studies of the inversion of the vertical image in young patients operated on for congenital blindness, and experimental inversion of the image by prisms are cited to show the close reciprocal relationship between the gravitational sense and visual perception. The accompanying sensory disturbances of postural orientation during the inversion experiment with prisms are in additional proof that the changed stimulus patterns impinging on the retina affect the sense of gravity.

5630
Krauskopf, J.
THE EFFECTS OF RETINAL IMAGE MOTION ON CONTRAST THRESHOLDS. — Army Medical Research Lab., Fort Knox, Ky. Report no. 221, Jan. 27, 1956. ii+33 p. (AMRL Project no. 6-95-20-001). AD 83 003 UNCLASSIFIED

Contrast thresholds for continuous seeing were determined under varying conditions of retinal image motion. The "stopped image" technique was used to eliminate normal retinal image motion. Controlled motion at various frequencies and amplitudes was introduced by means of a rotatable mirror in the optical system. Low frequency vibrations (1, 2 and 5 c.p.s.) of the retinal image were found to be beneficial to maintained vision while high frequency vibrations (10, 20 and 50 c.p.s.) were found to be detrimental to maintained vision when compared to vision in the absence of normal retinal image motion. (Author's abstract)

5631
Krieger, H. P.,
and M. B. Bender
OPTOKINETIC AFTERNYSTAGMUS IN THE MONKEY. — Electroencephalography and Clinical Neurophysiol. (Montreal), 8 (1): 97-106. Feb. 1956. DNLM

Optokinetic nystagmus and its afternystagmus was studied by recording the corneoretinal potential with the electroencephalograph in monkeys examined in darkness. The direction of the eye movements was determined by the antecedent optokinetic stimulus. The frequency and duration were only partially determined by this stimulus. Optokinetic afternystagmus was diminished and in time obliterated by light, but it was brought out again by returning the animal to darkness thereby demonstrating that light merely makes the phenomenon latent and does not abolish it. This after-response is suppressed by eyelid closure and sleep and can be reestablished by waking the animal. These observations may be analyzed in terms of figure-ground relationships of the stimulus, the effect of sleep on eye movements, proprioceptive mechanisms, and internuncial neuronal pools of reciprocating forces. A definitive mechanism has yet to be worked out. (Authors' summary, modified)

5632
Kuilman, J.
[VESTIBULAR NYSTAGMUS AND COUNTER-ROLLING OF EYES REGISTERED SIMULTANEOUSLY] Nystagmus vestibulaire et contre-rotation des yeux enrigistrés simultanément. — Practica oto-rhino-laryngologica (Basel), 18 (5): 287-293. Sept. 1956. In French, with English summary (p. 293). DNLM

After comparing the advantages and disadvantages of electro-nystagmography and those of optical nystagmography, the author points to the value of the optical method of Struycken-Kuilman for the simultaneous registration of nystagmus and of counter-rolling of the eyes. (Author's summary)

5633
Leibowitz, H.,
and L. E. Bourne
TIME AND INTENSITY AS DETERMINERS OF PERCEIVED SHAPE. — Jour. Exper. Psychol., 51 (4): 277-281. April 1956. DLC (BF1.J6, v. 51)

The function relating matched shape to exposure duration and to luminance was determined by matching ellipses with an obliquely viewed disc. For near-threshold stimulus conditions, the axis ratios of matched ellipses agree with the retinal image theory; with increase in either duration or luminance the matched axis ratios become larger. The diminution of the tendency toward perceptual constancy resulting from reduction of luminance is attributed to the impairment of visual acuity and intensity discrimination for the "additional" stimuli in the visual field. Some of the variation due to reduction of exposure below critical duration can be attributed to the reciprocal relation between time and intensity. Eye-movement records, taken while subjects were making shape judgments, confirm the finding that an exposure longer than the critical duration is required to produce the maximum tendency toward shape constancy. (From the authors' summary)

5634
Linschoten, J.
[STRUCTURAL ANALYSIS OF BINOCULAR DEPTH PERCEPTION: AN EXPERIMENTAL STUDY] Strukturanalyse der binokularen Tiefenwahrnehmung: eine experimentelle Untersuchung. — (Thesis, Univ. of Utrecht) Groningen: J. B. Wolters, 1956. xvi+573+59 p. In German, with English summary (p. 537-541). DLC (QP481.L5, 1956)

A structural analysis is presented of binocular depth perception, based primarily on phenomenal data and correlated with experimental studies and neurophysiological findings. The theory postulates an attraction operating in the binocular field between image points for the left eye and image points for the right eye. This attraction results in displacement of image points toward each other, and constitutes a correlate of depth. When the displacement is homonymous, the localization is in front of the plane of fixation; when it is heteronymous, localization is behind the plane of fixation; and when there is no displacement (correspondence) the point of localization is in the plane of fixation. The degree of depth is determined by the degree of displacement. Additional hypotheses are: (1) the attractive force increases with decrease in distance between disparate points; (2) a reactive and restrictive force counteracts the attractive force in displacement, and (3) the restrictive force increases more quickly than the attractive force. 727 references.

5635
Mann, C. W.,
and J. T. Ray
THE PERCEPTION OF THE VERTICAL. XIII. AN INVESTIGATION OF QUADRANT DIFFERENCES. — Tulane Univ., New Orleans, La. (Contract Nonr-475-05, ONR Project NR142-455); and Naval School of Aviation Medicine, Pensacola, Fla. (Project NM 001 110 500). Joint Project Report no. 39, May 18, 1956. ii+11 p. AD 107 736 UNCLASSIFIED

Four subjects made judgments of the postural vertical in a tilt chair under the condition of a constant amount of lme out of the vertical with three rates of displacement and three degrees of tilt. There were no statistically significant differences between right and left quadrants. Significant differences were found among subjects and experimental conditions producing adaptation.

5636
Mann, C. W.,
and J. T. Ray
THE PERCEPTION OF THE VERTICAL. XIV: THE EFFECT OF RATE OF MOVEMENT ON THE JUDGMENT OF THE VERTICAL. — Tulane Univ., New Orleans, La. (Contract Nonr-475-05); issued by Naval School of Aviation Medicine, Pensacola, Fla. (Project no. NM 001 110 500) Joint Project Report no. 40, May 22, 1956. ii+11 p. AD 105 716 UNCLASSIFIED

An experiment was designed to test the effect of different rates of tilting movement upon the judgment of the postural vertical in the absence of visual cues. Subjects were tilted at combinations of speeds, delay at the tilted position, and in right

and left quadrants. Analysis of variance of the constant errors indicates that the errors of judgment are significantly greater when the subjects are returned to the vertical at slower rates of movement. It is suggested that the problem of differential adaption to inclination as an influence upon vertical judgment should be examined in the airplane under conditions of relatively rapid and relatively slow return from a bank to a straight and level attitude. (Authors' abstract)

5637
Mann, C. W.
[VISUAL, PROPRIOCEPTIVE, AND OTHER SENSORY MECHANISMS INFLUENCING DISORIENTATION OF PILOTS] FINAL TECHNICAL REPORT. == Tulane Univ., New Orleans, La. (Contract Nonr-475-05); and Naval School of Aviation Medicine, Pensacola, Fla. Project no. NM 001 110 500, Joint Project Report no. 43. June 30, 1956. 11+7 p. AD 119 601 UNCLASSIFIED

A brief outline is presented of the development of the joint project between Tulane University and the U. S. Naval School of Aviation Medicine concerned primarily with the visual, proprioceptive, and other sensory mechanisms influencing disorientation of pilots. A listing of the technical reports are included. Areas of further research are suggested.

5638
Möhle, U.
[ON HEARING IN LIGHT AND DARK] Über das Hören im Hellen und Dunkeln. == (Dissertation, Medizinische Fakultät, Johannes-Gutenberg Universität, Mainz). 1956. (Mimeographed) In German. 57 p. DNLM (W4M22, 1956)

Audiometric examination of hearing thresholds of 30 subjects in illuminated and dark surroundings was negative with respect to any significant improvement of hearing in the dark. Any improvements noted may be ascribed to increased attention devoted to sound stimuli in absence of visual stimuli.

5639
Morin, R. E.,
D. A. Grant, and C. O. Nystrom
TEMPORAL PREDICTIONS OF MOTION INFERRED FROM INTERMITTENTLY VIEWED LIGHT STIMULI. == Jour. Gen. Psychol., 55 (1): 59-71. July 1956. DLC (BF1.J64, v. 55)

Same as the report, item no. 3224, vol. III.

5640
Mount, G. E.,
H. W. Case, J. W. Sanderson, and R. Brenner
DISTANCE JUDGMENT OF COLORED OBJECTS. == Jour. Gen. Psychol., 55 (2): 207-214. Oct. 1956. DLC (BF1.J64, v. 55)

Eight comparison stimuli consisting of four hues and their matching grays were judged for relative distance with each of two gray standards using a modified method of constant stimuli. The results clearly demonstrate a dependence of judgments of distance on the difference in brightness of the two standards, on the relative brightness differences of the comparison stimuli and on the differences between the hue and gray comparisons. The form of the dependencies in each comparison was such that stimuli which contrasted most with the background were seen in front of the stimuli which contrasted with the background relatively less. The magnitude of contrast effects would appear to be greatest in situations for which the primary determiners of distance are equivocal or absent. (Authors' summary, modified)

5641
Nelson, T. M.,
and S. H. Bartley
THE PERCEPTION OF FORM IN AN UNSTRUCTURED FIELD. == Jour. Gen. Psychol., 54 (1): 57-63. Jan. 1956. DLC (BF1.J64, v. 54)

A series of figures (targets) was presented in various tilts with reference to the observer. The visual field was totally dark, and thus unstructured and lacking "cues". Observers' drawings representing the shapes seen tended to be literal representations of the targets, thus representing the targets lying in the frontal plane. No real object could be isolated as a reference toward which to consider regression as in the investigations of earlier workers. Telling the observers that they were looking at circles at various degrees of tilt influenced behavior very little. (Authors' summary and conclusions)

5642
Nelson, W. H.,
V. W. Lyon, and A. C. Poe
A STUDY OF TEST SCORES OF PRINCETON NAVAL RESERVE OFFICER TRAINING CORPS STUDENTS ON FOUR NEW FORMS OF THE SPATIAL APPERCEPTION TEST. == U. S. Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 108 100, Report No. 14, May 1, 1956. 8 p. AD 105 693 UNCLASSIFIED

An investigation was made of four new forms of the Spatial Apperception Test, using as subjects four classes of Naval Reserve Officer Training Corps students at Princeton University. Results indicated that (1) the means of Forms 3 and 4 are equivalent, as are the means of Forms 5 and 6; (2) Forms 3, 4, 5, and 6 are more difficult than Forms 1 and 2 currently in operational use; (3) directions for Forms 3, 4, 5, and 6 as compared to those of Forms 1 and 2 are too complicated and confusing for the average examinee; and (4) a definite practice effect was observed between the first and second administrations of the Spatial Apperception Test. The practice effect substantiates the policy of requiring a lapse of time before permitting retesting.

5643
Sabeh, R.
SHAPE DISCRIMINATION AS A FUNCTION OF AREA AND LUMINANCE. == In: Symposium on Air Force human engineering, personnel, and training research, p. 236-243. Air Research and

Development Command, Baltimore, Md. ARDC Technical Report 56-8, 1956.
DLC (UG633.A377163, no. 56-8, 1956)

All three major variables, shape, luminance, and area, influence both discrimination accuracy and discrimination threshold to a statistically significant extent. A significant interaction was obtained between luminance and area indicating that the manner in which accuracy of discrimination and the discrimination threshold depend upon area, is affected by the particular luminance level used. With the more familiar goemetrical shapes, discrimination was definitely more accurate than with the irregular shapes. Luminance was not a significant variable in determining discrimination accuracy for the geometrical shapes, presumably due to the long experience of the observer with such shapes. (Author's summary and conclusions)

5644
Sachsenweger, R.
[THE EFFECT OF HETEROPHORIAS ON SPACE PERCEPTION] Der Einfluss von Heterophorien auf das räumliche Sehen. — Deutsche Gesundheitswesen, Das (Berlin), 11 (26): 883-889. June 28, 1956. In German. DNLM

Different viewpoints on the effect of various degrees of heterophoria on depth perception are discussed. Under optimal testing conditions the author did not find any adverse effects of heterophorias on depth perception. However, under conditions of dim illumination in orthophoric subjects experimentally created heterophorias by prism spectacles led to a premature disappearance of depth perception. Fatigue in presence of heterophoria seriously impairs the ability for fusion of binocular images and thereby suppresses spatial vision. Monocular myopia in presence of heterophoria also interferes with fusion and affects depth perception.

5645
Schubert, G.
[MODULATION OF PERCEPTION AND ITS NEUROPHYSIOLOGICAL BASES] Wahrnehmungsmodulation und ihre neurophysiologischen Grundlagen. — Zeitschrift fur Biologie (Munchen), 108 (5): 370-377. 1956. In German, with English summary (p. 377). DNLM

Changes of spatial perception induced in human subjects by wearing distorting prisms were investigated as a function of (a) prism strength, and (b) wearing time. A positive interaction was obtained between the factors of time and intensity. The neurophysiological basis of these modulations is visualized as the establishment of new excitation equilibria in functional circuits between the purely optical and the highest cortical association areas for any kind of spatial perception. (Author's summary, modified)

5646
Shipley, T.
THE CONVERGENCE FUNCTION IN BINOCULAR VISUAL SPACE [Abstract]. — Amer. Psychologist, 11 (8): 422. Aug. 1956. DLC (BF1.A55, v. 11)

Evidence concerning the relationship between depth perception and convergence is discussed. Experimental data are presented in terms of the geometry of binocular visual space. Using the alley experiment as a base, it is possible to fit both the classical data, and that of the present author, with a great variety of curves. Recent work has indicated that the boundary conditions of the function are definitely known, and that the relation must be monotonic in the middle range. Specifically, empirical evidence is needed on depth perception as a function of the approach of the angle of convergence to its zero bound, i.e., for very distant objects. (Quoted in full)

5647
Smith, A. H.
GRADIENTS OF OUTLINE CONVERGENCE AND DISTORTION AS STIMULI FOR SLANT. — Canad. Jour. Psychol., 10 (4): 211-218. Dec. 1956.
DLC (BF1.C3, v. 10)

Eight observers viewed monocularly four filmforms: a white circle and a white rectangle on black grounds; a black circle and a black rectangle on white grounds. The forms were shown in the frontal plane and slanted 10°, 20°, 30°, 40°, and 50° about a vertical axis. The curve of error in judging slant was a straight-line function of the visual angle, rather than S-shaped as predicted on the basis of superior foveal acuity and peripheral cortical satiation. Circles were perceived better than rectangles at slants greater than 30° but the differences in the opposite direction for the smaller angles, though consistent, were statistically insignificant. Black figures were perceived more accurately than white ones, but these differences were also statistically insignificant. (Author's summary)

5648
Smith, Olin W.,
and J. J. Gibson
APPARATUS FOR THE STUDY OF VISUAL TRANSLATORY MOTION. — Cornell Univ., Ithaca, N.Y. (Contract NONR 401(14)). Research Report, Sept. 1956. 5+1 p. AD 115 540 UNCLASSIFIED

An apparatus is described for the presentation of the optical movement of translation by a continuous belt (or belts) which may be viewed through a plate glass window completely covering the available observation surface. The apparatus was designed to provide accuracy, a wide range in the size of the stimulus fields and in the speed of their movement, and convenient use.

5649
Smith, Olin W.
DISTANCE CONSTANCY. — Cornell Univ., Ithaca, N. Y. (Contract NONR 401(14)). Research Report. Sept. 1956. 5 p. AD 115 540 UNCLASSIFIED

Twenty-three subjects estimated whether a strip of oilcloth of variable length, whose far edge was 125 feet away, was longer or shorter than a 10-foot standard strip of oilcloth placed 25 feet away. No judgments of equal size were allowed. A significant increase of 1.51 feet was obtained over the standard in the mean of the mean matches for all subjects. It is concluded that distance constancy

matches of short lengths at different distances can be successfully made.

5650
Smith, O[lin] W.
JUDGED DISTANCE AND SIZE CONSTANCY. — Cornell Univ., Ithaca, N. Y. (Contract Nonr 401 (14)). Sept. 1956. [25] p. AD 115 631
UNCLASSIFIED

Size matches, judgments of the distance from standard test objects, and judgments of the height of the comparison objects were compared for objects depicted in photographs. The photographs were viewed monocularly with a restricted field of view. Judgments were executed by two groups when (a) the portrayed distance was equal to 75% of the actual distance, and (b) when the portrayed distance was equal to 250% of the original distance. Two abstract (retouched) photographs were judged under the same conditions. Judgments of distance were in correspondence with the difference between viewing conditions for both complete and abstract photographs. Neither size matches nor judgments of height of the comparison stakes to which the size matches were made varied proportionally with the distance judgments. Size constancy matches were demonstrated to be independent of distance judgments. (From the author's summary)

5651
Smith, Olin W.
THE EFFECTS OF WINDOWS OF TWO SIZES ON MATCHES OF OBJECTIVE VELOCITY. — Cornell Univ., Ithaca, N.Y. (Contract NONR 401(14)). Research Report, Sept. 1956. 11+2 p. AD 115 540
UNCLASSIFIED

An investigation was made of the effect of windows of two different sizes (one twice the linear dimensions of the other) on velocity matches. Observers adjusted the speed of a belt viewed through the window so that the physical velocity of its surface was judged equal to the speed of a standard belt. The standard and variable fields were observed through the large window, through the small window, or separately through either the large or small window. No difference was observed between mean matches when the standard and variable belts were both viewed throught the large window or through the small window. Mean matches were significantly greater than the standard velocity in all conditions, but the accuracy of reproduction of movement was greater (the standard deviation was smaller) when the variable belt was viewed through the small window.

5652
Solley, C. M.
REDUCTION OF ERROR WITH PRACTICE IN PERCEPTION OF THE POSTURAL VERTICAL. — Jour. Exper. Psychol., 52 (5): 329-333. Nov. 1956. DLC (BF1.J6, v. 52)

It was hypothesized that subjects improve with practice in their accuracy of perception of the postural vertical. Two groups were used, subjects in one group being tilted 30° laterally to the left and subjects in a second group being tilted 30° laterally to the right. Each subject had to return himself to the point where he perceived himself as aligned with true vertical on each trial. Thirty such trials were given each subject. A decrease in (a) average number of degrees subject was off true vertical and (b) time required to make adjustments was found, though only the former was statistically significant. (Author's summary)

5653
Takagi, K.
THE RELATIONSHIP BETWEEN "SKIN-PRESSURE REFLEX" AND LABYRINTHINE FUNCTION. — Acta medica et biologica (Niigata), 4 (1): 81-91. July 1956. In English. DNLM

It was demonstrated in rabbits that pressure stimulation of the skin evokes various tonic changes in the entire body and inhibits the rapid phase of nystagmus. Stimulation to touch induces reverse effects such as development of transient movement or facilitation of the rapid phase of nystagmus. Experiments show that these effects are induced not only by the skin but by the labyrinth, eyes, and neck muscles. Kinetic and tonic functions were found in the labyrinth. Nystagmus occurs due to the conflict or competition between the slowly adapting tonic reflex and the rapidly adapting kinetic reflex opposing each other. The labyrinth is stimulated not only in passive rotation, but in active rotation of the head. During active rotation, nystagmus in man or rabbit occurs slightly or not at all. However, when the head is passively rotated, a remarkable nystagmus appears. In active rotation, the tonic reflex of the eye muscles is provoked by labyrinthine stimulation, which inhibits and controls kinetic movements of the eyeballs.

5654
Teichner, W. H.,
J. L. Kobrick, and E. R. Dusek
EFFECTS OF TARGET SEPARATION AND DISTANCE ON COMMONPLACE BINOCULAR DEPTH DISCRIMINATION. — Jour. Optical Soc. Amer., 46 (2): 122-125. Feb. 1956. DLC (QC350.O6, b. 46)

Experiments were performed to determine the effects of lateral target separation on commonplace binocular depth perception at distances of 10 to 100 feet. Target separations of 1.4 to 114.6 minutes were found to have a significant effect on depth perception only at the greater distances. The effect at increased distances is attributed to a loss of visual acuity rather than of depth discrimination. Precision of settings and the associated binocular image disparity were observed to decrease parabolically with distance. More sophisticated subjects showed a less rapid decrease in precision and a more rapid decrease in binocular image disparity with increasing distance.

5655
Teuber, H. L.,
and R. S. Liebert
EFFECTS OF BODY TILTS ON AUDITORY LOCALIZATION [Abstract]. — Amer. Psychologist, 11 (8): 430. Aug. 1956. DLC (BF1.A55, v. 11)

When we attempt to set a luminous line to the vertical, in the dark, moderate body tilts (up to 30°) produce constant errors, so that the line is displaced in a direction opposite to the body tilt. Corresponding effects appear in the tactile modality. The present study shows that body tilt produces similarly consistent displacements in localization of sounds. An ambient sound from a single overhead source is displaced opposite the body tilt. Binaural clicks (presented through earphones) appear in midline, when the ear on the side toward which subject leans receives stimulation earlier than the other ear. (Quoted in full)

5656
Wapner, S.,
H. Werner, and P. E. Comalli
SPACE LOCALIZATION UNDER CONDITIONS OF DANGER. — Jour. Psychol., 41 (2): 335-346. April 1956. DLC (BF1.J67, v. 41)

Three experiments were carried out to study the effect of danger on space localization. Danger was injected into the experiments by placing the subject at the left or right edge of a platform elevated 31 in. from the floor. Three results were obtained: (a) Under conditions of danger, asymmetrically induced by the precipice to one side, the physical position of the apparent median plane, relatively, shifts to the side opposite the location of danger; (b) Analogously, under these danger conditions, the physical position of apparent vertical is rotated in a direction opposite the location of danger; (c) There is evidence that this emotional factor of danger operates co-actively with non-emotional factors that are known to affect space localization. These effects were interpreted within the framework of the sensory-tonic field theory of perception. (Authors' summary)

5657
Weale, R. A.
STEREOSCOPIC ACUITY AND CONVERGENCE. — Jour. Optical Soc. Amer., 46 (10): 907. Oct. 1956. DLC (QC350.O6, v. 46)

A critical analysis is made of the interpretation of results obtained in three previously published experiments on the role of convergence in depth discrimination. The investigators cited found that at various perimetric angles stereoscopic acuity determined by estimation of the relative distances of two targets from the observer was (A) lower when only the immobile reference target was visually fixated than when (B) the reference and moveable test targets were fixated in turn. It is stated that the basic assumption of Ogle's argument (namely that the region of worse resolving power governs depth discrimination) in the rejection of Wright's acceptance of convergance as a factor in depth discrimination rests on experimental evidence which is apparently irrelevant because it is restricted to foveal vision. It is further suggested that the doubled number of mental judgments required in condition (B), as well as the further clues obtained during the time of transit, may have reduced the standard deviation observed by this method.

5658
Wodak, E.
[VESTIBULARLY DETERMINED ROTATORY AND MOTOR ILLUSIONS OF VISUAL AND OTHER SENSORY IMPRESSIONS] Vestibular bedingte Drehungs- und Bewegungstauschungen von optischen und anderen Sinneseindrücken. — Practica oto-rhino-laryngologica (Basel), 18 (2): 93-98. March 1956. In German, with English summary (p. 98). DNLM

Complementary to experiments on opto-gyral illusions, the author discusses the rotatory and motor illusions arising from various sensory impressions during and after rotation and progressive movement. They have no causal connection with the vestibular nystagmus. (Author's summary)

f. Psychomotor and Neuromuscular Performance and Responses (Including Reaction Time)

5659
Adams, J. A.
SOME IMPLICATIONS OF HULL'S THEORY FOR HUMAN MOTOR PERFORMANCE. — Jour. Gen. Psychol., 55 (2): 189-198. Oct. 1956. DLC (BF1.J64, v. 55)

Deductions relating quantitative aspects of human motor performance curves to experimentally manipulable variables were made from five equations of Hull's behavior theory. Acceptance or rejection of the five theoretical expressions in their present form is contingent upon empirical verification of these deductions. (Author's summary)

5660
Ammons, R. B.,
and L. Willig
ACQUISITION OF MOTOR SKILL. IV. EFFECTS OF REPEATED PERIODS OF MASSED PRACTICE. — Jour. Exper. Psychol., 51 (2): 118-126. Feb. 1956. DLC (BF1.J6, v. 51)

Four groups of subjects (26 in each) practiced rotary pursuit for 110 min. and 90 min. in training conditions, and 20 min. in test conditions. The two basic conditions called for continuous practice and distributed practice. The following four combinations of training and test conditions were used to make possible the measurement of warm-up decrement, temporary work decrement, and permanent work decrement: continuous-continuous, continuous-distributed, distributed-continuous, and distributed-distributed. It was found that (a) continuous practice led to poorer performance at all stages of practice; (b) proficiency increased rapidly for the first 20 minutes of practice and more slowly thereafter; (c) warm-up decrement and classical reminiscence remained at about the same level throughout practice; (d) temporary work decrement did not decrease significantly as practice continued; and (e) there was little or no evidence of permanent work decrement. (Authors' summary, modified)

5661
Ammons, R. B.
EFFECTS OF KNOWLEDGE OF PERFORMANCE: A SURVEY AND TENTATIVE THEORETICAL FORMULATION. — Jour. Gen. Psychol., 54 (2): 279-299. April 1956. DLC (BF1.J64, v. 54)

Essentially the same as the report, item no. 2374, vol. III.

5662
Ammons, R. B.,
C. H. Ammons, and R. L. Morgan
TRANSFER OF SKILL AND DECREMENTAL FACTORS ALONG THE SPEED DIMENSION IN ROTARY PURSUIT. — Perceptual and Motor Skills, 6 (1): 42. March 1956. DLC (BF311.P36, v. 6)

This is a summary of the report, item 2376, vol. III.

5663
Archer, E. J.,
G. W. Kent, and F. A. Mote
EFFECT OF LONG-TERM PRACTICE AND TIME-ON-TARGET INFORMATION FEEDBACK ON A COMPLEX TRACKING TASK. — Jour. Exper. Psychol., 51 (2): 103-112. Feb. 1956. DLC (BF1.J6, v. 51)

Thirteen paid, male students served as subjects in a 66-day experiment on the Mast Pedestal Sight Manipulation Test. Seven subjects, the control group, received little or no intentional intra-trial performance information feedback; the other six subjects heard a tone after they had been on target for 1 sec. continuously. After 40 sessions of practice, the tone reinforcement was discontinued and all subjects were given five more sessions of practice. Elimination of the tone led to a small drop of performance for the experimental group. The major findings, with respect to time continuously on target, showed that as the subject improves in total time on target, the improvement is not a simple increase in the number of hits but rather a shift in the frequency distribution of durations of hits. The very short hits decrease in frequency and eventually account for but a small proportion of the total time on target, whereas the frequency of long-duration hits increases and accounts for a much larger percentage of total time on target. (Authors' summary, modified)

5664
Battig, W. F.
TRANSFER FROM VERBAL PRETRAINING TO MOTOR PERFORMANCE AS A FUNCTION OF MOTOR TASK COMPLEXITY. — Jour. Exper. Psychol., 51 (6): 371-378. June 1956. DLC (BF1.J6, v. 51)

The effect of complexity of a motor task on the amount of transfer from verbal pretraining was studied. Twelve groups of 20 subjects each formed a factorial design, with four levels of complexity in terms of number of fingers used on a finger-positioning task (one to four), and three pretraining conditions (relevant stimulus, relevant stimulus-response, and control). Relevant stimulus pretraining required the subject to pronounce nonsense words formed from letters corresponding to the stimulus lights of the motor task. In relevant stimulus-response pretraining, the subject described verbally the correct finger positions. Control groups had no pretraining. All groups then received 20 one-minute trials on the motor task. The results led to conclusion that the amount of positive transfer from verbal pretraining to motor performance shows a consistent decrease as motor task complexity increases in terms of number of fingers used on a finger-positioning task. (Author's summary, modified)

5665
Bennett, C. A.
SAMPLED-DATA TRACKING: SAMPLING OF THE OPERATOR'S OUTPUT. — Jour. Exper. Psychol., 51 (6): 429-438. June 1956. DLC (BF1.J6, v. 51)

In the situation where an operator closes a control loop by his tracking behavior, the usual analog loop may be altered by sampling of the input to the operator or by sampling the operator's output. Three experiments, in which the subject's output was sampled, established the importance of sampling rate as a determinant of tracking performance. A functional relationship (tracking performance is proportional to the sampling rate raised to some power) was established, such that tracking performance is poorer at lower sampling rates. The variables of hand-control sensitivity and operator response-effect delays were found to affect sampled-data tracking performance. (Author's summary)

5666
Bilodeau, E. A.
STUDIES ON TARGET SIZE AND THE CONTROL OF PSYCHOMOTOR BEHAVIOR THROUGH SYSTEMATIC TRANSFORMATION OF KNOWLEDGE OF RESULTS. — In: Symposium on Air Force human engineering, personnel, and training research, p. 17-24. Air Research and Development Command, Baltimore, Md. ARDC Technical Report 56-8, 1956. DLC (UG633.A377163, no. 56-8, 1956)

A series of experiments are reviewed which indicate a 100% transfer from wide to narrow targets and vice versa in various tracking tasks. This was verified further in an experimental test of the hypothesis that different targets can elicit the same behavior. Other experiments cited deal with the effect of inflating or deflating error in signaling knowledge of results on the response.

5667
Bilodeau, I. M.
ACCURACY OF A SIMPLE POSITIONING RESPONSE WITH VARIATION IN THE NUMBER OF TRIALS BY WHICH KNOWLEDGE OF RESULTS IS DELAYED. — Amer. Jour. Psychol., 69 (3): 434-437. Sept. 1956. DLC (BF1.A5, v. 69)

Two experiments are reported which were designed to make delay in knowledge of results (KR) for a simple positioning response analogous to lag in a continuous tracking task by delaying KR over a number of trials. This manipulation

of delay, or lag in feed-back, was effective in increasing error (a) relative to an 0-trial delay and (b) progressively as trial-delay increased. The findings point to the importance of intervening responses in determining the effectiveness of delay in KR. (Author's summary)

5668
Bourne, L. E.,
and E. J. Archer
TIME CONTINUOUSLY ON TARGET AS A FUNCTION OF DISTRIBUTION OF PRACTICE. — Jour. Exper. Psychol., 51 (1): 25-33. Jan. 1956.
DLC (BF1.J6, v. 51)

Five groups of 20 subjects received thirty 30-sec. trials on a pursuit rotor. Each group worked under a different condition of practice distribution with 0, 15, 30, 45, and 60 sec. intertrial rest. After 21 trials, each group received 5 min. of rest followed by nine massed-practice trials. Response measures used were: total time on target, and duration of hits. The essential findings were: (1) Distribution of practice facilitated performance. (2) A significant amount of reminiscence was shown by 0- and 15- sec. groups. (3) The differences among groups in performance on the first postrest trial were significant. (4) Under the conditions of postrest massed practice, the groups tended to converge. (5) A significant warm-up effect was not observed. There is evidence that improvement in performance takes the form of more hits initially and shifts to longer hits later in practice. Further the skill of staying on target for relatively long durations continuously is less well learned by subjects serving under massed practice as compared to subjects serving under distributed practice. (Authors' summary, modified)

5669
Bowen, J. H.,
S. Ross, and T. G. Andrews
A NOTE ON THE INTERACTION OF CONDITIONED AND REACTIVE INHIBITION IN PURSUIT TRACKING. — Jour. Gen. Psychol., 55 (2): 153-162. Oct. 1956.
DLC (BF1.J64, v. 55)

Pursuit tracking latencies were measured for 48 subjects under conditions of sleep privation and non-privation and under three conditions of strenuous work. Linear pursuit tracking latencies may be described by a decay function of time elapsed since response evocation. It is inferred that this function reflects the temporal dissipation of reactive inhibition. Sleep privation raised the level of the function relating pursuit tracking latencies to time elapsed since response evocation. It is inferred that this effect is due to the lowering of the threshold for the operation of reactive inhibition. The results did not support the hypothesis that sleep privation and strenuous work would interact to lengthen pursuit tracking latencies or that strenous effector activity in one group of effectors would lengthen latencies in different groups of effectors. (Authors' summary, modified)

5670
Bowles, J. W.
ELECTROMYOGRAPHIC FACTORS IN AIRCRAFT CONTROL: A MUSCULAR ACTION POTENTIAL STUDY OF "CONFLICT". — Indiana Univ., Bloomington; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-125, Dec. 1956. 24 p. AD 132 269 UNCLASSIFIED

Alternative responses produce reciprocal muscle tension gradients. These gradients vary with the percentages of recognition a.d nonrecognition reactions. A situation in which the nonrecognition category is eliminated is probably the most economical, since it involves a more specific distribution of tension.

5671
Briggs, G. E.,
P. M. Fitts, and H. P. Bahrick
TRANSFER EFFECTS FROM A SINGLE TO A DOUBLE INTEGRAL TRACKING SYSTEM. — Ohio State Univ. Lab. of Aviation Psychology, Columbus (Contract AF 18(600)-1201); issued by Air Force Personnel and Training Research Center, Operator Lab., Randolph Air Force Base, Tex. (Project no. 7716, Task nos. 77292 and 57050). Research Report no. AFPTRC-TN-56-135, Dec. 1956. iii+17 p. AD 98 912 PB 125 974

Transfer of training on a simple or velocity tracking system to performance on a complex or acceleration tracking system was investigated. Early in training, performance under the simplified tracking procedures was superior to that under the conventional (acceleration) system. However, continued practice on the more difficult acceleration system eventually showed tracking proficiency equal to that of the velocity system. Furthermore, skill acquisition on the acceleration system was more rapid, the greater the degree of practice on the simpler velocity system. These results are interpreted as indicating that deletion of an important system transformation (the first stage of integration in an acceleration tracking system) permits significant savings in the amount of training required on the total system.

5672
Chernikoff, R.,
and F. V. Taylor
THE EFFECTS OF COURSE FREQUENCY AND AIDED TIME CONSTANT ON PURSUIT AND COMPENSATORY TRACKING [Abstract]. — Amer. Psychologist, 11 (8): 446. Aug. 1956.
DLC (BF1.A55, v. 11)

Independent variations in display mode (pursuit vs. compensatory) aided tracking time constant, and target course frequency are known to affect tracking performance. This experiment was designed to study the interaction among these parameters. Eighteen subjects tracked the six combinations of display mode (pursuit and compensatory) and aiding constants (0, 0.5, and ∞), with six subjects used on each of three course difficulty levels. The results indicated shifts in the relative proficiencies of the time constants with target frequency changes. Pursuit was superior to compensatory in all cases except when the low frequency course was tracked with 0 and 0.5 constants. (Quoted in full)

5673
Conrad, R.
THE TIMING OF SIGNALS IN SKILL. — Jour. Exper. Psychol., 51 (6): 365-370, June 1956. DLC (BF1.J6, v. 51)

Eighteen subjects performed a complex sensorimotor task in which a multidial display presented signals for response at approximately random time intervals under two conditions. In the first they could operate a control by means of which the interval between each pair of signals could be changed. In the second condition they were deprived of this control. It was arranged that the display would present signals at a rate exactly equal to that which each subject had selected in the first test, but the inherent temporal structure of the signal series (approximately random) was left undisturbed. The two resulting distributions of the interval between signals were compared. It is shown that the inherent distribution of the second test was changed in the first test in the direction of normality, and that the standard deviation (log time) was reduced by every subject. A close positive association was demonstrated between the extent of the difference between the two SD's and the extent of the improvement in performance score. Drawing on these results, the role of timing in skill is discussed, a distinction being drawn between the timing of continuously graded and intermittent response. (Author's summary, modified)

5674
Davis, R. C.
ELECTROMYOGRAPHIC FACTORS IN AIRCRAFT CONTROL: MUSCULAR TENSIONS DURING SIMULTANEOUS PERFORMANCE OF TWO TASKS AND THEIR EFFECTS ON PERFORMANCE. — Indiana Univ., Bloomington; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report No. 55-128, Dec. 1956. 14 p. AD 128 581 UNCLASSIFIED

Twenty subjects performed two tasks simultaneously and separately (supporting a 500-g. weight; SAM Discrimination Reaction Test). Muscular action potentials were recorded at specific times during the experiment and examined for the tension pattern of muscular responses and the relation of these to the response time. The main findings are: (1) The weight-supporting task produces a highly concentrated tension pattern; (2) the pre-stimulus tension level declines with time; (3) the discrimination response involves a temporary large muscular activity, beginning slightly later in the remote parts than in the "active" part; (4) a practice effect in the moving arm is manifested by the earlier increase in action potential; and (5) combination of the tasks produces an action potential mean approximately equal to the sum of the action potentials of the two tasks performed separately.

5675
Davis, R. C.
ELECTROMYOGRAPHIC FACTORS IN AIRCRAFT CONTROL: THE RELATION OF MUSCULAR TENSION TO PERFORMANCE. — Indiana Univ., Bloomington; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-122, Dec. 1956. 8 p. AD 125 753 PB 128 462

This paper presents the background and reviews the results of a series of studies dealing with the ways by which muscular tension affects the performance of a task. The studies were organized around the problem of learning how concurrent responses affect each other. Their design was based on the hypothesis that an exact electromyographic description of each of the responses taken singly makes it possible to predict what happens when they are combined. From the experimental data, a further hypothesis was then derived -- that there are patterns of response, detectable by electromyographic recording, which will facilitate or inhibit other responses according to their similarity. (Author's abstract) (22 references)

5676
Du Mas, F.,
and P. Worchel
THE INFLUENCE OF THE SPATIAL CONTEXT ON THE RELEARNING OF A ROTATED PERCEPTUAL-MOTOR TASK. — Jour. Gen. Psychol., 54 (1): 65-80, Jan. 1956. DLC (BF1.J64, v. 54)

The present experiment investigated the effect of the alteration in the spatial context on the relearning of a rotated stylus-maze problem. Forty subjects divided into two groups served in the present experiment. All subjects learned two stylus mazes. The first group learned Maze I first. Then the maze was rotated 180° and the subjects relearned the maze in its new position. They then learned Maze II. The experimenter and subject exchanged seats (180° rotation) and Maze II was relearned in this new position. For the second group the procedure was reversed. In general relearning was significantly affected by rotation, whereby subject rotation interfered more with relearning than the maze rotation. (From the authors' summary)

5677
Elam, C. B.,
and D. W. Tyler
THE DISCRIMINATION HYPOTHESIS AND CUE REVERSAL. — Radiobiological Lab., Univ. of Texas, Austin; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-82, Aug. 1956. 3 p. AD 113 595 PB 121 589

Fourteen Macaca mulatta (rhesus) monkeys, divided into two matched groups, were presented with a simultaneous discrimination problem in the Wisconsin General Test Apparatus. The reinforcement relationship was consistent with a given stimulus block in the case of one group, but was inconsistent for the other group. After eight days of training, both groups were presented a cue-reversal problem. It was found that animals presented the consistent relationship reversed more rapidly than did the other group despite their earlier demonstrated preference for the formerly positive stimulus. The results favor an interpretation based upon the discrimination hypothesis. (Authors' abstract)

5678
Ferroni, A.,
and L. Giulio
[SIMPLE REACTION TIME FOR LIGHT STIMULI DURING VOLUNTARY APNEA] Tempo di reazione

semplice per stimoli luminosi durante l'apnea volontaria. — Bollettino della Societa italiana di biologia sperimentale (Napoli), 32 (6): 502-503. June 1956. In Italian. DNLM

The reaction time to a light stimulus (red light) administered every 10 seconds in two normal subjects at the beginning of voluntary apnea was always increased. When the stimulus was administered at intervals of between 20 and 40 seconds (varied according to the duration of apnea) the reaction time became shorter, reaching normal values. At intervals between 40 to 45 seconds new increases in reaction time were observed which became greatly increased by the end of apnea.

5679
Fink, J. B.
ELECTROMYOGRAPHIC FACTORS IN AIRCRAFT CONTROL: THE DEVELOPMENT AND LOSS OF A MUSCLE TENSION SET TO AN INCIDENTAL STIMULUS. — Indiana University, Bloomington; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-130, Dec. 1956. 15 p. AD 128 582 UNCLASSIFIED

A Pavlovian conditioning paradigm was used to modify muscle action potentials preceding an instructed, overt response. Significant acquisition and extinction effects were found, and the inverse relation between muscle action potential amplitude and overt response latency was confirmed. It was concluded that incidental motor sets may develop in situations where some other response is occurring according to instruction. (Author's abstract)

5680
Fitts, P. M.,
W. F. Bennett, and H. P. Bahrick
APPLICATION OF AUTO-CORRELATION AND CROSS-CORRELATION ANALYSIS TO THE STUDY OF TRACKING BEHAVIOR. — In: Symposium on Air Force human engineering, personnel, and training research, p. 125-141. Air Research and Development Command, Baltimore, Md. ARDC Technical Report 56-8, 1956.
DLC (UG633.A377163, no. 56-8, 1956)

An outline is presented for deriving analytic measures of tracking together with empirical data on relations between several different measures. Suggestions are offered towards a general theory of measurement relative to motor performance.

5681
Fleishman, E. A.,
and W. E. Hempel
FACTORIAL ANALYSIS OF COMPLEX PSYCHOMOTOR PERFORMANCE AND RELATED SKILLS. — Jour. Applied Psychol., 40 (2): 96-104, April 1956. DLC (BF1.J55, v. 40)

Essentially the same as the report, item no. 2737, vol. III.

5682
Fleishman, E. A.
PREDICTING ADVANCED LEVELS OF PROFICIENCY IN PSYCHOMOTOR SKILLS. — In: Symposium on Air Force human engineering, personnel, and training research, p. 142-151. Air Research and Development Command, Baltimore, Md. ARDC Technical Report 56-8, 1956.
DLC (UG633.A377163, no. 56-8, 1956)

Important changes occur in the quantitative and qualitative pattern of aptitudes contributing to individual differences in psychomotor performance as practice continues. These changes are progressive, systematic, and predictable. Furthermore, it is possible to specify the stage of learning at which the factor structure of such tasks becomes stabilized. Psychomotor tests are better predictors of higher proficiency levels in other psychomotor tasks, although printed measures often define abilities contributing early in learning in such tasks. With practice, skill in these psychomotor tasks becomes, at least in part, increasingly a function of specific habits and skills acquired from the task itself and not identifiable from external measures. However, there is still considerable variance at advanced proficiency levels which is predictable from external measures. (Author's summary, modified)

5683
Garvey, W. D.,
and L. L. Mitnick
AN ANALYSIS OF TRACKING BEHAVIOR IN TERMS OF LEAD-LAG ERRORS. — Office of Naval Research. Naval Research Lab., Washington, D. C. (Project no. NR 592-010). NRL Report no. 4707, Feb. 16, 1956. 10 p. AD 88 106 UNCLASSIFIED

Using a compensatory tracking task with either a constant rate or a constant acceleration course input, an attempt was made to draw an analogy between the human operator's performance and the mathematically simplest mechanism which might be substituted to perform the operator's task. It was found that the type of mechanism to which the operator's performance is analogous is a function of the amount of practice given the operator of the system. In general, at the beginning of practice the operator's performance was found to be analogous to that of a one-integrator system (a Class I servo system); at the end of the practice the operator's performance was found to be analogous to that of a two-integrator system (Class II servo system). (Authors' abstract)

5684
Gibson, J. J.,
and E. J. Gibson
CONTINUOUS PERSPECTIVE TRANSFORMATIONS AND THE PERCEPTION OF RIGID MOTION. — Cornell Univ., Ithaca, New York (Contract Nonr 401(14)). [Unnumbered Report], Sept. 1956. 16 p. AD 113 527 UNCLASSIFIED

One group of subjects viewed perspective transformations of varying length on the visibly flat surface of a translucent screen. The patterns differed with respect to regularity vs. irregularity and form vs. texture. As a control, the same patterns were presented motionless at the end of the transformation sequence to a second group of subjects. It was observed that, for the first group, judgment of slant was independent of the regularity

of form or the texture presented; the controls, to the contrary, depended on these variables.

5685
Gottedanker, R. M.
PREDICTION-SPAN, SPEED OF RESPONSE, SMOOTHNESS, AND ACCURACY IN TRACKING. — Perceptual and Motor Skills, 6 (3): 171-181. Sept. 1956. DLC (BF311.P36, v. 6)

It was hypothesized that the tracker's response-time to error and base-time used for predictive continuation would be modified reciprocally according to the smoothness of the practice course. As learning was not observed, the hypothesis could not be tested in an experiment on 18 adult subjects. Prediction-span was markedly affected by the smoothness of the ongoing course but long-term effects were absent. Reaction time to error was stable, regardless of practice or conditions, at a mean value of 0.40 sec. Evidence suggested that correlation between reaction time and tracking skill is an inverse function of smoothness of criterion course. Autocorrelation measurements of response error showed a dominant periodic component of 1.4 sec. (Author's summary)

5686
Green, R. F.,
D. R. Goodenough, B. G. Andreas, A. A. Gerall, and S. D. S. Spragg
PERFORMANCE LEVELS AND TRANSFER EFFECTS IN COMPENSATORY AND FOLLOWING TRACKING AS A FUNCTION OF CONTROL CRANKS. — Jour. Psychol., 41 (1): 107-118. Jan. 1956. DLC (BF1.J67, v. 41)

Same as the report, item no. 4269, vol. IV.

5687
Hartman, B. O.
GRAPHIC TIME-ON-TARGET: A TRACKING SCORE WITH BOTH QUALITATIVE AND QUANTITATIVE ASPECTS. — Army Medical Research Lab., Fort Knox, Ky. Report no. 245, June 28, 1956. 1+14 p. (AMRL Project no. 6-95-20-001). AD 109 321 UNCLASSIFIED

A technique is described for the graphic recording of temporal and spatial characteristics (time-on-target) of tracking movements by parallel wiring of a recording pen with the clock clutch and counter of the tracking apparatus. The graphic record is relatively simple to score, and is apparently sensitive to intra- and inter-trial changes in performance. The technique offers a ready method for the calibration of scoring units.

5688
Herrington, L. P.
TEMPERATURE AND HUMAN ACTION. — Yale Scient. Mag., 31 (2): 6-17. Nov. 1956. DLC (Q1.Y16, v. 31)

The ecological surroundings of heat, light, radiation, sound, and related factors affect human psychophysical as well as physiological processes. The following topics are discussed: Relation of environmental temperature to life span, metabolic energy cost, temperature regulation, integrative activity of the nervous system, psychomotor performance, and work capacity.

5689
Holland, J. G.,
and J. B. Henson
TRANSFER OF TRAINING BETWEEN QUICKENED AND UNQUICKENED TRACKING SYSTEMS. — Jour. Applied Psychol., 40 (6): 362-366. Dec. 1956. DLC (BF1.J55, v. 40)

Four groups of six subjects each were used in a study of transfer of training from unquickened to quickened tracking systems and, conversely, from quickened to unquickened systems. A compensatory tracking task was employed. Two groups were trained on the unquickened system and two groups were trained on the quickened system. After training, each group was switched to the system for which it was naive. Transfer of training was evaluated by comparing the performance during this initial test session with the first training session of the two groups which originally were trained on the system in question. Conclusions reached were: (1) Positive transfer occurs in switching either from unquickened to quickened systems or from quickened to unquickened systems. (2) Different amounts of training, within the range employed in the present study, provide no difference in the extent of transfer. (3) Transfer of training between these two systems is not complete. Thus, some training is necessary before the full potential of the new system is achieved. (Authors' summary, modified)

5690
Kaestner, N. F.,
and D. A. Grant
TRANSFER OF TRAINING IN TRACKING AS A FUNCTION OF THE PREDICTABILITY OF UNIDIMENSIONAL TARGET COURSES. — Jour. Gen. Psychol., 55 (1): 103-116. July 1956. DLC (BF1.J64, v. 55)

Transfer effects in tracking were examined as a function of the degree of target course predictability. Courses were either periodic, and thus perfectly predictable, or were random in wave length and amplitude and thus highly unpredictable. Eighty subjects were evenly distributed among the eight experimental groups which evolved when the predictability factor was varied in all ways among three stages of training: early training, late training, and testing. The aperiodic targets were found to be more difficult to track than periodic ones. The no-transfer groups were superior to other groups in the test series on the same periodicity. Transfer late in training resulted in inferior proficiency. Early practice on periodic targets enhanced later tracking proficiency on the aperiodic targets, but the reverse conditions proved inefficient. Extended periodic tracking experience, however, interfered with later aperiodic tracking efficiency, possibly due to learning the particular rhythm of periodic targets. (Authors' summary, modified)

5691
Klemmer, E. T.
RHYTHMIC DIFFICULTIES IN A TOO SIMPLE TASK [Abstract]. — Amer. Psychologist, 11 (8): 414. Aug. 1956. DLC (BF1.A55, v. 11)

An interesting rhythmic disturbance occurs when a repetitive visual-motor task gets too easy. The subject's difficulty is characterized by responses drifting out of phase with stimuli and, in general, a complete loss of stimulus-response correspondence in time. The present experiments used a set of light bulbs, flashing one at a time, with a key-pressing response. The results show that the phase-keeping difficulty can be avoided by forcing the subject to make a discriminative response to each stimulus, but that changes in either the stimulus or response short of this do not help. (Quoted in full)

5692
Klemmer, E. T.
TIME UNCERTAINTY IN SIMPLE REACTION TIME. — Jour. Exper. Psychol., 51 (3): 179-184. March 1956. DLC (BF1.J6, v. 51)

Six subjects were given two series of simple reaction-time (RT) tests. In the first series the effect of changes in mean foreperiod and foreperiod variability were systemmatically investigated. In the second series the effect of spacing between stimuli was studied with no warning signal. These tests were designed to determine the relation between RT and the subjects' uncertainty about time of stimulus presentation. The results show that RT increases with foreperiod variability and with mean foreperiod above some small optimum value less than 1 sec. In a sequence of trials, the immediate foreperiod influences RT only if the previous foreperiod is different from it, and then only slightly. The striking finding in all tests with variable foreperiod is that the important determiner of RT is not the immediate foreperiod but rather the distribution of foreperiods within which it is embedded. (Author's summary)

5693
Knowles, W. B.,
and J. G. Holland
A MULTIPLE-CORRELATIONAL ANALYSIS OF COMPENSATORY TRACKING BEHAVIOR [Abstract]. — Amer. Psychologist, 11 (8): 446-447. Aug. 1956. DLC (BF1.A55, v. 11)

This study presents a modified multiple-correlation technique for analyzing the stimulus variables in a one-dimensional compensatory tracking task. High-speed recordings of error displacement, velocity, and acceleration, as well as joy-stick displacement, velocity, and acceleration were obtained. Multiple-regression equations were derived from critical values taken from the cross-correlation functions between these variables. The operator's force pattern showed the highest partial regressions on error displacement, stick displacement, and stick velocity. This suggests that response variables themselves are significant sources of stimulus information and indicates a possible point of weakness in previous mathematical descriptions of tracking behavior. (Quoted in full)

5694
Lincoln, R. S.
LEARNING AND RETAINING A RATE OF MOVEMENT WITH THE AID OF KINESTHETIC AND VERBAL CUES. — Jour. Exper. Psychol., 51 (3): 199-204. March 1956. DLC (BF1.J6, v. 51)

Subjects were trained to turn a handwheel at a constant linear rate with information supplied after each trial during the learning period. One group received verbal information in regard to amount and direction of error; a second group received kinesthetic error information concerning the amount of rate error and verbal indication of the direction of error; and a third group was given kinesthetic information about the standard rate. After training had been completed the subjects attempted to produce the same rate with the aid of the externally administered cues. One-third of each training group attempted this task immediately, the second after a delay of 1 hr., and the third after 24 hours. The results indicated that either verbal or kinesthetic error information was superior to kinesthetic information about the standard rate when the rate was being learned. In addition, the subjects were able to maintain the rate with a fair degree in accuracy after they were deprived of the cues used in learning. The final level of accuracy achieved under these conditions was unaffected by the amount of delay experienced before the retention of the rate was tested. (Author's summary, modified)

5695
Miller, E. F.
OCULAR PURSUIT OF A TARGET MOVING IN AN APPARENT CIRCULAR PATH. — Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 110 102, Report no. 1, Sept. 4, 1956. ii+20 p. AD 119 594 UNCLASSIFIED

Dynamic visual acuity tested with a rotary prism was compared with that measured with a rotating mirror apparatus. The abnormally distributed rotary prism thresholds were relatively higher than, yet correlated significantly with, those of the rotating mirror. The relative increase found with the prism in the rate of deterioration of acuity with an increase in angular velocity was attributed to the exclusive factor of rate of repeated rotation of the eye. (Author's abstract)

5696
Noble, M. E.,
and H. P. Bahrick
RESPONSE GENERALIZATION AS A FUNCTION OF INTRATASK RESPONSE SIMILARITY. — Jour. Exper. Psychol., 51 (6): 405-412. June 1956. DLC (BF1.J6, v. 51)

The subjects were trained to exert different amounts of force on a semirigid control in response to number stimuli. Intratask similarity was varied by employing two versions of the task, differing in the degree of separation between required adjacent force responses. Responses were measured on a continuous scale and response distributions were obtained for several response points under both conditions of response similarity. These distributions are interpreted as empirical gradients of response generalization. It is shown

that generalization of individual responses is significantly smaller for the condition of greater intratask response similarity. This condition results in steeper generalization gradients. Despite this effect adjacent response distributions show more overlap when the required responses are spaced more closely. (Authors' summary, modified)

5697
Nystrom, C. O.,
R. E. Morin, and D. A. Grant
TRANSFER EFFECTS BETWEEN AUTOMATICALLY-PACED TRAINING SCHEDULES IN A PERCEPTUAL-MOTOR TASK. — Jour. Gen. Psychol., 55 (1): 9-17. July 1956. DLC (BF1.J64, v. 55)

Same as the report, item no. 1891, vol. II.

5698
Rockway, M. R.,
G. A. Eckstrand, and R. L. Morgan
THE EFFECT OF VARIATIONS IN CONTROL-DISPLAY RATIO DURING TRAINING ON TRANSFER TO A LOW RATIO. — Wright Air Development Center. Aero Medical Lab., Wright-Patterson Air Force Base, Ohio. (Project no. 7197-71635). WADC Technical Report no. 56-10, Oct. 1956. iv+12 p.
AD 110 640 PB 121 886

Three groups of subjects received 25 one-minute training trials on a two-dimensional compensatory tracking task using one of three different control-display ratios. The results were as follows: (1) during training, tracking performance was a function of the control-display ratio employed; (2) practice with all of the training ratios produced significant positive transfer to the test ratio; and (3) the differences among the groups during the test period were not statistically significant. (Authors' abstract, modified)

5699
Seibel, R.
RATE OF RESPONSE AND TIME ON TARGET AS MEASURES OF MOTOR PERFORMANCE [Abstract]. — Amer. Psychologist, 11 (8): 388. Aug. 1956. DLC (BF1.A55, v. 11)

Motor performance on a paced visual tracking task was measured in terms of both rate of response and time on target. In order to track the target the subject was required to vary the rate of response and time on target. In order to track the target the subject was required to vary the rate at which he turned a crank. The independent variables of the experiment were speed of pacing, force necessary to perform, and distribution of practice. Results indicated that rate of response was almost directly proportional to variations in pacing speed, but was independent of variations in force requirement and distribution of practice. Time on target was affected by variations in all three independent variables. (Quoted in full)

5700
Senders, J. W.
TRACKING WITH INTERMITTENTLY ILLUMINATED STIMULI. — In: Symposium on Air Force human engineering, personnel, and training research, p. 244-247. Air Research and Development Command, Baltimore, Md. ARDC Technical Report 56-8, 1956.
DLC (UG633.A377163, no. 56-8, 1956)

When subjects performed a continuous tracking task on two separate indicators, the simultaneous scores obtained were not monotonic increasing functions of frequency of presentation. Instead, a local maximum in performance was found in the vicinity of 40 exposures per min. per indicator. This value is probably related to a natural alternation rate for this task. The fact that the level of performance at this maximum was still far less than that obtained in continuous illumination, suggests strongly that the sampling procedure used by a practiced subject is not periodic but instead is adapted and adjusted to match the short-term characteristics of the time function being displayed rather than the long-term statistical characteristics. (From the author's summary)

5701
Shephard, R. J.
A NULL-POINT DISCONTINUOUS ELECTRICAL PURSUIT METER. — Jour. Applied Psychol., 40 (5): 287-294. Oct. 1956. DLC (BF1.J55, v. 40)

Description is given of a null-balance electrical pursuit meter based on a Wheatstone bridge circuit. Evaluation in a group of normal subjects shows that under resting conditions it yields repeatable measurements of an initial response time and a total response time for a coordinated manual task of the type encountered in flying an aircraft. Possible applications include addition and subtraction problems, code substitution, discrimination tests, and measurements of visual contrast discrimination. During the stress of high-pressure breathing, there is a significant increase of initial response time and error, while the total response time tends to be reduced. These changes cannot be reproduced by local venous congestion or the wearing of pressure breathing equipment alone, and it is suggested that they represent a panic reaction to the pressurization. Training gives a marked improvement in the ability of all subjects to perform the task during the period of pressurization. (Author's summary)

5702
Siddall, G. J.,
and D. H. Holding
ERRORS OF AIM AND EXTENT IN MANUAL POINT TO POINT MOVEMENT. — Ministry of Supply (Gt. Brit.). Directorate of Physiological and Biological Research. Clothing and Stores Experimental Establishment. Report no. 63, Jan. 1956. 16 p. AD 109 920 UNCLASSIFIED

Forty-eight subjects were required to draw as fast as possible four lines in succession from a starting point to a target after a brief pretraining. Four directions of movement were compared: (1) left to right, (2) right to left, (3) outwards from the front of the body, and (4) inward to the body. The results were: (1) errors of extent were greater than errors of aim; (2) constant errors were overshoots and deviations to the right of the target; (3)

there were no differences in accuracy between the four directions, (4) duration of left to right movements was less than duration of movements in the other three directions; and (5) speed and accuracy were negatively correlated. (Authors' abstract, modified)

5703
Simon, J. R.,
and Karl U. Smith
THEORY AND ANALYSIS OF COMPONENT ERRORS IN AIDED PURSUIT TRACKING IN RELATION TO TARGET SPEED AND AIDED TRACKING TIME CONSTANT. — Jour. Applied Psychol., 40 (6): 367-370. Dec. 1956. DLC (BF1.J55, v. 40)

Records of error from 27 subjects are analyzed to find the relation between types of error in pursuit tracking and two main determinants of tracking accuracy, target speed, and aided tracking time constant. The main finding of this study is that the psychological effects of an aiding device are complex. Different types of movement which produce error are differentially affected by the aid. Increasing the aiding decreases the frequency of short-wavelength (fine positioning) and long-wavelength (rate control) errors. However, errors of intermediate wavelength are increased in frequency when aiding is increased. Since the intermediate-wavelength errors account for most errors in this task, the latter finding points to the hampering effects of aided tracking. Increasing target speed increases the frequency of all types of error. The experimental findings are interpreted as supporting a resonance theory of tracking. (From the authors' summary)

5704
Stockbridge, H. C. W.
LEARNING TO AIM AT MOVING TARGETS WITH KNOWLEDGE OF RESULTS. — Clothing and Stores Experimental Establishment. Directorate of Physiological and Biological Research, Ministry of Supply (Gt. Brit.). Report no. 68, July 1956. 9+1 p. AD 123 605 UNCLASSIFIED

Two groups of six subjects learned to aim at a moving target while given either no knowledge of results or an immediate auditory indication of results and numerical scores. Both groups were then tested with no knowledge of results, and were asked to estimate the quality of their performance. Knowledge of results during training apparently had a beneficial effect both on the acquisition of aiming skill and on the formation of standards of performance.

5705
Thompson, R. F.,
J. F. Voss, and W. J. Brogden
THE EFFECT OF TARGET-VELOCITY UPON THE TRIGONOMETRIC RELATIONSHIP OF PRECISION AND ANGLE OF LINEAR PURSUIT MOVEMENT. — Amer. Jour. Psychol., 69 (2): 258-263. June 1956. DLC (BF1.A5, v. 69)

Performance of linear pursuit-movement with the right arm was studied as a function of angle of movement from the body and target-velocity. The experiment involved use of an 8 x 8 Latin square repeated 10 times. The 8 angles (0°, 30°, 45°, 60°, 90°, 120°, 135°, and 150°) were represented by Latin letters and the 5 velocities (2.5, 3.0, 3.5, 4.0, and 4.5 cm./sec.) by the 2 squares. Each of two experimenters collected data from 40 subjects assigned to the 5 squares representing velocity. Analysis of variance of the standard-error scores revealed the trigonometric relationship of precision and angle of linear pursuit-movements as found in previous studies in this series. There was a significant difference in the functions obtained from the data of the two experimenters. Velocity has no significant effect, but when the error-scores are divided by trial-duration, thus reducing the scores to errors per unit time, this measure increases significantly as velocity increases. The function is linear over the range of velocities used in the experiment. (Authors' summary, modified)

h. Other Senses

5706
Hirsh, I. J.,
R. C. Bilger, and B. H. Deatherage
THE EFFECT OF AUDITORY AND VISUAL BACKGROUND ON APPARENT DURATION. — Amer. Jour. Psychol., 69 (4): 561-574. Dec. 1956. DLC (BF1.A5, v. 69)

The subjective perception of time was studied in relation to variations in the level of ambient noise or light in the experimental room. The subject was presented with a stimulus (tone or light) of different durations and asked to respond by holding a button for the same length of time. In control conditions the four combinations of light or dark, and quiet or noise, as background remained the same during periods of stimulus and response. Experimental conditions were so arranged that the dark or light environment during stimulation could be changed to light or dark during the response, or such that quiet or noise could be changed to noise or quiet. Under these conditions, darkness or light had no effect on the apparent durations of tones or lights. Stimuli presented in the quiet, however, elicited much longer responses in the noise than those made in quiet following a stimulus presented in the noise. The differences decreased as the difference between the noise levels in the two periods was decreased. It is suggested that the auditory rather than visual background is used to pace the psychological clock. (Authors' summary, modified)

5707
Keidel, W.-D.
[VIBRATION PERCEPTION: THE VIBRATION SENSE OF MAN] Vibrationsreception: Der Erschutterungssinn des Menschen. — Erlanger Forschungen, Reihe B, v. 2. Erlangen: Universitatsbund Erlangen, 1956. 154 p. DLC (QP301.K45, 1956)

Research in the field of vibration sensations is reviewed. The following aspects are considered: physical characteristics of body as conveyor of stimuli, anatomy of receptors, regulation of re-

ceptor-neural fiber unity, thresholds as indices of sensitivity, and central transformation and evaluation. Of interest to aviation medicine is a chapter dealing with research and clinical data on vibration damage to the human organism (p. 116-117). The author concludes that there is no specific vibration receptor, rather, information about vibration is transmitted through three different sensory organ systems: mechanoreceptors (skin and tendon end organs), the ear, and the periosteal pain receptors. Approximately 288 references.

5708
Shambaugh, G.
TEMPERATURE RECEPTORS, AN ANNOTATED BIBLIOGRAPHY. — Quartermaster Research and Development Center, Environmental Protection Research Division, Natick, Mass. Technical Report no. EP-24, April 1956. AD 100 292 PB 125 896

This is a bibliography dealing with studies on the effect of heat and cold receptors in man and animals. The bibliography is divided into four sections: the temperature receptors in man (annotated and listed chronologically); the temperature receptors in animals (annotated and listed chronologically); the effect of chemicals on temperature receptors (annotated and listed alphabetically); and an alphabetical listing of the above references, cross-indexed, together with additional pertinent reference. (About 220 references).

5. PSYCHOLOGY AND PSYCHIATRY

[Environmental effects under 6]

a. General

5709
Adams, J. A. 1956
VIGILANCE IN THE DETECTION OF LOW-INTENSITY VISUAL STIMULI. — Jour. Exper. Psychol., 52 (3): 204-208. Sept. 1956. DLC (BF1.J6, v. 52)

Vigilant or attentive behavior was studied. The Vigilance Test was used to evaluate the ability to detect small, low-intensity, aperiodically presented visual stimuli over a relatively long period of continuous observation. Each of four groups was presented stimuli at one of two brightness levels and one of two presentation times. The watching period was 110 min. A 10-min. rest was then given and this was followed by another 10 min. of watching. The results were as follows: (a) Average number of stimuli detected was related to stimulus brightness and duration. (b) All groups showed a steady decline in proficiency over the 110-min. period. (c) All groups displayed gain over rest. (d) The two groups having a short stimulus presentation time made a number of responses in the absence of the stimulus light. (Author's summary)

5710
Bersh, P. J.,
J. M. Notterman, and W. N. Schoenfeld
RELATIONS BETWEEN ACQUIRED AUTONOMIC AND MOTOR BEHAVIOR DURING AVOIDANCE CONDITIONING. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-80, May 1956. 7 p. AD 116 539 PB 127 293

Employing conditioned heart rate to measure anxiety, 20 male students were conditioned using a tone and a regularly paired electric shock as punishment. Subjects were then given a telegraph key which, pressed at the right time, enabled them to avoid being shocked. After the avoidance response was learned, the group was divided into two subgroups. For one subgroup the extinction phase of the experiment consisted of presenting the tone without the shock with the subject free to make the avoidance response or not. The second subgroup received ten presentations of the tone without shock while forcibly restrained and thus unable to make the avoidance response; the extinction then continued in the same manner as with the first subgroup. Results showed that, when the avoidance response was well learned, the acquired anxiety receded. Subjects of the restrained group, forced to find out that the electric shock was no longer part of the situation, lost their anxiety more rapidly than those who were allowed to discover this fact for themselves. (Authors' abstract)

5711
Bousfield, W. A.,
J. Esterson, and G. A. Whitmarsh
THE EFFECTS ON CONCOMITANT COLORED AND UNCOLORED PICTORIAL REPRESENTATIONS ON THE LEARNING OF STIMULUS-WORDS. — Univ. of Connecticut, Storrs (Contract Nonr-631 (00)). Technical Report no. 18, June 1956. 5 p.
AD 100 599 UNCLASSIFIED

The experiment permitted a comparative test of the immediate retention of 25 stimulus words, all of which were nouns, when they were presented twice for learning under three conditions as follows: a, words alone; b, words presented simultaneously with their uncolored pictures; c, words presented simultaneously with their colored pictures. These three conditions were interpreted as representing varying degrees of the compounding of signs of the objects connected by the words. The results were regarded as giving support to the following experimental hypothesis: With the number of presentations for learning of stimulus-words held constant, the number of these words recalled by subjects should vary positively with the number of simultaneously presented additional signs. The theoretical rationale of the study was based on the model of classical conditioning. (Authors' summary)

5712
French, E. G.
EFFECTS OF THE INTERACTION OF FEEDBACK AND MOTIVATION ON TASK PERFORMANCE [Abstract]. == Amer. Psychologist, 11 (8): 395. Aug. 1956. DLC (BF1.A55, v. 11)

The hypothesis tested here is that task-relevant feedback for achievement-motivated subjects and "feeling" feedback for affiliation-motivated subjects would produce higher performance scores than the reverse. In addition to the motivational and feedback variables, the extent to which the task was presented as a group or as an individual problem was varied. The results included a highly significant interaction between kind of motivation and perceived nature of the task with subjects with high affiliation motivation doing less well under the individual orientation. (Quoted in full)

5713
Holland, J. G.
VIGILANCE AND SCHEDULES OF REINFORCEMENT [Abstract]. == Amer. Psychologist, 11 (8): 414. Aug. 1956. DLC (BF1.A55, v. 11)

The parallel between decreasing efficiency in vigilance tasks and experimental extinction suggests that detection of the event for which a person is watching serves as reinforcement for the observing behavior preceding the detection. This possibility was investigated by providing different schedules of detectable events (fixed-interval and fixed-ratio schedules) in a vigilance task and obtaining cumulative records of a response which made the detection possible (i.e., an observing response). These records resemble those obtained in operant conditioning with animals demonstrating that detections serve as reinforcers and suggest that vigilance phenomena reflect responses which follow the principles of operant behavior. (Quoted in full)

5714
Lansing, R. W.,
E. Schwartz, and D. B. Lindsley
REACTION TIME AND EEG ACTIVATION [Abstract]. == Amer. Psychologist, 11 (8): 433. Aug. 1956. DLC (BF1.A55, v. 11)

Behavioral attentiveness is associated with EEG activation and alpha blockade in the EEG. Psychologically, attentiveness is reflected in reduced reaction time. The problem is to relate reaction time to EEG activation. Visual reaction times were measured during three conditions: resting with alpha waves, resting without alpha waves, and alerted with alpha blockade. Reaction times vary with duration of foreperiod alerting, attaining minimal levels in 300 milliseconds. Since EEG activation occurs within this same interval, both reaction time and activation are identified with an attentive set. Reaction times during the alerted condition averaged 220 milliseconds in contrast to 273 milliseconds for resting conditions. (Quoted in full)

5715
Mackworth, J. F.,
and N. H. Mackworth
THE OVERLAPPING OF SIGNALS FOR DECISIONS. == Amer. Jour. Psychol., 69 (1): 26-47. March 1956. DLC (BF1.A5, v. 69)

Same as the report, item no. 4591, vol. IV.

5716
Warren, J. M.
INTERTASK TRANSFER IN CODE SUBSTITUTION LEARNING. == Jour. Genetic Psychol., 89 (1): 65-70. Sept. 1956. DLC (L11.P4, v. 89)

Two experiments were performed to measure the amount of intertask transfer in code substitution learning. In the first experiment 16 subjects were tested on a different task each day for 16 days, and 16 subjects on the same task each day for 16 days. Both groups' performance was then compared on a series of four new transfer codes. Thirty subjects were tested on five different codes a day for two days in the second study. The two groups tested on a series of different tasks showed increments of 37 and 25.6% in their mean total substitutions per test period between the first and 16th and 10th tasks, respectively, which were significant at the .001 confidence level. The group which had practiced on the same tasks for 16 days was not significantly inferior to the group which had practiced different tasks each day, when both groups were compared on a series of transfer tasks. It is concluded that the effects of adjustment to the learning situation were largely responsible for the intertask transfer found. (Author's summary)

b. Psychology of Personality

5717
Barry, J. R.
A FURTHER STUDY OF THE MCKINNEY REPORTING TEST SCORES. == Jour. Abnormal and Social Psychol., 53 (2): 258-260. Sept. 1956. DLC (RC321.J7, v. 53)

The McKinney Reporting Test was administered to a group of 799 first pilots and copilots prior to starting B-29 Combat Crew Training. Criterion ratings of adjustment in training reflecting anxiety-proneness, predisposition to unfavorable reactions to stress and frustration, and poor defenses, were developed on the basis of medical and training records, sociometric data, and psychological tests and interviews. Two criterion groups, each consisting of 200 pilots and copilots, were selected from the upper and lower extremes of adjustment ratings to define the maximum adjustment differences in the population. The performance on the McKinney test by the upper criterion group was characterized by greater consistency and was less affected by the frustrating conditions of the test than that of the lower criterion group. On the whole this study supports the hypothesis that the test discriminates by means of frustration reactions between stress-sensitive and stress-resistant groups. The stress-sensitive persons as a group were less consistent in their test performance than the stress-resistant group.

5718
Barry, J. R.,
S. C. Fulkerson, A. L. Kubala, and M. R. Seaquist
SCORE EQUIVALENCE OF THE WECHSLER-BELLEVUE INTELLIGENCE SCALES, FORMS I AND II. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-23, May 1956. 4 p. AD 113 691 PB 124 530

In order that the equivalence of Form I and Form II of the Wechsler-Bellevue Adult Intelligence Scale might be evaluated, these two forms were administered on alternate days to 38 officers. When the tests were used as equivalent forms, a reliability coefficient of .71 was obtained. Significant practice effects were found for the Verbal, Performance, and Full Scale IQ's, and for four of the subscales. Lack of equivalence from form to form occurred for the Similarities, Object Assembly, and Digit Symbol subscales. IQ differences were considered to be excessive for 9 of the 38 officers even after corrections for practice were made. The implication of the study is that the two forms should be used in the clinic interchangeably with caution only.

5719
Berkowitz, L.
SOCIAL DESIRABILITY AND FREQUENCY OF INFLUENCE ATTEMPTS AS FACTORS IN LEADERSHIP CHOICE. — Jour. Personality, 24 (4): 424-435, June 1956. DLC (BF1.J66, v. 24)

Airmen at the Officers Candidate School (OCS), while still comparative strangers to each other, were formed into 19 six-men groups and assigned the task of assembling a footbridge out of precut lumber. Observers categorized the task behavior of the subjects as either attempted leading or nonleading acts. At the end of the session or when the group had finished the task, the observers rated each subject as a leader-attempting to and succeeding in directing the activity of the others in the group. The subjects also answered three sociometric or near-sociometric items. Criteria of success in OCS were obtained from peer ratings made halfway through and at the completion of the 16-week officer training course. The results support the following hypotheses: (1) the extent to which an individual is nominated for the position of group leader in the situational task will be positively related to the criteria of effectiveness in OCS, and (2) the subjects generally nominated as leaders will have made relatively many attempts to direct the activity of others in the group, and will have been rated frequently by these others as desirable social companions. Several problems pertinent to the use of situational tests for leadership selection are outlined. (Author's summary, modified)

5720
Cohen, S. I.,
A. J. Silverman, and N. R. Burch
A TECHNIQUE FOR THE ASSESSMENT OF AFFECT CHANGE. — Jour. Nervous and Mental Diseases, 124 (4): 352-360, Oct. 1956.
DLC (RC321.J83, v. 124)

Producing an increase in the subject's arousal level with stimulants, epinephrine, or emotional stimuli was accompanied by an increase followed by a decrease in the amplitude of galvanic skin responses to specific, externally applied stimuli. This was associated with a continuous increase in the frequency of spontaneous responses. A decrease in the amplitude of specific responses, accompanied a decrease in the arousal level. The subjects' responses to a group of words were compared before and after several words had been focused on during an interview where attempts were made to increase or decrease the affect associated with them. The results indicated that the general level of anxiety was lowered and less diffuse. However, specific responses to a limited number of words increased, and the galvanic skin responses appeared to vary with the affective responses of the subject. (From the authors' summary)

5721
Flandrois, R.
[THE RORSCHACH TEST IN THE FRENCH FIGHTER PILOT] Le test de Rorschach chez le pilote de chasse français. — Médecine aéronautique (Paris), 11 (2): 167-195, 1956. In French, with English summary (p. 195). DLC (TL555.M394, v. 11)

A comprehensive analysis is presented of results of the experimental administration of the Rorschach test to jet pilots in France. No significant differences from normal were observed in pilots, but the following trends were noted: (1) a relatively great number of whole responses and observations of human and animal movement; (2) an increased reaction time and percentage of animal responses in noncommissioned officers; (3) a reversal of the order of frequency of types of color responses; and (4) an increase in the number of individuals classified as introverts. It is concluded that the test could be a valuable aid in the supervision of flying personnel.

5722
Matarazzo, J. D.,
G. A. Ulett, and G. Saslow
ADAPTABILITY SCREENING OF FLYING PERSONNEL: HUMAN MAZE PERFORMANCE AS A FUNCTION OF INCREASING LEVELS OF ANXIETY. — Washington Univ. School of Medicine, St. Louis, Mo.; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-120, April 1956. 11 p. AD 107 823 PB 124 510

One hundred and one male subjects were administered the Modified Taylor Manifest Anxiety Scale, an intelligence test, and a standard stylus maze. The group was divided into seven subgroups, at increasing steps of an anxiety scale, according to Taylor scale scores and these subgroups were compared on two measures of maze learning: time and trials to reach a criterion level. The results, using time as a learning measure, supported the hypothesis that anxiety, an acquired drive, would facilitate learning up to a point and that beyond this level increased anxiety would be associated with a decrement in performance. The data with trials indicated a rectilinear relationship. Since time is a continuous factor and trials a discrete variable, it

was concluded that the hypothesis was generally supported. (Authors' abstract)

5723
O'Connor, W. F.,
and J. T. Bair
ANXIETY AND FLYING. II. MAJOR SOURCES OF ANXIETY AMONG PRE-SOLO STUDENTS. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-7, Feb. 29, 1956. [17] p.
AD 99 133 UNCLASSIFIED

The most significant source of anxiety among pre-solo students was found to be fear of failure. Fear of flight hazards appeared to be far less frequent a source of anxiety for beginning students than such factors as instructor behavior and poor performance. Lack of confidence in handling aircraft and feelings of inadequacy during the pre-solo stages were recognized by both students and instructors as normal responses. (Authors' conclusions, modified)

5724
Politur, D.,
and Y. Canel
[A THERAPEUTIC EXPERIMENT FOR THE SYNDROME OF LOSS OF SELF-CONFIDENCE IN THE JET PILOT] Sur un essai thérapeutique du syndrome de la perte de confiance en soi chez le pilote d'avion à réaction. — Médecine aéronautique (Paris), 11 (1): 119-120, 1956. In French.
DLC (TL555.M394, v. 11)

The warm baths of Luxeuil (France) were found to have a beneficial effect on pilots suffering from fear of flying. Ninety per cent of volunteer patients treated at the baths showed a significant improvement of symptoms of insomnia and lack of confidence.

5725
Roff, M.
PRESERVICE PERSONALITY PROBLEMS AND SUBSEQUENT ADJUSTMENTS TO MILITARY SERVICE: GROSS OUTCOME IN RELATION TO ACCEPTANCE-REJECTION AT INDUCTION AND MILITARY SERVICE. — Univ. of Minnesota, Minneapolis; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-138, April 1956. 17 p.
AD 113 602 PB 121806

This is the first report of a longitudinal follow-up study of patients of public school child guidance clinics and a nonpatient control group through subsequent military service. The object is to discover objective factors associated with predisposition to adult maladjustment, with particular reference to military service, for application in selection procedures. Results based on 2,542 Minnesota cases reported indicate that membership in a behavior-problem group is significantly adverse with respect to subsequent military service, but that, in terms of gross outcome, the majority of problem cases as well as controls did not appear unsatisfactory--hence the need for a more refined analysis of predictors and criteria to be reported. A preliminary prediction study of gross outcome, based on global analysis of clinic case folders, resulted in a high degree of successful predictions. (Author's abstract)

5726
Strollo, M.
[SOME PSYCHOLOGICAL CHARACTERISTICS RELATIVE TO JET FLIGHT] Alcune caratteristiche psicologiche relative al volo a reazione. — Rivista di medicina aeronautica (Roma), 19 (2): 328-338, April-June 1956. In Italian, with English summary (p. 337)
DLC (RC1050.R56, v. 19)

Differential characteristics observed during an investigation of pilots trained on conventional airplanes and recently changed to jet aircraft are analyzed from four psychological aspects (perceptual, motor, intellectual, and affective). A discussion is presented on a state often occurring in jet pilots and described as a feeling of isolation. It is a peculiar state of consciousness which appears during solo flights, at high altitude, and is motivated by the distance from "mother earth."

5727
Strollo, M.
[TEMPERAMENT AND CHARACTER IN THE PHYSIOGNOMY OF AIRPLANE PILOTS] Temperamento e carattere nella fisionomia del pilota di aviazione. — Rivista di medicina aeronautica (Roma), 19 (1): 79-102, Jan.-March 1956. In Italian, with English summary (p. 100-101).
DLC (RC1050.R56, v. 19)

The terms of temperament and character are analyzed and then related to the operational tasks of a pilot. Consideration is given to the significance of characterological studies in adaptability screening of pilots as well as in the general evaluation of their behavior.

5728
Surwillo, W. W.
PSYCHOLOGICAL FACTORS IN MUSCLE-ACTION POTENTIALS: EMG GRADIENTS. — Jour. Exper. Psychol., 52 (4): 263-272, Oct. 1956.
DLC (BF1.J6, v. 52)

The hypothesis that the slope of electromyographic gradients can be increased by raising the incentives in a task, was tested using a compensatory pursuit tracking task (A) and a following pursuit tracking task (B). Other related factors investigated were difficulty and goal structuring. Sixteen subjects performed Task A and Task B in balanced order. Incentives were considerably higher in Task A, it was more difficult, and more strongly structured than Task B. EMGs from three of four muscles studied revealed steeper gradients for Task A. The study was repeated with 16 Royal Canadian Air Force men. In this case a third task with a higher incentive—doubly rewarded Task A—was introduced. Results indicated that incentive was the primary factor in raising the EMG gradient. The shape of the gradients was not affected by variations in grip pressure, muscular fatigue, or the degree of muscular effort required. (Author's summary, modified)

5729
Tempereau, C. E.
FEAR OF FLYING IN KOREA. — Amer. Jour. Psychiat., 113 (3): 218-223, Sept. 1956.
DLC (RC321.A52, v. 113)

The "fear of flying" syndrome, implying emotional symptoms sufficient to threaten or impair flying proficiency, was infrequent in Korea during 1953 and early 1954. Fifteen cases were referred for psychiatric appraisal in a 17-month period. In five cases fear of flying was diagnosed as an incidental symptom in an otherwise unrelated psychiatric condition; in seven cases a pre-existent psychiatric illness was exacerbated by flying; and only in three cases psychiatric symptoms were precipitated by flying. Five different stages of emotional attitudes toward flying are distinguished, the final one culminating in a defense reaction. To attain a calm, mature approach to flying the pilot or passenger passes through two stages during which the mechanism of repression is operative. Development of typical fear of flying reactions is discussed and exemplified by illustrative case histories.

5730
Voas, R. B.
ANXIETY, INTELLIGENCE, AND DISTORTION TOWARD SOCIAL FAVORABILITY. — Naval School of Aviation Medicine, Pensacola, Fla. (Project no. NM 001 109 100). Report no. 10, May 1, 1956. 2 p. UNCLASSIFIED
Also published as: INTELLIGENCE AND THE DISTORTION OF RESPONSES ON THE TAYLOR ANXIETY SCALE. — Psychol. Reports, 2 (2): 87-89. June 1956. DLC (BF21.P843, v. 2)

In a study on the fakeability of the Taylor Manifest Anxiety Scale a group of 84 naval aviation cadets were instructed to choose the socially most acceptable answer, while another group of 319 cadets received normal instructions with the added statement that the results will be "off the record" and confidential. The American Council on Education intelligence test (ACE) was administered at the same time. For the first group of cadets, there was a statistically significant correlation of -.29 between the Taylor scores and the ACE scores. Under normal instructions the correlation was .06.

5731
Voas, R. B.
COMPARISON OF THE TAYLOR ANXIETY SCALE ADMINISTERED SEPARATELY AND WITHIN THE MMPI. — Psychol. Reports, 2 (4): 373-376. Dec. 1956. DLC (BF21.P843, v. 2)

McCreary and Bendig found a reduction in the mean score of the Taylor Manifest Anxiety Scale on retest. They hypothesized that fatigue reduces the anxiety scores and, therefore, that the scale imbedded in the full length Minnesota Multiple Personality Inventory would yield lower scores than when given separately. To test this hypothesis three groups of naval cadets were given both the scale alone and the scale imbedded in the MMPI. The reduction in anxiety score on retest was confirmed but this reduction occurred even after an 18-hour rest period. Further, there were no significant differences between forms. These results were interpreted as indicating that fatigue does not affect the anxiety scores in a consistent way, and that the two forms of the Taylor scale are comparable. (Author's summary)

5732
Voas, R. B.,
J. T. Bair, and R. K. Ambler
RELATIONSHIP BETWEEN BEHAVIOR IN A STRESS SITUATION AND LATER SEPARATION FROM FLIGHT TRAINING WITH EXPRESSED ANXIETY TOWARD FLYING. — Psychol. Reports, 2 (4): 393-397. Dec. 1956. DLC (BF21.P843, v. 2)

Same as the report, item no. 5125, vol. IV.

5733
Voas, R. B.,
J. T. Bair, and R. K. Ambler
SOME EVIDENCE FOR THE CONCURRENT VALIDITY OF THE HEINEMAN ANXIETY SCALE. — U.S. Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 0001 109 100, Report no. 11, May 1, 1956. 2 p. AD 105 715 UNCLASSIFIED
Also published in: Psychol. Reports, 2 (2): 99-100, June 1956. DLC (BF21.P843, v. 2)

The Heineman Scale (a forced-choice adaptation of the Taylor Manifest Anxiety Scale) was administered prior to the terminal interviews to 231 cadets who had failed or were withdrawing from the Naval Air Training Program. The presence or absence of "anxiety toward flying" statements during the interview was used as a criterion for concurrent validity of the Heineman scale. The results offer preliminary evidence for the concurrent validity of this measure in that the individuals who express anxiety toward flying in the terminal interview tend to have higher scores on the Heineman Scale. Several interpretations of these findings are advanced.

5734
Vries, E. de
[A DISCUSSION OF THE ROLE OF THE NERVOUS SYSTEM IN ADAPTATION TO FLYING JET AIRCRAFT] Discussie over de rol van het zenuwstelsel bij adaptatie aan het vliegen met supervliegtuigen. — Nederlands militair geneeskundig tijdschrift (s'Gravenhage), 9 (10): 296-311. Oct. 1956. In Dutch. DLC (RC971.N4, v. 9)

Central nervous system adaptation to the complex demands of jet flight is discussed in the light of recent neurophysiological advances and Pavlovian physiology. Sudden loss of the central nervous system adaptation because of conflicting emotions and hyperstimulation in flight, akin to Pavlovian "experimental neurosis", may be controlled by preselection of candidates without predisposition to neuroses, and by prevention of development of neuroses during flight training and further carrier.

5735
Walk, R. D.
SELF-RATINGS OF FEAR IN A FEAR-INVOKING SITUATION. — Jour. Abnormal and Social Psychol., 52 (2): 171-178. March 1956. DLC (RC321.J7, v. 52)

A self-rating scale of fear was administered to one group of airborne trainees in the mock-tower just prior to jumping, and to a second group of

airborne trainees after they had finished mock-tower training. For both groups performance was related to the self-ratings of fear. Trainees who passed the airborne course rated themselves lower on fear than those who failed the course. Similarly, trainees who achieved correct jump technique early in mock-training marked lower fear ratings than those who did not learn correct jump technique until late in training. Supplementary questions indicated that high self-ratings on fear accompanied by more physiological reactions to mock-tower jumping. Trainees who admitted high fear also tended to give negative answers on questions about danger on an attitude questionnaire; they were more worried about injury in airborne training or combat, and admitted less confidence in their ability to perform adequately in combat or in parachute jumping. (From the author's summary)

5736
Wallon, E. J.,
and W. B. Webb
THE EFFECT OF VARYING DEGREES OF PROJECTION ON TEST SCORES. — Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 108 100, Report no. 12, Feb. 15, 1956. 20 p. AD 96 375 UNCLASSIFIED

Two projective tests (the Rosenzweig Picture-Frustration test and a sentence completion test) were modified into a multiple-choice form. These tests were given in three ways: the projective test alone, the multiple-choice alone, and the projective test given and the subjects required to watch their responses to the multiple-choice form. The "objectification" resulted in a marked increase in "socially acceptable" responses. However, the joint administration of the tests more closely approximated the purely projective response. (Authors' abstract)

5737
Wallon, E. J.,
and W. B. Webb
A NOTE ON THE EFFECT OF TEST SET ON THE ROSENZWEIG PICTURE-FRUSTRATION TEST. — Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 108 100, Report no. 19, Nov. 1, 1956. 3 p. UNCLASSIFIED

The Rosenzweig Picture-Frustration Test was administered to a group of 70 naval aviation cadets under standard directions and to a group of 80 cadets with directions which induced a set to respond in the most socially acceptable manner. The results indicate that the Rosenzweig test, although a projective measure, is susceptible to intentional bias of the responses in favorable directions.

5738
Wallon, E. J.
A STUDY OF ROSENZWEIG SCORING PATTERNS AMONG NAVAL AVIATION CADETS. — U. S. Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 109 100, Report no. 19, May 1, 1956. 6 p. AD 105 713 UNCLASSIFIED

The Rosenzweig Picture-Frustration Test was administered to 210 cadets in the fifteenth week of pre-flight training. After completion of the entire program the test papers were scored for 21 cadets who dropped out from the program on their own request along with an equal number of papers selected randomly from the successful group. There were no significant differences in aggression patterns exhibited on the Rosenzweig test by the successful group and the withdrawal group. Within the withdrawal group, however, cadets withdrawing in advanced training were significantly less extrapunitive and tended to be more impunitive than those withdrawing in basic flight training.

5739
Warren, N. D.
PSYCHOLOGICAL ASPECTS OF JETS. — Air Line Pilot, 25 (11): 2-4; 14. Nov. 1956. DLC (TL501.A5537, v. 25)

Psychological stresses affecting pilot performance are intensified in modern high-permormance jet aircraft. Anxiety may be caused by the loss of pressurization at the altitude of jet operation, the strain of making accurate split-second decisions, or the possibility of mid-air collision. Anxiety, along with other emotional problems, produces fatigue which can result in gradual loss of timing and other pilot errors and ultimately cause accidents. Motivational aspects of fatigue also affect the pilot's manner of flying. Better selection and training will help the pilot to prepare for and manage these stresses as will good physical and mental efficiency.

5740
Zaccaria, M. A.,
J. Schmid, and S. Klubeck
A SIMPLE PROCEDURE FOR DEVELOPING EQUIVALENT FORMS OF INTEREST OR PERSONALITY QUESTIONNAIRES. — Air Force Personnel and Training Research Center, Lackland Air Force Base, Tex. Report no. AFPTRC-TN-56-107, Aug. 1956. 2+5 p. (ARDC Project no. 7701, Task no. 17077). AD 98 882 UNCLASSIFIED

Same as item no. 5200, vol. IV.

c. Social Psychology

5741
Lanzetta, J. T.,
G. R. Wendt, P. Langham, and D. Haefner
THE EFFECTS OF AN "ANXIETY-REDUCING" MEDICATION ON GROUP BEHAVIOR UNDER THREAT. — Jour. Abnormal and Social Psychol., 52 (1): 103-108. Jan. 1956. DLC (RC321.J7, v. 52)

Three-member teams worked on a group task under three experimental conditions: (1) a threat condition prior to which the subjects received orally 0.5 mg. of a mixture of Seconal and Benzedrine, (2) a threat condition without medication, and (3) a control (nonthreat) condition. Threat was imposed by structuring the sessions as evaluation tests. Behavioral indices were obtained from observers'

categorizations of the behavior of group members using Bales's category system, and ratings of each member on 10 characteristics. The subjects' perceptions of their group and their own motivational state were obtained from responses to an adjective check list. Threat-medication groups showed less tension and tension release, disagreed to a lesser extent, were less antagonistic, and were more active than threat groups. However, they were also rated as less efficient, less autocratic, less adaptable, and less achievement-motivated than control groups. They also received significantly lower ratings on leadership. It is suggested that medicated groups exhibit an active, non-aggressive type of behavior, which, however, is not task-oriented.

5742
Strollo, M.
[GROUP PSYCHOLOGY IN AERONAUTICAL ACTIVITY] La psicologia di gruppo nelle attivita aeronautiche. — Rivista di medicina aeronautica (Roma), 19 (2): 339-350. April-June 1956. In Italian, with English summary (p. 349).
DLC (RC1050.R56, v. 19)

Several essential characteristics of group structure in aviation are evaluated in order to demonstrate an ideal aircrew configuration. The general structure and dynamics of this prototype crew are described.

5743
Webb, W. B.
ELEMENTS IN INDIVIDUAL-TO-INDIVIDUAL COMMUNICATION. — Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 108 107, Report no. 4, May 1, 1956. AD 105 711
UNCLASSIFIED

A study was conducted with a homogeneous group of cadets accepted for Naval Air Training on four aspects of communication. Eight communicators chosen from this group were given five hours to assimilate three stories about Greek mythology before communicating them orally to successive communicatees in individual sessions. The communicatees were tested on assimilation of the material by a 45-item true-false test. Analyses of variance were made to reveal differences between communicators and between sessions. No significant differences were found in the ability of communicators to relay information. There were differences in the time required to transmit equal information. Communicator-communicatee interaction was not related to the amount of information obtained.

d. Psychiatry

[Neuropsychiatric examination under 8-f]

5744
Mebane, J. C.
PSYCHOSIS IN MILITARY FLIERS: AN ANALYSIS OF SEVENTY-SEVEN CASES. — Jour. Aviation Med., 27 (5): 390-396. Oct. 1956.
DLC (RC1050.A36, v. 27)

An analysis of seventy-seven cases of functional psychosis in Air Force fliers revealed a higher incidence of non-schizophrenic psychosis in comparison with a series of Naval neuropsychiatric patients. The incidence was greater within the 30-40 age group. The patients showed a moderate degree of predisposition, although records of past performance did not justify any sweeping categorizing of the group as selection failures. Medical personnel, especially the flight surgeon, identified and placed these patients under medical supervision. Three cases are presented to demonstrate the pre-psychotic borderline which creates management problems. The psychotic flier is a definite suicidal risk. Present medical standards regard a history of psychosis as disqualifying for further flying assignments. (Author's summary and conclusions, modified)

6. BIOLOGICAL, PHYSIOLOGICAL, AND PSYCHOLOGICAL EFFECTS OF ENVIRONMENTAL FACTORS AND STRESSES

a. General

5745
Aiken, E. G.
COMBINED ENVIRONMENTAL STRESSES AND MANUAL DEXTERITY. — Army Medical Research Lab., Fort Knox, Ky. Report no. 225, March 7, 1956. ii+18 p. (AMRL Project no. 6-95-20-001, Subtask S-1). AD 89327
UNCLASSIFIED

Environmental extremes of noise, illumination, and temperature were found to depress significantly the motor skills involved in a simulated line maintenance task. Individual prediction for speed and accuracy of performance under stress is poor. (Author's abstract)

5746
AUTO-HYPNOSIS. — U. S. Naval Aero-medical Safety Jour., 1 (4): 18. March 1956. DNLM

Since attention-distracting stimuli are absent to a marked degree in aviation, a pilot is subjected to auto-hypnosis. On long flights at high altitude, a pilot is deprived of environmental changes, is exposed to the constant surge of the engine, the unchanging instruments on the panel, and the constant bright sun entering the cockpit through the canopy. These factors, along with restricted movement and music tuned in from commercial stations, cause the pilot to drift into a hypnotic state. The development of this state is greatly implemented if the pilot were to narrow his behavior to a constantly repeated pattern of action such as scanning.

5747
Bartlett, F.
EFFECTS ON HUMAN PERFORMANCE OF VARIOUS STRESS CONDITIONS. — Flying Personnel Research Committee (Gt. Brit.). FPRC no. 961, Jan. 1956. 1 p.
AD 96 383 UNCLASSIFIED

The two areas of research on the effects of stresses of noise, heat and humidity, and sleeplessness needing further experimental work are: (1) effects on performance under chronic stress and in unpredictable environmental conditions, and (2) effects on performance associated with sudden changes of stress conditions.

5748
Bartlett, R. G.
STRESS ADAPTATION AND INHIBITION OF RESTRAINT-INDUCED (EMOTIONAL) HYPOTHERMIA. — Jour. Applied Physiol., 8 (6): 661-663. May 1956. DLC (QP1.J72, v. 8)

An experiment was conducted to investigate the ability of rats to adapt to simultaneous cold and restraint stresses, and to determine the effect of adaptation to restraint+cold or to an alternate stress (forced exercise) on restraint-induced hypothermia. It was found that restrained rats exposed to cold of 4-8° C. for 3 hours every day, every 2nd day, or every 4th day showed a significant adaptation, or improvement in the ability to maintain body temperature, after two exposures, while animals exposed every 8 days showed no adaptation. Exposures which resulted in good adaptation also produced a high mortality rate. The terminal body temperature of exercise-adapted restrained rats exposed to cold for 3 hours was significantly higher than that of unadapted controls. It is concluded that (1) the rat is able rapidly to adapt to the dual stresses of cold and restraint, suggesting an emotional component in adaptation; (2) adaptation is rapidly lost if it is not reinforced by the application of stress; and (3) adaptation to general stress may protect against restraint-induced hypothermia.

5749
Beischer, D. E.
EFFECT OF SIMULATED FLIGHT STRESSES ON THE CONCENTRATION OF SERUM CHOLESTEROL, PHOSPHOLIPID AND LIPOPROTEIN. — Jour. Aviation Med., 27 (3): 260-266. June 1956. DLC (RC1050.A36, v. 27)

Same as item no. 3813, vol. IV.

5750
Brüner, H.
[ON THE STRESS LIMITS OF THE HUMAN ORGANISM] Über Grenzbelastungen des menschlichen Organismus. — Zeitschrift für Flugwissenschaften (Braunschweig), 4 (3/4): 150-156. March/April 1956. DLC (TL503.W557, v. 4)

A task of aviation medicine is seen in the establishing a qualitative evaluation of the sum total of flight stresses, whereby any shift would be reflected as a corresponding shift in the physiological index of reactions to stress. The indices must be chosen so as to permit the establishment of limits of physiological tolerance. The combination of measures of physiological tolerance limits and of environmental stresses would allow the setting up of norms for complex stresses, duration of work, and work efficiency still within the limits of physiological tolerance. However, it is necessary first to arrive at an objective method for evaluating the individual's capacity to see whether he is optimally trained and acclimatized to the flight stresses. At present, aviation medicine is relatively well oriented as to the amount of physical work in flight and the physiological thresholds, compensatory reactions, and critical thresholds to different flight stresses. Parallels are drawn with the research along similar lines on stresses in the mining industry.

5751
Cain, J.,
J. Extremet, and H. Extremet
[SOME PSYCHOLOGICAL AND NEUROLOGICAL EFFECTS OF HYPOTHERMIA AND ANOXIA ON THE CONDITIONED RAT] Quelques effets psychologiques et neurologiques de l'hypothermie et de l'anoxie chez le Rat conditionné. — Comptes rendus de la Société de biologie (Paris), 150 (4): 737-738. 1956. DLC (QP1.S7, v. 150)

The cerebral functions of rats made hypothermic by anoxia and immersion in ice were tested during hypothermia and rewarming from a rectal temperature of 15°C. No effect of cooling (up to 40 minutes) was observed on the general behavior of rewarmed rats, or on conditioning to a color stimulus or to a labyrinth. Cortical posture and tone reflexes reappeared during rewarming in the order (1) static preparatory contact reflexes at 18° C., (2) static preparatory visual reflexes at 20°, (3) corrective attitude reflexes at 25°, and (4) reactions to pain, noise, or heat at 25° C.

5752
Cordier, D.,
and G. Pérès
[PROTEINEMIC DISTURBANCES INDUCED BY ALTITUDE AND SOLAR RADIATION] Troubles de la protéinémie provoqués par l'altitude et le rayonnement solaire. — Comptes rendus de la Société de biologie (Paris), 150 (1): 187-190. 1956. In French DLC (QP1.S7, v. 150)

Rats maintained at an altitude of 1800 m. for 17 days showed a marked decrease in the albumin fraction of serum and an increase in the globulin fraction with no change in total protein. After 32 days at altitude normal serum protein levels were observed. Repeated one-hour exposures to sunlight had no additional effect on the serum protein of 17-day altitude rats. Two and one-half hour exposures of 32-day altitude rats to sunlight produced a decrease in albumin and an increase in globulin to levels found in rats exposed to altitude for 17 days.

5753
Dempsey, C. A.,
T. H. Greiner, N. R. Burch, D. Chiles, and J. Steel
THE HUMAN FACTORS IN LONG RANGE FLIGHT. — Jour. Aviation Med., 27 (1): 18-22. Feb. 1956. DLC (RC1050.A36, v. 27)

Two experienced military pilots were confined in the cockpit of a grounded F-84 aircraft for a period of 56 continuous hours. A noise level of 115 decibels was maintained in the cockpit. The following observations were made: hearing losses ranged from 35-50 decibels, but recovery was complete within 4 days; food and water storage was safe, and it was observed that neither subject ate all the food although the total amount allotted to each contained 1/2 the normal calorie requirement for this period of time; the Air Force-Navy g suit was of great value in preventing fatigue and stagnation of blood in the lower limbs; a tiltable seat insert also relieved fatigue; standard personal equipment was satisfactory; two psychological tests indicated a diminution of alertness from the onset of a high performance period to its end; adrenal activity failed to show the presence of severe physiological stress; skin resistance to an electric current (galvanic skin response) showed a progressive decrease throughout the experiment, demonstrating increasing fatigue, and this became especially noticeable during the last four hours of the high-performance period; progressive onset of fatigue was also demonstrated on the electroencephalogram. After the test period, both subjects flew in a Link trainer, and completed the task within Air Force safety requirements.

5754
Domanski, T. J.
HUMAN STRESS RESPONSE IN JET AIRCRAFT OPERATIONS. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report No. 57-16, Dec. 1956. 4 p. AD 128 591 PB 128 480

Studies were made on the pre- to post-flight blood eosinophil response of jet pilots differing with respect to their prior flying experience in the aircraft concerned (F-86D and F-94). F-94 radar observers were also studied. Student pilots flying their first mission in the F-86D showed the highest incidence of postflight eosinopenia (85.7 percent). The minimum of such stress response (0 to 8.3 percent) occurred in experienced F-94 pilots and in experienced F-94 radar observers flying routine training missions, as well as in student pilots operating the F-86D simulator. An intermediate incidence of postflight eosinopenia (35.7 to 50.0 percent) was exhibited by experienced F-86D pilots engaged in new in-flight learning and by the more experienced student pilots flying in a later stage of the F-86D training program. (Author's abstract)

5755
Garvey, W. D.
DIFFERENTIATION OF "OPERATOR-TASK DIFFICULTY" IN MAN-MACHINE SYSTEMS WITH IDENTICAL INPUTS AND EQUIVALENT OUTPUTS [Abstract]. — Amer. Psychologist, 11 (8): 447. Aug. 1956. DLC (BF1.A55, v. 11)

The present study seeks (1) to demonstrate that two man-machine systems with identical inputs and equivalent outputs may require operator tasks which differ significantly in "difficulty," and (2) to provide objective measures of "operator task difficulty." Two man-machine systems' outputs were established to be equivalent after subjects had had some training. Then subjects were required to perform these same tasks under conditions of "stress," such as load-, fatigue-, and secondary-task-stress. The results indicated that the output of the two systems differed reliably under conditions of stress, even though outputs were equivalent under normal conditions. (Quoted in full)

5756
Harris, W.,
R. R. Mackie, and C. L. Wilson
PERFORMANCE UNDER STRESS: A REVIEW AND CRITIQUE OF RECENT STUDIES. — Human Factors Research, Inc., Los Angeles, Cal. (Contract Nonr 1241 (00)). Technical Report VI, July 1956. 83 p. AD 103 779 UNCLASSIFIED

Studies published after 1952 which deal with the effects of stress on performance were reviewed for bearing on operational performance under military stress conditions. The report discusses: (1) stimulus conditions employed to study the effects of stress on performance, (2) performance or behavior measures used and the experimental designs of the studies, (3) results obtained and conclusions drawn, and (4) problems involved in the experimental study of the effects of stress and suggestions for research plans. The general conclusion is that information from these studies cannot be generalized to operational performance under stress. Few of the experimental procedures can be viewed as analogous to actual field situations. A selected annotated bibliography (45 references) is included.

5757
Hitchcock, F. A.
SOME CONSIDERATIONS IN REGARD TO THE PHYSIOLOGY OF SPACE FLIGHT. — Astronautica acta (Wien), 2 (1): 20-24, 1956. In English. DLC (TL787.I46, v. 2)

The physiological stresses that will be encountered in space flight are considered. Exposure to barometric pressures lower than 47 mm. Hg (63,000 feet) will produce all of the harmful effects that would occur in a vacuum. Therefore, from a physiological viewpoint, any flight above 63,000 feet may be considered as space flight. In such flights sealed cabins provided with an air conditioned artificial atmosphere must be used. While compressed, liquid or chemical oxygen might be satisfactory for flights of short duration, the biological method of providing such atmospheres is probably the best. Thermal stresses, accelerative forces and cosmic radiation are some of the other factors which must be considered. The physiological responses of living animals to a vacuum are discussed. It is concluded that none of these physiological problems is unsurmountable. (Author's abstract)

5758
Holtzman, W. H.
and M. E. Bitterman
A FACTORIAL STUDY OF ADJUSTMENT TO STRESS. — Jour. Abnormal and Social Psychol., 52 (2): 179-185. March 1956. DLC (RC321.J7, v. 52)

The purpose of this study was to search for common factors in a variety of measures believed on the basis of previous research to be of value in the prediction of adjustment to stress. The variables selected for analysis were derived from ratings of personality and officer aptitude, objective and projective personality tests, measures of performance in stressful situations, the conditioning of the galvanic skin response, perceptual tests, and the analysis of urinary components. The subjects were 135 Air ROTC cadets at the University of Texas. Analysis of the intercorrelation matrix yielded seven factors. (Authors' summary, modified)

5759
Lampietro, P. F.,
M. J. Fregly, and E. R. Buskirk
MAINTENANCE OF BODY TEMPERATURE OF RESTRAINED ADRENALECTOMIZED RATS EXPOSED TO COLD: EFFECT OF ADRENAL CORTICAL HORMONES. — Canad. Jour. Biochem. and Physiol. (Ottawa), 34 (4): 721-729. July 1956. DLC (R11.C37, v. 34)

The colonic temperature of rats restrained and exposed to air at 5° C. decreased linearly with time in the cold air. Bilateral adrenalectomy increased the colonic cooling rate, whereas administration of adrenal cortical extract (ACE), cortisone acetate or desoxycorticosterone acetate (DOCA) to adrenalectomized rats decreased it. The lower colonic temperature of adrenalectomized rats in air at 25° C. returned to that of sham-operated (animals with fatty tissue removed from adrenal region) rats when cortisone or ACE was administered; however, colonic temperature did not appear either to increase incrementally or to pass through a maximum with increasing doses of either ACE or cortisone. DOCA had no effect on initial colonic temperature. Untreated adrenalectomized rats rarely survived lowering of colonic temperature to 22.5° C.; hence, the minimum colonic temperature to which adrenalectomized rats can be cooled and subsequently survive is considerably above that for normal rats (LD_{50} 15.3° C.). Administration of adrenocortical hormones increased survival even in doses which did not affect the colonic cooling rate. (From the authors' abstract)

5760
Jerison, H. J.
DIFFERENTIAL EFFECTS OF NOISE AND FATIGUE ON A COMPLEX COUNTING TASK. — Wright Air Development Center. Aero Medical Lab., Wright-Patterson Air Force Base, Ohio. WADC Technical Report no. 55-359, Oct. 1956. v+20 p. (Project no. 7193-71614). AD 110 506 PB 121 807

This report compares performance under the combined stress of noise and fatigue with that of fatigue alone. A complex mental counting test which involves mental work of a rather high order was the source of the performance measure. Although statistically significant differences between performance in noise and in quiet were found, these were not straightforward, and no simple relationship of the performance decrements and specific abilities could be established. It is therefore impossible to relate abilities involved in performance on the complex counting test to changes in performance under noise stress. Some indication was found of a direct relationship between susceptibility of individual subjects to auditory fatigue during a specific work period in noise and their ability to maintain performance in noise. (Author's abstract)

5761
Jones, G. Melville
AIRCREW FATIGUE IN LONG RANGE MARITIME RECONNAISSANCE. VI. GASTRIC ACTIVITY MEASUREMENTS. — RAF Inst. of Aviation Medicine (Gt. Brit.). Farnborough; issued by Flying Personnel Research Committee (Gt. Brit.). FPRC 907.6, Aug. 1956. [7] p. AD 112 723 UNCLASSIFIED

An investigation of gastric activity in one subject during a week of high intensity operational flying is described. The method chosen involved the ingestion of a daily test meal, by means of which it was possible to determine both motor and secretory responses of the gastric muscularis mucosa. The gastric activity determined in this way appeared to be increased by the operational experiences encountered, and it is inferred that this increase may have been due in some measure to the stressful or fatiguing nature of those experiences. The results, although of limited value in themselves on account of the limited experimental data available, are considered sufficiently positive to encourage continuation of the investigation. It is concluded, however, that a technique more appropriate to a field investigation should be employed. (Author's summary)

5762
Jones, G. Melville
AIRCREW FATIGUE IN LONG RANGE MARITIME RECONNAISSANCE. VII. STUDY OF RENAL EXCRETION OF UROPEPSINOGEN. — RAF Inst. of Aviation Medicine (Gt. Brit.), Farnborough; issued by Flying Personnel Research Committee (Gt. Brit.), Report no. FPRC 907.7, Aug. 1956. [11] p. AD 112 724 UNCLASSIFIED

An increase in the rate of renal uropepsinogen excretion was found in 16 active aircrew members during test days (those including a 15-hour night sortie) as compared to rest days. No significant trend in the rate of excretion was detected either from beginning to end of the nine-day test period, or from beginning to end of a sortie. There was, however, a significantly greater water output during the first five hours than during the remainder of the sortie, a finding thought to reflect, in part, a general disinclination for food and drink as a sortie progresses. It is concluded that, in the absence of any other obvious cause, the increased uropepsinogen excretion on test days may reflect in some measure the arduous or fatiguing nature of the operational experiences encountered. (Author's conclusions, modified)

5763
Jones, G. Melville
AIRCREW FATIGUE IN LONG RANGE MARITIME RECONNAISSANCE. IX. BODY WEIGHT CHANGES.

— RAF Inst. of Aviation Medicine (Gt. Brit.), Farnborough; issued by Flying Personnel Research Committee (Gt. Brit.), Report no. FPRC 907.9, Aug. 1956. [5] p. AD 112 726 UNCLASSIFIED

A survey of changes in weight of 37 aircrew during approximately one week of high-intensity flying operations is described. Marked inter-crew differences were observed, due to differences in the management of in-flight feeding by captains of aircraft. It is suggested that a higher degree of uniformity be attainable by amplification of this matter in training schedules. There was a tendency for aircrew who lived in to lose more weight than those who lived out, a finding thought to reflect the loss of meals which can occur on account of the necessity for daytime sleep between flights. It is suggested that adoption of a 24-hour catering service during high intensity-operations would obviate inadequate food intake due to this cause. (Author's summary, modified)

5764
Jones, Robert
and C. L. Taylor
METABOLIC EFFECTS OF WORK AND HEAT IN A SIMULATED PILOT'S TASK. — Univ. of California, Los Angeles (Contract AF 33(616)-32); issued by Wright Air Development Center. Aero Medical Lab., Wright-Patterson Air Force Base, Ohio. WADC Technical Report no. 56-2, April 1956. v+30 p. (Project no. 7155). AD 102 828 UNCLASSIFIED

The metabolic effects of heat and work have been studied in a comfort environment, 80° F., and in a hot environment, 160° F. The task consisted of stick and rudder control movements on a flight simulator resulting in an average energy expenditure of 75 Kcal./m.^{2}/hr. in two subjects. After one hour in the hot environment the metabolism rose 16.9 and 18.6 Kcal./m.^{2}/hr., respectively for rest and work. The temperature coefficient of metabolism, computed on either rectal or mean body temperature, is about 7 Kcal./m.^{2}/hr./°C. for both rest and work conditions. Respiratory minute volume and rate, however, did not increase significantly as a result of the heat exposure. An extensive compilation of aircrew metabolic rates is given in the appendix, covering fighter and bomber craft in combat and non-combat conditions. The data, while considerably variable, support the choice of 75 Kcal./m.^{2}/hr. as a suitable "typical" metabolic rate for aircraft personnel. (Authors' abstract)

5765
Kapor, G.
[REACTIONS OF FLIERS TO STRESSES OF MILITARY LIFE AND JOB REQUIREMENTS] O reakcijama letača na stresove vojničkog života i letačkog poziva. — Vojnosanitetski pregled (Beograd), 13 (11-12): 544-550. Nov.-Dec. 1956. In Serbo-Croatian, with English summary (p. 550). DLC (RC970.V63, v. 13)

Psychological disorders in fliers are considered to be reactions to stresses of military and flight environment, manifested as either generalized or localized tension states or neuroses. Various types of these disorders are classified and described, with emphasis on their effects on the capacity to adapt or meet the demands of the situation. Early recognition of slight behavioral disorders in pilots is needed, as it helps in the selection of applicants and in the assessment of adequate preventive measures for a successful adjustment to flight situations.

5766
Krause, A. C.
and S. B. Goren
THE EFFECTS OF HYPOXIA AND HYPEROXIA UPON THE OXYGEN TENSION OF VITREOUS HUMOR OF THE CAT. — Amer. Jour. Ophthalmol., 42 (5): 765-769. Nov. 1956. DNLM

Under normal physiological conditions, the oxygen tension in the vitreous humor of adult cats is 53 mm. Hg. When the animals were under conditions of hypoxia, the oxygen tension in the vitreous humor was subnormal. This is to be expected since blood hemoglobin contains less than the normal amount of oxygen when the oxygen tension of the atmosphere is low. Under conditions of increasing degrees of hyperoxia, a corresponding increase in oxygen tension of the vitreous humor resulted until a maximum of approximately 175 mm. Hg was reached. When the animal was removed from hyperoxic conditions and placed under normal physiological conditions, the oxygen tension decreased exponentially. (Authors' summary, modified)

5767
Lavenda, N.,
R. C. Bartlett, and V. E. Kennedy
LEUCOCYTE CHANGES IN RODENTS EXPOSED TO COLD WITH AND WITHOUT RESTRAINT. — Amer. Jour. Physiol., 184 (3): 624-626. March 1956. DLC (QP1.A5, v. 184)

An investigation was conducted of the effects of hypothermia and mild restraint stresses on the white blood cell picture of mice and rats. A leucopenia which was primarily the result of lymphopenia was observed in mice exposed to either cold (5° C.) or restraint for 1 1/2 hours. Simultaneous application of cold and restraint stresses had an additive effect on blood leucocytes. Exposure to cold for 3 hours induced no change in leucocyte count in rats, but a leucopenia due entirely to lymphopenia was caused by restraint alone or in combination with cold. Polymorphonuclear elements were reduced in the mouse by cold exposure and slightly increased in the rat during restraint. Total leucocyte counts in the blood of the mouse heart were only 50% of those in the rat in all experimental conditions.

5768
Murphy, C. W.,
and R. A. Cleghorn
STUDY OF ADRENOCORTICAL PHYSIOLOGY IN JET FLYING. — Canad. Jour. Biochem. and Physiol. (Ottawa), 34 (3): 534-542. May 1956. DLC (R11.C37, v. 34)

Eosinopenia was observed in pilots flying jet aircraft, with insignificant changes in urinary corticoid excretion and in salivary electrolyte concentration. In the absence of other supporting evi-

dence it is an open question whether eosinopenia is due to adrenocortical stimulation, to excitation of the sympathetic nervous system and epinephrine secretion, or to both. (Authors' conclusion, modified)

5769
Paschkis, K. E.,
A. Cantarow, D. A. DeBias, and G. Friedler
STUDIES ON THE MECHANISM OF CORTICAL HORMONE ACTION IN STRESS SURVIVAL. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-63, June, 1956. 9 p.
AD 115 160 PB 127 295

Survival of adrenalectomized rats stressed by formalin injection and exposure to cold (2°-4° C.) was studied. Animals were infused with various metabolites and compounds, whose metabolism was known to be influenced by adrenocortical hormones, to determine whether they offered protection against stress and whether the protection afforded by adrenocortical hormones might operate through influencing specific metabolic processes. Some compounds partially protected stressed rats; differences of response suggest different mechanisms operative in chemical and thermal stress. Survival effects of some compounds were further improved with addition of small doses of cortisone acetate or hydrocortisone, which administered alone gave only partial protection. Differences were observed with use of autonomic blocking agents: dibenamine and chlorpromazine were effective in chemical but not cold stress; pendiomide ditartrate protected cold-stressed, but not formalin-stressed animals. (Authors' abstract)

5770
Quinnel, R. K.
THE HUMAN COMPONENT IN EXTRATERRESTRIAL FLIGHT. — Tactical Air Command Surgeon's Bulletin (Headquarters Tactical Air Command, Langley Air Force Base, Va.), 6 (11): 1-24. Nov. 1956. DNLM

A general discussion is presented on the physiological stresses to be encountered in extraterrestrial flight such as accelerations, vibrations, cosmic radiations, and weightlessness. With the cabin control of pressurization, temperature, oxygen, carbon dioxide, and body odors is required, as well as adequate illumination and presentation of the instrument panel. Vision outside the cockpit may be important only for psychological reasons. (52 references)

5771
Raths, P.
[PARTICIPATION OF ENDOCRINE ORGANS IN STRESS REACTIONS OF THE LEUKOCYTES IN THE HAMSTER (CRICETUS CRICETUS L.)] Die Beteiligung endokriner Organe an Belastungsreaktionen des weissen Blutbildes beim Hamster (Cricetus cricetus L.). — Zeitschrift für Biologie (München), 108 (4): 300-311. April 1956. In German, with English summary (p. 310). DNLM

Arousal of hamsters from hibernation or hypothermia (8-10° C. body temperature) is accompanied by a progressive increase of lymphocytes and neutrophils which parallels that of body temperature. This process is followed by lymphopenia and pronounced neutrophilia. General excitation of non-dormant hamsters results in immediate lymphopenia and neutrophilia, the excitation caused by a fight being more effective than that brought about by inhalation of ether. Splenectomy proved to be of no influence on the changes in the blood picture under all three experimental stresses, while thyroidectomy retarded by two hours the course of the curve during recovery from hypothermia. After extirpation of both adrenal glands or removal of one and constriction of the other, stress lymphopenia did not appear but neutrophilia still took place. It is assumed that adrenal glands are activated in the awakening process. (Author's summary, modified)

5772
Risavi, A.
[CHANGES IN THE STATO-ACOUSTIC APPARATUS OF PILOTS] Promjene na statoakustičnom apparatu kod pilota. — Vojnosanitetski pregled (Beograd), 13 (11-12): 536-543. Nov.-Dec. 1956. In Serbo-Croation, with English summary (p. 542). DLC (RC970.V63, v. 13)

Audiograms of 56 pilots were recorded before and after a flight, while the caloric test was used for the vestibular function. The audiograms were satisfactory in 49 pilots, indicated a bilateral hearing loss for 5 pilots, and left-side hearing loss in two pilots. All pilots had a transitory hearing deficiency related to noise exposure. The vestibular mechanism was less sensitive after a single flight in 51 pilots. That acoustic trauma is the cause of vestibular sensitivity loss, was particularly obvious in airmen with some permanent hearing loss. During the flight, the vestibule is constantly stimulated by motion of the endolymph. It seems probable that the vestibular mechanism is not in a state of fatigue after a single flight, but rather in a state of excitability, which is probably the cause of the prolonged nystagmus after the caloric test. (Author's summary, modified)

5773
Vere, D. W.
AIRCREW FATIGUE IN LONG RANGE MARITIME RECONNAISSANCE. VIII. NOTE ON BLOOD CELL COUNTS. — RAF Inst. of Aviation Medicine (Gt. Brit.), Farnborough; issued by Flying Personnel Research Committee (Gt. Brit.). FPRC no. 907.8, Aug. 1956. [4] p. AD 112 725 UNCLASSIFIED

A study of total white, differential, and reticulocyte cell counts during an experimental flight is described. Attention is drawn to the fact that haemotological work in the field is beset by many problems other than those met with in hospital practice and an account of some of these is given. No significant changes in relation to the flying program were detected in cells other than eosinophils. An apparently significant fall in eosinophils was detected on flying days as compared with non-flying days, but it is emphasized that since the method of counting (i.e. as part of a differential white cell count) is not that properly used for an accurate

assessment of these cells, the finding cannot be taken as more than a pointer to further work. (Author's summary)

b. Acceleration (Including Rotation, Tumbling)

5774
ARDC SLED TESTS EJECTION IMPACT FORCES. — Aviation Week, 65 (24): 81, 83. Dec. 10, 1956. DLC (TL501.A8, v. 65)

The new catapult sled "Daisy Track" installed at the Holloman Air Development Center is described. Some of the studies on the effects of abrupt deceleration and on the best body position for emergency ejection are mentioned briefly.

5775
Brown, John L.,
and M. Lechner
ACCELERATION AND HUMAN PERFORMANCE: A SURVEY OF RESEARCH. — Jour. Aviation Med., 27 (1): 32-49. Feb. 1956. DLC (RC1050.A36, v. 27)

Same as the report, item no. 3900, vol. IV.

5776
Cochran, L. B.,
P. W. Card, and M. E. Norsworthy
G x TIME FLIGHT PATTERNS IN THE NAVAL TRAINING COMMAND. VI: AEROBATIC AND GUNNERY MANEUVERS AS FLOWN IN ADVANCED TRAINING UNIT 201. — Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 100 103, Report no. 4, June 21, 1956. ii+18 p. AD 119 598
UNCLASSIFIED

The magnitudes and particularly the durations of positive accelerative stresses to which personnel of Advanced Training Unit 201 are frequently exposed are of sufficient degree to produce such undesirable effects as: excessive fatigue, visual impairment, or loss of consciousness, particularly in the low g tolerant individual. In view of the durations of exposure, the proper use of anti-blackout equipment unquestionably has made a significant contribution to flight safety and efficiency in the Naval Air Training Command. Proper maintenance and use of anti-blackout equipment together with thorough indoctrination of all flight personnel on the protection provided are vitally important in the Naval Air Advanced Training Command. (Authors' summary)

5777
Cohen, S. I.,
A. J. Silverman, and G. Zuidema
PHYSIOLOGIC STRESS RESPONSE EVALUATION BY FOCUSED INTERVIEWING. — A.M.A. Arch. Neurol. and Psychiatry, 76 (6): 670-674. Dec. 1956.
DLC (RC321.A65, v. 76)

The hypothesis is presented that subjects displaying high levels of anxiety have low g tolerances, while those demonstrating aggressivity and low levels of anxiety have high g tolerance levels. These affects and impulses are significant emotional determinants influencing some of the cardiovascular mechanisms responsible for variations in g tolerance. Using the human centrifuge as the physiological stresser, subjects were exposed to controlled increments in g stress and their tolerance evaluated. Immediately following the runs the subjects were interviewed to determine their anxiety and arousal and handling of aggression during the test. Focused-interview techniques as part of a psychophysiological battery directed at evaluating affective constellations, is a promising method of judging cardiovascular responses to a physiological stress.

5778
Cranmore, D.
BEHAVIOR, MORTALITY, AND GROSS PATHOLOGY OF RATS UNDER ACCELERATIVE STRESS. — Jour. Aviation Med., 27 (2): 131-140. 1956.
DLC (RC1050.A36, v. 27)

A total of 269 rats were subjected to various combinations of magnitude and duration of positive or negative g forces. Rats which died from positive g stresses showed the following pathology: grossly there were petechial hemorrhages in practically all the subcutaneous tissues of the lower body, the large veins of the abdomen and the liver appeared to be engorged with blood. Also, the lungs showed hemorrhagic areas which varied from minute petechiae to some which were 5 mm. or more in diameter. The lungs were congested with blood, and this was also true of the lungs of those rats which survived, although the congestion was less marked—a few of the survivors showed no lung congestion, but all demonstrated the subcutaneous hemorrhages. Those animals dead from negative g stresses showed the following: subcutaneous hemorrhage throughout the entire upper body region, and hemorrhage into the eye socket and the muscles of the face. No hemorrhage was found in either the brain or the spinal cord. Hemorrhage of the lungs was frequently the same in both those animals which died and those which survived; congestion of the liver and blood vessels occurred in those animals which died, but only rarely in those surviving. Anoxia is believed to have been the immediate cause of death from both positive and negative g stress.

5779
Cranmore, D.,
and H. L. Ratcliffe
A STUDY OF ADAPTATION TO ACCELERATION WITH RATS AND GUINEA PIGS AS TEST ANIMALS. — Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pa. Report no. NADC-MA-5602, Feb. 27, 1956. v+16 p. (Project no. NM 001 100 306, Report no. 1). AD 90 233
UNCLASSIFIED

Experiments were conducted to explore the possibility of increasing tolerance to acceleration stress by developing appropriate schedules of conditioning. Guinea pigs and rats were subjected repeatedly to negative acceleration at levels that produced temporary loss of balance and respiratory difficulty, facial edema and hemorrhages from the nose, eyes and ears. These signs decreased in magnitude, and,

in some instances, disappeared completely as the schedule continued. Other signs of increased tolerance, and evidence of slight to moderate adrenal cortical hypertrophy, led to the conclusion that the animals were undergoing adaptation to acceleration stress, and that increased activity of the adrenal cortex is a factor in this process. (Authors' abstract)

5780
Crosbie, R. J.
DIRECTIONAL CONTROL OF ACCELERATIVE FORCES IN CENTRIFUGE BY SYSTEM OF GIMBALS. — Jour. Aviation Med., 27 (6): 505-511. Dec. 1956. DLC (RC1050.A36, v. 27)

A two-gimbal system of the human centrifuge is described and illustrated. It is used to control the direction of acceleration with respect to the subject, and to simulate inflight acceleration. In comparison to a freely swinging platform type of centrifuge, it allows for the partial reproduction of catapult g patterns, a great variety of jostling g patterns typical of uncontrolled aircraft duplicated as often as necessary, less unpleasant oculogyral illusions, and elimination of overshooting and oscillating. With proper instrumentation, this system may permit a pilot to control his own ride under various conditions.

5781
Crosbie, R. J.
FORCES DEVELOPED ON A CAR TRAVELING RADIALLY ALONG A MOVING CENTRIFUGE ARM. — Naval Air Development Center. Aviation Medical Acceleration Lab., Johnsville, Pa. (Project NM 001 100 303, Report no. 5). Report NADC-MA-5610, Sept. 4, 1956. vii+11 p. AD 108 391 UNCLASSIFIED

Equations are derived which enable one to determine the forces acting on a car traveling radially along a moving centrifuge arm. These forces are of interest in determining the feasibility of attaching a track to a centrifuge arm which will provide a device for producing either a step or an impulse forcing function. The author concludes that the Coriolis force developed on a radially moving car is of such magnitude as to make this method of producing a step forcing function extremely difficult, if not actually unfeasible. Under certain limiting conditions, the Coriolis force developed on this radially moving car may be canceled by proper control of the angular deceleration of the centrifuge. This deceleration must generally be of such magnitude that the centrifuge is slowed considerably, and hence the production of a step forcing function without the disadvantages of the Coriolis force is practically impossible. However, a definite impulse forcing function may be produced if the car is brought to rest at the end of the track on the centrifuge arm by compressing a spring of known force constant. This impulse is much less, however, than that obtainable by a typical linear accelerator or ejection seat device. (Author's abstract)

5782
Crosbie, R. J.
UTILIZATION OF A SYSTEM OF GIMBALS ON THE HUMAN CENTRIFUGE FOR THE CONTROL OF DIRECTION OF ACCELERATION WITH RESPECT TO THE SUBJECT. — Naval Air Development Center. Aviation Medical Acceleration Lab., Johnsville, Pa. (Project no. NM 001 100 303, Report no. 4). Report no. NADC-MA-5608, Aug. 2, 1956. v+12 p. AD 107 772 UNCLASSIFIED

Advantages of a centrifuge which utilizes a system of controllable gimbals over a freely swinging platform type of centrifuge are discussed. Particular emphasis is placed upon the ability of such a system to eliminate transverse and lateral components of the resultant acceleration on a subject during an entire g run. Although this elimination could be realized at the center of the gimbal system, the secondary accelerations produced by the gimbal motion itself, which exist at all parts of the subject's body remote from the center of rotation, could not be ignored. However, it was found that the oculogyral illusions which resulted from these accelerations were less disturbing to the subject than the oculogravic illusions which occurred on the freely swinging platform. Other advantages of this device which are discussed include the elimination of the characteristic oscillations of the freely swinging platform and the addition of a greater variety of g programs to centrifuges in general. (Author's abstract)

5783
Diringshofen, H. von
[25 YEARS OF AEROMEDICAL RESEARCH ON ACCELERATION: REVIEW AND CONCLUSIONS] 25 Jahre in der luftfahrtmedizinischen Erforschung der Beschleunigungen: Ein Rückblick und Ausblick. — Medizinische (Stuttgart), 1956 (52): 1843-1847. Dec. 29, 1956. In German. DNLM

The author reviews aeromedical research on the physiological effects of acceleration and deceleration forces in flight, including his own investigations. Present and future problems in this area are discussed while anticipating the transition to space flight which will add the physiological effects of weightlessness. In conclusion, it is pointed out that the aeromedical research on acceleration has benefited research in other areas, e.g., the physiology of circulation.

5784
Dorman, P. J.,
and R. W. Lawton
EFFECT ON G TOLERANCE OF PARTIAL SUPINATION COMBINED WITH THE ANTI-G SUIT. — Jour. Aviation Med., 27 (6): 490-496. Dec. 1956. DLC (RC1050.A36, v. 27)

A total of 305 runs on nine trained centrifuge subjects and 233 runs on twenty-four Navy pilots were performed. Using grayout (peripheral light loss) as an endpoint, 66.7 per cent of the fleet pilots were able to withstand 7 g for 15 to 30 seconds sitting upright, wearing a standard Navy Z-2 suit inflated to 7 - 9 p.s.i. pressure. The remainder failed the 7 g, 30-second run. The 65° supine position alone failed to improve the performance of this latter group. All of these subjects were then retested in the 65° supine position wearing an inflated Z-2 suit (7-9 p.s.i. pressure). One hun-

dred per cent of subjects thus tested successfully withstood 7 g for 30 seconds, although the unprotected tolerance in some subjects was as low as 2.5 g. (Authors' summary)

5785
Dorman, P. J.,
and R. W. Lawton
THE EFFECT OF PARTIAL SUPINATION COMBINED WITH THE ANTI-G SUIT ON G TOLERANCE IN NAVY PILOTS: A PRELIMINARY REPORT. — Naval Air Development Center. Aviation Medical Acceleration Lab., Johnsville, Pa. Report no. NADC-MA-5606, May 8, 1956. v+12 p. (Project no. NM 001 100 300, Report no. 4). AD 98 515
UNCLASSIFIED

A preliminary study of the g protection afforded by the combination of partial supination (65°) and the Navy Z-2 anti-blackout suit is presented. A total of 305 runs on 9 trained centrifuge subjects and 233 runs on 24 Navy pilots were performed. Using grayout (peripheral light loss) as an end point 66.7 percent of the fleet pilots were able to withstand 7 g for 15 to 30 seconds sitting upright, wearing a standard Navy Z-2 suit inflated to 7-9 p. s. i. pressure. The remainder failed the 7 g, 30-second run. The 65° supine position alone failed to improve the performance of this latter group. All of these subjects were then retested in the 65° supine position wearing an inflated Z-2 suit (7-9 p. s. i. pressure). One hundred percent of subjects thus tested successfully withstood 7 g for 30 seconds, although the unprotected tolerance in some subjects was as low as 2.5 g. (Authors' abstract)

5786
Edelberg, R.,
J. P. Henry, J. A. Maciolek, E. W. Salzman,
and G. D. Zuidema
COMPARISON OF HUMAN TOLERANCE TO ACCELERATIONS OF SLOW AND RAPID ONSET. — Jour. Aviation Med., 27 (6): 482-489. Dec. 1956.
DLC (RC1050. A36, v. 27)

Circulatory reflex activity was evaluated in normal subjects with and without anti-g suit protection during centrifuge rides by means of the gradual onset run (GOR), which can add up to 3.5 g to the conventional blackout level (average increment, 1.9 g). A hypothesis is presented to show how the GOR produces this increment. The increment has a high correlation with the amount of protection received from a g-suit for any given subject, a relationship which is interpreted as implying a reflex mechanism in g-suit protection. The GOR has application in predicting changes in a pilot's g-tolerance in the g-suit and in evaluating student pilots with a history of low g-tolerance. (Authors' summary, modified)

5787
Frankenhaeuser, M.,
[EFFECTS OF RADIAL ACCELERATIONS ON THE PSYCHIC FUNCTIONS.]. Effekter av radialacceleration på psykiska funktioner. I. — Meddelanden från flyg- och navalmedicinska namnden (Stockholm), 5 (1): 20-23. 1956. In Swedish, with English summary (p. 23).
DNLM

Time perception under acceleration was investigated on the human centrifuge. The stimuli used were auditory signals (1, 5, 10, 15, and 20 sec.) recorded on a magnetic tape and presented via earphones. The subject reproduced either the entire or half of the duration of stimulus (1) under normal conditions before acceleration, (2) during acceleration at 3 g, and (3) under normal conditions after the acceleration. The stimulus signal was underestimated to a greater extent during acceleration, the difference being statistically significant at the 1% level of confidence at the 10, 15, and 20-sec. stimulus durations.

5788
Frenckner, P.,
and L. Preber
RELATIONSHIP BETWEEN VESTIBULAR REACTIONS AND VEGETATIVE REFLEXES, STUDIED IN MAN BY MEANS OF A REVOLVING CHAIR OF NEW DESIGN. — Acta oto-laryngologica (Stockholm), 46 (3): 207-218, discussion, p. 219-220. May-June 1956. In English.
DNLM

Vegetative reactions were studied in male subjects after rotatory stimulation of the vestibule. A newly designed electrically operated revolving chair with attached apparatus for recording nystagmus, skin resistance, blood pressure and electrocardiogram was used. A distinct and characteristic fall of the resistance curve was found in neurovegetatively susceptible persons even with the use of weak stimuli (cupulometry). This fall in skin resistance seemed to be caused mainly by vestibular stimulation in the same way as nausea associated with motion sickness. Investigations on approximately 100 persons showed that, on comparison of the changes in skin resistance, the post-rotatory nystagmus, and the aftersensation of cupulometry, the variations in skin resistance were found to be correlated to the intensity and course of the rotatory after-sensation. (Authors' summary, modified)

5789
Gell, C. F.,
and D. Cranmore
DISLOCATION OF ORGANS AND TISSUES OF RATS EXPOSED TO ACCELERATION STRESS: POSSIBLE PHYSIOLOGIC SIGNIFICANCE. — Jour. Aviation Med., 27 (6): 497-504. Dec. 1956.
DLC (RC1050. A36, v. 27)

A study was conducted using a quick freeze technique for the anatomic fixation of rats exposed to graduated increments of acceleration stress and time. (1) Visceral displacement reaches a maximum at a relatively low level of acceleration stress in a short period of time in the application of positive, negative or transverse g. (2) Elongation and torsion of the lungs in positive g and compression of the lungs in negative g supports the postulate of Cranmore that death from acceleration stress is due to anoxic anoxia. (3) Elongation of the heart and great vessels in positive g and compression of these organs in negative g impedes tissue oxygenation by reducing the blood flow. (4) The possibility of tumbling creating pathologic changes due to a piston-like action caused by the alternating displacement of the visceral contents of the cavities above and below the diaphragm appears reasonable,

in view of the rapidity of displacement response to applied acceleration stress. (5) The application of transverse g creates little displacement of viscera with no significant physiologic disturbance at much higher g levels than can be applied in positive or negative g. (From the authors' summary and conclusions)

5790
Gerathewohl, S. J.,
H. Strughold, and W. F. Taylor
THE OCULOMOTORIC PATTERN OF CIRCULAR EYE MOVEMENTS DURING INCREASING SPEED OF ROTATION. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-33, April 1956. 19 p. AD 108 300 PB 124 532

The basic pattern of guided circular eye movements during increasing rotational target speed was photographed and analyzed with the use of a Master Ophthalmograph. Experiments were made with (1) saccadic eye movements at a constant speed of 15 r.p.m.; (2) during increasing speeds from 20 to 45 r.p.m.; and (3) from 40 to 85 r.p.m. As the rotational speed of the target increases, the movements of the eyes become more frequent, extensive, and irregular. It is concluded that a rotating target can be visually fixated without strain up to a speed of about 30 r.p.m.; that some subjects lose pace in the range between 30 and 60 r.p.m.; and that visual pursuit is extremely difficult at speeds higher than 75 r.p.m. Beyond this limit the oculomotoric pattern disintegrates completely. (Authors' abstract, summary and conclusions, quoted in part)

5791
Graybiel, A.,
J. L. Niven, and K. MacCorquodale
THE EFFECT OF LINEAR ACCELERATION ON THE OCULOGYRAL ILLUSION. — Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 110 100, Report no. 42, July 13, 1956. [22] p. AD 127 827 UNCLASSIFIED

The results of this study show that the duration of the oculogyral illusion is an increasing function of increasing angular acceleration. The heading of the observer relative to the axis of rotation of the centrifuge does not affect the duration of the oculogyral illusion. The increased magnitude of the linear acceleration component experienced when the seating radius was increased from 2 feet to 17 feet did not affect the duration up to centrifuge speeds of 8 r.p.m. (maximum angle ϕ = 20 degrees). The increase in magnitude of the linear acceleration component with increase in centrifuge speed beyond 8 r.p.m. becomes increasingly disruptive of performance, as oculogravic effects become dominant. The sign of the acceleration i.e., positive and negative acceleration, most probably does not influence the duration. (Authors' results)

5792
Guedry, F. E.,
and H. Kalter
DESCRIPTION OF HUMAN ROTATION DEVICE. — Army Medical Research Lab., Fort Knox, Ky. (Project no. 6-95-20-001, Subtask AMRL S-5). Report no. 242, May 23, 1956. i+17 p. AD 109 230 PB 128 523

A turntable was constructed for rotating subjects positioned within a radius of three feet from the center of rotation. Recorded performance of this device indicates that control of angular velocity is excellent. Control of angular accelerations and decelerations below 30°/sec.^{2} is very good and easily obtained with a cam system for driving the speed control potentiometer. Accelerations of 60°/sec.^{2} and decelerations of 50°/sec.^{2} can be obtained with the cam control system. However, to obtain these higher magnitudes, the cam must be cut to compensate for a lack in linearity of response. The system provides sufficient range of angular velocities and angular accelerations for conducting a wide variety of experiments in vestibular research. (Authors' abstract)

5793
Hahn, R.
[RESEARCH ON MODIFICATIONS OF AUDITORY THRESHOLD CAUSED BY THE PURKINJE PHENOMENON] Ricerche sulle modificazioni della soglia uditiva dovute al fenomeno di Purkinje. — Rivista di medicina aeronautica (Roma), 19 (3): 466-475. July-Sept. 1956. In Italian, with English summary (p. 473). DLC (RC1050.R56, v. 19)

Four subjects with normal hearing were subjected to vestibular stimulation by rotation. Immediately after cessation of the rotation (in the so-called first post-rotatory phase) the subject's head was flexed abruptly. Audiograms taken after the experiment showed an increase of the auditory thresholds for 500-, 1000-, and 2000-c.p.s. tones amounting to 5-20 decibels. This increase was greatest for the 500-cycle frequency. The threshold value did not return rapidly to the values observed before the experiment, but showed a phasic course with a 15-20 decible variation between two successive determinations and returned to normal values only 30 minutes after rotation. These threshold variations were not dependent upon the audiometrically studied ear or upon the sense of rotation, but upon central phenomena. The importance of auditory failure in relation to conditions of the pilot in flight is discussed.

5794
Hess, J. L.
THE APPROXIMATION OF THE RESPONSE OF THE HUMAN TORSO TO LARGE RAPIDLY APPLIED UPWARD ACCELERATIONS BY THAT OF AN ELASTIC ROD AND COMPARISON WITH EJECTION SEAT DATA. — Douglas Aircraft Co., Inc., El Segundo, Calif. Report no. ES 26472, Nov. 26, 1956. 51 p. AD 125 558 UNCLASSIFIED

It has been noticed that when the human body is subjected to very rapidly applied accelerations, the accelerations at points of the body can be considerably larger than the maximum value of the applied acceleration. This paper considers the case when the acceleration is applied along the line of the spine from seat to head as in ejection from aircraft and attempts to approximate the motion of the human torso under these conditions by that of an idealized, one-dimensional, visco-elastic structure. The simple case of homogeneous elastic rod is discussed in detail and its predictions compared with ejection seat data. The extensions to more complicated visco-

elastic structures are discussed. It is concluded that the elastic rod is a fairly good first approximation, but that it is not sufficiently exact to be used in making quantitative predictions. It is also concluded that more complicated structures will require more and better data for their evaluation. (Author's abstract)

5795
Howarth, C. I.
THE TIME COURSE OF PRESSURE BLINDNESS. — RAF Inst. of Aviation Medicine (Gt. Brit.), Farnborough; issued by Flying Personnel Research Committee (Gt. Brit.). FPRC no. 968, Aug. 1956. 2 p. AD 112 721 UNCLASSIFIED

When pressure is applied to the eyeball in excess of 120 mm. Hg, vision decreases progressively from the periphery of the visual field until finally the eye becomes blind. Three possible causes of the restriction of peripheral vision during retinal ischaemia are suggested: the higher sensitivity of the fovea; a possible storage of oxygen in the macular pigment; and the greater effectiveness of a minimal blood flow around the optic disc and along the course of the main retinal arteries. It has been shown that the last area of the retina to remain active during ischaemia lies between the fovea and the optic disc so that no one of these can be the single explanation of the form of the restricted visual field. Since foveal vision is not so insensitive to ischaemia as has been assumed, it is suggested that it may provide the most sensitive tests of aircrew g thresholds. (Author's summary)

5796
Jongkees, L. B. W.,
and J. A. J. Klun
ON PER- AND POST-ROTATORY REACTIONS. — Acta oto-laryngologica (Stockholm), 46 (4): 314-318. July-Aug. 1956. In English. DNLM

The effect of the interval between on and off rotational impulses on the duration of a rotatory sensation was measured for various magnitudes of the stimulation which was equally strong for both on and off acceleration. A rotating chair was used which could be accelerated in a short period of time until a constant velocity was reached (12.5°/second in 3 seconds, 24°/second in 2-1/2 seconds, 37°/second in 2 seconds, 60°/second in 3 seconds). The results support the view, expressed on graphs mathematically, that the cupula endolymph system acts as a highly damped torsion pendulum. Another conclusion is that the duration of the perrotatory sensation following acceleration in the beginning is identical with the duration of the postrotatory stopping impulses.

5797
Lawton, R. W.,
L. C. Greene, G. H. Kydd, L. H. Peterson, and R. J. Crosbie
ARTERIAL BLOOD PRESSURE RESPONSES TO G FORCES IN THE MONKEY. — Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pa. Report no. NADC-MA-5611, Sept. 24, 1956. iv+18 p. (Project no. NM 001 100 315. Report no. 3). AD115 268 UNCLASSIFIED

This study describes arterial blood pressure responses in monkeys subjected to positive acceleration. The three principal factors affecting the blood pressure are shown to be (a) the height of the fluid column in the g-axis, (b) the volume within, and (c) the distensibility of the arterial vascular tree. In addition to pressure changes due to the physical effect of acceleration on the fluid column, a decrease in arterial volume, and thus a pressure fall, occurs because of a change in the dynamic equilibrium of inflow and outflow in the system. These two factors tend to balance each other in the region of the diaphragm so that blood pressure changes are minimal in this area. (Authors' abstract)

5798
Lomonaco, T.,
M. Strollo, and L. Fabris
[BEHAVIOR OF MOTOR COORDINATION IN SUBJECTS EXPOSED TO ACCELERATION VALUES VARYING FROM 3 TO 0 G] Comportamento della coordinazione motoria in soggetti sottoposti a valori di accelerazione varianti da 3 a 0 g. — Proc. International Astronautical Congress, VIIth (Rome, Sept. 12-22, 1956), p. 825-839. Roma, 1956. In Italian. DLC (TL787.I44, v. 7)

Thirty subjects with normal labyrinthine function were exposed, by means of a subgravity tower, to accelerations varying from 3 to 0 g for a total time of 8 seconds, of which 4 were spent in subgravity. Under these conditions, studies were made of eye-hand coordination and body equilibrium. During the experiment the subjects showed motor incoordination. Under subgravity conditions there was evidenced an increase of muscle tonus, a sense of levitation, bewilderment and distraction, and various unpleasant sensations. Twenty of the thirty subjects exposed to various consecutive tests demonstrated improvement in the coordination test and a decrease in unpleasant sensations, indicating possible adaptation to experimental conditions.

5799
Mclaughlin, J.,
and I. Gray
BIOCHEMICAL RESPONSE TO TRAUMA. II. CORTICOSTERONE AND 17-HYDROXYCORTICOSTERONE LEVELS IN PLASMA OF RATS SUBJECTED TO TUMBLING TRAUMA. — Walter Reed Army Inst. of Research, Washington, D. C. WRAIR-86-56, April 1956. 9 p. (Project no. 6-59-12-022, Subtask no. 11). AD 112 801 UNCLASSIFIED

Corticosterone and 17-hydroxycorticosterone levels were determined in plasma of normal and traumatized rats. In general, it was found that the plasma levels rose with increasing number of turns at zero time after tumbling. When the corticosterone and 17-hydroxycorticosterone plasma levels of rats were examined over a period of 24 hours from the end of drumming, it appeared that the levels changed markedly. However, these changes were not parallel for the two steroids examined. The fractions separated as corticosterone and 17-hydroxycorticosterone showed the same elution behavior, ultraviolet absorption, fluorescence development and similar R_f by paper par-

tition chromatography as those of known samples of corticosterone and 17-hydroxycorticosterone. (Authors' abstract)

5800
Mittermaier, R.,
and G. Rossberg
[VESTIBULAR EXAMINATIONS WITH NEAR-THRESHOLD ACCELERATION STIMULI] Vestibulartsuntersuchungen mit schwellennahen Beschleunigungsreizen. — Archiv für Ohren- Nasen und Kehlkopfheilkunde (Berlin), 168 (4): 313-332. 1956. In German. DNLM

A series of investigations of the vestibular rotatory nystagmus were undertaken with healthy subjects using near-threshold accelerations. Both the perrotatory and the postrotatory reactions were registered on a nystagmograph. The results are presented in form of tables. It is concluded that the perrotatory reaction has to be separated into acceleration and postacceleration components, and the postrotatory reaction into the deceleration and postdeceleration components, since the time after the actual positive or negative acceleration gives the essential information about the strength of excitation. The perrotatory reaction results in more exact and even values than the postrotatory nystagmus. The secondary (inverse) phases appear with regularity only after an acceleration of at least $3°/sec.^2$ After lesser accelerations they appear only in a percentage of cases. (Authors' summary, modified)

5801
Ray, J. T.
A STUDY OF ADAPTATION TO TILT. — Publication no. 17,018. Ann Arbor: Univ. microfilms, 1956. v+100 p. 1956. DLC

By means of a lateral tilt chair, subjects were inclined from the gravitational vertical under varying conditions and required to return to that position which "felt upright". It was observed that the constant error of adjustments increased with the magnitude of inclination, and that the direction of initial inclination had no significant effect upon the adjustment error. Within each experimental session the constant error of adjustment was found to decrease with repeated trials (termed the intra-series decrement). It was further found that introduction of a sufficient rest period tended to restore the constant error of adjustment in the direction of its unpracticed level. Positive transfer of habituation of the response did not take place from one quadrant to the other and apparently the transfer of this effect approximates 100% since none of the differences were statistically significant. (101 references)

5802
Roggeveen, L. J.,
and P. Nijhoff
THE NORMAL AND PATHOLOGICAL THRESHOLD OF THE PERCEPTION OF ANGULAR ACCELERATIONS FOR THE OPTOGYRAL ILLUSION AND THE TURNING SENSATION. — Acta oto-laryngologica (Stockholm), 46 (6): 533-541. Nov.-Dec. 1956. In English. DNLM

Threshold determinations on the vestibular organ were made in fifteen subjects using a turning chair. Two criteria were used: (1) perception of a turning movement without further aids and (2) the optogyral illusion (caloric or rotatory stimulation applied with the visible surroundings reduced to a small luminous spot in a fixed position in relation to the subject and at a distance of 1 m. from his eyes). A reduction of the effect of fancied impressions was brought about by the administration of blank stimuli (no acceleration after the warning signal). A significant difference was found between sensitivity as expressed by the turning sensation and sensation expressed by the optogyral illusion, the latter being more sensitive. In most pathological cases a still larger difference was found. (Authors' summary, modified)

5803
Salzman, E. W.,
and S. D. Leverett
PERIPHERAL VENOCONSTRICTION DURING ACCELERATION AND ORTHOSTASIS. — Circulation Research, 4 (5): 540-545. Sept. 1956. DLC (RC681. A1A57137, v. 4)

Using a miniature balloon technique, peripheral vaso-constriction was measured in dogs given two types of centrifuge runs; one in which a peak of 3 g was reached in 3 to 4 seconds and held for a 15 second plateau, and the other in which the acceleration was gradually increased at the rate of 1 g per 10 seconds. By eliminating the constriction with Dibenzyline, an adrenergic blocking agent, the semiquantitative interpretation of results was made possible. Active peripheral venoconstriction was observed in dogs exposed to centrifugal acceleration. The magnitude of the venoconstrictor response was strongly correlated with the animal's ability to maintain arterial pressure, suggesting the importance of contraction of the venous reservoir in the support of cardiac output under a hydrostatic load.

5804
Salzman, E. W.,
and S. D. Leverett
STUDIES IN ORTHOSTATIC VENOCONSTRICTION. I. PERIPHERAL VENOCONSTRICTION DURING ACCELERATION. II. ROLE OF THE CAROTID SINUS MECHANISM. — Wright Air Development Center. Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 7216-71712). WADC Technical Report no. 56-483, Sept. 1956. iv+22 p. AD 97 298 UNCLASSIFIED

A technique for demonstrating active venous constriction has been developed, using miniature intravascular balloons. Validation of the technique was performed in vitro and by drug studies and direct stimulation of the sympathetic chain in vivo. Active venous constriction was demonstrated in dogs during acceleration on the centrifuge. The magnitude of the venous response was strongly correlated with the animals' ability to maintain arterial pressure. The importance of the venous system in supporting the circulation under a hydrostatic load is discussed. The demonstration of peripheral venoconstriction during common carotid artery occlusion implicated the carotid sinus mechanism in the con-

trol of peripheral venous tone. Deafferentation of the aortic arch by cervical vagotomy enhanced the venous response to carotid occlusion. Venoconstriction was correlated with arteriolar constriction in time course and magnitude. A parallel function of peripheral venomotion and arteriolar reactivity is suggested. (Authors' abstract)

5805
Schaefer, J.,
and S. Kubicki
[RECORDING OF EEG (ECG AND EYE NYSTAGMUS) IN ROTATORY MOVEMENTS] Zur Ableitung von EEG (EKG und Augennystagmus) bei Drehbewegungen. = Zeitschrift für die gesamte experimentelle Medizin (Berlin), 128 (1): 50-54. Nov. 1956. In German. DNLM

An apparatus is described which permits the simultaneous registration of the vestibular optic nystagmus induced by rotation together with the effect of centrifugal forces on the electroencephalogram and electrocardiogram. A small laboratory animal may be rotated and nystamgus, EEG and ECG recorded electrically during rotation.

5806
Stapp, J. P.,
and C. D. Hughes
EFFECTS OF MECHANICAL FORCE ON LIVING TISSUES. II. SUPERSONIC DECELERATION AND WINDBLAST. = Jour. Aviation Med., 27 (5): 407-413. Oct. 1956. DLC (RC1050.A36, v. 27)

Anesthetized chimpanzees were exposed to accelerations exceeding 28 g using a 1,400-pound sled propelled by up to nine 7,800-pound thrust rockets (each of 1.8 second duration) with an ejection-catapult actuated canopy jettisoning in 50 milliseconds. The onset of windblast in not less than 50 milliseconds to more than 2,800 pounds per square foot was sustained without injury so long as the animal's head was enclosed in a wind-proof helmet and head and extremities were adequately secured. Application of these findings to methods of escape from supersonic aircraft in flight are discussed. (From the authors' summary)

5807
Stapp, J. P.
MEASUREMENT FOR SURVIVAL. = Ordnance, 40 (216): 975-979. May-June 1956.
DLC (UF1.067, v. 40)

The propulsion, braking, and instrumentation systems of several high-speed linear decelerators designed for the investigation of problems of tolerance to forces incurred in aircraft crashes and during ejection from high-speed aircraft are described. The decelerators include (1) a rocket-propelled sled braked by pressurized gripping units units, on which tolerance limits for primates have been established foravarious body positions, and harness configurations developed; (2) a monorail suspended decelerator braked by collision, on which high tolerance limits to impacts of high rate of onset and short duration have been established for hogs, and the comparative vulnerability of body parts to impingement by simulated cockpit components evaluated; and (3) a high-performance rocket sled with water brakes, in which human velocities up to 632 m.p.h. have been obtained.

5808
Stasevich, R. A.,
and P. K. Isakov
[SPEED, ACCELERATION, G-FORCES. (SOME PROBLEMS OF PHYSICS AND PHYSIOLOGY APPLICABLE TO AVIATION)] Skorosti, uskorenita, peregruzki (Nekotorye voprosy fiziki i fiziologii primenitel'no k aviatsii). = Moskva: Voennoe Izdatel'stvo Ministerstva Oborony Soiuza SSR, 1956. 84 p. In Russian. DLC (RC1075.S8)

A discussion is presented for popular consumption on the speed of movement, acceleration, g-forces, and their effects on the human organism. The examples used are for the most part from aviation although some are also pertinent to space flight.

5809
Tabusse, L.,
and R. Mainard
[THE EFFECTS OF SPEED AND ACCELERATIONS ON THE CARDIOVASCULAR SYSTEM] Les effets de la vitesse et des accélérations sur le système cardio-vasculaire. = La santé de l'homme (Lyon), no. 92: 5-7. Jan.-Feb. 1956. In French. DNLM

The effects of high speed and accelerations on the cardiovascular system as shown by research and actual supersonic flight are briefly outlined. Changes have been observed in the electrocardiogram, arterial pressure, cardiac rhythm, and vasomotricity. It is concluded that supersonic flight is dangerous for the cardiovascular system, and may cause ischemic hypoxia which will eventually lead to anoxemic hypoxia.

5810
Usachev, V. V.
[EFFECT OF RADIAL ACCELERATIONS ON CONDITIONAL VASOMOTOR REFLEXES] Vliianie radial'nykh uskorenii na uslovnye sosudisto-dvigatel'nye refleksy. = Zhurnal vysshei nervnoi deiatel'nosti (Moskva), 6 (4): 555-560. July-Aug. 1956. In Russian. DLC (QP351.Z65, v. 6)

The effects of acceleration on the central nervous system were studied by plethysmographic measurement of changes in the conditional vasomotor (vasoconstriction) reflexes to a bell and unconditional vasomotor reflexes to cold water stimulation. Five healthy males, 21 to 32 years of age, were subjected to positive acceleration in a centrifuge of 3.5 m. radius. Maximum force was exerted for 20 sec. The decline of both, cold-pressor reflex and the conditional vasomotor reflex, and the increase in the respective latencies during the first twenty to twenty-six minutes after rotation attest to the dominance of inhibition processes under acceleration in those parts of brain which regulate the vascular tonus.

5811
White, W. J.,
and W. R. Jorve
THE EFFECTS OF GRAVITATIONAL STRESS UPON VISUAL ACUITY. = Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio. WADC Technical Report no.

56-247, Nov. 1956. vi+29 p. (Project no. 7193, Task no. 71611). AD 110 444 PB 121 709

Experiments were conducted on a human centrifuge to determine the relation between gravitational stress and visual acuity with the factor of cerebral circulatory competence minimized by the use of protective measures known to ameliorate the gross visual symptoms associated with acceleration. Visual acuity was measured with the checkerboard targets that are standard with the Ortho-Rater. Gravitational stress was found to have a significant and progressive effect on visual acuity. Factors hypothesized to account for the differences in visual performance during gravitational stress include: (1) involvement of the autonomic nervous system and its effect on visual acuity; (2) changes in the shape of the eyeball or refracting surfaces; and (3) displacement of the crystalline lens in the direction of gravity. The lens-displacement hypothesis is tentatively accepted to account for the acuity changes under gravitational stress.

5812
White, W. J.,
and M. B. Riley
THE EFFECT OF POSITIVE ACCELERATION (G) ON THE RELATION BETWEEN ILLUMINATION AND DIAL READING. — In: Symposium on Air Force human engineering, personnel, and training research, p. 306-310. Air Research and Development Command, Baltimore, Md. ARDC Technical Report 56-8, 1956.
DLC (UG633.A377163, no. 56-8, 1956)

Six subjects with normal visual acuity read instrument dials at five brightness levels while exposed to positive accelerations ranging from 1 to 4 g on the centrifuge. Results show: (1) at the highest brightness level there was no difference in the percentage of errors at various g values; (2) at the three highest brightness levels the percentage of errors did not differ for acceleration loads up to 3 g; (3) at the two lower brightness levels, errors were inversely related to brightness and directly related to the value of g; and (4) at the 4 g level there was a systematic increase in errors with decreasing brightness. Most of the gross errors occurred at the lowest brightness level and did not appear to be related to g load.

5813
Young, J. G.,
and I. Gray
BIOCHEMICAL RESPONSE TO TRAUMA. III. EPINEPHRINE AND NOREPINEPHRINE LEVELS IN PLASMA OF RATS SUBJECTED TO TUMBLING TRAUMA. — Walter Reed Army Inst. of Research, Washington, D. C. WRAIR-87-56, April 1956. 6 p. (Project no. 6-60-09-012, Subtask no. 1).
AD 112 802 UNCLASSIFIED

Plasma levels of epinephrine and norepinephrine were determined in normal and traumatized rats using the fluorimetric method of Weil-Malherbe and Bone. Trauma was produced by tumbling in a Noble-Collip drum. Epinephrine levels increased 2 to 5 times with tumbling, norepinephrine 5 to 10 times. Epinephrine and norepinephrine were determined periodically from 0 to 24 hours after tumbling. In general, norepinephrine levels began to fall within 1 hour after tumbling and returned approximately to normal in 4 to 8 hours. The epinephrine levels remained elevated for 1 to 2 hours and returned to normal with 4 to 8 hours. (Authors' abstract)

5814
Zuidema, G. D.,
S. I. Cohen, A. J. Silverman, and M. B. Riley
HUMAN TOLERANCE TO PROLONGED ACCELERATION. — Jour. Aviation Med., 27 (6): 469-481. Dec. 1956. DLC (RC1050.A36, v. 27)

Using physiologic and psychologic measures, man's tolerance to graded prolonged accelerations was investigated. Dimming of vision occurred late in the higher g runs of all subjects despite the fact that they were protected by anti-g suits and running at 0.4 g below their predetermined blackout level. Blood pressures at heart level showed graded increases in both systolic and diastolic components under increasing g. Pulse pressure remained relatively constant. Four of five subjects showed arrhythmias at high g levels. This myocardial irritability may be attributed to a relative coronary insufficiency with maximum coronary flow proving to be inadequate for a massive work load. High g loads produced excessive central nervous system excitability as reflected by skin resistance measures. This degree of excitability was not compatible with organized, goal-directed performance as demonstrated by decrements in continuous and discontinuous performance tasks. The higher levels of sustained g in this experiment approach man's physiologic and psychologic limits of tolerance. (Authors' summary)

5815
Zuidema, G. D.,
S. I. Cohen, A. J. Silverman, and M. B. Riley
HUMAN TOLERANCE TO PROLONGED ACCELERATION. — Wright Air Development Center. Aero Medical Lab., Wright-Patterson Air Force Base, Ohio. WADC Technical Report no. 56-406, Oct. 1956. iv+12 p. (Project no. 7216-71712).
AD 97 156 UNCLASSIFIED

Subjects whose blackout level had been determined while wearing the standard USAF anti-g suit were subjected to a series of nine runs distributed in random order, but consisting of three runs at 2.5 g for 115 sec. each, three 4.0 g runs for 80 sec. each, and three runs at a g level 0.4 below individual blackout levels. Physiological and psychological determinations indicated: (1) dimming of vision occurred late in the higher-g runs of all subjects despite the fact that they were protected by anti-g suits and running at 0.4 g below their predetermined blackout level. (2) Blood pressures at the heart level showed graded increases both in systolic and diastolic components under increasing g; pulse pressure remained relatively constant. (3) Four of five subjects showed cardiac arrhythmias at high g levels. (4) High g loads produced excessive central nervous system excitability as reflected by skin resistance measures. And (5) the higher levels of sustained g in this experiment approach man's physiological and psychological limits of tolerance. (Authors' summary, in part)

c. Subgravity

5816
Beckh, H. J. A., von
GRAVITY CHANGES IN AIRCRAFT AND SHIPS. — Jour. Brit. Interplanetary Soc., 15 (2): 73-81. March-April, 1956. DLC (TL790.A1B7, v. 15)

Same as item no. 2460, vol. III, with additional observations of optical displacement illusions under subgravity conditions in ships.

5817
Gerathewohl, S. J.
PERSONAL EXPERIENCES DURING SHORT PERIODS OF WEIGHTLESSNESS REPORTED BY SIXTEEN SUBJECTS. — Astronautica acta (Wien), 2 (4): 203-217. 1956. In English.
DLC (TL787.I46, v. 2)
Also published in: Proc. International Astronautical Congress, VIIth (Rome, Sept. 12-22, 1956), p. 313-334. Roma, 1956. DLC (TL787.I44, v. 7)

A series of experiments on weightlessness was conducted using a Lockheed T-33 type aircraft for dives and parabola flights yielding practical weightlessness from 10 to 30 seconds duration. Records of the personal experiences of sixteen subjects during these states were obtained by interviews, pilot reports, and written statements. The majority of subjects felt very comfortable during weightlessness; several subjects reported sensations of motion with no emotional involvement. A small group of subjects experienced discomfort, nausea, and severe symptoms of motion sickness. Tolerance to weightlessness is discussed with regard to space flight. It is theorized that individuals differ significantly as to their susceptibility to sub- and zero-gravity and their adaptability to weightlessness. If the right persons can be selected and adapted, some earlier concepts about artificial acceleration or "quasi-gravity" of space vehicles can be revised. (Author's abstract)

5818
Grant, L. J.,
LIFE UNDER LOW GRAVITY CONDITIONS. — Jour. Space Flight, 8 (8): 3-5. Oct. 1956.
DLC (TL780.C413, v. 8)

The low-gravity conditions which will be encountered on space flights, e.g., to the moon, present different problems from those associated with zero gravity. First, the dichotomy between mass and weight, nonexistent on the earth, has serious implications for the construction of space suits for exploration on the moon, locomotion of the explorers, and transportation on the moon surface. If low gravity is accompanied by low pressure it will cause an increase in capillary siphonage, evaporation problems due to high vapor pressure and low boiling point, a high rate of evaporation, and poor sound conduction. Several prophylactic measures are suggested to counteract muscular atrophy during a long-term stay at low gravity.

5819
Levering, B.
THE CASE OF THE CURIOUS CAT: "LUCKY" FLOATS IN WEIGHTLESS REPOSE AT RANDOLPH'S SCHOOL OF AVIATION MEDICINE. — Skyline, 14 (4): 10-13. Dec. 1956.
DLC (TL724.5.N57N6, v. 14)

Experiments on weightlessness are becoming increasingly important to aviation as man approaches space flight. Detailed discussions are made of S. J. Gerathewohl's investigations with the cat (Lucky) which are a part of a three-fold research project on weightlessness which he is conducting at the USAF School of Aviation Medicine. Other portions of the program include studies of human tolerance to weightlessness (wherein volunteer subjects experience weightlessness during parabola flights) and visual illusions during zero gravity (wherein subjects are requested to place a pencil dot on targets). Mention is made of several other investigations monitored by Dr. Gerathewohl particularly the "sealed cabin simulator" studies (under the immediate direction of H. Strughold) wherein living conditions during space flights are reproduced as closely as possible.

d. Barometric Pressure (Altitude)

[Altitude suits under 10-b; Altitude sickness under 8-b]

5820
Achiary, A.,
A. Cabanon, V. André, and J. Richet
[RAPID AND EXPLOSIVE DECOMPRESSIONS IN FLIGHT: STUDY OF 15 CASES] Décompressions rapides et explosives en vol: etude de 15 observations. — Médecine aéronautique (Paris), 11 (1): 73-86. 1956. In French. DLC (TL555.M394, v. 11)

Fifteen cases of decompression occurring in fighter aircraft at high altitude are described. No serious effect of decompression on either men or equipment was observed in any case. It is recommended that equipment be provided for protection against extreme cold and for the automatic supply of oxygen under pressure.

5821
Agadzhanian, N. A.
[EXTINCTION OF CONDITIONAL ELECTRO-DEFENSIVE MOTOR REFLEXES IN A RAREFIED ATMOSPHERE] Ugashenie uslovnykh dvigatel'nykh elektrooboronitel'nykh refleksov v usloviiakh razrezhennoi atmosfery. — Zhurnal vysshei nervnoi deiatel'nosti (Moskva), 6 (2): 260-268. March-April 1956. In Russian.
DLC (QP351.Z65, v. 6)

Dogs conditioned to defensive motor reflexes at the sound of a bell were subjected to decompression to altitudes of 6000 and 8000 meters. The extinction of the reflexes was studied and interpreted in Pavlovian terms. It is concluded that the mechanisms of extinction involve the weakening of the cerebrocortical cells in acute hypoxia.

5822
Altland, P. D.,
and B. Highman
EFFECTS OF HIGH ALTITUDE EXPOSURES ON DOGS AND ON THEIR SUSCEPTIBILITY TO ENDOCARDITIS [Abstract]. — Federation Proceedings, 15 (1, part I): 3. March 1956.
DLC (QH301.F37, v. 15)

Studies were made on dogs exposed to simulated altitudes of 25,000 feet, 6 hours daily, 5 times weekly, for 1-27 months. Pathological studies revealed marked vascular engorgement and cardiac lesions. Dogs with hematocrits from 67 to 81 (exposed for 5-8 months) received intravenous injections of Staphylococcus aureus and showed either mitral and aortic bacterial vegetation, nonbacterial valvulitis, or renal infarct. Two dogs, killed in 14-20 days showed no cardiac changes attributable to bacteria. Dogs which received Streptococcus mitis showed nonbacterial valvulitis, except for one which was apparently unaffected. Another dog is alive after continuing altitude exposures for 27 months. These findings suggest that susceptibility to endocarditis is moderately increased in dogs exposed to simulated high altitudes. (Authors' abstract, modified)

5823
Aykut, R.,
M. Terzioğlu, and F. Özer
[VARIATIONS OF THE ERYTHROCYTE OSMOTIC RESISTANCE AND OF THE BLOOD BILIRUBIN LEVEL AT AN ALTITUDE OF 1850 METERS] Variazioni della resistenza osmotica degli eritrociti e del tasso bilirubinemico all'altezza di 1850 metri. — Minerva medica (Torino), 47 (53): 10-13. July 4, 1956. In Italian. DNLM

Ten subjects staying at Uludag, Turkey (1850 meters of altitude) showed an 8% increase in erythrocyte values over those obtained at sea level. An increase in erythrocyte fragility and in blood bilirubin content was also observed along with a decrease in erythrocytic osmotic resistance. These changes are probably related to the altitude-induced acceleration of hemolytic processes and the stimulation of erythropoietic activity.

5824
Bacq, Z. M.,
Y. Cuypers, E. Evrard, and R. Soetens
[HYPERSENSITIVITY TO BAROMETRIC DECOMPRESSION IN THE RAT INJECTED WITH CYSTAMINE] Hypersensibilité à la dépression barométrique du rat injecté de cystamine. — Médecine aéronautique (Paris), 11 (1): 87-92. 1956. In French. DLC (TL555.M394, v. 11)

Essentially the same as item no. 3762, vol. IV.

5825
Balke, B.,
J. G. Wells, and J. P. Ellis
EFFECTS OF ALTITUDE ACCLIMATIZATION ON WORK CAPACITY [Abstract]. — Federation Proceedings, 15 (1, part I): 7. March 1956.
DLC (QH301.F37, v. 15)

An attempt was made to measure the reduction of working capacity during acute and chronic exposure to altitude levels of 14,000 ft. A standardized test of gradually increased work load on a bicycle ergometer was applied at base level for controls, in a low pressure chamber and during a 6-wk. stay on Mt. Evans, Colorado. Comparable physical condition was achieved by a preceding physical training of 8 weeks duration. In all experiments the oxygen consumption at comparable work intensities remained practically unchanged. The pulmonary ventilation (BTPS) was almost doubled at altitude. Maximal ventilation observed was 122 liters/min. at base level but 170 liters/min. after some acclimatization on Mt. Evans. In the acute exposure to hypoxia the blood pressure was not altered. However, with acclimatization to 14,000 ft. preceding systolic and diastolic pressure went up. The pulse rate exceeded the ground level values for same work intensities in the range of light and medium work load, though the pulse maxima were remarkably (11-14%) lower at altitude than at base level. On the average of 6 subjects the performance tests in the low pressure chamber showed a reduction in work capacity of 27%. Surprisingly, 6 weeks of acclimatization to an altitude of 14,000 ft. were not sufficient to raise this performance level perceptibly. Immediately after return from the mountain, physical performance was improved above the controls. The maximal oxygen uptake was increased. (Authors' abstract)

5826
Becker, E. L.,
and B. J. Joseph
OBSERVATIONS OF THE INULIN SPACE IN DOGS DURING THE PROCESS OF ADAPTATION TO HIGH ALTITUDE. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-141, July 1956. 2 p. AD 113 520 PB 124 528

The volume of distribution of inulin was studied in three dogs prior to exposure to a simulated altitude of 20,000 feet, and several observations over a period of 18 months were made after the dogs had become acclimated to the altitude. None of the values were significantly different from the control values on these dogs. (Authors' abstract)

5827
Becker, E. L.,
J. A. Schilling, and R. B. Harvey
RENAL FUNCTION IN MEN ACCLIMATIZED TO AN ALTITUDE OF 15,000 FEET. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-142, July 1956. 2 p. AD 113 530
PB 124 529

Studies of renal function were made on five normal men native to an altitude of 14,900 feet. Glomerular filtration rates were determined by the constant infusion of inulin, and effective renal plasma flow was measured by the constant infusion of para-aminohippurate. All subjects showed a statistically significant decrease in filtration rate, effective renal plasma flow, and effective renal blood flow, with an increase in hematocrit and filtration fraction. (Authors' abstract)

5828
Beischer, D. E.,
and S. Born
THE "BOILING" PHENOMENON OF LIVING TISSUE AT LOW ATMOSPHERIC PRESSURE. — Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 103 100, Report no. 1, July 9, 1956. ii+12 p. AD 107 735
UNCLASSIFIED

Cold-blooded animals, resistant to anoxia, were exposed to ambient pressures equal and below the vapor pressure of their body fluids. The boiling phenomenon of tissues usually observed at altitudes above 64,000 feet was not found to be the violent bubbling process experienced at normal atmospheric pressure, but mainly an accelerated surface evaporation without bubble formation and plasma denaturation. The chief damage to tissue exposed unprotected to extremely low ambient pressure was caused by water loss with ensuing dry-out and freezing. It is suggested that the body of flyers exposed to ambient pressures above 64,000 feet be protected against the danger of freeze-drying by a water-impermeable suit. (Authors' findings, modified)

5829
Berry, L. J.,
TISSUE CITRIC ACID CONTENT AND SUSCEPTIBILITY TO INFECTION IN MICE ACCLIMATIZING TO AND RECOVERING FROM ALTITUDE. — Bryn Mawr Coll., Pa.; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-110, Aug. 1956. 6 p. AD 113 832
PB 121 592

Citric acid concentration of blood, liver, spleen, kidney, duodenum, and heart of mice acclimatizing to a simulated altitude of 20,000 feet progressively declined to a level 30 percent below control values (heart 20 percent) after 3 weeks in decompression chambers and remained unaltered during 3 additional weeks of exposure. Animals kept in the chambers for 3 weeks and returned to normal atmospheric pressures showed no change in citrate concentration after 5 days of recovery. After 10 days of recovery, liver and spleen had normal amounts of citric acid, but remaining specimens were normal only after 14 days. Susceptibility to Salmonella typhimurium infection was greatest when the citric acid concentration was significantly lower than that of the control group. When citrate was normal, susceptibility was normal. (Author's abstract)

5830
Brendel, W.
[ADAPTATION OF RESPIRATION, HAEMOGLOBIN, BODY TEMPERATURE, AND CIRCULATION DURING AN EXTENDED SOJURN AT HIGH ALTITUDES (HIMALAYAS)] Anpassung von Atmung, Hämoglobin, Körpertemperatur und Kreislauf bei langfristigem Aufenthalt in grossen Höhen (Himalaya). — Pflügers Archiv fur die gesamte Physiologie (Berlin), 263 (2): 227-252. 1956. In German.
DLC (QP1.A63, v. 263)

Periodic measurements were made of the circulatory and respiratory functions of mountain climbers before and during an extended Himalayan expedition. The transition from sea level to altitudes of 4000 to 7000 meters produced increases in respiratory volume, hemoglobin level, and blood pressure, and a decrease in heart rate. Rectal temperature declined in several subjects in correlation with relatively great increases in respiratory volume. The response of blood pressure and heart rate to the performance of a standard exercise at altitude was decreased by altitude acclimatization from that observed at sea level or at altitude prior to acclimatization.

5831
British European Airways
VISCOUNT DEPRESSURISATION. — Aero Med. Soc. Jour. (New Delhi), 3 (1): 48-50. April 1956. DNLM

A report is presented of the decompression of a Viscount aircraft at an altitude of 23,500 feet. Descent was made at 1500 feet per minute to 12,000 feet, with only the crew breathing oxygen. Early symptoms of anoxia were experienced by members of the crew before fitting oxygen, but most passengers were apparently unaffected. No difficulty was encountered in maintaining ear ventilation during descent.

5832
Brown, F. W.,
and R. H. Lee
INJURY FROM THE DECOMPRESSION COMPONENT OF AN AIR-BLAST WAVE. — Nature (London), 178 (4531): 490. Sept. 1, 1956. DLC (Q1.N2, v. 178)

To study the effects of air blast, mice were exposed to increased air pressure (80 lb. above atmospheric) for various lengths of time and then explosively decompressed in 30 milliseconds. Survival depended on the length of pressurization: all mice survived if the pressurization was shorter than 100 milliseconds; at 1 second pressurization, 12% died; at 1 minute, 80%. The authors conclude that the explosive-decompression component of an air-blast wave by itself has no lethal effect.

5833
Campos Rey de Castro, J.,
and B. Iglesias
MECHANISMS OF NATURAL ACCLIMATIZATION: PRELIMINARY REPORT ON ANATOMIC STUDIES AT HIGH ALTITUDES. — Inst. of Andean Biology, Lima, Peru; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-97, June 1956. 6 p. AD 126 831 UNCLASSIFIED

Preliminary postmortem pathological studies are reported of specimens from 30 Andean natives acclimatized to altitudes of about 4000 meters. Most of the natives died in accidents. The organs investigated include the lungs, trachea, bronchi, heart, liver, spleen, kidneys, striated muscle, ovaries, testes, and, in several cases, brain and adrenal glands. All alterations found are considered to be related to the environmental hypoxic factor, the most constant changes being congestion and dilatation of blood capillaries and sinusoids. (Authors' summary, modified)

5834
Chapin, J. L.
EVIDENCE FOR SIMULTANEOUS LOWERING OF UPPER AND LOWER LIMITS OF CO_2 TOLERANCE [Abstract]. — Federation Proceedings, 15 (1, part I): 34. March 1956.
DLC (QH301.F37, v. 15)

Nine subjects resided continuously at high altitude (Mt. Evans, Colo., 14,150 ft., and Echo Lake, 10,600 ft.) for 3 weeks during which their upper limits of CO_2 tolerance were measured by ventilatory response to gradually increasing CO_2 in a rebreathing system and their low CO_2 tolerances were measured by a performance test and by the appearance of tetany, both during artificially induced hyperventilation. At the end of the 3-week acclimatization period the subjects returned to Denver, Colo., elevation 5,300 ft., for recovery measurements and the establishment of normal values. Exposure to the altitude of Mt. Evans and Echo Lake resulted, in addition to the well known sensitivity to high CO_2, in performance improvement during hyperventilation and almost complete absence of the symptoms of tetany at those CO_2 levels which had produced tingling and twitching during the control period. These results are interpreted as indicating that with low CO_2 acclimatization the CO_2 range moves down rather than merely shortening. (From the author's abstract)

5835
Chiodi, H.
RESPIRATORY ADAPTATIONS TO CHRONIC, HIGH ALTITUDE HYPOXIA [Abstract]. — Federation Proceedings, 15 (1, part I): 35. March 1956.
DLC (QH301.F37, v. 15)

Respiratory characteristics, arterial acid-base equilibrium and arterial oxyhemoglobin dissociation curves were studied in subjects residing continuously for many years (residents) at 3990 and at 4515 meters above sea level, and in a group of lowlanders (newcomers) within 8 weeks after their arrival at these same altitudes. At 3990 m. average resting pulmonary ventilation (liters/min./m.^{2}) was 5.3 in 16 newcomers and 4.5 in 11 residents. At 4515 m., 2 newcomers averaged 5.6, and 20 residents 4.9 liters/min./m.^{2} Alveolar carbon dioxide tension, alveolar ventilation and oxygen ventilation equivalent changes were in accordance with total ventilatory alterations. Oxygen breathing at both levels of increased altitude depressed average pulmonary ventilation slightly more in the newcomers than in the residents, and in no case even to values associated with air breathing at sea level. Respiratory response to inhaled CO_2 was greater in newcomers and less in residents at high altitude, than was found in normal subjects at sea-level. Hemoglobin oxygen affinity and arterial pH of residents at high altitude were found to be within the normal ranges of sea level. (Author's abstract)

5836
Coles, D. R.
HEAT ELIMINATION FROM THE TOES DURING EXPOSURE OF THE FOOT TO SUBATMOSPHERIC PRESSURES [Abstract]. — Jour. Physiol. (London), 131 (3): 5P. March 28, 1956.
DLC (QP1.J75, v. 131)

Heat elimination from the toes of six men was measured by water calorimetry during exposure of the foot to decreased atmospheric pressures for periods of 10 minutes. Heat elimination was increased or unchanged during the application of pressures of 50 and 100 mm. Hg below atmospheric pressure, and either increased or decreased at pressure differentials of 150 and 200 mm. It is suggested that the application of negative pressures of 50 or 100 mm. Hg produces little alteration in resistance to blood flow in the toes, but that pressures of -150 or -200 mm. Hg. are sufficient in some individuals to increase resistance.

5837
Coles, D. R.,
B. S. L. Kidd, and G. C. Patterson
THE REACTIONS OF THE BLOOD VESSELS OF THE HUMAN CALF TO INCREASES IN TRANSMURAL PRESSURE. — Jour. Physiol. (London), 134 (3): 665-674. Dec. 28, 1956.
DLC (QP1.J75, v. 134)

The rate of blood flow through the calves of both legs was measured plethysmographically after exposure of one leg to pressures of 50 to 200 mm. Hg below atmospheric for periods of 30 or 60 seconds. Exposure to -100 to -200 mm. Hg, but not to -50 mm. Hg, produced a reduction in blood flow in the exposed calf. Occlusion of the circulation to the leg during exposure to -100 mm. Hg abolished the subsequent reactive hyperemia observed when occlusion was induced before exposure to reduced pressure. It is concluded that the vasoconstriction caused by reduced pressure is dependent on distension of the blood vessels in the calf, and is a direct response to an increase in differential pressure between the lumen of the blood vessels and the outside air.

5838
Correa, J.,
R. Allaga, and F. Moncloa
STUDY OF ADRENAL FUNCTION AT HIGH ALTITUDES WITH THE INTRAVENOUS ACTH TEST. — Inst. of Andean Biology, Lima, Peru; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-101, Sept. 1956. 6 p.
AD 126 286 PB 126 043

The suprarenal function was stimulated by means of intravenous administration of ACTH in two groups of subjects, healthy men living at sea level and healthy native residents in Morococha, at an altitude of 4,540 meters (14,900 feet). The response to this stimulation was determined by measuring the urinary excretion of 17-ketosteroids and 17-hydroxycorticoids and the fall in the circulating eosinophils. Well-defined differences were not found between the two groups. (Authors' abstract)

5839
Costo, G.,
and J. Corigliano
[RIGHT VENTRICULAR HYPERTROPHY IN MINERS AT ALTITUDE. I. NON-SILICOTIC MINERS] Compromiso ventricular derecho en mineros de altura. I. Mineros considerados sin silicosis pulmonar. — Revista peruana de cardiología (Lima), 5 (1): 25-38. Jan.-April 1956. In Spanish, with English summary (p. 36-37). DNLM

A study was made of 142 electrocardiograms of nonsilicotic miners working at 3,800 and 4,900 meters above sea level. A right-axis deviation was found in 19.7%, and a left-axis deviation in 2.1% of the miners. In the group showing right-axis deviation, the value varied between 90° and 119°. Signs of right ventricular hypertrophy were found in 34.5% of the cardiograms, and signs of incomplete right bundle-branch block in 14%. Some relationship was noted between QRS complex configurations in the VI lead and the pattern of the complex in the right $V3_R$ and $V4_R$ leads. The T-wave in VI lead was inverted in 14% of the subjects, while 6.3% were diphasic. 4.2% of the electrocardiograms were isoelectric. The R-wave in the U5 lead was above the maximum limit in 10% of the miners, indicating possible left as well as right ventricular hypertrophy. (Authors' summary, modified) (35 references)

5840
Cuba, A.,
M. Copaira, E. de la Vega, and B. Pareja
[VITAMIN E IN LAMBS AT ALTITUDE. I. TOCOPHEROLEMIA AND BLOOD PICTURE IN NORMAL LAMBS] Vitamina "E" en corderos de la altura. I. Tocoferolemia y cuadro hemático en corderos normales. — Revista de la Facultad de medicina veterinaria, Universidad nacional mayor de San Marcos de Lima (Peru), 7-11: 178-184. "1952-1956". In Spanish, with English summary (p. 183). DNLM

Twelve consecutive determinations were made of the blood picture and serum tocopherol in nine lambs at 4000 meters above sea level. The first determination was made between 24 and 48 hours after birth, and the others at intervals of 7, 15, and 30 days. At 60 days it was observed that the highest values in the number of erythrocytes, hemoglobin, and packed erythrocyte volume coincided with the lowest levels of tocopherol. After 60 days, the hematological variations tended toward the normal, reaching normal levels in 240 days. It is suggested that these findings constitute a physiological curve in lambs at altitude which is related to a hypotocopherolemic state. (Authors' summary, modified)

5841
Cuba, A.,
M. Copaira, E. de la Vega, and B. Pareja
[VITAMIN E IN LAMBS AT ALTITUDE. II. TOCOPHEROLEMIA AND BLOOD PICTURE IN LAMBS SUBJECTED TO A VITAMIN E DEFICIENT DIET] Vitamina "E" en corderos de la altura. II. Tocoferolemia y cuadro hemático en corderos sometidos a dieta deficiente en vitamina "E". — Revista de la Facultad de medicina veterinaria, Universidad nacional mayor de San Marcos de Lima (Peru), 7-11: 185-192. "1952-1956". In Spanish, with English summary (p.190 and 192). DNLM

A group of lambs at 4000 meters above sea level were subjected to a vitamin E-deficient diet 48 hours after birth for a period of 5 months, during which time the blood picture and blood tocopherol levels were periodically determined. After 90 days a marked increase in the number of erythrocytes, hemoglobin, and packed erythrocyte volume was found which persisted until the end of the experiment at 150 days. Aside from polycythemia, the clinical manifestations of mountain sickness or vitamin E deficiency were not observed. (Authors' summary, modified)

5842
Curry, E. T.,
and F. Boys
EFFECTS OF OXYGEN ON HEARING ACUITY AT SIMULATED ALTITUDE. — Eye Ear Nose and Throat Monthly. — 35 (4): 239-245. April 1956. DNLM

Normal subjects breathing supplemental oxygen were decompressed at the rate of 1,000 feet per minute until a simulated altitude of 15,000 feet was reached. Immediately upon arrival at 15,000 feet and following 30 minutes, hearing thresholds for all frequencies were measured. No statistically significant effect on the audiometric threshold was found at simulated altitude.

5843
Ferguson, F. P.,
and D[ietrich] C. Smith
EFFECTS OF ACUTE DECOMPRESSION STRESS UPON PLASMA AND URINARY POTASSIUM IN ADRENALECTOMIZED DOGS [Abstract]. — Federation Proceedings, 15 (1, part I): 62. March 1956. DLC (QH301.F37, v. 15)

In 17 experiments upon cortisone-maintained bilaterally adrenalectomized dogs, plasma K concentration decreased by an average of 19.7% during 90-min. exposure to 30,000 ft. In 16 experiments upon desoxycorticosterone acetate-maintained dogs, it decreased by an average of 15.5% under the same conditions. Urinary excretion of potassium increased during hypoxia in both series of experiments. Exposure of cortisone-maintained dogs to severe hypoxia resulted in an increase in plasma K concentration similar to that observed in intact animals under comparable conditions. These results appear to support the conclusion that, in dogs, the presence of the adrenal glands is not essential for the changes in plasma and urinary K observed during acute decompression stress. (From the authors' abstract)

5844
Ferguson, F. P.,
Dietrich C. Smith, and J. Q. Barry
THE RESPONSE OF PLASMA POTASSIUM TO ACUTE DECOMPRESSION STRESS IN ADRENALECTOMIZED DOGS. — Univ. of Maryland School of Medicine, Baltimore; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 57-14, Nov. 1956. 14 p. AD 122 154 PB 121 842

Bilaterally adrenalectomized dogs maintained on cortisone or desoxycorticosterone acetate, or animals in moderate adrenal insufficiency were decompressed to a simulated altitude of 30,000 feet for 90 minutes (three 30-minute periods). Plasma potassium concentration consistently showed a marked decrease by the end of the first 30 minutes and remained depressed for the duration of decompression. This response is similar to that observed in intact dogs and indicates that, in this species, the hypokalemia of acute decompression stress is not mediated by the adrenal glands.

As in intact dogs, plasma sodium concentration remained unchanged during decompression. In adrenalectomized animals, decompression failed to produce the increase in hematocrit and the eosinopenia observed in intact dogs. (Authors' summary, modified) (36 references)

5845
Freydberg, H.
[BASAL METABOLISM AT MEDIUM ALTITUDES] Der Grundumsatz in mittleren Höhen. — Schweizerische medizinische Wochenschrift (Basel), 86 (21): 629-630. May 26, 1956. In German. DNLM

The basal metabolic rate (BMR) was measured in 5 subjects at altitudes of 270 m. (Basel), 1770 m. (St. Moritz-Bad), and 3028 m. (Piz Nair). There was no significant increase in the BMR for any of the subjects at 1770 m. altitude. Only one subject had a significantly elevated BMR at 3028 m. (Author's summary)

5846
Ghinozzi, G. P.
[BEHAVIOR OF RECTAL TEMPERATURE IN RABBITS SUBJECTED TO REDUCED BAROMETRIC PRESSURE] Comportamento della temperatura rettale di conigli sottoposti a depressione barometrica. — Rivista di medicina aeronautica (Roma), 19 (4): 669-675. Oct.-Dec. 1956. In Italian, with English summary (p. 674). DLC (RC1050.R56, v. 19)

Rabbits decompressed to a simulated altitude of 7,000 meters for one hour exhibited a decrease in rectal temperature by 1.7° C. (from 40° C. to 38.3° C.). This decrease is attributed to anoxic anoxia induced by exposure to reduced barometric pressure.

5847
Gökhan, N.,
and M. Terziŏglu
[LEUKOCYTES AND LEUKOCYTE COUNT AT 1850 METERS OF ALTITUDE] Leucociti e formula leucocitaria a 1850 m. di altezza. — Minerva medica (Torino), 47 (53): 16-18. July 4, 1956. In Italian. DNLM

The leukocyte count in young subjects staying at Uludag, Turkey (1850 meters of altitude) did not vary significantly outside of normal limits, with the exception of a slight increase in young neutrophils and a more notable increase in monocytes. These latter changes were dependent on the stimulative effect of altitude on the myeloid system. Since neutrophils and monocytes have the special function of protecting the body against infection, it is concluded that persons at high altitude are poorly equipped to fight infections in general.

5848
Grandpierre, R.,
P. Grognot, and F. Violette
[MIDDLE EAR AND EXPLOSIVE DECOMPRESSION] Oreille moyenne et decompression explosive. — Journal de physiologie (Paris), 48 (3): 565-566. May-June 1956. In French. DNLM

A brief review is presented of various experiments dealing with the mechanism of retrotympanic hemorrhage occurring in animals following explosive decompression. It appears that hemorrhage in explosive decompression is associated with recompression. Explosive decompression seems to affect the venous system of the middle ear and the internal portion of the tympanic membrane. Retrotympanic hemorrhage caused by explosive decompression is the sum of hemorrhage due to pressure with an arteriocapillary starting point, called barotrauma, and of a venous hemorrhage peculiar to explosive decompression originating from the fissures of venous tissue and released at recompression.

5849
Halhuber, M. J.
[CLIMATE AND CIRCULATION ON HIGH MOUNTAINS] Klima und Kreislauf im Hochgebirge. — Sportmedizin (Freiburg im Breisgau), 7 (12): 325-327. Dec. 1956. In German. DNLM

The three phases of acclimatization to altitude are summarized. The first phase consists of a vagotonic reaction characterized by a slower pulse rate, decreased stroke and minute volume, and increased peripheral arterial resistance. Within half an hour to one hour there occurs a shift to altitude amphotony manifested by an increase in pulse rate, enlarged minute volume and decreased peripheral vascular resistance. At the same time respiration deepens, CO_2 tension in the alveoli decreases, muscle tone increases, thresholds of the sense organs are lowered, and the circulating blood volume and red blood count are raised due to the emptying of blood pools. The subjective symptoms are: excitability manifested by a light finger tremor, hyperreactivity to sympathomimetics, and bad sleep during the first days. The final phase may be described as an increased lability of the autonomic nervous system. It constitutes the endpoint of acclimatization to altitude. The author distinguishes further between "mountain sickness" and anoxia. Prophylaxis and therapy of mountain sickness have to be adjusted to the phase of acclimatization reached by the individual.

5850
Hittmair, A.
[THE TREATMENT OF ANEMIA IN HIGH MOUNTAINS] Anamiebehandlung im Hochgebirge. — Wiener medizinische Wochenschrift (Wien), 106 (9): 208-211. March 9, 1956. In German. DNLM

The physiological reactions of the organism to high-mountain climate can be roughly divided into: (a) general nonspecific reactions up to 3000 m. altitude, (b) compensatory reactions (polyglobulia, etc.) up to 4500-5000 m. altitude, and (c) decompensation above 5000 m. altitude. The appearance of polyglobulia is a function of the altitude difference rather than the absolute altitude reached. It is characteristic of the immediate response (predominantly sympathetic) to rapid ascent in a decompression chamber. In contrast, rapid ascents to mountains on a lift elicit a vagotonic reaction followed by altitude amphotonia with the sympathetic predominating. This second phase is similar to

the period of altitude adaptation (7-8 days) characterized by polyglobulia, increased hemolysis and erythropoiesis, and hemoconcentration. Decrease of hemoglobin in presence of erythrocytosis is due to ultraviolet rays interfering with the incorporation of iron within the hemoglobin molecule. Mountain therapy of different anemias is discussed.

5851
Hugin, F.,
J. Keith, F. Verzar, and H. Winz
[CHANGES IN THE VEGETATIVE-AUTONOMIC EXCITABILITY IN THE HIGH-ALTITUDE CLIMATE] Änderungen der vegetativ-autonomen Erregbarkeit im Höhenklima. — Schweizerische medizinische Wochenschrift (Basel), 86 (22): 650-652, June 2, 1956. In German. DNLM

In 30 of 34 subjects, localized hyperemia after stimulation of the skin with anodized electrophoresis of 1% solution of pilocarpine was less pronounced and disappeared quicker at altitudes of 1800 m. (St. Moritz-Bad) and of 3450 m. (Jungfraujoch) than at lower levels. This hyperemia was followed faster by a circulatory anemic reaction. These findings suggest either a decrease in the parasympathetic excitability of the vasodilatators of the skin or an increase in excitability of the vasoconstrictor sympathetic axon reflexes of the skin, which constitute a reaction to the pilocarpine erythema. (Authors' summary, modified)

5852
Hurtado, A.,
T. Velásquez, B. Reynafarje, and H. Aste-Salazar
BLOOD GAS TRANSPORT AND ACID-BASE BALANCE AT SEA LEVEL AND AT HIGH ALTITUDES — Inst. of Andean Biology, Lima, Peru; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-104, Oct. 1956. 17 p. UNCLASSIFIED

Investigations on the gas transport, the acid-base balance, and the electrolyte balance were carried out on the arterial blood of 80 healthy adult subjects living at sea level and in 40 native residents of Morococha, at an altitude of 4,540 meters (14,900 feet). In a few subjects mixed venous blood from the pulmonary artery was obtained simultaneously with the arterial blood, and similar measurements were carried out in both samples. From the aspects investigated the data indicate that a permanent residence at high altitudes presents definite and constant modifications in the circulating blood. (Authors' abstract)

5853
Hurtado, A.,
T. Velásquez, C. Reynafarje, R. Lozano, R. Chávez, H. Aste Salazar, B. Reynafarje, C. Sánchez, and J. Muñoz
MECHANISMS OF NATURAL ACCLIMATIZATION: STUDIES ON THE NATIVE RESIDENT OF MOROCOCHA, PERU, AT AN ALTITUDE OF 14,900 FEET. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-1, March 1956. 62 p. AD 102 674 PB 124614

Investigation was made of the physiologic characteristics, at rest and during physical activity, in the Indian native resident of Morococha, Peru, a mining town located in the Andean region at an altitude of 14,900 feet (4,540 meters) with an average barometric pressure of 446 mm. Hg. Comparative observations were carried out on healthy men living in Lima, at sea level. The native resident of high altitudes, who lives with an alveolar oxygen tension of about 50 mm. Hg. and an arterial oxygen saturation of 80%, exhibits definite adaptative mechanisms in the respiratory, hematic, and circulatory functions. The efficiency of these mechanisms is significantly evident in his behavior under the additional stress of physical activity, which is characterized, when compared to sea level conditions, by a longer performance, a decreased energy cost, a lower production of lactic and pyruvic acids and a reduced oxygen debt. These last characteristics suggest the presence of tissue adjustments which may constitute the fundamental basis of acclimatization to high altitudes. (Authors' abstract)

5854
Kolder, H.
[TRUE EXPLOSIVE DECOMPRESSION] Echte explosive Dekompression. — Internationale Zeitschrift fur angewandte Physiologie (Berlin), 16 (3): 212-216, 1956. In German. DNLM

The cause of death in explosive decompression was investigated by exposure of animals to decompressions in which the complicating factors of anoxia, gas embolism, and autochthonous gas formation were eliminated. Animals were compressed to ambient pressures up to 4 atmospheres in 10 seconds, and immediately decompressed in 1.5 seconds to atmospheric pressure. Decompression from 4 atmospheres resulted in death in all untreated animals, while narcotized animals, animals in which the thorax was protected by sponge-rubber wrapping, and vagotomized animals survived. Lung damage was observed in both control and narcotized animals. Death in control animals was concluded to be a direct result of the shock (blast)-induced apnea mediated by the vagal nerves. Electrical stimulation of the central stump of the severed vagal nerves produced an apnea similar to that observed in explosive decompression.

5855
Kolder, H.
[EXPLOSIVE DECOMPRESSION TO LOW BAROMETRIC PRESSURE: RESULTS OF RAPID DECREASE OF ATMOSPHERIC PRESSURE] Explosive Dekompression auf Unterdruck: Die Folgen der Abnahme des Luftdruckes in kürzester Zeit. — Österreichische Akademie der Wissenschaften (Wien). Mathematisch-naturwissenschaftliche Klasse. Sitzungsberichte, Abteilung II, 165 (8-10): 357-419. 4 plates. 1956. In German. DLC (AS142.V311, v. 165)

Rats were subjected to explosive decompression with the pressure difference varied between 0.4 to 0.9 kg./cm.^{2} and the decompression time from 1.3 to 180 millisec. Decompression resulted in immediate cessation of breathing, followed within a few seconds by convulsions and paresis. Death took place either through suffocation because of massive pulmonary hemorrhage, or within half an hour after apparent recovery with dominant symp-

toms pointing to pulmonary edema. Anesthesia raised decompression tolerance to greater pressure differentials. Vagotomy prevented respiratory block but did not affect the appearance of convulsions. Artificial pneumothorax had a protective effect against rupture of diaphragm. The effects of explosive decompression are due to two processes: (1) escape of the expanding air from the lungs, and (2) expansion of the thorax under lower ambient pressure. Aeroemboli in mediastinum and heart seem to be of pulmonary origin rather than due to intravascular or autochthonous gas bubble formation. The mechanism operating in explosive decompression is assumed to be the same as that in blast injury. (180 references)

5856
Konecci, E. B.,
D. Criscuolo, and M. B. Danford
SURVIVAL OF ALTITUDE-ACCLIMATIZED RATS FOLLOWING 800 R WHOLE-BODY X-IRRADIATION. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-65, May 1956. 4 p. AD 113 246 UNCLASSIFIED

This study indicates that 6-month altitude acclimatized rats (2 months at 16,000 feet and 4 months at 18,000 feet) are in a better physiologic state to withstand an 800 r exposure than are otherwise comparable ground level controls. Only 3 of 25 ground level controls--as against 16 of 17 altitude-acclimatized animals--survived the 800 r dose. After irradiation, the acclimatized animals were returned to 18,000 feet. Although significant decreases in weight and in hematocrit were observed in the acclimatized animals, by the 19th day following the initial irradiation they had returned to approximately their pre-irradiation levels. An additional dose of 650 r on the 31st day killed all survivors; the 3 controls had died by the 3d day and the 16 acclimatized rats by the 12th day. (Authors' abstract)

5857
Lalli, G.,
and E. Sulli
[CHANGES IN BLOOD COAGULATION IN THE COURSE OF ACCLIMATIZATION TO HIGH ALTITUDE] Modifiche che intervengono nel corso dell'acclimatazione alle alte quote sulla coagulazione del sangue. — Rivista di medicina aeronautica (Roma), 19 (4): 606-618. Oct.-Dec. 1956. In Italian, with English summary (p. 616-617).
DLC (RC1050.R56, v. 19)

Male rabbits decompressed for a period of 15 days to a simulated altitude of 6,000 meters showed a notable increase in platelet number; a decrease in coagulation and calcification times; a decrease in prothrombin time; and an increase in fibrinogen and total protein in the blood. During acclimatization to high altitude the first phase of blood coagulation was notably accelerated. Clot retraction time was increased when the clot was free from adhesion, accompanied by an increase in hematocrit value; it was decreased when the clot adhered to the walls.

5858
Lalli, G.,
E. Sulli, and G. P. Ghinozzi
[MODIFICATIONS OF CHOLINESTERASE ACTIVITY IN VARIOUS RAT TISSUES INDUCED BY ACCLIMATIZATION TO HIGH ALTITUDE] Modifiche indotte dall'acclimatazione alle alte quote sulla attività colinoesterasica su vari tessuti nel ratto. — Rivista di medicina aeronautica (Roma), 19 (2): 316-322. April-June 1956. In Italian, with English summary (p. 321).
DLC (RC1050.R56, v. 19)

Rats decompressed to simulated altitudes ranging from 4,000 to 8,000 meters exhibited no significant changes in the cholinesterase activity of the brain. Chronic anoxia, however, produced a marked decrease of this activity in the myocardium (-46.6%), liver (-51%), and lungs (-32.8%). Reduction in cholinesterase activity may be attributed to the great changes produced in pseudo-cholinesterases in the course of acclimatization to high altitude.

5859
Lapras, A.
[TOLERANCE TO ANOXIA: LESSONS OF A HIMALAYAN EXPERIENCE] Tolerance à l'anoxie: leçons d'une expérience himalayenne. — Presse médicale (Paris), 64 (43): 1019-1021. May 30, 1956. In French.
DNLM

Adoption of a technique of progressive acclimatization to hypoxia in combination with usage of oxygen above 7000 meters resulted in successful ascents in the Himalayas above 8000 m. with no illness or fatigue. Acclimatization was accomplished by the progressive establishment of camps at altitudes of 4700 m. for three weeks, 5300 m. for 2-3 weeks, and finally at 6300 m. At the end of the acclimatization period, resting climbers were able to remove their oxygen masks for several hours above 7000 m. with no difficulty.

5860
Lenti, C.,
and M. A. Grillo
[THE EFFECT OF HIGH MOUNTAINS ON PHOSPHOROLYSIS IN SKELETAL AND HEART MUSCLE] Über die Wirkung des Hochgebirges auf die Phosphorolyse im Skelett- und Herzmuskel. — Naturwissenschaften (Berlin), 43 (23): 541. 1956. In German.
DLC (Q3.N7, v. 43)

Rats maintained for 15 to 19 days at an altitude of 2,961 meters showed an increase of 32% in the phosphorylase activity of skeletal muscle over values observed in rats at 239 m. and an increase of 26% in the activity of heart muscle. A suggested mechanism of the increase is the decrease in adenosine triphosphate known to occur during hypoxia.

5861
Leubner, H.
[THE EFFECTS OF ALTITUDE CLIMATE AND EXAMINATION OF SUITABILITY FOR MOUNTAINEERING] Wirkung des Höhenklimas und Bergtauglichkeitsuntersuchung. — Sportmedizin (Freiburg im Breisgau), 7 (12): 329-335. Dec. 1956. In German.
DNLM

The results of experimental and field research on the physiological effects of mountain climate are reviewed in regard to its action on (1) the autonomic nervous system and consequently the circulatory regulation, (2) a stress effect on the pituitary-adrenal system, and (3) metabolic effects and organ changes. The author suggests certain diagnostic tests for examination of alpinists.

5862
Luft, U. C.,
and R. W. Bancroft
TRANSTHORACIC PRESSURE IN MAN DURING RAPID DECOMPRESSION. — Jour. Aviation Med., 27 (3): 208-219, June 1956.
DLC (RC1050.A36, v. 27)
Also issued as: School of Aviation Med., Randolph Air Force Base, Tex. Report no. 56-61, Aug. 1956. 13 p. AD 113 692 PB 121588

The dynamics of rapid decompression as reflected in the transthoracic pressure were studied in a rigid model and in man. It is demonstrated that in a dry model [bottle] containing air, the peak pressure encountered in rapid decompression is dependent upon the absolute differential of the cabin and the time characteristic of the model relative to that of the cabin. The impulse of the pressure wave measured in the bottle as the pressure time integral is directly proportional to the fractional differential. In the human chest, transthoracic pressure increases with the fractional differential, as well as with the absolute differential of decompression. This discrepancy between the model and the human lungs is attributed mainly to water vapor generated in the lungs during decompression. The time characteristic for the lungs and airways of a subject decompressed in the end-expiratory phase of breathing was found to be 0.55 second. This is equivalent to the decompression rate of a cabin with a ratio V/A (volume to effective orifice) of 200 m^3/m^2. The mean expiratory flow resistance offered by the airways during rapid decompression appears to be considerably greater than during spontaneous, quiet breathing. (Authors' summary)

5863
Luria, L.
[THE PROBLEM OF NUTRITION WHILE LIVING ON A HIGH MOUNTAIN] Sul problema alimentare nel soggiorno in alta montagna. — Rassegna clinicoscientifica (Milano), 32 (11): 294-296. Nov. 1956. In Italian. DNLM

Subjects living at 1,000-1,700 meters above sea level had a daily diet of about 3500 calories (with 1 liter of wine, 770 calories) of which 435 calories were of proteins, 1850 of glucides (52%), and 1170 of lipids (37%). When these persons worked at high altitude (Mount Rosa, 4560 meters above sea level), a daily diet of 5,430 calories (with 770 calories for wine consumption) was used, composed of glucides, 2300 calories (44%); proteins, 700 calories (13%); and lipids, 2250 calories (43%). All subjects maintained on this diet stayed in good health and lost no appreciable amount of weight. Since loss of body water at high altitude is high, about 2 liters of beverages per day were permitted (tea, broth, wine). At high altitude, a reduction in glucide values is seen along with a notable increase in protein and lipid values.

5864
Marticorena Pimentel, E.
[PROBABLE EFFECT OF HIGH ALTITUDE IN THE DETERMINATION OF THE PERSISTENCE OF THE DUCTUS ARTERIOSUS: OBSERVATIONS ON 3,000 SCHOOL CHILDREN AT ALTITUDE] Probable influencia de las grandes alturas en la determinación de la persistencia del conducto arterioso: observaciones realizadas en 3,000 escolares de altura. — Revista de la Asociación médica de la provincia de Yauli (La Oroya), 1 (4): 25-31. Oct.-Dec. 1956. In Spanish. DNLM

Same as item no. 4614, vol. IV.

5865
Mercier, A.
[THE PSYCHOSOMATIC FACTOR IN VISUAL TROUBLES AT ALTITUDE] Le facteur psychosomatique dans les troubles visuels en altitude. — Médecine aéronautique (Paris), 11 (1): 29-32. 1956. In French. DLC (TL555.M394, v. 11)

Factors contributing through physiological or psychosomatic mechanisms to the visual fatigue encountered during flight at high altitudes are discussed, including lack of atmospheric haze, increased glare and ultraviolet radiation, increased contrast between the dark cockpit and the environment as a result of reflection of light from the clouds beneath the airplane, the absence of focal objects beyond the aircraft, and the sensation of solitude associated with depression and apprehension, affecting accommodation and retinal adaptation through disturbance of the hypothalamus.

5866
Mercier, A.
[VISUAL DISORDERS AT ALTITUDE] Les troubles visuels en altitude. — Bulletin des societés d'ophtalmologie de France (Paris), 2: 353-355. Feb. 1956. In French. DNLM

Pilots flying above 40,000 feet complain of visual fatigue upon landing, whereas flights of long duration at lower altitudes produce no visual repercussions. At high altitudes, the conditions of flight and the surrounding medium affect retinal adaptation and accommodation. Factors responsible for visual disorders are atmospheric changes, dazzle, changes in illumination, accommodation in an empty sky, sensation of solitude, and psychosomatic factors.

5867
Merino, C. F.
THE PLASMA ERYTHROPOIETIC FACTOR IN THE POLYCYTHEMIA OF HIGH ALTITUDES: PRELIMINARY REPORT. — Inst. of Andean Biology and Dept. of Pathological Physiol., Faculty of Med., Lima, Peru; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-103, Nov. 1956. 5 p. AD 126 283 PB 128 467

An investigation was made of the possible presence of an erythropoietic factor in the plasma of native residents at high altitudes (between 3,900 and 4,540 meters). The injection of 250 to 300 cc. of plasma obtained from these men into 15 healthy subjects living at sea level resulted in a moderate but constant increase of reticulocytes, which reached its

maximal degree between the second and fourth day after the injection. The constancy of this finding and the absence of response in another group of 13 men who received plasma from sea level, give some significance to the data obtained. (Author's abstract)

5868
Monge, C.
A. Cazorla T., G. Whittembury M., Y. Sakata B., and C. Rizo-Patrón
[DESCRIPTION OF THE CIRCULATORY DYNAMICS IN THE HEART AND LUNGS OF THE INHABITANTS AT SEA LEVEL AND AT HIGH ALTITUDES BY MEANS OF THE DYE DILUTION TECHNIQUE] Descripción de la dinámica circulatoria en el corazón y pulmones de habitantes del nivel del mar y de las grandes alturas por medio de la técnica de dilución del colorante. — Anales de la Facultad de medicina, Universidad nacional mayor de San Marcos de Lima (Peru), 39 (2): 498-511. 1956. In Spanish. DNLM

An English translation of this paper had appeared in 1955, see item no. 4662, vol. IV.

5869
Nagy, L.
[AN APPARATUS FOR THE MEASUREMENT OF METABOLISM IN SMALL LABORATORY ANIMALS AT VARIOUS BAROMETRIC PRESSURES AND TEMPERATURES] Anyagesereményéro készülék kis laboratóriumi állatok számára különböző barometrikus nyomáson és homersékleten. — Kisérletes orvostudomány (Budapest), 8 (4): 401-403. July 1956. In Hungarian, with German summary (p. 403).
DLC (R850.K47, v. 8)

An apparatus is described, suitable for determination of oxygen consumption in rats and guinea pigs at varying temperatures, atmospheric pressure, low barometric pressure, as well as at normal pressure with low O_2 tension. The O_2 consumption can be measured with an accuracy of 1 cubic cm., therefore even short experimental periods give exact values of the metabolic rate. (Author's summary)

5870
Newsom, B. D.,
and D. J. Kimeldorf
ANORETIC RESPONSES TO RADIATION AND THEIR EFFECT UPON ALTITUDE TOLERANCE [Abstract]. — Federation Proceedings, 15 (1, part I): 136. March 1956. DLC (QH301.F37, v. 15)

X-irradiated rabbits exhibited a severe decrease in food consumption which persisted for the 3 days of observation. Irradiated rabbits had an increased altitude tolerance similar to that previously observed in the rat. When nonirradiated rabbits were deprived of food for 72 hours prior to altitude exposure the altitude tolerance was similar to that of the irradiated animal. While the food consumption was lower during the 3 days following irradiation in mice the effect was much smaller than that observed for rats and rabbits. Guinea pigs and hamsters exhibited only a slight decrease in food consumption with recovery occurring after 24 hours. The mice, guinea pigs and hamsters did not exhibit a significant increase in altitude tolerance 3 days after irradiation. However, when nonirradiated mice and guinea pigs were food-deprived, the altitude tolerance was significantly increased. These observations provide further evidence that the postirradiation increase in altitude tolerance is dependent upon the postirradiation anorexia. (Authors' abstract, modified)

5871
Pace, N.,
L. B. Meyer, and B. E. Vaughan
ERYTHROLYSIS ON RETURN OF ALTITUDE ACCLIMATIZED INDIVIDUALS TO SEA LEVEL. — Jour. Applied Physiol., 9 (2): 141-144. Sept. 1956. DLC (QP1.J72, v. 9)

Observations were made of the red blood cell and hemoglobin levels of ten sea-level residents before, during, and after an 11-week sojourn at altitudes above 10,000 feet. It was found that the polycythemia observed at high altitudes required 6-7 weeks to reach stabilization, while red cell and hemoglobin levels were reduced to one-third the stabilized altitude levels within 17 days after descent to sea-level conditions. Comparison of the normal rate of disappearance of red blood cells with the observed rate indicated that both a decrease in the rate of erythropoiesis and an increase in the rate of erythrolysis were necessary to account for the rapid restoration of the polycythemic blood cell counts to a normal value.

5872
Peñaloza, D.
ELECTROCARDIOGRAPHIC OBSERVATIONS ON TEN SUBJECTS AT SEA LEVEL AND DURING ONE YEAR OF RESIDENCE AT HIGH ALTITUDE. — Inst. of Andean Biology, Lima, Peru; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-98, Nov. 1956. 12 p.
AD 126 286 PB 126 043

Ten subjects were taken from Lima, at sea level, to Morococha, at an altitude of 14,900 feet, and the electrocardiographic changes occurring during one year of residence were studied. No changes of the auricular activation process were observed. SAQRS shifted to the right and backward. In lead aVR the terminal R wave was increased. In the left precordial leads the S wave became larger. SAT vector tended to shift backward. In the right precordial leads, T waves became negative or atypical in shape. Elevation of the RS-T segment was also observed. All these changes tended to decrease in the last months. One year of residence in Morococha was not sufficient time for the changes of the T wave to disappear. This finding suggests that acclimatization was not yet complete. (Author's abstract)

5873
Peña Matías, L. A.
[HUMAN SERUM PROTEINS: FILTER PAPER ELECTROPHORESIS: NORMAL VALUES AT SEA LEVEL (LIMA) AND AT ALTITUDE (MOROCOCHA). COMPARISON WITH CHEMICAL FRACTIONATION: METHOD OF WOLFSON, COHEN, CALVARY, AND ICHIVA] Seroproteínas humanas: electroforesis al papel de filtro: valores normales al nivel del mar (Lima) y en altura (Morococha). Comparación con el fraccionam to químico: método de Wolfson, Cohn,

Calvary e Ichiva. — Anales de la Facultad de medicina, Universidad nacional mayor de San Marcos de Lima (Peru), 39 (2): 512-542. 1956. In Spanish. DNLM

A comparative analysis of blood proteins by means of filter paper electrophoresis in normal persons living near sea level (Lima, Peru, 150 meters) and at altitude (Morococha, Peru, 4,540 meters) demonstrated certain differences in the levels of albumin and gamma globulin. No significant difference was observed in proteinemia, values for total blood proteins, or alpha and beta globulins between the subjects at sea level and at altitude. Blood protein values for the two groups obtained by means of Wolfson, Cohn, Calvary and Ichiva's chemical fractionation method generally agreed with those obtained by electrophoresis. (87 references)

5874
Perazzo, D. L.
[ALTITUDE AND URINARY 17-KETOSTEROIDS] Altura y 17-cetosteroides urinarios. — Semana médica (Buenos Aires), 109 (12): 60-64. July 12, 1956. In Spanish. DNLM

An increase was found in the urinary excretion of 17-ketosteroids of four subjects decompressed at the rate of 500 meters per minute to a simulated altitude of 4,000 meters. At 2,000 meters, ketosteroid excretion was relatively insignificant in 50% of the subjects. Only under the effect of marked hypoxia (breathing of 12.7% oxygen mixture, corresponding to 4,000 meters of altitude) was there evidence of an increase in the urinary 17-ketosteroid level in two subjects, but remained unchanged in the others.

5875
Picón-Reátegui, E.
INTRAVENOUS GLUCOSE TOLERANCE TEST AT SEA LEVEL AND AT HIGH ALTITUDES. — Inst. of Andean Biology, Lima, Peru; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-105, Dec. 1956. 7 p. AD 126 289 PB 128 475

Determinations of the capillary blood content of glucose, before and after the intravenous administration of glucose, were made in healthy men living at sea level and in native residents of Morococha (14,900 feet). The basal concentration of glucose in the blood was lower at high altitudes, but a higher value was observed in this environment 4 minutes after its administration. The drop in the blood glucose, after the initial rise, occurred more rapidly at high altitudes. No symptoms of hypoglycemia were observed among the natives of Morococha, in spite of the very low values of blood glucose observed. At sea level and at high altitudes, the utilization of glucose varied in direct relation to the concentration of this substance in the blood. (Author's abstract)

5876
Picón-Reátegui, E.
STUDIES ON THE METABOLISM OF CARBOHYDRATES AT SEA LEVEL AND AT HIGH ALTITUDES. — Inst. of Andean Biology, Lima, Peru; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-107, Nov. 1956. 14 p. AD 126 740 UNCLASSIFIED

Two groups of healthy adult males - one group living in Lima, Peru, at sea level, the other in Morococha, 14,900 feet altitude - were studied to learn the effect of altitude on the assimilation of glucose. The fasting; venous blood values of glucose, pyruvic and lactic acids, inorganic phosphate and potassium, and the changes which occur after the oral administration of glucose were determined. The concentration of glucose in the venous and capillary blood samples was found to be consistently lower at high altitude. The extrahepatic assimilation of glucose was similar at the two elevations. There was no difference in the fasting concentration of lactic acid in venous blood and no significant differences in the basal concentrations of pyruvic acid and potassium and in changes which occur after ingestion of glucose. At high altitude there was a greater concentration of inorganic phosphate in the blood, but the trend of changes was the same in the two locations. (Author's abstract)

5877
Rabin, M.
THE INFLUENCE OF VARIATION IN ALTITUDE UPON SALIVARY ELECTROLYTE COMPOSITION. — (Thesis, University of Zurich.) 15 p. Zurich: Schippert & Co., 1956. In English. DNLM (W4.Z96)

Passive ascent of 25 normal females from Zurich, 1340 feet of altitude, to Valbella, 5000 feet of altitude caused a decrease in the salivary sodium content and sodium/potassium ratio. Previous research by other authors had demonstrated that high altitude stimulates adrenocortical activity, and that adrenocortical hyperactivity causes a decrease in salivary sodium and sodium/potassium ratio. It is, therefore, suggested that the observed effect of altitude on salivary electrolytes is mediated by adrenocortical hormones. (Author's summary, modified)

5878
Rahm, W. E., Jr.,
W. F. Strother, and J. F. Crump
THE EFFECTS OF PRESSURE IN THE EXTERNAL AUDITORY MEATUS. — Annals Otol. Rhinol. and Laryngol., 65 (2): 656-664. Sept. 1956. DLC (RF1.A6, v. 65)

Positive and negative pressures were applied at the external auditory meatus of anesthetized cats exposed to tonal stimuli. Cochlear potentials were used as the index of auditory action. Increased pressure in the external meatus had a marked effect on the electrical responses of the cochlea. For certain tones a small degree of pressure produced a slight improvement, but large pressures always caused a reduction of the responses. In general, low tones were more affected than high tones, but the relation is not exactly in the order of frequency. The principal effects of positive and negative pressure on sound transmission are due primarily to an alteration in the tension of the drum membrane. (Authors' summary, modified)

5879
Ressel, F. A.
[CONTRIBUTION TO THE STUDY OF POLYCYTHEMIA AT ALTITUDE] Contribución al estudio de las poliglobulias de altura. — Revista clínica española (Madrid), 62 (4): 239-251. Aug. 31, 1956. In Spanish, with English summary (p. 250). DNLM

High altitude polycythemia, determined in men and women living in Pulacayo, Bolivia (4,250 meters of altitude), appears to reach lower values than those previously reported, and is characterized by an increase of about 550,000 erythrocytes (2.38% increase per 1,000 meters of altitude). Hemoglobin values remain within normal limits. Included are tabulated average values for erythrocytes and hemoglobin in both sexes. (Author's summary, modified)

5880
Rey de Castro, J. C.,
and D. Iglesias
MECHANISMS OF NATURAL ACCLIMATIZATION: PRELIMINARY REPORT ON ANATOMIC STUDIES AT HIGH ALTITUDES. — [Universidad nacional mayor de San Marcos de Lima (Peru)]. Inst. of Andean Biology; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-97, June 1956. 6 p. AD 126 831 UNCLASSIFIED

This is a preliminary report on anatomic studies of pathologic specimens obtained from persons acclimatized to altitudes of about 4,000 meters. Most of these people had died in accidents. The organs investigated included the lungs, trachea, bronchi, heart, liver, spleen, kidneys, striated muscle, sexual glands, and, in a few cases, brain and suprarenal glands. (Authors' abstract)

5881
Reynafarje, C.,
and R. Lozano
MECHANISMS OF NATURAL ACCLIMATIZATION: OBSERVATIONS ON THE IRON METABOLISM AND THE FREE PROTOPORPHYRINS OF THE ERYTHROCYTES IN THE POLYCYTHEMIA OF HIGH ALTITUDES. — Inst. of Andean Biology, Lima, Peru; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-99, June 1956. 7 p. AD 119 787 PB 121 828

Observations on the iron metabolism, by means of the administration of Fe^{59}, and on the concentration of free protoporphyrins in the circulating red cells were made on four groups of subjects: (1) men living at sea level, (2) native residents at an altitude of 14,900 feet, (3) men taken to high altitude for a temporary exposure, and (4) subjects studied at sea level after their return from a six-month period of exposure to high altitudes. An increase of the erythropoietic activity which was observed in the group of residents at high altitude was even more accentuated during the first few days of exposure to the low-pressure environment. A depression of the erythropoietic activity was found, however, on their return to sea level. An increase of the free erythro-protoporphyrins was found both in the men living permanently and in those dwelling temporarily at high altitudes. A tendency to decrease the amount of this pigment was found in the men returning to sea level. (Authors' summary)

5882
Reynafarje, C.
RED CELL LIFE SPAN IN THE NEWBORN AT SEA LEVEL AND AT HIGH ALTITUDES. — Inst. of Andean Biology, Lima, Peru; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-100, Aug. 1956. 4 p. AD 120 094 UNCLASSIFIED

The life span of the red cells of five newborns at high altitudes and five newborns at sea level was determined by "tagging" the cells with Cr^{51} and subsequently injecting them into healthy adults. It was found that the survival time of red cells in newborns is shorter than that observed in adult subjects. There was no appreciable difference in the results obtained in the newborns at sea level and at high altitudes. (Author's abstract)

5883
Rivolier, J.
[MEDICINE AND MOUNTAIN] Médecine et montagne. — 201 p. Paris: B. Arthaud, 1956. (Collection Sempervivum, 30). In French. DLC (RC103.A4R5)

This is a semi-scientific handbook concerned with the medical and physiological problems associated with mountain expeditions and with providing practical recommendations for those engaged in mountain climbing. Included are an explanation of the various physical phenomena of high altitude and discussions of the physiology of respiration, muscular work, regulation of heat and cold, and acclimatization. Survival at high altitude is considered in terms of nutrition, oxygen supply, adequate training, equipment, and drugs. The symptoms, prevention and treatment of altitude sickness, fatigue, frostbite, sunburn, eye disorders, and injuries are also described.

5884
Rotta, A.,
A. Cánepa, A. Hurtado, T. Velásquez, and R. Chávez
PULMONARY CIRCULATION AT SEA LEVEL AND AT HIGH ALTITUDES. — Jour. Applied Physiol., 9 (3): 328-336. Nov. 1956. DLC (QP1.J72, v. 9)

A comparative study was made of the pulmonary circulation of sea-level residents, one-year and native-born residents of a high altitude environment (14,900 feet), and two cases of chronic mountain sickness. Men living at high altitude were characterized by hyperventilation, polycythemia and increased blood volume which were especially marked in cases of mountain sickness, decreased peripheral blood pressure (particularly systolic), increases in pulmonary vascular resistance and right ventricular work, and increases in pulmonary artery and right ventricle pressure which were most marked in cases of mountain sickness and least in temporary residents. No change was observed in pulse rate, and cardiac output was increased only in cases of mountain sickness. Arterial blood hemoglobin oxygen saturation was decreased to a lesser extent in short-term residents than in native residents as a result of a greater

hyperventilation in the temporary group. Administration of 35% oxygen to high-altitude residents decreased pulse rate and cardiac output, but decreased pulmonary artery pressures only in cases of mountain sickness. Factors suggested to explain the rise in pulmonary pressure in high-altitude residents include the increase in pulmonary vascular resistance produced by anoxia, changes in blood volume, hyperventilation, and low alveolar carbon dioxide.

5885
Safar, P.
ANESTHESIA AT HIGH ALTITUDE. — Annals Surgery, 144 (5): 835-840. Sept. 1956.
DLC (RD1.A5, v. 144)
Also Spanish translation in: Revista de la Asociacion medica de la provincia de Yauli (La Oroya), 1 (4): 16-24. Oct.-Dec. 1956.
DNLM

Peculiarities observed by the author and local clinicians during general and regional anesthesia in natives living at high altitude are reported. Accurate data which could explain these observations are lacking. The polycythemic native, and even more the normocythemic newcomer, require increased pulmonary ventilation at all times at high altitudes to avoid hypoxia (and respiratory acidosis in the native who has a low alkaline reserve). During anesthesia this can be accomplished most easily by manual hyperventilation (intermittent positive pressure breathing) with high concentrations of oxygen. The patient should have fully recovered consciousness and muscle power at the end of an operation before he is disconnected from the anesthetic apparatus. Drugs which exert prolonged depressant effects on breathing and consciousness should be avoided. The relative advantages of certain anesthetic technics are reported. (Author's summary)

5886
San Martín, M.,
Y. Prato, and L. Fernández
MECHANISMS OF NATURAL ACCLIMATIZATION: EXCRETION OF URINARY STEROIDS AT SEA LEVEL AND AT HIGH ALTITUDES. — Inst. of Andean Biology, Lima, Peru; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-100, Aug. 1956. 2 p. AD 119 790
UNCLASSIFIED

A comparative study was made of the urinary excretion of 17-ketosteroids and reducing corticosteroids in healthy adult men living at sea level and in native residents living at an altitude of 14,900 feet. No significant differences were observed between the two groups. The variability observed in the results was also of about the same degree at both altitudes. (Authors' abstract)

5887
Scano, A.,
G. Meineri, F. Rossanigo, and B. Tagliamonte
[BEHAVIOR OF SOME RESPIRATORY VALUES IN MAN AT BAROMETRIC PRESSURES OF 760, 526, AND 379 MM. Hg] Comportamento di alcune grandezze respiratorie nell'uomo alle pressioni barometriche di 760, 526 e 379 mm Hg. — Rivista di medicina aeronautica (Roma), 19 (4): 595-605. Oct.-Dec. 1956. In Italian, with English summary (p. 603). DLC (RC1050.R56, v. 19)

Respiratory studies were made in thirty-five normal jet pilots (average age, 25 years) at sea level and following decompression to simulated altitudes of 3,000 and 5,500 meters. There was no increase in respiratory frequency, an insignificant increase in pulmonary ventilation (2.2%) at 3,000 meters, a significant increase (23.4%) at 5,500 meters, and a relatively higher increase in alveolar ventilation. Alveolar carbon dioxide and oxygen tensions and respiratory quotient, when plotted on an oxygen-carbon dioxide diagram resulted in a curve placed between the curve for non-acclimatized and acclimatized subjects. A correlation of =46.8% was found between the values for alveolar ventilation and alveolar carbon dioxide tension at the different altitudes. The importance is stressed of respiratory variations for the careful and exact evaluation of the functional responses to barometric decompression. (Authors' summary, modified)

5888
Scano, A.,
and E. Busnengo
[BEHAVIOR OF THE ELECTROCARDIOGRAM IN MAN DECOMPRESSED TO SIMULATED ALTITUDES OF 3,000 AND 5,500 METERS] Il comportamento dell'elettrocardiogramma nell'uomo in depressione barometrica ad altitudini fittizie di 3000 e 5500 metri. — Rivista di medicina aeronautica (Roma), 19 (2): 263-284. April-June 1956. In Italian, with English summary (p. 282).
DLC (RC1050.R56, v. 19)

No abnormal electrocardiographic changes were observed in 68 (75.6%) out of 90 subjects at sea level or when decompressed to simulated altitudes of 3,000 and 5,500 meters. Twenty-two subjects (24.4%) exhibited changes at sea level without abnormal changes at altitude. Six subjects, not included in the general means, displayed an abnormal electrocardiographic response to anoxic stimulation and an increase in cardiac frequency. Cardiac frequency at sea level and at 3,000 meters presented a nonsignificant increase as compared to the increase at 5,500 meters. The most steady and important changes in the ECG tracings at 5,500 meters concerned the P wave, which showed a voltage increase of 25.5%, the QRS complex which decreased 15%, and the T wave which decreased 26%. Similar changes were observed at 3,000 meters but to a lesser degree. (26 references)

5889
Schilling, J. A.,
R. B. Harvey, and B. Balke
ALTITUDE TOLERANCE AND WORK CAPACITY OF DOGS UNDERGOING EXTENSIVE PULMONARY RESECTION. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-93, Feb. 1956. 9 p. AD 95 150
PB 123 031

Tests were conducted (1) to investigate the work capacity of dogs and their tolerance to altitude exposure and rapid decompression following varying degrees of pulmonary resection and (2) to observe certain physiologic and pathologic changes that accompany the operative procedures. Two series of

healthy mongrel dogs averaging 15.0 kg. in weight were selected for the tests. Altitude-exposure tolerance was measured by two tests: a steady ascent to 33,000 ft. at a rate of 6000 ft./min and a rapid ascent to 20,000 ft. at a rate of 40,000 ft./min. followed by a gradual ascent to 33,000 ft. at a rate of 1000 ft./min. The end point in both tests was the inability of the animal to stand on ascent to lower atmospheric pressures. Results showed a good tolerance to removal of 60% of the original lung volume; removal of more than 60% produced a crippled animal with pathologic sequelae which appeared to be incompatible with life. (AD abstract)

5890
Schilling, J. A.,
R. B. Harvey, E. L. Becker, T. Velásquez, G. Wells, and B. Balke
WORK PERFORMANCE AT ALTITUDE AFTER ADAPTATION IN MAN AND DOG. — Jour. Applied Physiol., 8 (4): 381-387. Jan. 1956.
DLC (QP1.J72, v. 8)

The work performance of three human subjects was recorded by a standard treadmill test at altitudes of 760 feet, at 14,900 feet after 2 1/2 months adaptation to this altitude, and again at 760 feet two weeks after return to the low altitude. A similar test was used to measure the work performance of four trained dogs at 760 feet, and at 760 feet and 19,000 feet after acclimatization to a simulated chamber altutide of 19,000 feet. A marked increase in ventilation and ventilatory equivalents for a given work load was observed in all subjects at altitude, without a corresponding increase in heart rate. Oxygen consumption was fairly constant for similar work loads in all tests. In humans, physical performance observed during tests at 760 feet before acclimatization to altitude was higher than that recorded at high altitude after 10 weeks adaptation, but lower than that obtained after return to low altitude. Characteristic rises in hemoglobin, hematocrit, and red blood cell counts were noted in all subjects at high altitude. Lactic pyruvic acid ratios in human subjects were considerably lower at high altitude. (Quoted in part).

5891
Stewart, W. K.
HIGH ALTITUDE AND SPACE TRAVEL. — Royal Soc. Promotion of Health Jour. (London), 76 (8): 423-424. Aug. 1956.
DNLM

A brief account is presented of the medical, engineering, and physical problems to be encountered in manned high altitude and space travel. Providing a satellite or space ship with proper pressurization, temperature regulation, and ventilation necessary for human comfort and life is the chief concern of the engineer. Medical problems include the effects of high speed, accelerations, and weightlessness on the human in flight. The physical factors encountered in space are the effects of radiations (X, ultravtolet, cosmic), and the possibility of collision with meteorites.

5892
Stuckney, J. C.
D. W. Northrup, and E. J. Van Liere
CARDIAC DILATATION WITHOUT HYPERTROPHY FROM REDUCED AMBIENT PRESSURE IN RATS. — Circulation Research, 4 (2): 217-219. March 1956.
DLC (RC681.A1A57137, v. 4)

Cardiac dilatation appeared in rats exposed, after decompression within 0.4 seconds, for 10 seconds, to an ambient pressure of 30 to 32.5 mm. Hg (72,400 to 70,700 feet). Dilatation, determined roentgenographically, persisted for two or three days. Some rats were submitted to one long exposure, while others were repeatedly subjected to short exposures. Sacrifice of the rats sufficiently long after exposure to permit cardiac hypertrophy to develop revealed no evidence of it as determined from heart weight-body weight ratios. (Authors' abstract, quoted in part)

5893
Tappan, D. V.,
V. R. Potter, B. Reynafarje, and A. Hurtado
MECHANISMS OF NATURAL ACCLIMATIZATION: TISSUE ENZYME STUDIES AND METABOLIC CONSTITUENTS IN ALTITUDE ADAPTATION. — Inst. of Andean Biology, Lima, Peru; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-98, Oct. 1956. 13 p. AD 125 756
PB 128 491

Succinoxidase activity has been demonstrated to be significantly higher in the tissues of guinea pigs native to altitudes of 14,000 to 14,900 feet than in tissues of sea level animals. Desoxyribonucleic acid is proportionately higher in the tissues of altitude animals, indicating a larger number of cells per gram of tissue with a constant amount of succinoxidase activity per cell. Data on "antimycin A titer" and cytochrome oxidase suggest that altitude acclimatization may be aided by increases at limiting steps in an enzyme series. Altitude animals possess increased glycolysis and adenosine triphosphatase capacities and have higher levels of high energy phosphate accumulated in their tissues. Animals moved from one altitude to the other show changes indicative of the acclimatization process. (Authors' abstract)

5894
Tappan, D. V.,
and B. Reynafarje
MECHANISMS OF NATURAL ACCLIMATIZATION: TISSUE PIGMENT STUDIES IN ALTITUDE ADAPTATION. — Inst. of Andean Biology, Lima, Peru; issued by School of Aviation Medicine, Randolph AFB, Tex. Report no. 56-97, Oct. 1956. 8 p.
AD 125 754 PB 128 468

Studies on the pigment content of muscle and organ tissues of sea level and altitude (14,900 feet) guinea pigs have demonstrated a significant increase in myoglobin in five of eight tissues in sea level animals kept in the altitude for an average of 75 days. Lesser but consistent increments were indicated for the myoglobin and cytochrome C levels for the altitude compared to the sea level groups. Higher blood hemoglobin values and ratios of heart weight to body weight and red to white tissue in several muscles were found for the altitude guinea pigs and add to the total body content of respiratory pigments. The relationship of pigment levels to enzyme activities and the utility of various methods for measuring tissue pigments are discussed. (Authors' abstract)

5895
Terziŏglu, M.,
F. Oezer, and N. Gokhan
[PLASMA AND ERYTHROCYTE LEVEL OF HUMAN BLOOD BICARBONATE AND CHLORIDE IONS AT AN ALTITUDE OF 1950 METERS] Tasso plasmatico e globulare degli joni bicarbonico e cloro nel sangue umano all'altezza di 1850 metri. — Minerva medica (Torino), 47 (53): 14-16. July 4, 1956. In Italian.
DNLM

No significant changes were observed in the distribution of cellular and plasma bicarbonate in subjects staying at Uludag, Turkey (1850 meters of altitude) for 11 days. The plasma chloride ion remained unchanged, but erythrocyte chloride content increased by 7.4% and 5.4% in two experimental periods. During the first few days at altitude plasma water content decreased, but cellular content increased. Total blood values for bicarbonate and chloride ions showed a decrease by 7 and 5.3% of the bicarbonate values, and an increase of 2.9 and 1.9% of the chloride values in two experimental periods. On the basis of these results, the decrease in alkaline reserve at altitude can not be explained in terms of the redistribution of alkaline ions between blood and tissue as a result of increased loss of carbon dioxide from the alveolar surface.

5896
Timiras, P. S.,
A. A. Batts, G. W. Hollinger, R. Karler, A. A. Krum, and N. Pace
ENDOCRINE RESPONSES DURING ADAPTATION TO MODERATELY HIGH ALTITUDE [Abstract]. — Federation Proceedings, 15 (1, part I): 187. March 1956. DLC (QH301.F37, v. 15)

Studies of various organs were made in rats exposed for various periods of time at the 12,500 foot level of the White Mountain Research Station, California (P animals); in rats of the second generation born at the station (F_2 animals); and in rats remaining in the parent colony on the Berkeley campus (sea level controls). After 1-3 days of exposure, adrenocortical activity was stimulated as indicated by (a) a 40-50% increase in adrenal weight; (b) a loss of adrenal ascorbic acid (after 1 day's exposure), and (c) a 60-80% decrease in weight of thymus, spleen and lymph nodes. No changes in weight could be observed in hypophysis, testes and thyroid. The preputial glands were significantly enlarged after 3 days' exposure. After 2 months' exposure, the P animals showed a significant enlargement of the hypophysis and thyroid as well as of the adrenals even when other criteria (e.g. growth, reproduction, blood hemoglobin and hematocrit) indicated adaptation to the new environment. Testes and preputial glands remained unchanged. On the other hand, in the F_2 animals born at high altitude, endocrine weights appeared to be similar to those of sea level controls. (Authors' abstract, modified)

5897
Udalov, IU. F.
[EFFECT OF NOVOCAIN ON THE TOLERANCE OF HIGH ALTITUDES IN WHITE RATS] K voprosu o vliianii novokaina na perenosimost' belymi krysami prebyvaniia na bol'shikh vysotakh. — Biulleten' eksperimental'noi biologii i meditsiny (Moskva), 42 (8): 53-55. Aug. 1956. In Russian.
DLC (R91.B56, v. 42)

The role was studied of secondary effects on the brain and other organs due to interoceptor reflexes activated by the chemoreceptors of internal organs in anoxic death. Death occurred in rats at a simulated altitude of 11,000 m. (169 mm. Hg). In the second part of the experiment, interoceptive impulses were excluded by Novocain block (Novocain injected bilaterally in the frontal cervical surface area and in the abdominal cavity) in the experimental animals. Both, the experimental rats and the controls were taken to 11,000 m. simulated altitude and remained there for 10 minutes. Six of the 23 controls and two of the 25 experimental animals died. These results support the hypothesis that interoceptive reflexes are pathological in character and have a negative influence on altitude tolerance. However, it is possible, that in addition to blocking the interoceptive impulses Novocain also exerts an anticholinergic effect on the central nervous system.

5898
Ulrick, W. C.,
W. V. Whitehorn, B. B. Brennan, and J. G. Krone
TISSUE RESPIRATION OF RATS ACCLIMATIZED TO LOW BAROMETRIC PRESSURE. — Jour. Applied Physiol., 9 (1): 49-52. July 1956.
DLC (QP1.J72, v. 9)

The tissue respiration rate of rats acclimatized to a simulated altitude of 18,000 feet for an average of 11.2 weeks was determined by the Warburg technique under 100% oxygen. Acclimatized animals showed increases in hemoglobin values and heart-body weight ratios, but no significant alterations from normal in growth rate, total metabolic rate, and rectal temperature. No significant changes were observed in the tissue respiration rates of brain, small intestine, diaphragm, liver, skeletal muscle, atrium, and ventricle. Adrenal-body weight ratios were unchanged, but increased adrenocortical activity was suggested by a significant increase in adrenal oxygen consumption. The rate of respiration of kidney slices was reduced. It is concluded that a generalized adaptation of cellular metabolism to high altitude does not occur, but that changes may be demonstrated in tissues specifically involved in the adaptation process. (Authors' abstract, quoted in part)

5899
Valdivia, E.
MECHANISMS OF NATURAL ACCLIMATIZATION: CAPILLARY STUDIES AT HIGH ALTITUDES. — Inst. of Andean Biology, Lima, Peru; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-101, June 1956. 6 p.
AD 120 093 PB 121 748

A significantly greater number of capillaries per square millimeter of muscle tissue and a higher ratio of the number of capillaries per number of muscle fibers in the same area were observed in guinea pigs born and raised at high altitudes as compared with another group investigated at sea level. The possible adaptative significance of these characteristics, in relation to the

low-pressure environment, has been indicated. (Author's summary)

5900
Vanlerenberghe, J.,
G. Biserte, and F. Guerrin
[EXPERIMENTAL STUDY OF LIPOPROTEIN FRACTIONS IN BAROMETRIC DECOMPRESSION] Étude expérimentale du lipoprotéinogramme en dépression barométrique. — Comptes rendus de la Société de biologie (Paris), 150 (8-9): 1545-1549. 1956. In French. DLC (QP1.S7, v. 159)

Electrophoretic studies were made of blood protein and lipoprotein from dogs exposed for 1 to 7 hours to simulated altitudes of 6,000 to 11,000 meters. Dogs exposed daily or every 48 hours for several days showed the appearance of a third lipoprotein fraction and a tendency towards trailing of the γ-globulin fraction of protein. The lipoprotein changes were similar to those resulting from tissue destruction and lipid liberation.

5901
Vaughan, B. E.,
and N. Pace
CHANGES IN MYOGLOBIN CONTENT OF THE HIGH ALTITUDE ACCLIMATIZED RAT. — Amer. Jour. Physiol., 185 (3): 549-556. June 1956. DLC (QP1.A5, v. 185)

An abstract of this paper has been published in 1955, see item 5109, vol. IV.

5902
Vavala, D. A.
HEMATOTYMPANUM AT REDUCED BAROMETRIC PRESSURE. — U. S. Armed Forces Med. Jour., 7 (3): 436-438. March 1956. DLC (RC970.U7, v. 7)

A rare case is presented of hematotympanum in the left ear of an aviation cadet during routine chamber flight to a simulated altitude of 43,000 feet. On descent, the cadet complained of blocked ears and at 18,000 feet the chamber was leveled to enable him to clear his ears. He experienced no pain, merely a sensation of fullness. Chamber descent was resumed and at 5,000 feet blood was observed oozing from the left ear. Upon descent to ground level bleeding was stopped and therapy against secondary infection instituted. The left ear drum healed completely without impairment of hearing. This lesion was probably caused by traumatic rupture of the ear drum incident to reduced barometric pressure.

5903
Velásquez, T.
MAXIMAL DIFFUSING CAPACITY OF THE LUNGS AT HIGH ALTITUDES. — Inst. of Andean Biology, Lima, Peru; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-108, Nov. 1956. 9 p. AD 128 585 UNCLASSIFIED

The maximal diffusion capacity (DO_2) of the lungs during submaximal physical activity and at two levels of oxygenation was determined in 12 native residents of Morococha, at an altitude of 4,540 meters. A different degree of exercise was used in two groups of subjects, and no relation was observed between the oxygen consumption and the value of DO_2. The values of DO_2 were found to be consistently higher than those observed at sea level by several investigators who used similar technics in the measurement. An interpretation of this finding, which represents an adaptative mechanism to the low pressure environment, has been attempted on the basis of various physical and physiologic characteristics present in the high-altitude residents. (Author's abstract)

5904
Violette, F.
[THE LAW OF DECOMPRESSION AND ITS APPLICATION IN AVIATION MEDICINE] La loi de décompression et son intérêt en médecine aéronautique. — Médecine aéronautique (Paris), 11 (2): 163-165. 1956. In French. DLC (TL555.M394, v. 11)

Previous theoretical demonstrations of the relationship of cabin decompression to lung decompression have allowed the calculation of a coefficient of air flow (equal to the area of the orifice/cabin volume) which can be accurately used to determine the maximum safe gas escape openings of sealed chambers.

5905
Violette, F.
[PULMONARY PRESSURE DURING EXPLOSIVE DECOMPRESSION] La pression pulmonaire au cours de la décompression explosive. — Médecine aéronautique (Paris), 11 (1): 71-72. 1956. In French. DLC (TL555.M394, v. 11)

Essentially the same as the excerpts of item no. 5122 (vol. IV) published in Comptes rendus de l'Academie des sciences (Paris), 241: 1855-1857, 1955.

5906
Vitale, U.
[STUDY OF THE LESIONS INDUCED BY EXPLOSIVE DECOMPRESSION IN THE VARIOUS ORGANS AND SYSTEMS AND ESPECIALLY IN THE CENTRAL NERVOUS SYSTEM] Studio delle lesioni provocate dalla "decompressione esplosiva" sui vari organi ed apparati e specialmente sul sistema nervoso centrale. — Rivista di medicina aeronautica (Roma), 19 (1): 19-41. Jan.-March 1956. In Italian, with English summary (p. 38-39). DLC (RC1050.R56, v. 19)

Rabbits and dogs were explosively decompressed to a simulated altitude of approximately 15,000 meters for 20 minutes. Apparent physiopathological phenomena observed were increased intra-abdominal and intrathoracic volume and pressure; spasmodic breathing; micturation; and after recompression, paresis. Post-mortem anatomy and histology demonstrated pulmonary hemorrhage, congestion, and areas of atelectasis and emphysema; liver fissurization, centrolobar congestion, subcapsular petechiae, dilatation and edema; kidney acute passive congestion and slight hemorrhage; mesenteric congestion; abnormal dilatation of the heart with slight hemorrhage; cerebral edema, congestion of meningeal blood vessels, subpial hemorrhage, no hemorrhage

in the white or gray matter, and no free blood in the cerebral ventricles. Causes of these lesions were possibly due to the shock of explosive decompression, the increase in intra-abdominal and intrathoracic pressures, or the release of intracellular gases.

5907
Whiteside, T. C. D.
VISION AT HIGH ALTITUDE. = Flying Personnel Research Committee (Gt. Brit.). Report no. FPRC 910, Nov. 1954. 5 p. AD 59 070 UNCLASSIFIED
Condensed French translation: La vision en haute altitude. Médecine aéronatique (Paris), 11 (1): 41-43, 1956. DLC (TL555.M397, v. 11)

The visual difficulties of high-altitude flight include glare produced by the greater atmospheric density and resulting brightness (light scattering) beneath the aircraft, and empty field vision, which is associated with myopia and problems of the determination of the distance, size, and relative angular speed of sighted objects. Glare caused by the unhindered flooding of light into the eyes and by increased contrast between the exterior and the instrument panel may be attenuated by shielding of the eyes, avoidance of anoxia, and improved illumination of the cockpit.

e. Anoxia

[Hyperoxia, hypocapnia, etc., under 3-c]

5908
Albers, C.,
and W. Usinger
[THE CIRCULATION OF THE DOG IN ACUTE HYPOXIA] Der Kreislauf des Hundes bei akutem Sauerstoffmangel. = Pflügers Archiv für die gesamte Physiologie (Berlin), 263 (2): 201-226. 1956. In German. DLC (QP1.A63, v. 263)

The circulatory effects of the inhalation of 8% O_2 in N_2 for 30 minutes were investigated in unanesthetized and anesthetized dogs. Hypoxia in all cases caused an increase in heart rate, an increase in systolic and diastolic blood pressure with a slight decrease in the pressure differential, an increase in pulse wave speed and in compliance a decrease in the heart stroke volume, no significant change in heart minute volume, and a rise in peripheral resistance. The respiratory response included an increase in tidal volume, a decrease in blood O_2 saturation, an increase in arterial pH, and a slight increase in the arterio-venous oxygen pressure difference. In lightly anesthetized dogs, the circulatory parameters were quantitatively similar to those of unanesthetized dogs and showed less individual variation. In dogs more deeply anesthetized, greater increases were observed in respiratory tidal volume and in respiratory frequency. The variability of the results of different investigators concerning the circulatory response to hypoxia is attributed to the variable influences of hypoxia and hypocapnia in different physiological situations, to experimental differences in the length of the hypoxic exposure, in ambient temperature, in the use of anesthesia, in analytical methods, and to individual and species differences.

5909
Alnfanov, V. N.
[THE EFFECT OF HYPOXIA AND LOW BAROMETRIC PRESSURE ON THE MOTOR AND SENSORY CHRONAXY IN MAN] Vliianie gipoksii i nizkogo barometricheskogo davleniia na motornuiu i senzornuiu khronaksiiu u cheloveka. = Biulleten' eksperimental'noi biologii i meditsiny (Moskva), 41 (1): 27-30. Jan. 1956. In Russian. DLC (R91.B56, v. 41)
English translation in: Bull. Exper. Biol. and Med. (Consultants Bureau, New York), 41 (3): 29-32. 1956. DLC (R850.B8, v. 41)

Measurements of motor chronaxy in the fingers of the left hand (m. flexor digitorum sublimis) and of the sensory chronaxy in the left eye were taken in (a) 23 men in a low-pressure chamber at 405 mm. Hg to determine the effect of hypoxia, and (b) 47 men breathing oxygen at an atmospheric pressure of 198 mm. Hg to determine the effect of low pressure without hypoxia. The results show normal variations of motor and sensory rheobases and increased motor and sensory chronaxies in subjects with good hypoxia tolerance. After descent the chronaxies returned to normal levels within 30-40 min. In poor hypoxia tolerance there was a decrease in motor rheobase and a sharp increase of motor chronaxy. Similarly, during good tolerance of low barometric pressure both rheobases and chronaxies vary around normal levels. As the condition of subject deteriorates, chronaxies increase considerably, particularly the motor chronaxy, at altitude and after descent. Chronaximetry is recommended as a supplementary method for objective determination of tolerance to variations in baromteric pressure.

5910
Alpert, N. R.,
J. R. Davis, and R. W. England
OXYGEN CONSUMPTION AND LACTATE PRODUCTION OF RAT DIAPHRAGMS AND LIVER SLICES BEFORE, DURING AND FOLLOWING SEVERE HYPOXIA [Abstract]. = Federation Proceedings, 15 (1, part I): 2. March 1956. DLC (QH301.F37, v. 15)

Tissue oxygen consumption and lactate production and removal were measured before, during and following a 60-minute period of hypoxia. In the diaphragm oxygen consumption was depressed, and during recovery never greater than control values. The lactate produced was independent of the amount of oxygen missed during hypoxia. Furthermore, for the first 30 minutes of recovery lactate was produced at the same rate as during hypoxia. In liver slices, oxygen consumption was depressed, but during the first 10-minutes of recovery was greater than control values.

5911
Arézzo, G.,
P. Prioreschi, G. Silini, and P. Metalli
[STUDY ON HYPOXIC HYPOTHERMIA IN RABBIT] Studio sull'ipotermia ipossica nel coniglio. = Minerva chirurgica (Torino), 11 (18): 874-879. Sept. 30, 1956. In Italian. DNLM

Restrained and unrestrained rabbits were exposed to a cold environment until a rectal temperature of about 22°C. was reached and then placed under either anoxic or normal conditions. It was observed that

anoxia accelerated the rate of body cooling in both groups of animals. Rapid cooling was better tolerated than slow cooling, possibly because body reactions were inhibited faster, especially the enzymatic processes which control thermoregulation.

5912
Barker, J. N.
MODIFICATIONS OF HEMOGLOBIN AFFINITY AND HYPOXIA TOLERANCE IN INFANT AND ADULT RATS FOLLOWING EXPOSURE TO LOW AND HIGH O_2 TENSIONS AND IRRADIATION [Abstract]. — Federation Proceedings, 15 (1, part I): 8. March 1956. DLC (QH301.F37, v. 15)

Infants have hemoglobin with a higher affinity for O_2 than that of the adult, and hypoxia tolerances are greater in proportion to affinity. High-affinity hemoglobins (HAHb) and high tolerances were also found in some adult rats and mice after exposure to low oxygen pressure. Further studies indicate that HAHb appears within 24-72 hours in all adult rats exposed for 2 hours daily to an oxygen pressure of 50 mm. Hg., affinities often exceeding the mean for newborn rats if exposures are continued for a week. Exposures to an oxygen pressure of 27 mm. for 10 minutes or of 90 mm. for 20 hours are less effective. Polycythemia does not necessarily accompany the shift. If HAHb, which normally occurs only in infants, is a consequence of intrauterine hypoxia, its production might be inhibited by high oxygen pressure. In newborn rats exposed to 50% O_2 for 72-96 hours, the disappearance of HAHb and of hypoxia tolerance was greatly accelerated, and the infants were more anemic than controls. Although affinities did not increase on removal to air, they did on exposure to low oxygen pressure. Splenectomized rats readily produce HAHb on exposure to low oxygen pressure. No abnormalities attributable to presence of HAHb have been observed. (From the author's abstract)

5913
Becker, E. L.,
and B. J. Joseph
RENAL HEMODYNAMICS AND THE URINARY CONCENTRATING MECHANISM IN POLYCYTHEMIC DOGS. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-140, July 1956. 3 p. AD 129 203 PB 127 304

Dogs rendered polycythemic by exposure to low oxygen tension (8%) for two years at sea level demonstrated a decrease in renal filtration rate and effective plasma flow, and an increase in effective renal blood flow and filtration fraction in comparison to normal control animals and other data recorded in the literature. A decrease was found in renal resistance in the polycythemic animal. The concentrating capacity, measured by T^cH_2O (the volume of water removed from the isometric glomerular filtrate in the elaboration of a concentrated urine during osmotic diuresis) was substantially lower in polycythemic dogs than in controls. (Authors' summary, modified)

5914
Binet, L.,
D. Quivy, and M. V. Strumza
[BLOOD COAGULATION AND ANOXIA] Coagulabilité sanguine et anoxie. — Journal de physiologie (Paris), 48 (3): 393-395. May-June 1956. In French. DNLM

Blood coagulation time was studied in the blood of anesthetized dogs breathing a 3.4% oxygen mixture for forty minutes. It was found that hypocapnic anoxic anoxia produced a moderate, but significant, acceleration of blood coagulation.

5915
Brown, John L.,
J. H. Hill, and R. E. Burke
THE EFFECT OF HYPOXIA ON THE HUMAN ELECTRORETINOGRAM. — Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pa. Report no. NADC-MA-5615, Nov. 30, 1956. vi+23 p. (Project no. NM 001 110 300, Report no. 2). AD 119 986 UNCLASSIFIED

Hypoxia was induced in two subjects by having them breathe, at atmospheric pressure, oxygen-nitrogen mixtures which contained lower percentages of oxygen than that found in normal air. The amplitude of the electroretinogram response to stimulation by red light was reduced by more than 50% while subjects breathed a mixture containing 9% oxygen. This mixture is equivalent to the atmosphere at an altitude of 20,000 feet. Implications of this finding are discussed in relation to current interpretations of the electroretinogram. (Authors' abstract)

5916
Brown, J. H. U.
FAILURE OF THE RESPIRATORY RESPONSE TO LOW OXYGEN TENSION. — Jour. Aviation Med., 27 (5): 460-461. Oct. 1956.
DLC (RC1050.A36, v. 27)

Three cases are noted of persons who failed to respond to low oxygen tension with the usual respiratory reflexes attributed to the carotid body. These cases occurred during an experiment conducted in a course of medical physiology to illustrate the carotid body response to low oxygen tension.

5917
Cahn, J.,
and M. Herold
[CARDIAC METABOLISM IN ANOXIA] Métabolisme cardiaque d'anoxie. — Comptes rendus de la Société de biologie (Paris), 150 (12): 2133-2136. 1956. In French. DLC (QP1.S7, v. 150)

Anoxia produced by tracheal obstruction in rabbits and dogs resulted in a marked increase in cardiac debt and a lesser increase in femoral artery pressure followed by a decline to zero. Auriculo-ventricular dissociation and disturbances of the S-T interval associated with bradycardia were observed in some cases at an arterial pressure level near zero. Anoxia produced: (1) an increase in blood glucose and lactate, and a decrease in pyruvate, particularly at the terminal stage, (2) a 100% increase in the coefficient of extraction and an 820% increase in the cardiac consumption of glucose, (3) a progressive decrease in the coefficient of extraction and cardiac consumption of

pyruvate: (4) myocardial production of lactate accompanied by a negative coefficient of extraction; and (5) no significant change in myocardial glycogen.

5918
Cheymol, J.,
and C. Levassort
[TISSUE HYDRATION AND RESISTANCE TO HYPOXIA] Hydratation des tissus et résistance à l'hypoxie. — Bulletin de la Société de chimie biologique (Paris), 38 (2-3): 547-555. 1956. In French. DLC (QD1.S47, v. 38)

Hydration of adult rats by intresophageal injection of large quantities of water or by intraperitoneal injection of isotonic glucose solution produced a significant increase in survival rate during exposure to a simulated altitude of 11,000 meters. It is suggested that hypoxia causes an accumulation of metabolic wastes and an elevation of intracellular osmotic pressure, and that intracellular hydration allows the maintenance of an isotonic state. The increased resistance of young animals to hypoxia is attributed to their greater hydration.

5919
Cheymol, J.,
and C. Levassort
[RESISTANCE TO HYPOXIA AND THERMOREGULATION] Résistance à l'hypoxie et thermorégulation. — Comptes rendus de la Société de biologie (Paris), 150 (12): 2106-2109. 1956. In French. DLC (QP1.S7, v. 150)

A survival rate of 90% was observed in rabbits allowed to become progressively hypothermic (average decline in body temperature 6.6° C.) during exposure to a simulated altitude of 9000 meters. Rabbits in which body temperature was maintained at a normal level by regulation of the ambient temperature had a maximum survival time of 2 1/2 hours, and an average survival time of 1 hour and 20 minutes. It is suggested that lowered body temperature enables the organism to survive with little oxygen, while maintenance of normal temperature maintains oxygen consumption at a relatively high level and results in tissue anoxia.

5920
Chirico, M.,
and G. Binda
[ON THE EXTRARENAL CLEARANCE OF SODIUM THIOSULFATE IN CONDITIONS OF INDUCED HYPOXEMIA] Sul comportamento della clearance extra renale del tiosolfato sodio in condizione di ipossiemia provocata. — Biologia latina (Milano), 9 (3): 433-440. July-Sept. 1956. In Italian, with English summary (p. 400). DNLM

The extrarenal clearance of sodium thiosulfate was studied in 10 dogs breathing a mixture of 10% oxygen in nitrogen. A more or less evident decrease in the clearance rate was found, probably related to the reduced metabolic activity in the liver induced by hypoxia.

5921
Christensen, E.
CEREBRAL ANOXIA=PATHOLOGICAL ANATOMY. — Acta psychiatrica et neurologica scandina tca (København), 31 (2): 127-137. 1956. In English. DNLM

Examples of histological findings in anoxia deaths are cited to show that histological changes in the central nervous system in different forms of anoxia are independent of the type of anoxia. They do depend upon the degree of anoxia and the condition of the individual patient at the onset of the lesion.

5922
Cier, J. F.,
and Y. Houdas
[THE DISRUPTION OF THE MECHANISMS OF EXTERNAL PANCREATIC SECRETION BY ANOXIA] La dissociation par l'anoxie des mécanismes de la sécretion externe pancréatique. — Comptes rendus de la Société de biologie (Paris), 150 (8-9): 1564-1566. 1956. In French. DLC (QP1.S7, v. 150)

Exposure of dogs to 7% oxygen breathing had no effect on the secretory response of the pancreas to injection of secretin, but progressively diminished and eliminated the pancreatic response to peripheral stimulation of the vagal nerve. The results demonstrate the resistance of the pancreatic cells and the susceptibility of nervous tissue to anoxia.

5923
Conn, H. L.
EFFECTS OF DIGITALIS AND HYPOXIA ON POTASSIUM TRANSFER AND DISTRIBUTION IN THE DOG HEART. — Amer. Jour. Physiol., 184 (3): 548-552. March 1956. DLC (QP1.A5, v. 184)

An investigation was conducted of the effects of hypoxia (6-7% O_2) and the administration of digitalis on the steady state kinetics and distribution of potassium in the left ventricle of the normal dog heart. Digitalis and especially hypoxia were observed to produce reductions in interstitial-intracellular potassium transfer rates and rate constants, and in cell and interstitial potassium concentrations. Hypoxia also caused a marked increase in the plasma-interstitial potassium exchange rate and rate constants, apparently because of an increased coronary blood flow. It is concluded that aerobic metabolism is necessary for a considerable fraction of potassium transfer in the heart.

5924
Cook, S. F.,
and M. H. Alafi
ROLE OF THE SPLEEN IN ACCLIMATIZATION TO HYPOXIA. — Amer. Jour. Physiol., 186 (2): 369-372. Aug. 1956. DLC (QP1.A5, v. 186)

In order to determine quantitatively the participation of the spleen and the bone marrow in the hypoxic increase in red cell count, five groups of splenectomized and non-splenectomized mice were exposed to a simulated altitude of 15,000 feet for periods of 30 to 58 days. Red blood cell counts and hematocrit determinations were made at intervals during the exposure. It was found that about two-fifths of the increase in red cells could be referred to a tonic contraction of the spleen and

the remaining three-fifths to the production of red cells by the bone marrow. (Authors' abstract, modified)

5925
Edstrom, R. F. S.,
and H. E. Essex
SWELLING OF THE BRAIN INDUCED BY ANOXIA. — Neurology, 6 (2): 118-124. Feb. 1956. DLC (RC321.A47, v. 6)

Systemic anoxia was induced in anesthetized dogs by breathing pure nitrogen or pure carbon dioxide. Fourteen animals survived anoxia sufficient to produce circulatory failure, a decrease in blood pressure below 40 mm./Hg, and in some cases as much as two minutes of cardiac arrest. By the end of the postanoxic period no noticeable brain swelling or increased intracranial pressure attributable to cerebral edema were exhibited. One animal surviving a longer period of cardiac arrest (six minutes) caused by nitrogen inhalation later showed progressive elevation of the intracranial pressure. Cerebral edema was demonstrated histologically.

5926
Ferroni, A.,
and M. Manica
[EFFECTS OF HYPOXIA ON RESPIRATION IN HYPOTHERMIC ANIMALS] Effetti della ipossia sulla respirazione in animali ipotermici. — Bolletino della Società italiana di biologia sperimentale (Napoli), 32 (1-2): 119-120. Jan.-Feb. 1956. In Italian. DNLM

After breathing a mixture of 12% oxygen in nitrogen, the respiratory frequency of normothermic guinea pigs increased by 20%. Breathing 6% oxygen in nitrogen decreased the frequency after 30-60 seconds. An increased respiratory frequency was found in animals cooled to an internal body temperature of 26° and 24°C., and breathing a 12% oxygen mixture; at a temperature of 22°C. and after 60 seconds of breathing the oxygen-deficient mixture, a reduction in respiratory frequency occurred. Animals breathing a 6% oxygen mixture at a body temperature of 24°C. showed no change in respiratory frequency; at temperatures above 26°C., frequency was decreased. At a body temperature of 22°C. respiratory frequency was reduced by 30-50%. It is concluded that the response of respiratory frequency to hypoxia during gradual hypothermia to 26°C. is influenced by a mixture of 12% oxygen, to 24°C. by a mixture of 6% oxygen. At a body temperature of 22°C. the breathing of oxygen-deficient mixtures induced a depressive effect on the bulbar centers.

5927
Ferroni, A.,
and M. Manica
[RESPIRATORY REACTIONS TO HYPOXIA IN GUINEA PIGS WITH DENERVATED CAROTID BODIES AND WITH INTACT AND DISSECTED VAGI] Reazioni respiratorie alla ipossia nelle cavie a glomi carotidei denervati, a vaghi integri e sezionati. — Bolletino della Società italiana di biologia sperimentale (Napoli), 32 (1-2): 116-119. Jan.-Feb. 1956. In Italian. DNLM

Breathing of oxygen-deficient gas mixtures (12% or 6% oxygen in nitrogen) increased the respiratory frequency in intact guinea pigs. After bilateral cervical vagotomy, however, the animals reacted to hypoxia by a decrease in respiratory rate. Denervation of the carotid bodies resulted in a slight increase (12% O_2) or a decrease (6% O_2) of the respiratory frequency. Simultaneous vagotomy and carotid-body denervation depressed the respiratory rate and, in severe anoxia (6% O_2), resulted in apnea and death. It is concluded that in guinea pigs the carotid body is important in the respiratory response to hypoxia. Afferent vagal impulses are indispensable for maintaining normal reflex activity of the respiratory center. When these impulses are suppressed, as seen under the depressive central action of oxygen deficiency, a further reduction in pulmonary ventilation ensues.

5928
Flückiger, E.
[THE OXYGEN CONSUMPTION OF THE RAT EXPOSED TO LOWERED OXYGEN PARTIAL PRESSURE] Der Sauerstoffverbrauch der Ratte bei vermindertem Sauerstoffpartialdruck. — Helvetica physiologica et pharmacologica acta (Basel), 14 (3): 369-381. 1956. In German, with English summary (p. 380). DNLM

The significance of chemical thermoregulation in the decline in body temperature associated with hypoxia was investigated in rats by measurement of oxygen consumption during 10% O_2 breathing (at atmospheric pressure) before, during, and after exposure for 2 weeks to an ambient air pressure of 350 mm. Hg. The oxygen consumption of normal rats was observed to decrease a maximum of 30% within 15 minutes after initiation of 10% O_2 breathing, while rectal temperature decreased gradually throughout several hours of hypoxia. Rats previously exposed to altitude showed a gradual increase in oxygen consumption during 10% O_2 breathing to a value approaching normal after 2 weeks. The metabolic adaptation to hypoxia in these animals was observed for 8 days after return to normal ambient pressure. Rectal temperature during continuous exposure to lowered ambient pressure was restored to normal within 3-4 days. It is concluded that the decrease in body temperature observed during hypoxia is the result of decreased oxygen consumption, and that the restoration of rectal temperature during prolonged hypoxia is accomplished chiefly by physical heat regulation. (conservation).

5929
Fritts, H. W.,
E. Braunwald, A. P. Fishman, and A. Cournand
INFLUENCE OF INDUCED HYPOXIA ON CENTRAL BLOOD VOLUME OF NORMAL MAN [Abstract]. — Federation Proceedings, 15 (1, part I): 68. March 1956. DLC (QH301.F37, v. 15)

The effect of acute induced hypoxia on the central blood volume was investigated by two different methods. Method 1. T-1824 dye was injected into the main pulmonary artery and a dilution curve inscribed by sampling arterial blood through a recording densitometer. The volume of blood between the points of injection and sampling was calculated from the product of the mean circulation time and the cardiac output. The output was measured both by the Hamilton dilution principle and by the direct Fick technique. Although the values of output agreed well (±10%) during control

periods, the agreement was less perfect during hypoxia, the dye frequently giving a higher value. In 7 of 13 subjects studied, the central blood volume calculated on the basis of the dye output increased from 100 to 400 cc. during arterial hypoxemia in which the oxygen saturation varied between 85 and 68%. Method 2. The subject was balanced on a tilt-table with the fulcrum at the level of the diaphragm, and the relative weights of the two ends of the body were compared before and after inducing arterial hypoxemia comparable to that used in method 1. Of 5 subjects studied, none displayed an increase in the weight of the head end of the body. (From the authors' abstract)

5930
Gömöri, P.,
and L. Takács
[CIRCULATORY REGULATION IN HYPOXIA]
Kreislaufregulation bei Hypoxie. — Zeitschrift für ärztliche Fortbildung (Jena), 50 (7/8): 286-295. April 1956. In German. DNLM

The authors review experimental findings on the compensatory reactions of the cardiovascular system to hypoxia. The following hemodynamic changes were found in arterial hypoxia: (1) the minute volume is considerably increased, with a slightly increased blood pressure; (2) the total resistance of the circulatory system is decreased; (3) the hemodynamics of individual organs are shifted as evidenced by the general vasoconstriction of the renal and spleenic areas, with vasodilatation in the heart, brain, extremities and partly also in the liver; and (4) the organ friction of the minute volume is larger than normal in the heart, and smaller than normal in the kidney. The hypoxic response of the pulmonary circulation is an increase in the blood pressure in the pulmonary artery due to increase in the blood volume and a constriction of the pulmonary vessels.

5931
Gomóri, P.
[HYPOXIA AND CIRCULATORY REGULATION]
Hypoxie und Kreislaufsregulation. — Acta physiologica Academiae scientiarum hungaricae (Budapest), 9 (Suppl): 1-3. 1956. In German.
DLC (QP1.M333, v. 9)

The mechanism of the increase in blood minute volume induced by hypoxia is examined by a discussion of the circulatory response to hypoxia in the head, heart, liver, extremities, and kidneys. It is concluded that the mechanism consists of an increase in the blood flow to the heart, produced by a decrease in the total circulatory resistance and a selective distribution of the blood to the various body organs.

5932
Gurvich, G. I.,
V. IA. Repin
[THE EFFECTS OF OPERATIVE EXCLUSION OF VISUAL, AUDITORY, AND OLFACTORY ANALYZERS ON ANIMALS' RESISTANCE TO ACUTE ANOXIA]
Vliianie operativnogo vykliuchenila zritel'nogo, sluKhovogo i obonlatel'nogo analizatorov na ustoichivost' zhivotnykh k ostromu kislorodnomu golodaniiu. — Akademiia nauk Belorusskoi SSR (Minsk), Trudy instituta fiziologii, 1:232-237. 1956. In Russian.
DLC (QP1.A48, v. 1)

Experiments were conducted with 18 dogs, two months after surgical exclusion of visual, auditory, and olfactory analyzers, and with 18 control dogs. Each experimental animal was exposed, together with a control matched for size, sex, and age, to simulated altitudes ranging from 165 to 308 mm. Hg in a decompression chamber. At the time when the control animals exhibited significan: behavioral and physiological disturbances due to acute anoxia, these were not observed in the experimental animals. It follows that dogs with excluded visual, olfactory, and auditory senses, in association with the corresponding functional changes in the brain, show significantly higher resistance to anoxia as compared to normal controls.

5933
Hardmeier, E.,
and H. K. Knoepfel
PSYCHIATRIC ASPECTS OF HYPOXIC STATES.
— Meddelanden från flyg- och navalmedicinska nämnden (Stockholm), 5 (2): 25-34. 1956. In English.
DNLM

A series of 13-error test (Knoepfel) were administered to 23 subjects during hypoxia in a decompression chamber, and to 40 controls. Nineteen of the subjects were able to do the tests up to a maximum altitude of 22,500 ft. After additional 28 min. of hypoxia, the next test at 21,000 ft. was completed by only five subjects. During descent all subjects recovered and were able to carry out the test at 12,000 and 600 ft. The 13-error test was found useful in diagnosing mild degrees of hypoxia by an increase in time required for calculations and in the number of errors and corrections. The fact that errors increase more than corrections demonstrates the inhibition of critical faculties under hypoxia. The results indicate the presence of reversible organic brain damage which disappeared upon oxygen administration. Each case of hypoxia shows an individually determined clinical picture interpreted psychodynamically to be due to hypoxia-produced reduction of ego-controls in the individual.

5934
Hemingway, A.,
and L. Birzis
NERVOUS CONTROL OF SHIVERING. IV. THE EFFECT OF HYPOXIA ON SHIVERING. — Univ. of California, Los Angeles; issued by Arctic Aeromedical Lab., Ladd Air Force Base, Alaska (Project no. 8-7951). Report no. 5, April 1956. 10 p.
AD 95 925 PB 125854
Also published as: EFFECT OF HYPOXIA ON SHIVERING. — Jour. Applied Physiol., 8 (6): 577-579. May 1956. DLC (QP1.J72, v. 8)

The oxygen consumption of cats anesthetized sufficiently or not to eliminate shivering was investigated during hypoxia produced by breathing progressively decreasing oxygen concentrations in nitrogen for 1 to 3 hours. In deeply anesthetized cats the oxygen consumption rate showed no significant change at oxygen levels from 21 to 6%. Similar results were observed in animals in which shivering was abolished by decerebration. In shivering animals the oxygen consumption rate at high oxygen levels was 3-4 times the non-shivering value. At oxygen concentrations below 12% the oxygen consumption fell sharply to the non-shivering level as shivering was abolished.

5935
Houdas, Y.
[DIGESTIVE SECRETIONS AND ANOXIA: EXPERIMENTAL STUDY OF SALIVARY, BILIARY, AND PANCREATIC SECRETIONS] Sécrétions digestives et anoxie: etude expérimentale des sécrétions salivaire, biliaire et pancréatique. = (Thesis, Faculté mixte de médicene et de pharmacie de Lyon.) Lyon: Emmanuel Vitte Publisher, 1956. 63 p. In French. DNLM (W4.L99, No. 152, 1956)

A decrease was observed in the salivary, biliary, and pancreatic secretions of subjects rendered anoxic by breathing an oxygen-deficient mixture (7% oxygen in nitrogen) for several hours. Biliary secretion showed an insignificant decrease (10-15%) during the first hour of anoxia and did not change as the experiment progressed. With reference to the submaxillary gland, electrostimulation of the chorda tympani decreased but did not abolish secretions. Pancreatic secretion following an injection of secretin was not especially modified by anoxia nor was lipase activity of the juice, but following electrostimulation of the pneumogastric nerve it was totally depleted. Recuperation was not complete even after return to normal oxygen breathing. The different behavior of the anoxic pancreas indicates that humoral and nervous processes are not identical and may be dissociated by anoxia. (43 references)

5936
Klein, P. D.,
and J. F. Thomson
COMPARISON OF ENZYME DISTRIBUTION IN LIVER OF NORMAL, FASTED AND HYPOXIC GUINEA PIGS. = Amer. Jour. Physiol., 187 (2): 259-262. Nov. 1956. DLC (QP1.A5, v. 187)

Exposure of guinea pigs to a simulated altitude of 25,000 feet 16 hours a day for 3 days produced decreases on a wet-weight basis in the activities of liver succinic dehydrogenase, uricase, and catalase. Lesser decreases in uricase and catalase activity, and no change in the activity of succinic dehydrogenase, were observed in animals fasted for 3 days to duplicate the weight loss of hypoxic animals. On a nitrogen basis the enzyme activity of liver from fasted animals was lower than that of hypoxic animals. The discrepancy is attributed to a distinct loss of enzyme protein nitrogen concentration per fresh weight of liver in fasted animals, through loss of water and glycogen and enzyme inactivation. No differences in the sedimentation characteristics of particles containing succinic dehydrogenase activity were observed in normal, fasted, or hypoxic livers. In the hypoxic liver, uricase showed a greatly increased sedimentability, apparently because of a change in the physical state of uricase-containing particles.

5937
Klepzig, H.,
G. Kindermann, and H. Reindell
[SENSITIVITY OF THE ATHLETIC HEART TO ANOXIA] Zur Frage der Empfindlichkeit des Sportherzens gegen Sauerstoffmangel. = Zeitschrift für Kreislaufforschung (Darmstadt), 45 (1/2): 8-17. Jan. 1956. In German. DNLM

Electrocardiograms during anoxic stress (10% or 6% O_2 in nitrogen) were taken of 23 normal individuals, 25 top athletes with enlarged hearts, 20 patients with circulatory disturbances, and 19 patients with cardiac anomalies. The athletes on the average exhibited the same deviations under anoxic stress as the normal individuals. There was less change in the T wave of the top athletes with the largest hearts than in the athletes with the smallest hearts. The degree of change is independent of the duration of anoxic respiration. In most of the cases it was less 10 minutes after the beginning of the experiment than after 5 minutes. The deviations of the T wave are not to be regarded as an indication of oxygen lack in the cardiac muscle, but rather an expression of a shift in the autonomic regulatory processes under stress. The athletic heart is not more sensitive to anoxia than that of a nonathletic healthy individual.

5938
Knauff, H.-G.,
and W. Schramm
[MORPHOLOGICAL EQUIVALENTS OF HISTOTOXIC HYPOXIA] Zur Frage morphologischer Äquivalentbilder der histotoxischen Hypoxydose. = Frankfurter Zeitschrift für Pathologie (München), 67 (4): 308-336. 1956. In German. DNLM

The effects of the oxidative poisons potassium cyanide and potassium malonate, and the oxidative substrates saccharose and dextrose on the cells of the kidneys of rats, rabbits, and guinea pigs were compared with the effects of severe hypoxia. Histological examination of kidney and liver slices from animals exposed for 30 to 140 minutes to a simulated altitude immediately below that resulting in collapse (approximately 11,000 m.) before exposure to fatal anoxia (13,000 m.) showed the presence of clear, sharply defined intracellular vacuoles. Vacuolization similar to that caused by hypoxia was observed in kidney tissue 10 minutes after injection of potassium cyanide or malonate in the renal artery. The cell disintegration, cloudy swelling, and spongy changes sometimes associated with hypoxia were not observed in any case.

5939
Lalli, G.
[BEHAVIOR OF ERYTHROCYTE RESISTANCE DURING CHRONIC ANOXIA] Comportamento della resistenza globulare nel corso dell'anossia cronica. = Revista di medicina aeronautica (Roma), 19 (4): 638-643. Oct.-Dec. 1956. In Italian, with English summary (p. 642). DLC (RC1050.R56, v. 19)

Rats decompressed to simulated altitudes of 5,500 and 6,500 meters for a period of 15 days showed no significant changes in the maximum hemolytic resistance of erythrocytes. The minimum resistance exhibited a tendency to increase at lower altitudes (5,500 meters) and to decrease at higher altitudes (6,500 meters).

5940
Legouix, J. P.,
R. Chocholle, and A. Wisner
[MODIFICATIONS OF THE DISTORTION OBSERVED ON THE MICROPHONIC COCHLEAR POTENTIAL DURING ANOXIA] Modifications de la distorsion observée sur le potentiel microphonique cochléaire

pendant l'anoxie. — Journal de physiologie (Paris), 48 (3): 605-607. May-June 1956. In French. DNLM

Cochlear microphonic potentials dissapear very early in anoxic guinea pigs. This distortion may be attributed to short circuits which are established between the various cochlear structures capable of reducing or augmenting selectively the fundamental and the harmonics.

5941
Lowrance, P. B.,
J. F. Nickel, C. M. Smythe, and S. E. Bradley
COMPARISON OF THE EFFECT OF ANOXIC ANOXIA AND APNEA ON RENAL FUNCTION IN THE HARBOR SEAL (PHOCA VITULINA, L.). — Jour. Cellular and Compar. Physiol., 48 (1): 35-49. Aug. 1956. DLC (QP1.W55, v. 48)

Renal function in the harbor seal was studied during the asphyxia of apnea, and during anoxic anoxia produced by inhalation of 10% oxygen in nitrogen. Both apnea and anoxia resulted in a diminution of glomerular filtration rate and renal plasma flow. The urine volume decreased, and the total output of sodium and potassium diminished. The urinary concentration of sodium tended to fall, whereas the urinary concentration of potassium usually remained unchanged. The tubular reabsorption of water decreased relative to filtration. The influence of vagal activity, respiratory movements, and cardiac rate and rhythm on renal function could be excluded. The conclusion was reached that in these experiments apnea and anoxia have comparable effects on renal function in the seal. (Authors' summary)

5942
Luft, U. C.,
and W. K. Noell
MANIFESTATIONS OF BRIEF INSTANTANEOUS ANOXIA IN MAN. — Jour. Applied Physiol., 8 (4): 444-454. Jan. 1956. DLC (QP1.J72, v. 8)
Also issued as: THE MANIFESTATIONS OF SUDDEN BRIEF ANOXIA IN MAN. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-86, Jan. 1956. 14 p. AD 92 258 UNCLASSIFIED

The cerebral manifestations of anoxia were investigated in two subjects who breathed oxygen during and after exposure by rapid decompression to a barometric pressure of 68-70 mm. Hg for durations of 6 to 18 seconds. The following rapid sequence of neurological events was observed: (1) a state of automatism, amnesia, and confusion occurring 13-15 seconds after decompression, with slight electroencephalographic changes consisting chiefly in the activation of normal rhythms; (2) a phase of "arrest" after 17-19 seconds, with sudden loss of consciousness, cessation of spontaneous movements, fixation of the eyes followed by a conjugated upward rolling of the eyeballs, respiratory arrest, and a continuous increase in electroencephalographic slow wave activity; (3) a phase of falling posture at 19-20 seconds, interrupted by muscular contractions, and accompanied by a progressive deterioration of the electroencephalogram, with dominance of abnormally slow frequencies and temporary absence of brain activity. It is suggested that the pattern of anoxic failure depends upon the loss of normal function in major integrating systems of cerebral activities. The net anoxic survival time of the most sensitive of these systems is apparently 4-5 seconds, and of that which determines loss of comprehension (unconsciousness) 7-8 seconds.

5943
Maag, C. H.,
and A. L. Hall
CHARACTERISTICS OF MENTAL IMPAIRMENT UNDER HYPOXIA. — Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 101 104, Report no. 2, March 1, 1956. ii+24 p. AD 105 697 UNCLASSIFIED

Characteristics were investigated of the decrement in performance on a conceptual reasoning test under conditions of oxygen deprivation. Ten subjects were exposed to various simulated altitudes for 129 minutes or until unconsciousness, whichever occurred first. The results indicate that in terms of individual response efficiency hypoxic stress does not bring about a linear increase of impairment, but periods of impaired behavior followed by constancy of performance and again response failure or impairment. These periods of impairment interspersed with lucid intervals become more frequent until final collapse when continual response impairment occurs without intervening periods of lucidity. (Authors' abstract modified)

5944
McDowall, R. J. S.
THE EFFECTS OF LACK OF OXYGEN ON THE CIRCULATION (ANOXIA, HYPOXIA, ANOXAEMIA). — In: R. J. S. McDowall. Control of the circulation of the blood. Supplemental volume. p. 238-250. London: W. Dawson and Sons, 1956. DLC (QP101.M33, v. 2)

A brief review is presented of the literature dealing with the effects of anoxia on the vasomotor centers, the blood flow, and the heart. (262 references)

5945
McIlroy, M. B.,
F. L. Eldridge, and R. W. Stone
THE MECHANICAL PROPERTIES OF THE LUNGS IN ANOXIA, ANEMIA AND THYROTOXICOSIS. — Clinical Sci. (London), 15 (2): 353-360. May 1956. DNLM

The mechanical properties of the lungs were studied at rest and during exercise on a treadmill ergometer in subjects breathing a 12% oxygen mixture and in patients with anemia and thyrotoxicosis. The coefficient of elastic resistance and the mean inspiratory non-elastic resistance were found to be normal. In anoxia, the ventilatory response to exercise was greater than normal and in two subjects was sufficient to cause dyspnea at a grade of exercise at which there was no dyspnea while breathing air. (From the authors' summary)

5946
Maffei, G.,
and L. Marcucci
[BEHAVIOR OF ALKALINE PHOSPHATASE AND OF THYMONUCLEIC AND RIBONUCLEIC ACIDS IN THE INTERNAL EAR AND TRACHEA OF GUINEA PIGS IN ANOXIA] Sul comportamento della fosfatasi alcalina e degli acidi timonucleinico e ribosonucleinico dell' orecchio interno e nella trachea della cavia in anossia. — Rivista di medicina aeronautica (Roma), 19 (1): 3-18. Jan.-March 1956. In Italian, with English summary (p. 15). DLC (RC1050.R56, v. 19)

Histological cochlear changes were demonstrated in guinea pigs rendered anoxic by decompressing them to simulated altitudes of 7,000 and 9,000 meters, two hours daily, for fifteen consecutive days. A decrease was also observed in cochlear alkaline phosphatase and thymo- and ribonucleic acid activity. The intensity of cochlear alkaline phosphatase activity decreased at 7,000 meters and ceased completely at 9,000 meters. The trachea exhibited no histological changes, but the reticulohistiocytic system of the peribronchial lymph glands appeared to be activated. Tracheal alkaline phosphatase and thymo-and ribonucleic acid activity decreased progressively with the increase of anoxia. Biochemical changes induced by anoxia in the cochlea and trachea are more apparent and occur earlier than histological changes, and may be used to detect even the slightest degrees of anoxia.

5947
Malméjac, J.,
G. Chardon, H. Boiteau, and C. Neverre
[EFFECT OF ANOXEMIA ON THE PLASMA POTASSIUM LEVEL: DISCUSSION OF THE ORIGIN AND MECHANISMS OF PRODUCTION OF THE OBSERVED CHANGES] Influence de l'anoxémie sur le taux de potassium plasmatique: discussion sur l'origine et les mécanismes de production des modifications observées. — Médecine aéronautique (Paris), 11 (1): 5-15. 1956. In French.
DLC (TL555.M394, v. 11)

A series of experiments were conducted on chloralosed dogs to investigate the mechanism of the increase in plasma potassium induced by inhalation of an hypoxic gas mixture (6-8% oxygen). Shunting of efferent blood from the adrenal gland of one dog to another produced an increase in plasma potassium in the latter when the donor dog was exposed to hypoxia. The increase in plasma potassium in the recipient dog was eliminated by denervation of the donor adrenal, but was unaffected by perfusion of the donor adrenal with blood from a third nonhypoxic dog. Effective removal of both adrenals in dogs exposed to hypoxia caused a less rapid and more prolonged increase in plasma potassium. Functionally hepatectomized dogs showed a slower and smaller increase, and no response to the injection of adrenaline. It is concluded that the increase in plasma potassium during hypoxia is produced by release of a potassium reserve from the liver (in response to centrally-regulated adrenaline secretion) and from the tissues (through a change in the cellular permeability to potassium).

5948
Marcotte-Boy, G.,
J. Cheymol, and G. Boussier
[HYPOXIA AND EXCRETION OF A URINARY MUCOPROTEIN] Hypoxie et élimination d'une mucoprotéine urinaire. — Bulletin de la Société de chimie biologique (Paris), 38 (4): 785-790. 1956. In French, with English summary (p. 790).
DLC (QD1.S47, v. 38)

A positive Donaggio reaction was observed in the urine of 80% of rabbits exposed to a simulated altitude of 7,000 meters for five hours, while 90% of control rabbits showed a negative reaction. A positive reaction was observed in all cases in a solution obtained by dialysis and lyophilization of urine and in a solution of mucoprotein obtained from the lyophilized urine solution by precipitation with alcohol. The small ratio of nitrogen in mucoprotein to total urinary nitrogen was insufficient to explain the increase in non-urea nitrogen observed during hypoxia. Electrophoresis of serum from hypoxic rabbits revealed a new protein fraction between the β and γ globulins in 60% of the animals.

5949
Nagy, L.,
[THE MECHANISM OF THE DECLINE IN METABOLISM AND BODY TEMPERATURE PRODUCED BY HYPOXIA IN THE RAT] Der Mechanismus der durch Hypoxie verursachten Energieumsatz- und Körpertemperatursenkung bei der Ratte. — Acta physiologica Academiae scientiarum hungaricae (Budapest), 9 (Suppl.): 34. 1956. In German.
DLC (QP1.M333, v. 9)

The induction of electrolytic lesions in the epithalamus of rats was found to eliminate the decline in metabolism and body temperature associated with exposure to a lowered ambient pressure (400 mm. Hg) at an environmental temperature of 22° C. It is concluded that the decrease in metabolism observed in intact animals during hypoxia is caused by a central nervous mechanism, which is obstructed by lesion of the epithalamus, rather than by a decline in the oxygen concentration of the body tissues.

5950
Nahas, G. G.
EFFECTS OF ACUTE EXPOSURE TO LOW OXYGEN TENSION ON THE CIRCULATION OF VAGOTOMIZED NONNARCOTIZED DOGS. — Jour. Applied Physiol., 9 (1): 65-68. July 1956.
DLC (QP1.J72, v. 9)

A study was made of the effect of bilateral cervical vagotomy on the circulatory response of nonnarcotized trained dogs to hypoxia produced by mask breathing of 8% O_2 in N_2. Exposure for 3 minutes produced a decrease in arterial O_2 saturation to 52% of normal, an increase in mean pulmonary artery pressure of 3 mm. Hg, no significant change in systemic blood pressure, and increases in heart rate, cardiac output, respiratory rate, and respiratory tidal volume. Calculated pulmonary resistance was unchanged, while calculated

peripheral resistance fell by 23%. It is suggested that in the vagotomized animal, the local vasodilator effect of hypoxia is predominant over the increased peripheral resistance observed in intact animals as a result of hypoxic stimulation of the carotid and aortic chemoreceptors.

5951
Nahas, G. G.
INFLUENCE OF LOW OXYGEN TENSION ON PULMONARY CIRCULATION AFTER TEMPORARY ARREST OF VENTILATION IN CURARIZED DOGS. — Jour. Applied Physiol., 9 (3): 352-358. Nov. 1956. DLC (QP1.J72, v. 9)

A study was made of the effect of low oxygen tension on pulmonary circulation after elimination of the ventilatory responses to hypoxia. Photokymographic records of pressures and cardiac output determinations were made during artificial ventilation after induced arrest, and at the end of 90-second periods of apneic oxygenation (following 100% O_2 breathing, with the trachea connected to 100% O_2) and apneic hypoxia (following ventilation with air). After 90 seconds of apneic oxygenation (arterial oxygen saturation 100%), mean pulmonary artery pressure and the pressure gradient between pulmonary artery and vein were significantly decreased, while mean femoral artery pressure was increased. Cardiac output and calculated pulmonary and peripheral resistances were unchanged. During apneic hypoxia (arterial oxygen saturation 46%), mean pulmonary artery, pulmonary vein, and femoral artery pressures, and the pressure gradient between pulmonary artery and vein were significantly increased. Calculated pulmonary and peripheral resistances were increased, while heart rate and right arterial pressure fell, and cardiac output as unchanged.

5952
Neil, E.
INFLUENCE OF THE CAROTID CHEMORECEPTOR REFLEXES ON THE HEART RATE IN SYSTEMIC ANOXIA. — Archives Internationales de pharmacodynamie et de therapie (Gand), 105 (3-4): 477-488. March 1, 1956. DNLM

A technique is described whereby the carotid bodies are supplied by carotid blood flow or by oxygenated Ringer-Locke solution from a reservoir. In cats spontaneously breathing 5% oxygen in nitrogen anoxic tachycardia develops. This tachycardia is not affected if perfusion of oxygenated Ringer-Locke solution replaces the carotid blood flow through the carotid bodies, although reflex hypopnea and hypotension result in these conditions. Restoration of the flow of anoxic blood through carotid bodies after perfusing the glomus tissues with oxygenated Ringer-Locke in cats spontaneously breathing low oxygen mixtures causes hyperpnea, hypertension, and subsequent bradycardia. Bradycardia is vagal in origin and appears to be secondary to post-perfusion hyperpnea. It is not seen subsequent of oxygenated Ringer-Locke perfusion of the carotid bodies in cats which are artificially ventilated with 5% oxygen in nitrogen. The carotid chemoreceptor reflexes make no contribution to the tachycardia of systemic anoxia. (Author's summary, modified)

5953
Otis, A. B.,
and G. S. Husson
PHYSIOLOGICAL ADAPTATION TO CHRONIC HYPOXIA. D. OXYGEN TRANSPORT. — Johns Hopkins Univ. School of Medicine, Baltimore, Md.; issued by School of Aviation Medicine, Randolph AFB, Tex. Report no. 56-26, March 1956. 7 p. AD 107 958 UNCLASSIFIED

Some features of oxygen transport in hypoxia of circulatory origin are presented and compared with the situation present in altitude hypoxia. The polycythemia which develops in both types of hypoxia is described and discussed. It is concluded that polycythemia is an adaptation which is of especial advantage in the case of hypoxia of circulatory origin. (Authors' summary)

5954
Polosa, C.,
A. Dagianti, A. Saporaro, and G. Angrisani
[BEHAVIOR OF THE OXIMETRIC CURVE, THE RESPIRATORY RHYTHM, AND PULMONARY VENTILATION IN HYPOXIA EXPERIMENTALLY INDUCED BY BREATHING OF A MIXTURE WITH A LOW OXYGEN CONTENT] Comportamento della curva ossimetrica, del ritmo respiratorio e della ventilazione polmonare nell'ipossia indotta sperimentalmente mediante respirazione di miscela a basso tenore di O_2. — Bolletino della Società italiana di biologia sperimentale (Napoli), 32 (12): 1076-1079. Sept. 1956. In Italian. DNLM

Eleven normal persons breathing a mixture of 11% oxygen in nitrogen for a period of 10-16 minutes demonstrated an increase in pulomnary ventilation of 7-58%. Hyperventilation was observed during the first minutes of the experiment when arterial oxygen saturation was still relatively high (86-93%), but decreased by the end of the experiment. Oximetric findings showed a progressive decrease. With regard to the respiratory rhythm, no subject exhibited respiration of the periodic type.

5955
Presl, J.
[THE EFFECT OF SOME STIMULANTS OF THE CENTRAL NERVOUS SYSTEM (PENTAMETHYLENETETRAZOL AND PHENYLISOPROPYLAMINE) ON THE RESISTANCE OF THE ORGANISM TO HYPOXIA] Der Einfluss einiger Excitantia des Zentralnervensystems (Pentamethylentetrazol und Phenylisopropylamin) auf die Widerstandsfahigkeit des Organismus gegen Hypoxie. — Physiologia bohemoslovenica (Praha), 5 (3): 298-304. 1956. In German. DLC (QP1.C417, v. 5)

The effect of pentamethylenetetrazol and phenylisopropylamine on the resistance of adult mice to acute altitude anoxia is a function of the interval between the injection of these drugs and the onset of anoxia. It is possible to raise or lower the resistance with the same dosage. In young rats less and 24 hours old these drugs did not raise tolerance to acute anoxia; instead resistance was regularly lowered. The resistance of the central nervous system to hypoxia is not only dependent on the phase of the ontogenetic (and phylogenetic) development of the organ-

ism, but also on the functional state of the central nervous system. Excitation lowers the resistance, certain forms and states of inhibition raise it. (Author's summary)

5956
Reinhardt, W. O.,
and J. M. Yoffey
THORACIC DUCT LYMPH AND LYMPHOCYTES IN THE GUINEA PIG: EFFECTS OF HYPOXIA, FASTING, EVISCERATION AND TREATMENT WITH ADRENALINE. — Amer. Jour. Physiol., 187 (3): 493-500. Dec. 1956. DLC (QP1.A5, v. 187)

Studies were conducted to determine ranges of normal values for thoracic-duct lymph flow and cellular output in the young male guinea pig, and to investigate the reactions of lymph flow and lymphocyte output to fasting, hypoxia, evisceration, biliary obstruction or fistulation, treatment with adrenaline, and extirpation of the thymus and/or the spleen. The total lymphocyte output of 42 guinea pigs maintained for 1 to 10 days at an altitude of 3457 m. was observed to be 50% greater than that of animals maintained at sea level. The increase in cellular output during hypoxia was the result of an increase in both lymph flow and cellular content.

5957
Samaras, S. C.,
O. J. Klinger, and B. C. Russum
ANOXIA IN RELATION TO REFRIGERATION, PREGNANCY, AND RETICULOENDOTHELIAL SYSTEM [Abstract]. — Federation Proceedings, 15 (1, part I): 161. March 1956.
DLC (QH301.F37, v. 15)

Survival time of mice asphyxiated by enclosure in sealed jars at room temperature averaged about thirty minutes. Refrigeration at 7° to 10° C. prolonged survival of anoxic animals to an average of two hours, four times that of controls. Slides of tissues of all experimental and control animals asphyxiated after reticuloendothelial system blockade by Trypan blue showed only parenchymatous degeneration of the liver, hyperemia and hemorrhage of the lungs with overdistention, and hyperemia of the spleen and meninges, which could be correlated with anoxia. Parenchymatous degeneration of the liver occurred in all refrigerated animals, while pulmonary hyperemia and hemorrhage were found in some. With combined anoxia and refrigeration parenchymatous degeneration occurred in all mice, hyperemia in some; pulmonary hyperemia and hemorrhage in most, and in several cerebral hyperemia was present. (Authors' abstract, modified)

5958
Schneider, M. 1956
[HYPOXIA AND ANOXIA] Hypoxie und Anoxie. — Therapiewoche (Karlsruhe), 6 (9/10): 217-221. Feb. 1956. In German. DNLM

Compensatory and adaptational mechanisms to acute and chronic hypoxia, respectively, and resultant shifts in cellular and organ metabolism are described. The minimum metabolic rate necessary for preservation of life lies below 20% of the normal for brain, and may be maintained at one tenth of the normal circulation. Complete recovery of central nervous system function is still possible 3-1 2 min. after cessation of heart activity. Irreversible damage results after longer periods. However, individual cases of complete recovery and experiments with ischemia followed by artificial respiration show the brain survival time to be longer than usually assumed. Death results from an insufficiency of the heart hyperstimulated in the post-asphyxic phase by the highly excited central nervous system. Therefore recovery may be promoted by speeding up recovery of the heart and preventing additional stress on the heart during the recovery process. Hypothermia is suggested as a possibility. Also mechanisms operating in oxygen poisoning are noted.

5959
Shephard, R. J.
CHANGES OF PHYSIOLOGY AND PSYCHOMOTOR PERFORMANCE DURING ACUTE HYPOXIA: SOME OBSERVATIONS WITH THE NULL-BALANCE DISCONTINUOUS PURSUIT METER. — RAF Inst. of Aviation Med., Farnborough (Gt. Brit.); issued by Flying Personnel Research Committee. FPRC no. 963, March 1956. 19 + 16 p. UNCLASSIFIED
Also published as: PHYSIOLOGICAL CHANGES AND PSYCHOMOTOR PERFORMANCE DURING ACUTE HYPOXIA. — Jour. Applied Physiol., 9 (3): 343-351. Nov. 1956. DLC (QP1.J72, v. 9)

Ten normal subjects exposed to a simulated altitude of 20,000 feet for 10 minutes showed a progressive decrease in arterial oxygen saturation to 70-75%, an increase of 40% in pulse rate, and an increase in respiratory minute volume of 40-50% at rest and an additional 15-25% during operation of a pursuit meter. Respiratory rate was unchanged in some subjects and fluctuated between normal and 60-70% above normal in others; periodic breathing was noted in two cases. Significant changes in psychomotor performance on a null-balance electrical pursuit meter were observed in all subjects. Two principal types of response were noted, identified by a progressive depression of higher centers (increase of initial response time and error) or by an initial stimulation (decrease of initial response time with increased error) followed by depression. Emotional disturbances associated with frustrating tasks were observed in some cases.

5960
Strollo, M.
[BEHAVIOR OF THE REACTION TIMES RELATED TO INTELLIGENCE TESTS IN HYPOXIA] Sul comportamento dei tempi di reazione collegati a prove intellettive in ipossia. — Rivista di medicina aeronautica (Roma), 19 (3): 443-465. July-Sept. 1956. In Italian, with English summary (p. 462-463). DLC (RC1050.R56, v. 19)

Fifty jet pilots decompressed to a simulated altitude of 5,500 meters for about half an hour were given a psychomotor test, and an intelligence test (mental calculations). In the measurement of reaction time, psychomotor rapidity was generally affected by altitude, showing a mean impairment of 10% in comparison to the values obtained at sea level. Psychomotor regularity was only slightly impaired. In mental performance there was a

quantitative reduction similar to that observed in the psychomotor rapidity test; qualitatively, however, the decline was more pronounced.

5961
Szák, J.,
and Nikodémusz, J.
[THE EFFECT OF ARTIFICIAL HYPOXIC STRESS ON BLOOD SUGAR IN THE PRESENCE OF DISTURBANCES OF THE AUTONOMIC NERVOUS SYSTEM] Mesterséges hypoxiás terheléses vércukor-vizsgálatok vegetatív idegrendszeri kiegyenülyozatlánság eseteiben. — Kísérletes orvostudomány (Budapest), 8 (2): 158-162. March 1956. In Hungarian, with German summary (p. 162). DNLM

Twenty-five subjects with autonomic nervous system disturbances and twenty-five normal controls underwent hypoxic stress in an altitude chamber at 85 mm. Hg pO_2. The effect of hypoxia on the blood sugar showed no significant differences between both groups. It is concluded that the lower hypoxia tolerance exhibited by individuals with autonomic instability is not based on changes in the carbohydrate metabolism. (Authors' summary, modified)

5962
Tabusse, L.,
and Montrichard
[CHANGE IN THE TOLERANCE OF THE GUINEA PIG TO ANOXIA UNDER THE INFLUENCE OF CERTAIN DRUGS: CHLORPROMAZINE, ACETYLCHOLINE, PRISCOLINE] Modification de la tolérance du cobaye à l'anoxie sous l'influence de certaines drogues; chlorpromazine, acétylcholine, chlorhydrate de benzyl-imidazoline. — Médecine aéronautique (Paris), 11 (3): 306-313. 1956. In French, with English summary (p. 313).
DLC (TL555.M394, v. 11)

The intravenous administration of chlorpromazine in guinea pigs was found to cause a significant acceleration of the time to appearance of apnea during exposure to a simulated altitude of 13,000 meters. Administration of acetylcholine or priscoline had no effect on resistance to anoxia. It is suggested that the use of chlorpromazine be forbidden in flying personnel and in others exposed to the danger of anoxia.

5963
Tabusse, L.
[VITAMIN C IN STRONG DOSES AND TOLERANCE TO ANOXEMIA] Vitamine C à forte dose et tolérance à l'anoxémie. — Médecine aéronautique (Paris), 11 (1): 17-20. 1956. In French.
DLC (TL555.M394, v. 11)

Injection of vitamin C in guinea pigs 30 minutes prior to exposure to a simulated altitude of 12,000 meters resulted in 7 of 9 cases in increased resistance to anoxia. The protective effect of vitamin C is tentatively attributed to its multiple role in blood acidification, protection against the destruction of adrenaline, cellular oxidation, and in the synthesis of adrenal hormones.

5964
Vacca, C.,
and E. Boeri
[VARIATIONS OF THE RIBOFLAVIN AND NICOTINIC ACID CONTENT IN RATS SUBJECTED TO REPEATED HYPOXIA] Variazioni del contenuto di riboflavina e di acido nicotinico in ratti sottoposti ad ipossia ripetuta. — Rivista di medicina aeronautica (Roma), 19 (2): 323-327. April-June 1956. In Italian, with English summary (p. 326).
DLC (RC1050.R56, v. 19)

Rats were decompressed to simulated altitudes ranging from 8,500-9,000 meters, four hours daily, consecutively for 15 days. At the last exposure, the animals were rapidly elevated to 15,000 meters and then killed. A decrease was found in the riboflavin and nicotinic acid contents of the heart, liver, kidneys, and carcass. A possible mechanism for this decrease may be related to the hypoxic induction of enzyme loss due to the increase in membrane permeability.

5965
Vassar, P. S.,
and D. M. Taylor
EFFECTS OF HYPOXIA ON IRON ABSORPTION IN RATS. — Proc. Soc. Exper. Biol. and Med., 93 (3): 504-506. Dec. 1956.
DLC (QP1.S8, v. 93)

Rats exposed to 15% oxygen for 48 hours showed a one-third increase in the gastro-intestinal absorption of orally administered radioactive iron during the next 24 hours. It is suggested that hypoxia may exert an indirect effect, possibly through erythropoietic stimulation on a humoral mechanism, which influences the intestinal mucosa.

f. Environmental Temperature

[Body temperature under 3-c; Thermal radiation under 6-n]

5966
Adolph, E. F.,
and J. Richmond
ADAPTATION TO COLD IN GOLDEN HAMSTER AND GROUND SQUIRREL MEASURED CHIEFLY BY RATES OF BODY COOLING. — Jour. Applied Physiol., 9 (1): 53-58. July 1956.
DLC (QP1.J72, v. 9)

A study was made of the effect of various conditions of cold exposure on cold adaptation in hamsters and squirrels. Adaptation was measured as a decreased rate of deep-body cooling and an increased resting heat production. Significant decreases in cooling were found during exposure to cold as much as 45 days after a single adapting exposure. The decreased rate of cooling was a result chiefly of an increase in heat production in the early stages of cooling. In hamsters, adaptation was induced more effectively by several hours of gradual cooling of both core and skin (moderate general hypothermia) than by prolonged exposure to cool air without hypothermia, by head cooling without deep hypothermia, or by rapid deep hypothermia. Sensitivity to adapting influences was un-

related to absolute rates of cooling or to the rewarming characteristics of the species.

5967
Allen, J. M.
THE INFLUENCE OF COLD, INANITION AND INSULIN SHOCK UPON THE HISTOCHEMISTRY OF THE ADRENAL MEDULLA OF THE MOUSE. — Jour. Histochem. and Cytochem. 4 (4): 341-346. July 1956. DNLM

The release of adrenaline from the adrenal medulla of the mouse under conditions of insulin shock and inanition and the release of noradrenaline under conditions of cold stress (exposure to 4° C. for 7-14 days) was histochemically demonstrated. Associated with the release of both adrenaline and noradrenaline was the development of high levels of alkaline phosphatase activity in the secretory cells. The histochemical response of adrenal medulla stroma following cold stress offers presumptive evidence that ACTH is released by noradrenaline or by hypothalamic pathways. (Author's summary, modified)

5968
Babineau, L. M.
[EFFECT OF DIET AND TEMPERATURE ON CERTAIN BIOLOGICAL CONSTANTS IN THE WHITE RAT] Influence de l'alimentation et de la température sur quelques constantes biologiques du rat blanc. — Laval médical (Québec), 21 (1): 112-133; (2): 250-269; (3): 386-416; (4): 555-582; (5): 691-707. Jan.-May 1956. In French. DNLM

Originally appeared as a thesis, Université Laval (Québec).

Rats maintained on a high-fat diet during exposure to cold of 0-9° C. for up to 125 days showed a greater gain in weight than animals maintained on a low-fat diet, but a markedly lesser gain in weight than rats on a high-fat or low-fat diet at normal temperature. Addition of a high-protein component to the high-fat diet of rats exposed to cold had no additional effect on body weight. Normal rats on a high-fat diet had a higher total lipid content than those on a low-fat diet, while no dietary difference was observed in rats exposed to cold. The fat content of perirenal, carcass, skin, and depot fat showed a linear correlation with total lipid content regardless of environmental temperature, resulting in a constant variation of the fractional proportions of total fat with temperature. Both exposure to cold and maintenance on a low-fat diet caused an increase in the weight of the liver, while only exposure to cold increased kidney weight. Body water content remained constant in relation to body weight minus fat, despite changes in fat content. Liver glycogen was increased in cold-exposed rats, but neither diet nor exposure to cold had any effect on muscle glycogen. The rate of glucose absorption was decreased in rats fed a high-fat diet at normal temperature, but was increased in rats exposed to cold. (60 references).

5969
Bass, D. E.,
and Henschel
RESPONSES OF BODY FLUID COMPARTMENTS TO HEAT AND COLD. — Physiol. Reviews, 36 (1): 128-144. Jan. 1956. DLC (QP1.P45, v. 36)

A review of the literature is presented dealing with the effects of heat and cold on body fluids with emphasis on the responses of man. Topics included are (1) seasonal variations in body fluids; (2) effects of heat on plasma and blood volumes, sweat secretion, and renal function; (3) effect of prolonged heat and cold exposure; (4) effect of cold; and (5) acclimatization to heat and cold. (106 references).

5970
Brody, H.,
and S. Rodbard
THE EFFECT OF HIGH TEMPERATURE UPON NERVE CELLS OF THE CHICKEN BRAIN [Abstract]. — Anat. Record, 124 (2): 390. Feb. 1956. DLC (QL801.A45, v. 124)

Histological studies were made of the brains of three-week-old chicks exposed to a heat lamp which raised body temperatures 3.5-6°C. Examination revealed extensive changes, particularly in the diencephalon and hypothalamus, with dispersion of the Nissl material in a fine dustlike formation throughout the nerve cell bodies, eccentricity of nuclei, and extensive cytoplasmic vacuolation. The changes were not observed in chicks cooled to a temperature of 25°C.

5971
Brown-Grant, K.
CHANGES IN THE THYROID ACTIVITY OF RATS EXPOSED TO COLD. — Jour. Physiol. (London), 131 (1): 52-57. Jan. 27, 1956. DLC (QP1.J75, v. 131)

Exposure of rats to cold of 11° or 6.5° C. for 72 hours was found to increase the rate of release of injected radio-iodine from the thyroid, while 16° C. had no effect, and exposure to 0-2° C. caused no change or an inhibition. The rate of release of radio-iodine at 11° C. was inhibited by adrenalectomy. It is suggested that exposure to severe degrees of cold (0-2° C.) acts as a non-specific stress to reduce the secretion of thyrotrophic hormone by the anterior pituitary.

5972
Buskirk, E. R.,
M. Kreider, R. Brebbia, N. Morana, F. Daniels, B. E. Welch, J. B. Mann, W. Insull, and T. E. Friedemann
CALORIC INTAKE AND ENERGY EXPENDITURE IN A SUB-ARCTIC ENVIRONMENT. —Quartermaster Research and Development Center. Environmental Protection Div., Natick, Mass. Technical Report EP-33, March 1956. [50] p. AD 89 323 PB 122 895

Caloric intake and caloric expenditure were studied in eight men during 10 days of pre-bivouac, 12 days of bivouac and 8 days of post-bivouac. Fort Churchill, Manitoba, Canada was the test site. Mean ambient temperatures for the three periods were -25°C. (-13°F), -31°C (-23°F), and -26°C (-15°F) respectively. Caloric intake averaged approximately 3600

Cal/man/day for the entire study. The men consumed 3,613, 3,644 and 3,472 Calories respectively during the pre-bivouac, bivouac and post-bivouac periods. Since a weight loss of 1.9 kg occurred during the bivouac period, an estimated correction of caloric requirement for this weight loss would increase it to 4,260 Cal/man/day. Dietary composition did not change during the three periods of the experiment. The percentage of the total energy of the average food consumed during all periods was 13.8% from protein, 38.5% from fat, and 47.7% from carbohydrate. Energy expended during outdoor activities involving progression across the snow cover at 2.27 mph was found to average approximately 7 Cal/min or 221 Cal/m^2/hr. Thus, the men averaged 1,500 Cal/man/day for outdoor activity. Variations were noted in energy expenditure between skiing, snowshoeing and walking over the same snow cover. Snowshoeing was the most economical in this group of men. (From the Authors' abstract)

5973
Casentini, S.
[RELATION BETWEEN PANTOTHENIC ACID AND STRESS CAUSED BY COLD] Rapporti tra acido pantotenico e stress da freddo. — Bolletino della Società italiana di biologia sperimentale (Napoli), 32 (12): 1419-1422. Dec. 1956. In Italian. DNLM

Death occurred first in control rats and much later in pantothenic acid-treated rats kept in a cold temperature (0°C.). 40% of the treated animals survived in the cold. Adrenalectomized rats administered physiological solution or sodium pantothenate and placed in a cold cell at 0°C. died within 2-5 hours regardless of treatment. In another series of experiments rats were subdivided into four groups. One group of controls and a group of pantothenic acid-treated animals were kept at normal temperature whereas the other two groups were exposed to 0°C. for four hours. No significant changes were found in adrenal ascorbic acid and cholesterol contents between the groups. It is concluded that pantothenic acid permits greater survival of animals exposed to a prolonged cold stress by means of a mechanism operating at the level of the adrenal and possibly inducing a reparatory synthesis of specific corticosteroids.

5974
Cottle, M. K.
STUDIES ON THYROID GLAND FUNCTION IN RATS EXPOSED TO COLD. — Publication no. 17,120. ix+58 p. Ann Arbor: Univ. Microfilms, 1956. DLC

Thyroid function in male albino rats exposed to cold (5° C.) for 1-180 days was studied. Twenty-four-hour conversion ratios ($\frac{\text{serum protein-bound } I^{131}}{\text{serum total } I^{131}}$) were above control values in animals exposed for eight days and remained higher than control values when measured in animals exposed for sixty days. Biological decay data also indicated an increased turnover of thyroid hormone during early exposure and after prolonged (180 days) exposure to 5° C. In contrast, gland weight and I^{131} content four hours after injection increased upon preliminary exposure, but returned to approximately control values after sixty days at 5° C., indicating that these are not sensitive and consistent measures of thyroid hormone secretion. The increased secretion and utilization of thyroid hormone in the cold is probably related to the increased food intake, energy output, and capacity of the cold-adapted animals to increase heat production. (Author's summary) (88 references)

5975
Cottle, M. [K]
and L. D. Carlson
TURNOVER OF THYROID HORMONE IN COLD-EXPOSED RATS DETERMINED BY RADIOACTIVE IODINE STUDIES. — Endocrinol., 59 (1): 1-11. July 1956. DLC (QP187.A25, v. 59)

A comparative study was made of methods of estimation of thyroid hormone secretion in rats exposed to cold. An elevation of twenty-four hour conversion ratios (serum protein-bound I^{131}/serum total I^{131}) was observed in animals exposed to temperature of 5° C. for 8 to 60 days. Measurement of the rate of release of radioiodine from the thyroid also indicated increased turnover of thyroid hormone during early exposure and after prolonged exposure (180 days) to cold. Thyroid gland weights and I^{131} content were increased in the early period of exposure, but returned to control values after 60 days. It is suggested that thyroid weight and I^{131} uptake are not sensitive and consistent measures of thyroid hormone secretion.

5976
Cullumbine, H.,
and S. Miles
THE EFFECT OF ATROPINE SULPHATE ON MEN EXPOSED TO WARM ENVIRONMENTS. — Quart. Jour. Exper. Physiol. (London), 41 (2): 162-179. April 1956. DNLM

The process of acclimatization to hot (110° F.) and warm moist (90° F.) environments was studied in 40 male subjects, and the effects of intramuscular injection of 2 mg. of atropine sulfate on the fifth and tenth days of exposure assessed. In both environments, acclimatization consisted of a readjustment of cardiovascular balance, an increase in sweat loss, a decrease in sweat chloride content, and an increase in blood volume. Atropine increased circulatory embarrassment by raising the pulse rate and by general vasodilation, and added to the climatic stress by limitation of sweating. In an unacclimatized or partially acclimatized individual in a hot dry environment, circulatory failure and cerebral irritation probably produce casualties before failure of the heat-controlling mechanism can develop. (Authors' summary, modified)

5977
Daniels, F.
CONTACT COOLING OF THE HAND AT -20° F. — Quartermaster Research and Development Command, Environmental Protection Division, Natick, Mass. Technical Report no. EP-22, Jan. 1956. iv+21 p. AD 84 819 PB 122 898

Cooling curves were obtained at eleven points on the hand and fingers of three men with bare hands exposed at -20° F. Measurements were made

with hand exposed to air, grasping iron and aluminum pipes covered with an expanded plastic material, and grasping the bare iron pipes. The general shape of cooling curve in air and in contact with the insulated pipes was an initial rapid drop, followed by a slower fall which was practically a straight line during the period of measurement. Some of the points of contact with bare metal plunged in a straight line to below the freezing point of water. The favored position of the third finger in having slower cooling than the other fingers was apparent. The small finger was particularly vulnerable to rapid cooling. The importance of insulating metal equipment in the cold is discussed; such insulation is in many instances more feasible than trying to maintain dexterity by insulating the hand. (Author's abstract)

5978
Daniels, F.,
and R. Madden
ENERGY EXPENDITURE DURING SOME SUB-ARCTIC BIVOUAC ACTIVITIES. — Quartermaster Research and Development Center, Environmental Protection Div., Natick, Mass. Technical Report no. EP-20, April 1956. iv+17 p. AD 100 291
PB 124 866

The energy cost for the performance of certain activities was measured at Fort Churchill, Canada. The energy costs varied from about 40 Cal./m.^{2}/hr. (in sleeping bag at night) to about 325 Cal./m.^{2}/hr. (simulated infantry assault), an eight-fold increase. Other activities, such as cutting snow blocks, chopping ice, pitching tents, etc., were also measured and the energy costs were in the range 200-300 Cal./m.^{2}/hr. The importance of these findings to the design of Arctic clothing is discussed. (Authors' abstract)

5979
Deb, C.,
and J. S. Hart
HEMATOLOGICAL AND BODY FLUID ADJUSTMENTS DURING ACCLIMATION TO A COLD ENVIRONMENT. — Canad. Jour. Biochem. and Physiol. (Ottawa), 34 (5): 959-966. Sept. 1956.
DLC (R11.C37, v. 34)

Absolute blood and plasma volumes decreased in rats during exposure to a warm environment (30° C.), while extracellular fluid volume, total body water, and body weight increased. Rats transferred from warm to cold (6° C.) environment had larger plasma and blood volumes than rats at 30° C. after the first week of exposure. After five weeks, blood volume was 22% greater on an absolute basis and 30% greater relative to total body water than that of the larger rats at 30° C. There were no differences in extracellular fluid volumes between warm and cold exposed rats at comparable intervals. Total water and intracellular water tended to be greater in rats at 30° C. on an absolute basis but much greater per unit body weight in rats at 6° C. No differences were observed in erythrocyte counts, hemoglobin concentration, or plasma specific gravity between warm and cold exposed rats, but there was an increased hematocrit, increased corpuscular volume, and decreased corpuscular hemoglobin content in rats kept at 6° C. Hemoglobin, erythrocytes and plasma specific gravity increased with time in both groups. (From the authors' abstract)

5980
Denison, M. E.,
A. Horita, and G. Dell'olio
EFFECT OF PROLONGED EXPOSURE TO COLD ON OXYGEN CONSUMPTION AND SERUM PROTEIN BOUND IODINE LEVELS [Abstract]. — Anat. Record, 125 (3): 634-635. July 1956.
DLC (QL801.A45, v. 125)

Dogs exposed to a temperature of -20° C. for 30 days showed increases of approximately 17% in oxygen consumption and 183% in serum protein-bound iodine until the 23rd day of exposure, when levels returned to pre-exposure values. It is indicated that the activity of the thyroid gland increases during the initial phase of cold exposure, and returns to the pre-exposure level after adaptation to low environmental temperature.

5981
Denison, M. E.,
and R. L. Jasper
GLUCURONIDASE ACTIVITY IN LIVER AND KIDNEY FROM ANIMALS EXPOSED TO A LOW ENVIRONMENTAL TEMPERATURE [Abstract]. — Federation Proceedings, 15 (1, part I): 47. March 1956.
DLC (QH301.F37, v. 15)

Cold exposure of male rats and of castrated male rats tends to decrease the liver glucuronidase activity. Castration results in a decrease in renal glucuronidase activity of the order of 20%. Kidney glucuronidase activity is decreased in rats exposed to a low environmental temperature. This decrease is approximately 24% in intact male rats and approximately 40% in castrated rats. Treatment of intact and castrated male rats with sesame oil at room temperature does not significantly alter the kidney glucuronidase activity. Treatment with testosterone propionate tends to increase the renal glucuronidase activity. It is postulated that cold and the level of both cortisone and testosterone propionate are influencing the glucuronidase activity in the kidney in, as yet, some unexplained manner. (From the authors' abstract)

5982
Depocas, F.
METABOLIC RESPONSE OF WARM AND COLD ACCLIMATED RATS TO VERY COLD ENVIRONMENTS [Abstract]. — Federation Proceedings, 15 (1, part I): 48. March 1956.
DLC (QH301.F37, v. 15)

The heat production (indirect) of 30° C. acclimated (I) and 6° C. acclimated (II) Sprague-Dawley adult male rats was determined with an open circuit metabolism apparatus over the temperature range −36° C. to 30° C. after an equilibration period of 20 minutes or more. At all temperatures heat production of II was higher than that of I, but, the slope of the heat production versus temperature curve was similar in both groups at least between -7° C. and 20° C. A constant volume closed circuit metabolic system with a lag of only 2.5 minutes was devised and used for measurements of the average heat production of

I and II at =25° C. between the 3rd and 20th minute of exposure. The results indicate that (1) a rise in heat production of 2.5 and 3 times basal takes place in both groups of rats within 3 minutes after exposure and is apparently maintained until the end of the 20-minute test; and that (2) the value given by II is the one expected from the slope of the heat production curve at higher temperature while that given by I is lower than that expected. In summary, the metabolic response of white rats to cold exposure is extremely rapid and at the lower temperatures I reaches a maximum metabolic rate while II can still show an increase. (From the author's abstract)

5983
DesMarais, A.
FURTHER STUDIES ON THYROID-ADRENAL-ASCORBIC ACID RELATIONS IN ANIMALS EXPOSED TO COLD. — Canad. Jour. Biochem. and Physiol. (Ottawa), 34 (6): 1251-1260. Nov. 1956.
DLC (R11.C37, v. 34)

In adrenalectomized rats given large doses of cortisone (2.5 mg.) and exposed to cold (14° C.), the administration of either ascorbate (150 mg.) or desoxycorticosterone acetate (DCA, 2.5 mg.) enhances the survival, reduces the extent of thymolysis, and decreases the activation of the thyroid. In adrenalectomized rats recieving no cortisone or DCA or low doses (0.4 and 0.1 mg.) of these hormones, ascorbate administration (150 mg.) still retains some of its beneficial effects on resistance to cold (better growth and survival); when low doses of DCA (0.1 mg.) are given without cortisone, ascorbate administration seems to have a deleterious effect on the growth and survival during exposure to cold, with a greater increase in thyroid activity. In thyroidectomized rats exposed to cold, ascorbate administration (150 mg.) has no effect in the absence of thyroxine, but increases the efficiency of low doses (3 g.) of thyroxine, preventing at the same time some of the typical signs of an alarm reaction: thymolysis and adrenal enlargement. These results are interpreted as showing that the role of the cortical hormones in resistance to cold might be limited to a "conditional" action and that the beneficial effects of ascorbate administration would be mediated through hormones. (From the author's abstract)

5984
Edholm, O. G.,
R. H. Fox, and R. K. Macpherson
THE EFFECT OF BODY HEATING ON THE CIRCULATION IN SKIN AND MUSCLE. — Jour. Physiol. (London), 134 (3): 612-619. Dec. 28, 1956.
DLC (QP1.J75, v. 134)

Blood flow in the human forearm during heating by partial immersion was measured by water plethysmography before and after iontophoresis of adrenaline to occlude skin circulation. Occlusion of skin circulation was observed to eliminate entirely the increase in blood flow normally associated with body heating. It is concluded that the increase in blood flow during heating is due wholly to changes in the circulation of the skin and superficial tissues.

5985
Egdahl, R. H.,
and J. B. Richards
EFFECT OF EXTREME COLD EXPOSURE ON ADRENOCORTICAL FUNCTION IN THE UNANESTHETIZED DOG. — Amer. Jour. Physiol., 185 (2): 239-242. May 1956.
DLC (QP1.A5, v. 185)

An analysis was made of the 17-hydroxycorticosteroid content of adrenal venous blood collected from unanesthetized dogs prior to and during exposure to environmental temperatures of -46° to -50°C. for 2-28 hours and -75° to -79°C. for 4-5 hours. A marked increase in adrenal steroid output was observed soon after the onset of exposure in both temperature ranges, followed after 1-3 hours by a return to control pre-exposure levels. Intravenous administration of ACTH at the end of the exposure period increased the adrenal 17-hydroxycorticosteroid output. Body temperature remained normal throughout the cold exposure.

5986
Egdahl, R. H.,
D. M. Hume, and J. B. Richards
TOLERANCE OF THE DOG TO EXTREME COLD EXPOSURE. — Naval Medical Research Inst., Bethesda, Md. (Project no. NM 007 081.22.10). Research Report (Vol. 14, p. 389-394), May 6, 1956. AD 101 237
UNCLASSIFIED

No ill effects and virtually constant rectal temperatures were observed in 16 of 17 unanesthetized dogs exposed to -46° to -50°C. and -76° to -80°C. for periods of from 3 to 27 hours. Two bilaterally adrenalectomized dogs withstood -46° to -50°C. for 4 1/2 hours and one adrenalectomized dog withstood -5°C. for 8 hours without any obvious adverse effects. The course of these animals was in no way different from those with intact adrenals exposed to the same temperatures for the same periods of time. (Authors' abstract)

5987
Erikson, H.,
J. Krog, K. Lange Andersen, and P. F. Scholander
THE CRITICAL TEMPERATURE IN NAKED MAN. — Acta physiologica scandinavica (Stockholm), 37 (1): 35-39. 1956

The critical air temperature, below which body temperature could not be maintained without an increase in metabolic rate above the resting level, was found in naked man to be approximately 26°C. The metabolic cost of the maintenance of an adequate heat balance below this temperature was determined in subjects whose CO_2 output was measured during the performance of work on a bicycle ergometer, which was barely sufficient to eliminate sensations of cold. The rate of CO_2 production at 27-30°C. was approximately doubled at 17°C., tripled at 6°C., and quintupled at -6°C., in conformity with Newton's law of cooling.

5988
Erikson, H.
OBSERVATIONS ON THE METABOLISM OF ARCTIC GROUND SQUIRRELS (CITELLUS PARRYI) AT DIFFERENT ENVIRONMENTAL TEMPERATURES. —

Acta physiologica scandinavica (Stockholm), 36 ((1-2)): 66-74. 1956. DNLM

The metabolic rate of Arctic ground squirrels was determined at various environmental temperatures and during various seasons of the year. In August the animals were observed to tolerate environmental temperatures from -30° to +40°C. well, but survived at higher temperatures for only limited periods. The metabolic rate remained fairly constant at temperatures from +10° to +50°C. and increased at lower temperatures. During sleep the metabolic rate was reduced to about 50% of the average daytime values. In the period of weight gain in the fall, high respiratory quotients were observed during the first hours after feeding at temperatures above 0°C., while normal quotients were found below 0°C. The effect of temperature on the metabolism diminished rapidly 4-5 hours after feeding. During spring, no effect of environmental temperature on the respiratory quotient was observed.

5989
Felts, J. M.,
and E. J. Masoro
RAT LIVER METABOLISM IN RELATION TO COLD EXPOSURE AND FASTING [Abstract]. — Amer. Jour. Physiol., 187 (3): 597. Dec. 1956. DLC (QP1.A5, v. 187)

The pathways of glucose catabolism during cold exposure with fasting were investigated by measurement of the oxidation of glucose-1-C^{14} and glucose-6-C^{14} in liver slices from cold-fasted rats. The data indicate that there is a marked shift in the metabolism of glucose from the glycolytic pathway to the phosphogluconate oxidative pathway during cold-fasting, while lactate oxidation is unchanged. It is suggested that carbon 1 of lactate yields CO_2 more rapidly in the cold-fasted liver, but that the oxidation of the second carbon of lactate is unaltered.

5990
Fleischner, J. R.,
and F. Sargent
EFFECTS OF HEAT AND COLD ON THE RAT: A STUDY OF CROSS-ACCLIMATIZATION [Abstract]. — Amer. Jour. Physiol., 187 (3): 598. Dec. 1956. DLC (QP1.A5, v. 187)

From Selye's concept of acclimatization to heat and cold as an adjustment in the pituitary-adrenal axis, it was theorized that the cold- or heat-acclimatized rat should adjust better to the opposite temperature stress than animals not previously exposed to either temperature extreme. To test this deduction, rats exposed to hot (94-96° F.) or cold (33-40° F.) temperatures for 29 or 50 days were transferred to the opposite temperature environment. Cold-acclimatized rats exposed to a hot environment exhibited sustained hyperthermia, while heat-acclimatized rats exposed to cold developed a transient hypothermia. The results indicate a cross-sensitization rather than a cross-acclimatization of temperature-stressed animals.

5991
Froese, G.,
and A. C. Burton
HEAT LOSSES FROM HUMAN HEAD IN THE COLD [Abstract]. — Federation Proceedings, 15 ((1, part I)): 69. March 1956. DLC (QH301.F37, v. 15)

Heat loss from the head was measured by means of a temperature gradient calorimeter in three subjects exposed to cold temperatures. Since no detectable peripheral constriction was found in the head it was postulated that the brain temperature remains normal in the cold.

5992
Geiger, E.,
and J. J. Pinsky
EFFECT OF CHANGES IN ENVIRONMENTAL TEMPERATURE ON STOMACH EMPTYING IN RATS. — Proc. Soc. Exper. Biol. and Med., 91 (1): 107-110. Jan. 1956. DLC (QP1.S8, v. 91)

The effect of temperature stress on stomach emptying time was determined by exposure of rats to a cold (3° C.) or hot (37° C.) environment following consumption of a measured protein meal after 24 hours of fasting. Determinations of nitrogen contained in the stomachs of animals sacrificed after two hours of exposure to heat or cold revealed a significant delay in emptying time in cold, and a greater delay in heat. No retardation of stomach emptying time was observed in animals exposed to heat or cold for five days prior to testing. It is concluded that the delay in stomach emptying was produced by temperature change, associated with an increased production of epinephrine, rather than by hot or cold temperature itself.

5993
Giono, H.,
and L. Chevillard
[EFFECT OF PROLONGED COLD EXPOSURE ON THE VASOMOTRICITY OF THE GUINEA PIG] Influence de l'exposition prolongée au froid sur la vaso-motricité du cobaye. — Journal de physiologie (Paris), 48 (3): 558-561. May-June 1956. In French. DNLM

Guinea pigs living in a cold environment (4° C.) displayed a higher ear temperature when exposed to outside temperatures ranging between 8° and 25° C., than did animals maintained at 20° C. This indicates a greater activity of the peripheral circulation in cold-adapted animals. A circulatory increase was also noted in the foot. Cold-adapted animals had a better developed mechanism of physical thermoregulation (vasomotricity) than animals living at 20° C. These phenomena, especially intense in the ear, depend on the environmental temperature, the temperature at which measurements are taken, and the duration of cold exposure in non-adapted animals prior to measurement.

5994
Good, A. L.
A STUDY OF SOME OF THE PHYSIOLOGIC ADJUSTMENTS OF UNANESTHETIZED DOG WHEN EXPOSED TO EXTREME COLD. — Publication no. 17,853. Ann Arbor: Univ. Microfilms, 1956. ml+154 p. DLC

Upon sudden exposure to -35° C., blood and rectal temperatures of unanesthetized dogs increased quite markedly (0.4 to 0.7° C.), decreased after about fifteen minutes, and did not return to pre-exposure levels by the end of thirty minutes. These results indicate that -35° C. air is adequately warmed in the respiratory passages. The rise in blood and rectal temperatures is attributed to cutaneous vasoconstriction and increased heat production resulting from shivering. Under the same conditions of cold (1) intravenously administered epinephrine produced a transient reduction in respiration, cessation of shivering for 1-2 1/2 minutes, and slight decreases in blood and rectal temperature; (2) the breathing of 4% carbon dioxide induced marked reduction in shivering, increased rate and amplitude of respiration, and consistent decrease in blood and rectal temperature; (3) intravenously administered Lidar caused a consistent increase in blood and rectal temperature, and (4) intravenous succinylcholine varying degrees of muscle paralysis with visible shivering not markedly affected. (134 references)

5995
Grad, B.,
and V. A. Kral
DIFFERENCES IN RESPONSE OF YOUNG AND OLD MICE TO COLD [Abstract]. — Revue canadienne de biologie (Montreal), 15 (3): 253-254, Dec. 1956.
DLC (QH301.R47, v. 15)

Mature young female mice, 4-6 months old, resisted cold exposure better than old mice, 17-21 months old. Mortality was greatest in old mice when both groups were housed individually in a metal cage and moved from room temperature (26-28°C.) to cold (6-7°C.). Exposure to temperatures lower than this killed almost as many young as old mice, whereas exposure to higher temperatures killed almost as few old as young mice. The importance of housing conditions was demonstrated in an experiment in which old mice resisted an environmental temperature of -1 to +1°C. as well as young mice when both groups were maintained in a 15% wooden cage. At 9-11°C. the basal metabolic rate, food intake and blood sugar increased more in young than in old mice, whereas body weight decreased more in the latter as a result of cold exposure. (Authors' abstract, modified)

5996
Haddy, F. J.,
M. Fleishman, and J. Scott
THE EFFECT OF COLD UPON SYSTEMIC SMALL AND LARGE VESSEL RESISTANCE. — Army Medical Research Lab., Fort Knox, Ky. Report no. 252, July 13, 1956. ii + 12 p. (AMRL Project no. 6-64-12-028, Subtask, Cold Injury Studies).
AD 109 431 UNCLASSIFIED

Exposure of anesthetized dogs to a temperature of 0°C. for 15 minutes resulted in an increase of 43% in total foreleg vascular resistance. The relatively small resistance changes of veins and arteries (10% of the increase) showed no consistent relation in time, direction, and pattern to those of the small vessel segment. Nerve block decreased the small-vessel response, but did not affect the constriction of the arteries and veins. Nerve block in combination with a sympatholytic and adrenolytic agent decreased further the small-vessel response, and eliminated significant venous and arterial constriction. The response is attributed chiefly to a small-vessel constriction based approximately equally on nervous, humoral (epinephrine and or norepinephrine) and local mechanisms. The control of venous and possibly arterial resistance corresponds largely to the level of circulating or locally released epinephrine and or norepinephrine. (Quoted in part).

5997
Handley, C. A.,
and R. A. Seibert
THE BIOCHEMISTRY OF TISSUE TRAUMA: MUSCLE PROTEIN. — Baylor Univ. Coll. of Medicine, Houston, Tex.; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-89, Jan. 1956. 8 p. AD 95 148
PB 123 032

Muscles of rabbits subjected to cold injury at 0° and -5° C. for 30 minutes showed little damage after 24 hours. There were no significant differences in the weights of muscles or in the amount of myosin extracted from treated and untreated muscles. In contrast to this, -15° C. cold injury for 30 minutes produced statistically significant changes if the treatment produced a solidly frozen muscle. The total amount of myosin extractable was decreased to one-half the control levels and, as a consequence, the adenosinetriphosphatase activity and sulfhydryl content were decreased. (From the authors' abstract)

5998
Hardenberg, E.,
and P. G. Bamberg
BLOOD FLOW CHANGES IN THE LEG OF THE DOG FOLLOWING COLD INJURY. — Naval Medical Research Institute, Bethesda, Md. (Project Report no. NM 007 081.14.03). Research Report (vol. 14: 877-890), Nov. 8, 1956. AD 127 471
UNCLASSIFIED

In an attempt to determine the nature of the circulatory changes which occur in tissues injured by exposure to cold, the rate of venous outflow was studied in the dog's hind leg exposed to freezing temperatures. Control blood flow rates were found to vary considerably from animal to animal (20 to 90 cc./minute) but varied little in each individual. During exposure to cold, in most of the experiments, the legs froze: flow decreased almost to zero, and the temperature in the leg fell well below 0° C. In some experiments, however the legs did not freeze: flow remained high throughout exposure, and tissue temperature remained above 0° C. In response to the injection of vasoactive drugs, the control venous outflow showed: (a) a decrease after intravenous epinephrine; (b) a decrease after intra-arterial epinephrine into the experimental leg; and (c) a transient increase after intra-arterial acetylcholine into the experimental leg. After exposure to cold, the legs which did not freeze still showed these reactions. However, in the legs which were frozen, the reactions to intra-arterially injected drugs were very much diminished, and the flow was increased instead of decreased when epinephrine was intravenously administered. (From the authors' abstract)

5999
Hart, J. S.,
O. Heroux, and F. Depocas
COLD ACCLIMATION AND THE ELECTROMYOGRAM OF UNANESTHETIZED RATS. — Jour. Applied Physiol., 9 (3): 404-408. Nov. 1956.
DLC (QP1.J72, v. 9)

Electromyographic examination of warm-acclimated rats exposed to a temperature of 6° C. showed the presence of a continuous shivering which increased but was not directly proportional with decreases in temperature. During continued exposure, shivering decreased in magnitude and disappeared entirely in four weeks, but failed to disappear in five weeks at -6° C. Cold-acclimated rats returned to a temperature of 6° C. after temporary exposure to 30° C. showed an increase in oxygen consumption within three minutes, with no evidence of an increase in muscular activity. Restraint or exposure to -6° C. caused a return of shivering in cold-acclimated rats. The evidence suggests the reliance of cold-acclimated rats on chemical rather than physical thermogenesis except in increased stress situations.

6000
Hart, J. S.,
and O. Heroux
UTILIZATION OF BODY RESERVES DURING EXPOSURE OF MICE TO LOW TEMPERATURES. — Canad. Jour. Biochem. and Physiol. (Ottawa), 34 (3): 414-421. May 1956. DLC (R11.C37, v. 34)

White mice acclimated for four weeks to 6° C. had a body water content on an absolute and on a fat-free basis that was greater than that of mice acclimated to 23° C. When exposed to freezing temperatures (23° C. mice at -7° C., 6° C. mice at -13° C.), the weight loss and loss of water were greater in the cold acclimated group. Fat was the major tissue energy reserve utilized under these conditions. In both acclimation groups it accounted for 85 to 89% of the total calories, the remainder being supplied mostly by protein. There was a reduction in heat of combustion of the fat of mice during exposure to freezing temperatures that signified an alteration in chemical composition of the fat. (Authors' abstract, modified)

6001
Hellon, R. F.,
R. M. Jones, R. K. Macpherson, and J. S. Weiner
NATURAL AND ARTIFICIAL ACCLIMATIZATION TO HOT ENVIRONMENTS. — Jour. Physiol. (London), 132 (3): 559-576. June 28, 1956.
DLC (QP1.J75, v. 132)

Pulse rate, body temperature, and sweat rate were determined during heat exposure in subjects similar in every respect other than their residence in England or in Singapore. Subjects were exposed to one of sixteen environmental conditions provided by a factorial combination of two levels of air temperature, humidity, air speed, and energy expenditure. During the four-hour exposure, the tropical group showed a greater sweat secretion in response to increases in temperature and work rate, a greater decline in sweat output with increased air velocity, a smaller increase in rectal temperature, a lower pulse, and a lower mean skin temperature than did nonacclimatized subjects. Skin temperature was decreased with work and increased during rest in tropical subjects, while the reverse was true in the non-tropical group. It is concluded that the superior ability to withstand hot environments exhibited by men living in the tropics involves physiological as well as behavioral adaptation, and that the physiological basis of this natural acclimatization is identical with the artificial acclimatization produced in the laboratory.

6002
Heroux, O.
CAPILLARY COUNTS IN DIFFERENT ORGANS OF WARM AND COLD ACCLIMATED WHITE RATS [Abstract]. — Federation Proceedings, 15 (1, part I): 92. March 1956. DLC (QH301.F37, v. 15)

Capillaries were counted on benzidine stained cross-sections of leg muscles (soleus, gastrocnemius, plantaris), ears, liver and heart of rats killed with ether after acclimation to 30° C. (Ia), acclimation to 30° C. and exposure to 6° C. for 2 hr. (Ib), acclimation to 6° C. (II). Capillary counts in organs of Ib did not differ from those found in any of the corresponding ones in Ia and the results were pooled (I). In soleus and gastrocnemius, capillaries were counted only in densely vascularized areas. There were 3 such areas in the red fiber regions of the gastrocnemius which covered 4% of the muscle in I and 7% in II, and 1 area in the soleus which covered 18% in I and 43% in II. In the leg muscles, there were 85% more capillaries/mm.^{2} in II than in I, except in the white fibers of gastrocnemius where no change was seen. There were also more smaller muscle fibers/mm.^{2} in II, but, except for the soleus, the ratio capillary/fiber was nevertheless higher in II and in I (1.6 against 1.2). In liver and heart there was no change in number of capillaries after cold acclimation but in the ears there was a 12-fold increase. In summary, cold acclimation had the effect of increasing vascularization in ears and leg muscles but not in liver and heart. (Author's abstract)

6003
Heroux, O.,
J. S. Hart, and F. Depocas
METABOLISM AND MUSCLE ACTIVITY OF ANESTHETIZED WARM AND COLD ACCLIMATED RATS ON EXPOSURE TO COLD. — Jour. Applied Physiol., 9 (3): 399-403. Nov. 1956.
DLC (QP1.J72, v. 9)

The metabolism and muscle activity of rats acclimated for 4 to 6 weeks to temperatures of 6° or 30° C. were investigated after anesthetization with barbital. The oxygen consumption and rectal and muscle temperatures of cold-acclimated rats were found to be higher at 30° C. than those of warm-acclimated rats. After exposure for 30 minutes at 6° C., cold-acclimated rats showed a two-fold increase, and warm-acclimated rats a 30-50% increase, in oxygen consumption. Colonic and leg muscle temperatures fell faster during the 1-1 1/2 hours exposure in warm acclimated rats. Electromyograms from leg and back muscles showed a marked and continuous rise in electrical output in warm-acclimated rats, which often preceded by 15-20 minutes the rise in oxygen consumption, while no change was observed in the electromyograms of

cold-acclimated rats. It is suggested that the metabolic response of cold-acclimated rats is not associated with muscular physical activity, and therefore consists of a chemical thermogenesis.

6004
Hildes, J. A.
SOME PHYSIOLOGICAL ASPECTS OF ARCTIC WARFARE. — Canadian Services Med. Jour. (Ottawa), 12 (9): 776-786. Oct. 1956. DNLM

Following a review of the means of maintaining body temperature in the Arctic (clothing, hand and footwear, head and face protection, sleeping arrangements, food, water requirements), a discussion is presented on the physiological mechanisms of acclimatization to cold. Included are such topics as the general thermal state; vascular adaptation; metabolic acclimatization; fat insulation, and the significance of acclimatization in humans. Consideration is given to the selection of personnel for services in the Arctic to exclude those with organic disease of the peripheral vascular system or with troublesome sequelae of old frostbite. Training of personnel in the method of living in the Arctic and in the use of special gear is considered an important factor in operational efficiency and in the avoidance of cold injury.

6005
Hines, H. M.,
C. J. Imig, and W. J. Roberson
COMPARISON OF BLOOD FLOW IN NORMALLY INNERVATED AND IN SYMPATHECTOMIZED LEGS OF DOGS AFTER EXPOSURE TO COLD. — State Univ. of Iowa College of Med., Iowa City; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-53, May 1956. 7 p. AD 116 537 PB 127 297

Volume blood flow was measured by a technic of venous occlusion plethysmography in hind legs of dogs with intact innervation and in sympathectomized legs during and following rewarming after an exposure to cold. The area of the leg from the level of the knee down was immersed in an alcohol dry-ice mixture at -4° C. for 3 1/2 hours. During and for some time after rewarming there occurred an increase in blood flow in hind legs with intact innervation but no change occurred in sympathectomized legs after exposure to cold. Intravenous injections of pentobarbital sodium and of hexamethonium were followed by an increase in blood flow in legs with intact innervation but with no change in blood flow in sympathectomized legs. The increase in blood flow of limbs after exposure to cold appears to be due to an altered vasomotor tone. (Authors' abstract)

6006
Hines, H. M.,
C. J. Imig, and L. C. Senay
NEUROMUSCULAR DAMAGE RESULTING FROM EXPOSURE OF THE HIND LEGS OF RATS AND HAMSTERS TO COLD. — State Univ. of Iowa College of Med., Iowa City; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-54, May 1956. 5 p. UNCLASSIFIED

Studies were made concerning the effects of exposing one hind leg of rats to baths at 0° C. for 3 hours upon tibial nerves and gastrocnemii. Evidence was found that the changes in muscle were secondary to motor nerve damage. A diminution occurred in the capacity of tibial nerves of the legs which had been exposed to cold to elicit upon stimulation isometric tension in their gastrocnemii. The changes in muscle following exposure of a leg to cold resembled those following motor nerve denervation. Atrophy and loss of strength occurred in the gastrocnemius muscles after but not before impairment of motor neuron function was in evidence. The exposure to cold of a leg with a denervated gastrocnemius muscle did not result in any greater atrophy or strength loss than occurred in its unexposed denervated contralateral control. No functional damage was found in the tibial nerves and gastrocnemii of hamsters after subjecting their legs to the same pattern of cold exposure as was employed in the studies on rats. (Authors' abstract)

6007
Horvath, S. M.,
G. B. Spurr, B. K. Hutt, and L. H. Hamilton
REACTIONS OF NUDE MEN TO A MILD COLD EXPOSURE [Abstract]. — Federation Proceedings, 15 (1, part I): 96. March 1956. DLC (QH301.F37, v. 15)

Ten nude male subjects were exposed a total of 15 times for a 12-hour period to an environment having an ambient temperature of 15° C. and a relative humidity of 35%. The subjects were first maintained for a 24-hour period in an environment of 24° C. and 50% relative humidity and were returned to this environment for further tests following their cold exposure. Body temperature, metabolism and some cardiovascular reactions were measured before and after 1, 5 and 10 hours of cold exposure. The rectal temperature did not change as a consequence of the cold exposure. However, because of the fall in mean skin temperature, the mean body temperature decreased from a control value of 35.2° to 33.5° C. Heat production increased from a control of 41.3 Cal./m.^{2}/hour to a peak value of 63.9 Cal./m.^{2}/hour during the 5th hour in the cold. (Authors' abstract)

6008
Iampietro, P. F.,
J. A. Vaughan, A. R. MacLeod, B. E. Welch, J. G. Marcinek, J. B. Mann, M. P. Grotheer, and T. E. Friedemann
CALORIC INTAKE AND ENERGY EXPENDITURE OF ELEVEN MEN IN A DESERT ENVIRONMENT. — Quartermaster Research and Development Center. Environmental Protection Research Div., Natick, Mass. Technical Report no. EP-40, Oct. 1956. [28] p. AD 114 059 PB 126 578

Caloric intake and expenditure were studied in eleven men during a sojourn in the hot-dry environment found at Yuma, Arizona. The mean ambient temperature was 33° C. (91° F.) and the mean relative humidity was 35%. Caloric intake averaged 2857 Calories/man/day during the study. When caloric intake was corrected for the caloric equivalent of body weight loss (0.102 kg./man/day), the average intake was increased to either 3311 Cal./day or 2878 Cal./day, depending on whether the correction for change in body fat was based on skinfold thickness data or on body water data. The

dietary composition of the food (per cent of Calories) was 12.5% protein, 35.5% fat and 52.0% carbohydrate. Energy expended during the 24-hour period (marching and other activities) averaged 2977 Calories/man/day. (Authors' abstract)

6009
Iampietro, P. F.,
E. R. Buskirk, and D. E. Bass
DIURNAL OXYGEN CONSUMPTION AND RECTAL TEMPERATURE OF MAN DURING CONTINUOUS COLD EXPOSURE [Abstract]. — Amer. Jour. Physiol., 187 (3): 606-607. Dec. 1956.
DLC (QP1.A5, v. 187)

A study was made of the effects of exposure to a temperature of 60° F. for 14 days with little clothing and minimal physical activity on the daily patterns of oxygen consumption and rectal temperature of five men. Resting oxygen consumption during cold exposure exhibited gradual increases during the day which were similar in pattern, but at a higher level, to those observed during a preceding period of exposure to 80° F. Basal metabolic rate and rectal temperatures were unchanged in the cold, while caloric intake was increased. It is concluded that the body increases oxygen consumption and food intake sufficiently to maintain the body core temperature from the first day of cold exposure, and that the increased oxygen consumption is not attributable to an increased metabolic rate.

6010
Imig, C. J.,
W. J. Roberson, M. Gault, and H. M. Hines
BLOOD FLOW IN THE HIND LIMBS OF DOGS AFTER EXPOSURE TO COLD. — State Univ. of Iowa, Iowa City; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-66, March 1956. 8 p. AD 94 789
PB 124 613

Volume blood flow was measured in the hind limbs of dogs during and following rewarming of the tissues after exposure of the extremity to various intensities and durations of cold. The volume of blood flow was found increased during and following the rewarming period after cooling of the tissues to 0° or below and after cooling the tissues to approximately 12° C. by a 3 1/2-hour exposure. Cooling of the hind limb to approximately 15° C. by a 30-minute exposure to cold did not significantly affect the blood flow during the post-exposure period. No significant changes in blood flow were found during and following rewarming of the foot after cooling the tissues to 27° C. by exposure to cold for 20 minutes. (Authors' abstract)

6011
Imig, C. J.,
W. J. Roberson, and H. M. Hines
COMPARISON OF BLOOD FLOW IN NORMALLY INNERVATED AND IN SYMPATHECTOMIZED LEGS OF DOGS AFTER EXPOSURE TO COLD. — Amer. Jour. Physiol., 186 (1): 35-38. July 1956.
DLC (QP1.A5, v. 186)

Venous blood flow was measured by venous occlusion plethysmography in the intact or sympathectomized hind legs of dogs during local cold exposure and during rewarming. Cooling to a point slightly above freezing was accomplished by immersion of the legs in an alcohol-dry ice mixture at -4° C. for 3 1/2 hours. An increase in blood flow was observed in hind legs with intact innervation during cold exposure and for some hours after rewarming. No change in blood flow was observed in sympathectomized legs. It is suggested that the increase in blood flow in intact limbs was caused by a cold-induced vasomotor dysfunction or impairment.

6012
Intoccia, A.,
and L. Van Middlesworth
ALTERATIONS IN IODIDE METABOLISM DURING COLD EXPOSURE [Abstract]. — Federation Proceedings, 15 (1, part I): 99. March 1956.
DLC (QH301.F37, v. 15)

Six rats were fed 10 g./day of a low-iodide goitrogenic diet tagged with I^{131}, allowed to reach equilibrium with the diet at an environmental temperature of 27° C., the fecal excretion of I averaging 60% and the urinary excretion 35% of the daily dose. When the rats were exposed to 13° C., no appreciable change was noted in fecal and urinary I^{131} excretion after one week. Lowering the temperature to 10° C. produced, after one day, a reversal in the fecal and urinary excretion pattern: the urinary I^{131} increased from 35% to 70% of the daily intake and fecal I^{131} decreased to 30%. After two days at 10° C., the radioactivity over the thyroid area increased from 345% to 452%. These data may indicate that one of the first metabolic alterations in cold is an increased delodination of thyroid hormone, resulting in more endogenous iodide available to the thyroid and kidneys. (Authors' abstract, modified)

6013
Jasper, R. L.,
H. M. Levy, and H. Platt
THE ACCUMULATION OF FAT IN THE LIVER OF RATS EXPOSED TO COLD. — Army Medical Research Lab., Fort Knox, Ky. Report no. 256, Sept. 7, 1956. ii+12 p. (AMRL Project no. 6-64-12-028, Subtask, Cold Injury Studies). AD 109 058
UNCLASSIFIED

Female rats exposed to cold (1-4° C.) for six hours showed an increase in the fat concentration of the liver from 10.4 to 19.2%. The increase was comparable to that produced by treatment with ethionine. The response often failed to occur in adrenalectomized rats, but was not prevented by administration of estrogen or testosterone, by adrena. demedullation, or by the administration of adrenergic blocking agents. It is proposed that the accumulation of fat in the liver during exposure to cold reflects an increased mobilization of fat from body stores to meet a demand for energy. The prevention by adrenalectomy of an increase in liver fat following a variety of treatments supports the concept of a common mechanism of fat mobilization requiring a facilitating concentration of adrenocortical hormone.

6014
Jasper, R. L.
EFFECT OF ESTROGEN AND ETHIONINE ON COLD-INDUCED FATTY LIVER OF RATS [Abstract]. — Federation Proceedings, 15 (1, part I): 118. March 1956. DLC (QH301.F37, v. 15)

An increase in liver fat is apparent after 2 hours of exposure to cold and develops at a rate comparable to that observed in ethionine-treated fasting rats maintained at 25° C. Attempts to intensify this cold-induced increase in liver fat by the injection of ethionine prior to cold exposure gave variable results. In some instances ethionine further increased the accumulation of liver fat, but in a number of experiments it exerted a significant lipotropic action. The lipotropic effect of ethionine in cold-exposed animals appears to be related to the systemic estrogen level. Estrogen-treated and untreated castrate female rats when exposed to cold showed the same increase in liver lipides as intact animals. However, a priming dosage of estrogen given 4 hours before cold exposure resulted in a marked lipotropic action of injected ethionine. (From the author's abstract)

6015
Jaulmes, C.,
and A. Benitte
[ACCLIMATIZATION TO COLD] Acclimatation au froid. — Revue médicale française (Paris), 37 (6): 363-368. June 1956. In French, with English summary (p. 368). DNLM

Selecting persons who can tolerate cold is impossible by ordinary medical tests. Diet for cold climates was found to be dependent upon physical strain and dress variable according to various atmospheric conditions (cold, humidity, wind, altitude), but essentially with many layers of air between the garments. In a cold environment, prevention of frostbite is essential, and rapid, intense heating is recommended for therapy in cases of acute hypothermia. On the whole it is stated that cold acclimatization depends on clothing, diet, training, and mental and physical efficiency.

6016
Jaulmes, C.,
and A. Benitte
[ACCLIMATIZATION TO HEAT] L'acclimatation à la chaleur. — Revue médicale française (Paris), 37 (5): 353-360. June 1956. In French, with English summary (p. 360). DNLM

Chemical regulation plays a small role in the body's control of heat. Body temperature is primarily controlled by physical regulation. Upon heat exposure, loss of body water and sodium chloride are the symptoms observed first; when these are compensated acclimatization is possible. Consideration is given to the disorders caused by heat: dehydration syndrome and hyperthermia.

6017
Kassenaar, A. A. H.,
L. D. F. Lameyer, and A. Querido
THE EFFECT OF ENVIRONMENTAL TEMPERATURE ON THE BLOOD PROTEIN BOUND IODINE CONTENT OF THYROXINE MAINTAINED THYROIDECTOMIZED RATS. — Acta endocrinologica (Copenhagen), 21 (1): 37-40. Jan. 1956. In English. DNLM

Thyroidectomized rats kept at 4°C. and maintained on 6 mg. of dl-thyroxine per day had significantly lower protein-bound-iodine blood levels than did animals kept at 21°C. or 32°C. In normal rats an almost significantly higher ($0.002 < P < 0.05$) protein-bound-iodine level of blood was found when the animals were kept at 4°C. as compared with the values obtained at room temperature of 32°C. (From the authors' summary)

6018
Kirsteins, A.
SURVIVAL OF CORTISONE- AND CORTICOTROPIN-TREATED RATS DURING EXPOSURE TO COLD. — Surgery, 40 (2): 337-348. Aug. 1956. DLC (RD1.S78, v. 40)

The tolerance to cold (-9°C.) in rats is significantly greater at rest than during moderate exercise. Short-term cortisone or corticotropin administration prior to and/or during exposure to cold did not appreciably influence tolerance of anesthetized or non-anesthetized rats to cold, neither at rest nor during moderate exercise. Adrenal suppression (medical adrenalectomy) did not significantly alter the tolerance to cold of rats at rest or during moderate exercise. Long-term intermittent cortisone administration prior to exposure to cold definitely increased the tolerance of rats to cold, both at rest and during moderate exercise. (Author's summary, modified)

6019
Kuhn, L. A.
THE EFFECTS OF ARCTIC CLIMATE AND DIFFERENT SHELTER TEMPERATURES ON THE ELECTROCARDIOGRAM. — Amer. Heart Jour., 51 (3): 387-397. March 1956. DLC (RC681.A1A58, v. 51)

Normal men between 20 and 21 years of age performed standard work outdoors in an artic climate (average temperature -16.4° F., with a low of -34° F.) while living in shelters with temperatures of 50° or 70° F. Significant electrocardiographic changes occurred with greater frequency and severity in the arctic climate after both heavy and light work. No abnormalities were observed in the resting electrocardiograms. Depression of the RS-T segment, increase in height of the T wave, premature ventricular contractions, and disappearance of the R wave in V_4 were the principal post-exercise ECG alterations observed. Changes were more severe in men living in the 50° F. arctic shelter than in those housed at 70° F.

6020
Lamport, H.
TOLERANCE TO HEAT EXPOSURE OF THIRSTING MAMMAL [Abstract]. — Federation Proceedings, 15 (1, part I): 115. March 1956. DLC (QH301.F37, v. 15)

The thermal response of a thirsting mammal exposed in a dry environment hotter than body temperature is estimated, assuming that the animal is covered with fur or clothing which is not wetted by perspiration but permits its free evapo-

ration. Considering a sinusoidal diurnal fluctuation in environmental temperature or a fixed one, this analysis leads to the conclusion that the larger the animal the better it can withstand a period of heat exposure without water, provided that food is freely available. However, allowing for the metabolism needed to permit foraging for food where it is scarce indicates an optimum size for the thirsting mammal under given stressful conditions. (From the author's abstract)

6021
Lavenda, N.,
and R. G. Bartlett
DISTRIBUTION OF CIRCULATING EOSINOPHILS OF THE RAT IN COLD STRESS [Abstract]. — Federation Proceedings, 15 (1, part I): 116. March 1956. DLC (QH301.F37, v. 15)

Rats were subjected to cold stress (10° C.) for one hour. Eosinophil and differential determinations were made prior to and four hours and twenty-four hours after exposure. Before exposure to cold there was invariably a greater concentration of eosinophils in the tail than in the circulation from the heart. Four hours after exposure there was a large rise of eosinophil concentration in the tail vein with a moderate rise in the blood of the heart. Twenty-four hours later the eosinophil concentration in both the heart and tail returned to the level of the unexposed animals. (Authors' abstract, modified)

6022
LeBlanc, J.
EVIDENCE AND MEANING OF ACCLIMATIZATION TO COLD IN MAN. — Jour. Applied Physiol., 9 (3): 395-398. Nov. 1956. DLC (QP1.J72, v. 9)

Soldiers exposed for four months to an Arctic winter climate were subjected to a test exposure to cold of 47° F. for one hour at intervals throughout the winter. Heat production, oxygen consumption, and rectal temperature during test exposures at the end of the Arctic period were found to be lower than those observed earlier during the period or those observed in warm-adapted subjects, while skin temperatures were similar in all groups. The results do not substantiate the hypothesis of Carlson that acclimatization is effected by a decreased body core and an increased shell, implying maintenance of rectal temperature. It is suggested that acclimatization is associated with a lowering of the body "thermostat" to more economical levels.

6023
LeBlanc, J. S.
IMPAIRMENT OF MANUAL DEXTERITY IN THE COLD. — Jour. Applied Physiol., 9 (1): 62-64. July 1956. DLC (QP1.J72, v. 9)

The finger dexterity of subjects in whom the hand, arm, or finger was selectively cooled was measured in two tests involving large (A) or small (B) finger-joint movements. Cooling of the arm produced a 20% decline in the performance of both tests, while hand cooling caused a similar decrease in test A but a significantly smaller decrease in test B. After finger cooling a sharp drop in test A and no impairment of dexterity in test B were observed. It is indicated that both increased viscosity of the synovial fluid of the finger, and a factor affected by arm cooling are involved in the decrease in finger dexterity observed in cold.

6024
Lemaire, R.,
and M. Boura
[EFFECTS OF HEAT ON THE INTENSITY OF VASOMOTOR REACTIONS INVOLVED IN THE MAINTENANCE OF ARTERIAL PRESSURE] Effects de la chaleur sur l'intensité des réactions vasomotrices impliquées dans le maintien de la pression artérielle. — Journal de physiologie (Paris), 48 (3): 612-614. May-June 1956. In French. DNLM

Blood pressure measurements were made in anesthetized vivagotomized dogs exposed to temperatures between 55° and 60° C. for 45 minutes. Pressure responses were very marked during the first 20 minutes at which time elevation of central temperature was noted. After 30 minutes of heat exposure, blood pressure began to decrease. These results may be attributed to central and peripheral nervous mechanisms and hormonal mechanisms which are disturbed in an independent manner by the elevated central temperature; increased sensitivity of circulatory regulatory mechanisms during thermolysis reactions caused by elevated central temperature; and thermal vasodilatory reactions under the regulation of the sympathetic nervous system controlled by the cortico-hypothalamic-mesencephalic centers.

6025
Lemaire, [R.]
[THE WORK OF THE AVIATOR IN A TROPICAL CLIMATE] Le travail de l'aviateur en climat tropical. — Forces aériennes françaises (Paris), 11 (118): 441-451. Aug.-Sept. 1956. In French. DLC (UG625.F8F66, v. 11)

The life of the aviator in tropical climates is essentially the same as that in temperate climates, but the continual change from warm to cold temperatures in flying often results in fatigue. The condition is manifested by lassitude in some individuals and hyperactivity in others, insomnia, and digestive disturbances resulting from lowered resistance to microbial infection. Exposure to warm temperatures often impairs efficiency by inducing physiological changes unfavorable to flying, such as peripheral vasodilatation and nervous tension. It is suggested that high performance may be furthered by elimination of aviators with impaired thermoregulatory function from tropical duty, by acclimatization of personnel, and by provision of proper clothing, housing, and nutrition.

6026
Masoro, E. J.,
and C. L. Asuncion
FATTY ACID SYNTHESIS FROM DIETARY CARBOHYDRATE IN RELATION TO COLD EXPOSURE [Abstract]. — Federation Proceedings, 15 (1, part I): 126. March 1956. DLC (QH301.F37, v. 15)

Rats were placed in a metabolism cage ventilated with carbon dioxide-free air at temperatures of 24°-27° C. and 2°-6° C. in the case of control

and cold rats, respectively. During a 24-hour period the rat was allowed to eat ad libitum a diet composed of 25% casein, 10% fat, and 51% uniformly C^{14}-labeled glucose, then killed and analyzed for fatty acid-C^{14} content. The percentage of glucose-C^{14} converted to $C^{14}O_2$ varied considerably but in most cases was greater than 50% of the ingested C^{14}. The percentage of C^{14} incorporated into fatty acids also showed a considerable range. When the data are expressed in milligrams of ingested glucose converted to fatty acids, the cold-exposed rats showed at least as great a lipogenic activity as did the control animals. (Authors' abstract, modified)

6027
Mills, A. W.
FINGER NUMBNESS AND SKIN TEMPERATURE. == Jour. Applied Physiol., 9 (3): 447-450. Nov. 1956. DLC (QP1.J72, v. 9)

The tactile discrimination of the right index fingertips of men exposed for 20 minutes to a cold environment (14° to -23°C.) was found to decrease with the skin temperature of the same area. The measure of tactile discrimination was minimum separation between two edges at which they could be discriminated as two. The log log of this separation was found to be inversely proportional to skin temperature between 0° and +33°C. If the finger was rewarmed by a phase of spontaneous vasodilatation, which generally developed after 15 minutes of exposure to +18° to +23°C., tactile discrimination recovered with the rise in skin temperature. If spontaneous rewarming did not occur at that temperature, frostbite usually ensued. (Author's abstract)

6028
Nedzel, A. J.,
and Jessie Brown
EFFECTS OF BODY CHILLING UPON THE BLOOD VESSELS OF DENERVATED AND INTACT KIDNEYS IN DOGS AND RABBITS: FINAL REPORT. == Jour. Aviation Med., 27 (3): 236-238. June 1956. DLC (RC1050.A36, v. 27)

Chilling of the dog's body leads to a considerable suppression, for a time, of urine flow from the intact kidney, while in the denervated one this is not observed. Chilling of rabbits affects mainly the cortical part of the intact kidneys, where the number of blood vessels and glomeruli is considerably diminished. In the denervated kidneys this is not noted. It is suggested that the application of cold to the skin causes a response in the vascular bed of the kidney. This response is of the type usually seen in a group of extra-abdominal organs which in general react in a vegetative manner similar to that of skin. (Authors' conclusions)

6029
Nelson, D. H.,
R. H. Egdahl, and D. M. Hume
CORTICOSTEROID SECRETION IN THE ADRENAL VEIN OF THE NON-STRESSED DOG EXPOSED TO COLD. = Endocrinol., 58 (3): 309-314. March 1956. DLC (QP187.A25, v. 58)

The adrenal secretion of 17-hydroxycorticosteroids was observed in dogs exposed to a temperature of +10°C. for periods of 1-33 hours three to nine days after insertion of a permanent cannula in the lumbo-adrenal vein. No consistent rise in corticosteroid secretion from the basal level was observed in dogs exposed to cold. Elevated corticosteroid values were found during surgery, following warming after cold exposure and after the administration of ACTH in cold or at room temperature. It is suggested that the observed basal secretion of 6 mg. 17-hydroxycorticosteroids per 24 hours may be adequate to prevent pituitary stimulation in cold, or that the dog is less sensitive to cold stress than are other animals in which an adrenal reaction to cold has been seen.

6030
Nicholls, D.,
F. C. Heagy, and R. J. Rossiter
PHOSPHORUS METABOLISM OF THE ADRENAL GLAND OF THE RAT: EFFECT OF EXPOSURE TO A COLD ENVIRONMENT FOR EIGHT DAYS ON THE AMOUNTS AND P^{32}-LABELLING OF PHOSPHOLIPID AND RIBONUCLEIC ACID. == Canad. Jour. Biochem. and Physiol. (Ottawa), 34 (3): 543-553. May 1956. DLC (R11.C37, v. 34)

The incorporation of inorganic phosphate labelled with P^{32} into the lipid P and ribonucleotide P of the adrenal glands of rats exposed to cold (3° C.) for eight days was measured 16 hours after the P^{32} injection. In the cold-exposed animals, there was a decrease in the specific activity of both the lipid P and the ribonucleotide P and also a decrease in the specific activity of the lipid P and the ribonucleotide P relative to that of the inorganic P of the adrenal. The cold exposure caused an increase in the amounts of lipid P, ribonucleic acid (RNA), and desoxyribonucleic acid (DNA) per pair of adrenals. There was an increase in the ratio lipid P : DNA-P, but no change in the ratio RNA-P : DNA-P. Calculation showed that the cold exposure caused a decrease in the percentage renewal rate of both lipid P and ribonucleotide P, most of which could be attributed to the increased amounts of lipid P and ribonucleotide P present at the beginning of the isotope experiment. However, when allowance for this was made by calculating the renewal rates of the P of the phospholipid and RNA per pair of adrenals, the values remained slightly less in the cold-exposed animals. (Authors' abstract)

6031
Nungesser, W. C.
RENAL RESPONSES TO COLD EXPOSURE OF LARGE v. SMALL DOGS [Abstract]. == Federation Proceedings, 15 (1, part I): 138-139. March 1956. DLC (QH301.F37, v. 15)

Trained, unanesthetized small female dogs (8-10 kg.) exposed for one hour in a room cooled to near 0° C., showed a decrease in effective renal plasma flow, glomerular filtration rate, and urine volume. Skin temperatures of the foot-pads and trunk also decreased in these animals. In the present series large female Labrador-type dogs weighing about 25 kg. were studied under similar conditions. The responses of the large dogs differed from those of the small dogs in several ways. The glomerular filtration rate usually increased, while the renal plasma flow either increased or did not change. The large dogs showed a greater fall in trunk surface temperature than did the

small dogs when exposed to the same cold conditions. The urine volume usually decreased in both groups. Urine osmolarity and the osmotic U/P ratio increased, suggesting that active tubular reabsorption of water was increased in the cold. (Author's abstract)

6032
Peacock, L. J.
A FIELD STUDY OF RIFLE AIMING STEADINESS AND SERIAL REACTION PERFORMANCE AS AFFECTED BY THERMAL STRESS AND ACTIVITY. — Army Medical Research Lab., Fort Knox, Ky. Report no. 231, April 18, 1956. ii+9 p. (Project no. 6-95-20-001). AD 92 230 UNCLASSIFIED

Rifle aiming steadiness and serial reaction performance were investigated under conditions of heat and cold stress. It was found that short duration activity under cold stress resulted in an increase in horizontal tremor, and that a 2-hour forced march in low ambient temperature resulted in increased tremor in both horizontal and vertical dimensions. Heat stress appeared to cause no changes in rifle aiming steadiness. The serial reaction test was not sensitive to heat or cold stress. (Author's abstract)

6033
Pepler, R. D.
THE EFFECTS OF HIGH AIR TEMPERATURES AND HUMIDITY ON PERFORMANCE. — Flying Personnel Research Committee (Gt. Brit.). FPRC no. 961.2, Jan. 1956. 1 p. AD 96 383 UNCLASSIFIED

A summary is presented of experimental findings in regard to the effect of high air temperature and humidity separately or in combination with other stresses on the performance of acclimatized and unacclimatized individuals. In general, efficiency in carrying out skilled tasks in warm atmospheres declines within the first few minutes. This effect on performance is proportionately greater if additional stresses are present. Although a man may be able to compensate for adverse climatic effect under certain conditions, it is done often by neglecting other features of the situation.

6034
Rahandraha, T.,
and A. R. Ratsimamanga
[COMPARATIVE EFFECTS OF CORTICOSTEROID PRECURSORS INCUBATED IN THE PRESENCE OF SCORBUTIC OR NORMAL ADRENAL ON THE RESISTANCE OF ADRENALECTOMIZED RATS TO COLD] Effets comparatifs de précurseurs de corticostéroides incubés en présence de surrénale scorbutique ou normal sur la résistance au froid de rats surrénaloprives. — Journal de physiologie (Paris), 48 (3): 696-697. May-June 1956. DNLM

Adrenalectomized rats exposed to cold (0° C.) were administered incubated products (normal or scorbutic adrenal extract with cholesterones). The results showed the important role of vitamin C in the biosynthesis and metabolism of corticosteroids active in the resistance of the body to cold. Vitamin C appears to have a protective role in the physiological activity of corticosteroids. Cholesterones in the presence of ar adrenal rich in vitamin C are transformed into active polar corticosteroids capable of prolonging survival of adrenalectomized rats exposed to cold. These findings were not observed when scorbutic adrenal extract was used.

6035
Ralli, E. P.,
J. Kuhl, H. Gershberg, E. M. Beck, E. R. Street, and B. Laken
EFFECTS OF VITAMIN SUPPLEMENTATION OF THE DIET ON REACTION TO SHORT-TERM COLD STRESS IN NORMAL YOUNG MALE ADULTS. — Metabolism, 5 (2): 170-196. March 1956. DLC (R850.M38, v. 5)

Young men exposed to a short-term cold stress (immersion in water at 9.3° C. for 8 minutes) were studied before and after six weeks of treatment with either calcium pantothenate, vitamin B_{12} or the whole vitamin B complex plus ascorbic acid. Cold stress caused a fall in temperature in all subjects, except the group receiving vitamin B_{12} which displayed a higher temperature one hour after stress. Treatment did not affect blood pressure, heart rate, serum water and sodium levels, blood sugar, or plasma potassium levels. Cold stress caused various changes in the total numbers and proportions of white blood cells. After the administration of vitamin B_{12}, the levels of serum protein were significantly lower than before. Blood lactic acid, which rose immediately after stress, was not affected by the treatment. The administration of whole B complex plus ascorbic acid, or of calcium pantothenate, decreased serum cholesterol levels. Serum chloride levels after stress were lower in the pantothenate and placebo treated groups. In normal young males on adequate diets, supplementation with large doses of vitamin fractions did not influence the capacity to recover from the effects of cold stress. (Authors' summary, modified) (24 references)

6036
Robinson, K. W.,
and W. V. Macfarlane
THE INFLUENCE OF ENVIRONMENTAL TEMPERATURE ON THE LEVEL OF PLASMA ANTIDIURETIC SUBSTANCES IN THE RAT. — Australian Jour. Biol. Sci., 9 (1): 130-138. Feb. 1956. DNLM

The level of plasma antidiuretic substances was doubled when rats were exposed continuously to an environment of 95° F. for 28 days, and was reduced to half with continuous exposure to cold (43° F.). When reduction in body weight accompanied heating, the antidiuretic potency of the blood was markedly increased. Exposure to a temperature of 104° F. for 2 hours, whether acutely or once daily for 28 days, failed to alter the concentration of antidiuretic substance in the blood. A single exposure to these conditions for 4 hours produced a four-fold rise in the level. The release of antidiuretic substance appears to arise from heat-induced dehydration and from the response of receptors to heat as such. Plasma protein concentration changed in the same direction as antidiuretic substance concentration. Acclimatization to heat or cold did not alter sensitivity of the rat's kidney tubules to exogenous pitressin. Adrenalectomy failed to produce any change in antidiuretic activity of

the blood during short, acute heat exposure. (Authors' summary, modified)

6037
Roddie, I. C.,
J. T. Shepherd, and R. F. Whelan
EVIDENCE FROM VENOUS OXYGEN SATURATION MEASUREMENTS THAT THE INCREASE IN FOREARM BLOOD FLOW DURING BODY HEATING IS CONFINED TO THE SKIN. — Jour. Physiol. (London) 134 (2): 444-450. Nov. 28, 1956.
DLC (QP1.J75, v. 134)

The oxygen saturation of blood samples withdrawn simultaneously from a superficial and a deep forearm vein was determined before and during body heating in eight subjects. During 30-40 minutes of heating by immersion of the feet and calves in warm water, the oxygen saturation of the superficial blood samples gradually increased from 40-72% to 85-99%. No increase was observed in the oxygen saturation of the deep samples. Since the superficial vein drained chiefly skin, and arterial oxygen saturation and the metabolism of forearm tissues were unchanged during heating, it is concluded that the observed changes in venous oxygen saturation reflected changes in blood flow. It is indicated that the increase in forearm blood flow during heating consists entirely of an increase in skin blood flow.

6038
Sapin-Jaloustre, J.,
and H. Sapin-Jaloustre
[THE SLOWING OF THE RATE OF GROWTH OF THE NAILS AND HAIR IN THE ANTARCTIC]
Le ralentissement de la vitesse de croissance des phanères dans l'Antarctique. — Presse médicale (Paris), 64 (38): 901-903. May 12, 1956. In French.
DNLM

The rate of growth of the hair and fingernails was measured in several subjects during an extended exposure to a temperature of 7-14° C. in the Antarctic. The average daily rate of growth of the left thumbnail of four subjects for a six-month period was 0.102 mm., or 6/10 the rate observed by other investigators in France. The average daily growth rate of the hair of the head in two subjects (0.278 mm.) and of the beard in one subject was also 6/10 the rate found in temperate climates. The data suggest a permanent decrease in the surface temperature of men as a result of acclimatization to cold.

6039
Sealander, J. A.
INFLUENCE OF TEMPERATURE STRESS ON UPTAKE OF P^{32} IN THE RAT. — Amer. Jour. Physiol., 186 (2): 227-230. Aug. 1956.
DLC (QP1.A5, v. 186)

Tissue measurements of P^{32} and total P were made 48 hours after intraperitoneal injection of tracer phosphorus in rats exposed to cold (2° C.) or heat (35° C.) for 10 to 30 days. Cold-stressed animals showed a decrease in the P^{32} concentration of bone, adrenals, and liver, an increase in brown fat, and no significant change in body fat. Heat-exposed animals showed an increase in the P^{32} concentration of bone, adrenals, and liver, and no significant change in other tissues. In rats exposed to cold the relative specific activity of adrenals, brown fat, and body fat was increased after 10 days and decreased thereafter, while the activity of liver and bone was progressively decreased. In heat-stressed animals specific activities after 10 days were decreased in bone, liver, and body fat, and greatly increased in the adrenals and in brown fat; this trend was reversed with continued heat exposure. The changes with continued exposure are attributed to dilution, and the vascular shifts and hormonally conditioned metabolic changes associated with acclimation. In general, total P levels increased progressively during exposure to cold (except for bone) and decreased during exposure to heat.

6040
Sellers, E. A.,
and R. W. You
DEPOSITION OF FAT IN CORONARY ARTERIES AFTER EXPOSURE TO COLD. — Brit. Med. Jour. (London), no. 4971: 815-819. April 14, 1956.
DLC (R31.B93, no. 4971)

Over half of the rats fed a stock ration and exposed to cold (1-3° C. for 18 months) developed lipoidosis of the coronary vessels. Total blood lipids and free and bound cholesterol were significantly increased. In several cases aortic lesions and hypertension were observed. Coronary lipoidosis was produced in rats fed a high-fat, high-cholesterol diet with choline and exposed to cold for six weeks. Myocardial lesions were observed in these animals whether choline was present or not. Arterial lesions were not found in rats fed the same diet without choline.

6041
Stevens, C. E.,
S. A. D'Angelo, K. E. Paschkis, A. Cantarow, and F. W. Sunderman
THE RESPONSE OF THE PITUITARY-THYROID SYSTEM OF THE GUINEA PIG TO LOW ENVIRONMENTAL TEMPERATURE. — Jefferson Medical Coll. Daniel Baugh Institute of Anatomy and the Division of Endocrine and Cancer Research, Philadelphia, Pa.; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-21, April 1956. 12 p. AD 113 515 UNCLASSIFIED

Essentially the same as item no. 5007, vol. IV.

6042
Sutherland, G. B.,
and D. H. Campbell
COLD-ADAPTED ANIMALS. I. CHANGES IN BLOOD CLOTTING AND ELECTROPHORETIC PROPERTIES OF RABBIT PLASMA. — Proc. Soc. Exper. Biol. and Med., 91 (1): 64-67. Jan. 1956.
DLC (QP1.S8, v. 91)

Rabbits maintained for two months at 4° C. developed increases in platelet and erythrocyte count, hematocrit, plasma protein concentration, -globulins and fibrinogen, and in whole blood and plasma clotting times. Decreases occurred in serum albumin concentration and prothrombin time. It is suggested that retardation of clotting in spite of decreased prothrombin time may be due to an in-

crease in the resistance of platelets or to chemical alteration of thromboplastin. (Authors' summary, modified).

6043
Sutherland, G. B.,
and D. H. Campbell
IMMUNOCHEMICAL AND BLOOD CHEMISTRY STUDIES OF "COLD ADAPTED" ANIMALS. — California Inst. of Technol., Pasadena; issued by Arctic Aeromedical Lab., Ladd Air Force Base, Alaska (Project no. 8-7951) [Unnumbered report], Sept. 1956. 37 p. AD 116 884 PB 124 783

Electrophoretic patterns were obtained for blood samples of 4 arctic squirrels injected with bovine serum albumin (BSA). The negative results obtained may indicate a seasonal variation in this species. The BSA-injected squirrels showed two components in the alpha globulin moiety, and normal animals showed only one. In rabbits exposed to prolonged cold (4°C.) electrophoretic evidence indicated a decrease in serum albumin and a decrease in beta globulin and fibrinogen fractions. Clotting mechanism studies showed an increase in total protein, platelet and erythrocyte counts, hematocrit, blood and plasma clotting times, and a decrease in prothrombin time. The level of antibody developed appeared to be unaltered, but the rate of loss was much increased by exposure to cold.

6044
Swanson, H. E.
EFFECT OF TEMPERATURE ON INTERRELATIONS BETWEEN THYROXIN AND ADRENALINE [Abstract]. — Federation Proceedings, 15 (1, part I): 183-184. March 1956.
DLC (QH301.F37, v. 15)

The influence of thyroxin on the calorigenic response to adrenaline was calibrated by measuring the oxygen consumption and body temperature of thyroidectomized rats receiving daily doses of 0, 6, 12, 24 and 48 μg of thyroxin before and after adrenaline injection, and living at 30° C., 18° C. and 10° C. The calorigenic action of adrenaline was related to the thyroxin level. The increased metabolism with decreased temperature may be partly chemical and partly muscular. In cold adaptation, an increase in the chemical component may spare the muscles. This may be due to thyroxin-adrenaline interrelationships. In comparison with metabolic rates consequent to administered thyroxin, the oxygen consumption of intact rats, measured at 30° C., indicated a doubling of thyroxin secretion after 2-5 weeks' exposure to 5° C., and the response to injected adrenaline was correspondingly greater. Assuming that endogenous adrenaline secretion is maximal during cold exposure (as suggested by the refractility to exogenous adrenaline when oxygen consumption is measured at 10° C.), then the function of increased thyroxin secretion in cold-adapted animals is to increase the effectiveness of endogenous adrenaline. The response to administered adrenaline at 30° C. confirms the increase in thyroxin activity. (Author's abstract)

6045
Thron, H. L.
[THE EFFECT OF AMBIENT TEMPERATURE ON PERIPHERAL CIRCULATION] Der Einfluss der Umgebungstemperatur auf die Korperschalendurchblutung. — Archiv fur physikalische Therapie Balneologie und Klimatologie (Leipzig), 8 (3): 158-162. May-June 1956. In German. DNLM

There exists considerable controversy in the research literature on the behavior of the peripheral circulation in the human organism at different ambient temperatures. While some claim, on the basis of direct calorimetric studies, that the peripheral circulation remains constant below threshold temperatures of 28°C. or 24°C., others have found that the total peripheral resistance increases steadily from +50° to 15°C. The author's own experiments showed that circulation decreases almost linearly with decreasing temperature from +42°C. to 5°C., which indicates that the hypothesis of an over-all circulation constancy in the cold is unsound. (From the author's summary)

6046
Thron, H. L.
[THE TEMPERATURE GRADIENT OF THE SKIN OF THE HUMAN FACE AT VARYING AMBIENT TEMPERATURES] Der Temperaturgradient in der menschlichen Gesichtshaut bei Einwirkung verschiedener Umgebungstemperaturen. — Pflügers Archiv fur die gesamte Physiologie (Berlin), 263 (2): 109-126. 1956. In German.
DLC (QP1.A63, v. 263)

The temperature gradient of the cheek during exposure to ambient temperatures ranging from 42° to 0° C. was investigated in a single subject. Below 28-29° C. the difference in temperature between the inner and outer surfaces of the cheek showed an almost linear increase with declining ambient temperature, while the sublingual temperature remained largely constant. Above 28-29° C., the temperature gradient of the cheek was stable and the sublingual temperature was increased. Theoretical analysis of the distribution of heat in the cheek tissues on the basis of measured temperatures indicated the presence of a surface blood flow parallel to the body surface, providing maximum heat conservation. Values for heat conduction, blood flow, and heat production in the tissues of the cheek showed a distinct decline with decreasing ambient temperatures.

6047
Treadwell, C. R.
EFFECT OF LIPOTROPIC FACTORS ON COLD PHYSIOLOGY. — George Washington Univ., Washington, D. C. (Contract AF 18(600)-463. Project no. 22-1301-0007). Annual Report, Feb. 1, 1955-Jan. 31, 1956. [12] p. AD 112 119
UNCLASSIFIED

The experiments have confirmed the conclusion of the previous annual report that cold is an effective lipotropic agent. There is no demonstrable requirement for lipotropic factors in the cold in rats receiving diets containing up to 40% fat. The principal effect of cold on the lipids of the liver, blood, adrenals, and kidneys was to produce a marked decrease (to normal levels) in the neutral fat fraction. Cold, over a three week period, did not lower the free or ester cholesterol content of the adrenals, indicating a later adjustment of the animals to the immediate stress of cold. In three

out of four experiments the data have shown that animals in the cold on high fat diets can utilize large amounts of fat without metabolic ketosis. Data on ketosis in the cold suggest strongly that previous reports of metabolic ketosis were due to an actual or relative deficiency of calories. In changing from a low fat diet to a high fat diet there is an immediate response of an increase in the blood lipid fractions both at 25° and at 1° C. During the three-week period there is a gradual return to control levels at both temperatures. Animals at 1° metabolize large amounts of fat without an increase in blood lipids over the levels of comparable animals at 25°. (Author's conclusions)

6048
Vliegenthart, J. A.
[SOME INVESTIGATIONS ON THE CHEMICAL MECHANISM OF THERMOREGULATION BY STRESS OF COLD] Enige onderzoekingen over het chemische mechanisme van de thermoregulatie bij afkoeling. — (Thesis, Rijksuniversiteit te Utrecht) 61 p. Utrecht: H. J. Smits, 1956. In Dutch, with English summary (p. 61). DLC (QP82.V55)

A review is presented of the literature concerned with the physical, physiological, and chemical factors of thermoregulation in homeothermic organisms; biochemistry of thyroid hormones; oxidative phosphorylation and its uncoupling; and cooling experiments. The role of oxidative phosphorylation and its uncoupling by thyroid hormones forms the basis of a hypothesis concerning the biochemical changes following cold stress. These may be due to the temporary production of extra heat, which causes exhaustion of the thermoregulators (thyroid hormones) in the tissue concerned. In order to test the part of the reaction chain postulated in the hypothesis, rats were studied after an exposure of 10 minutes to an air current of -20° C. to determine whether or not their lungs showed a decrease in protein-bound-iodine. In other series of experiments, the tracer technique was applied. Radioactive iodine and thyroxin were injected before cooling. Radiation measurements above the nose and thyroid gland were performed and the excretion products examined for radioactivity. Individual differences in the test animals were found to be great, so that no conclusions could be reached.

6049
Walsh, R. J.
I. Kaldor, and H. Cotter
THE EFFECT OF AMBIENT TEMPERATURE ON HAEMOGLOBIN CONCENTRATION. — Australian Jour. Exper. Biol. and Med. Sci. (Adelaide), 34 (1): 59-64. Feb. 1956. DLC (QH301.A8, v. 34)

The mean hemoglobin concentration of 28 female subjects was observed to be significantly higher on a cold (14.5° C.) than on a hot (29.5° C.) day. No significant difference in hemoglobin values was observed in mice exposed for 1-20 hours to temperatures varying from 6° to 37° C. Splenectomy and absence of hair had no effect on hemoglobin values in rats and mice exposed to heat or cold. It is suggested that the plasma volume in humans is increased in heat by vasodilatation of the cutaneous vessels and that rodents lack the temperature adjusting mechanism associated with cutaneous sweat glands and absence of hair.

6050
Weiss, A. K.,
TISSUE OXYGEN CONSUMPTIONS OF RATS ADAPTED TO COLD [Abstract]. — Federation Proceedings, 15 (1, part I): 197. March 1956. DLC (QH301.F37, v. 15)

Cold exposure of a few days' duration elevates the resting metabolism of the intact rat. Various tissues removed from such cold-adapted animals have increased rates of oxygen consumption. The extent of the elevation of the oxygen consumption of these tissues varies with such factors as strain of animal, age, sex, intensity and duration of cold exposure. Generally, liver slices show the greatest percentage increase; skeletal muscle comes next, followed by cardiac muscle slices and diaphragm; kidney slices, however, are apparently inconsistent in their response. There are other tissues in the cold-adapted rat whose oxygen consumptions are not elevated in a statistically significant manner. Brain cortex, lung, spleen, thymus and testis fall into this latter category. The effect of cold exposure on the oxygen consumption of tissues is similar to the response to massive doses of thyroxine in thyroidectomized rats. (Author's abstract, modified)

6051
Welch, B. E.,
J. G. Marcinek, J. B. Mann, M. P. Grotheer, T. E. Friedemann, P. F. Iampietro, J. A. Vaughn, and A. MacLeod
REPORT ON CALORIC INTAKE AND ENERGY EXPENDITURE OF ELEVEN MEN IN A DESERT ENVIRONMENT. — Medical Nutrition Lab. (Army), Denver, Colo. Report no. 190, Aug. 27, 1956. 1+22 p. AD 108 836 UNCLASSIFIED

Caloric intake and expenditure were studied in eleven men during a sojourn in the hot-dry environment found at Yuma, Arizona. The mean ambient temperature was 33° C. (91° F.) and the mean relative humidity was 35%. Caloric intake averaged 2857 Calories/man/day during the study. When caloric intake was corrected for the caloric equivalent of body weight loss (0.102 kg./man day), the average intake was increased to either 3311 Cal/day or 2878 Cal./day, depending on whether the correction for change in body fat was based on skinfold thickness data or on body water data. The dietary composition of the food (per cent of Calories) was 12.5% protein, 35.5% fat and 52.0% carbohydrate. Energy expended during the 24-hour period (marching and other activities) averaged 2977 Calories/man/day. (Authors' summary)

6052
Wilson, O.
ADAPTION OF THE BASAL METABOLIC RATE OF MAN TO CLIMATE = A REVIEW. — Metabolism, 5 (5): 531-542. Sept. 1956. DLC (R850.M38, v. 5)

A brief review is presented of studies dealing with the effect of climate on the basal metabolic rate (BMR). A low rate is found in normal white

persons living in hot environments, and a low rate is evidenced when going from a temperate zone to the tropics. The high BMR of the Eskimo is dependent upon a high protein diet and apprehension. White men staying in cold regions for long periods showed no increase in BMR. (Author's summary, modified) (190 references)

6053
Wilson, O.
BASAL METABOLIC RATE IN THE ANTARCTIC. = Metabolism, 5 (5): 543-554. Sept. 1956.
DLC (R850.M38, v. 5)

The average basal metabolic rate (BMR) of nine out of fifteen subjects who were followed during a two year stay in the Antarctic and after their return home was +41% during the first year; +5.0% during the second year, and -4.9% after returning home. Average monthly BMR showed a significant seasonal trend, with peaks in the autumn and spring and a fall during the polar night. This periodicity is attributed to outdoor activity, cold exposure, and other factors due to the specific nature of antarctic climate. The low BMR observed during the polar night is regarded as a result of adaptation to a cold climate along with a sedentary, indoor life. (Author's summary, modified) (82 references)

6054
Wood, J. E.,
D. E. Bass, and P. F. Iampietro
RESPONSES OF PERIPHERAL VEINS OF MEN CONTINUOUSLY EXPOSED TO COLD [Abstract]. = Amer. Jour. Physiol., 187 (3): 642. Dec. 1956.
DLC (QP1.A5, v. 187)

Five scantily-clad men were exposed continuously for 2 weeks to a temperature of 60° F. after adaptation for 2 weeks to a temperature of 80° F. Forearm blood flow and venous distensibility were measured at 1-2 day intervals by 90° water plethysmography. Vasoconstriction was found to be greatest during the first 48 hours of cold exposure, becoming less marked with continued cold. Venous pressure was increased in 4 subjects to peak values after 1-7 days, and decreased to normal thereafter. The presence of a generalized peripheral vascular adaptation to continuous cold stress is suggested.

6055
Woodcock, A. H.,
J. J. Powers, and J. R. Breckenridge
MAN'S THERMAL BALANCE IN WARM ENVIRONMENTS. = Quartermaster Research and Development Center. Environmental Protection Research Division, Natick, Mass. Technical Report no. EP-30, July 1956. (Project no. 7-83-01-003). iv+15 p.
AD 106 663 PB 124 637

A theoretical analysis of the factors influencing stress in warm and hot environments is developed on the basis of physical equations of heat and moisture transfer. Two situations are considered, in which either all sweat is evaporated and cooling limited by sweat secretion, or the skin is wet and cooling is limited by the amount of sweat which can be evaporated. In the former case, stress is a function of dry-bulb temperature alone and depends on the amount of sweat secreted, which may vary considerably among individuals. In the latter case, tolerance is shown to be mainly dependent on wet-bulb temperature and on the largely invariable vapor pressure. Consideration is also given to the practical case of complete evaporation from some areas of the skin and incomplete evaporation from others. Graphical presentation is used to demonstrate the separate and combined effects of various environmental factors and of clothing. The theoretical results are shown to agree with the experimental findings of others. (Authors' abstract, modified)

6056
Woods, R.,
and L. D. Carlson
THYROXINE SECRETION IN RATS EXPOSED TO COLD. = Endocrinol., 59 (3): 323-330. Sept. 1956.
DLC (QP187.A25, v. 59)

Thyroxine secretion in animals exposed to cold for various durations was estimated by two methods: (1) determination of the amount of d,l-thyroxine required daily by cold-exposed rats to prevent the thyroid hypertrophy of propylthiouracil treatment (an estimate of the thyroxine needed to restore the hypophyseal-thyroid system to its normal equilibrium); and (2) estimation of the daily dose of l-thyroxine which restored oxygen consumption of thyroidectomized rats to normal (a measure of the over-all peripheral action of the hormone). Results of both studies confirm the previous evidence that thyroxine secretion is greatly increased following two weeks at a low environmental temperature. It is further established that thyroid activity remains at a high level throughout a 60-day cold exposure. (Authors' summary, modified).

6057
Wright, L. A.
MEDICAL ASPECTS OF MILITARY OPERATIONS BY THE RCAF IN A COLD CLIMATE. = Canadian Services Med. Jour. (Ottawa), 12 (9): 768-775. Oct. 1956.
DNLM

The problems are reviewed which involve medical personnel in supporting military operations of the Royal Canadian Air Force in the Northern parts of Canada. Mention is made of the organization of medical facilities, mercy flights, and aeromedical evacuation in a cold climate. Consideration is given to medical personnel trained in parachute-rescue techniques. Trainees pack and maintain their own parachute and equipment, and are given extensive training in bush lore, mountain climbing, travel over rough terrain, and in the principles of survival. This personnel gives instruction in first aid and provides medical coverage at all camps in the event of accident or injury. Epidemiological problems peculiar to the northern area are also discussed briefly. (46 references)

6058
Zarrow, M. X.,
and M. E. Denison
SEXUAL DIFFERENCE IN THE SURVIVAL TIME OF RATS EXPOSED TO A LOW AMBIENT TEM-

PERATURE. — Amer. Jour. Physiol., 186 (2): 216-218. Aug. 1956. DLC (QP1.A5, v. 186)

Mature and immature rats of both sexes were exposed to an ambient temperature of 2° C. A marked sexual dimorphism in survival time during exposure to cold was first observed in the rats at the age of 60 days; comparable results were obtained with 120-days-old rats. In both instances the females survived for a much longer period in the cold than did the males. Castration had no effect in the female, but increased survival time in the male. Pretreatment with daily doses of estradiol had no effect, while testosterone propionate decreased survival time in castrated males and females. It is suggested that the sex difference in survival during cold exposure is the result of an inhibitory action of testosterone rather than a protective effect of the female hormones. (Authors' abstract, modified)

6059
Zipp, H.
[THE BEHAVIOR OF PERIPHERAL ARTERIES OF THE MUSCULAR TYPE IN RESPONSE TO HEAT AND COLD STIMULI] Über das Verhalten der peripheren Arterien vom muskulären Typ bei Wärme- und Kältereizen. — Zeitschrift für Kreislaufforschung (Darmstadt), 45 (13/14): 488-495. July 1956. In German. DNLM

The peripheral pulse wave velocity was measured in 47 subjects after heat and cold stimulation. The data indicate that a decrease of velocity after warm-up and an increase after cooling cannot be explained in terms of a passive pressure response to a fall or a rise of blood pressure. In most cases the active change in the tonicity of the vessel walls predominates over the change in the internal vascular pressure. The type of change in arterial musculature tonus depends upon the initial state of the vascular elasticity. A high-level constriction results in an increase of the pulse wave velocity (a decrease of elasticity) even in the presence of falling pressure. A less constricted vessel reacts with little increase in the peripheral pulse wave velocity in spite of rising blood pressure, while one close to the accommodation state reacts with a large increase of peripheral pulse wave velocity.

g. Sound, Noise, and Vibration

[Protective devices under 10-b; Effects of noise on hearing under 4-c; Noise characteristics of planes under 11-b]

6060
Anthony, A.
CHANGES IN ADRENALS AND OTHER ORGANS FOLLOWING EXPOSURE OF HAIRLESS MICE TO INTENSE SOUND. — Jour. Acoust. Soc. Amer., 28 (2): 270-274. March 1956. DLC (QC221.A4, v. 28)

The systemic effects of local abdominal and scrotal skin exposure to moderately high (150 db., 18 kc., without skin heating) and high (160-168 db., 20 kc., with skin heating) levels of air-borne sound were studied in hairless mice. Areas of the body not under study were protected from noise exposure by shielding. Examination of control mice revealed that 10 minute daily immobilization for one to three months was sufficiently stressful to cause hypertrophy of the adrenal cortex and involution of the thymus. The adrenal response was increased in immobilized mice exposed to moderately high levels of sound. The absence of gonadal damage and the occurrence of only slight changes in the hemopoietic system in both groups indicated that the animals were exposed to only mild stress stimuli. The local and systemic response to more intense sound was similar to that observed after ordinary skin burns, and was attributed to the stress of heating rather than sound. (Author's summary, quoted in part)

6061
Arnould, P.,
and R. Blanchet
[THE EFFECT OF NOISE ON THE LEUCOCYTE PICTURE IN THE GUINEA PIG] L'action du bruit sur la formule leucocytaire chez le Cobaye. — Comptes rendus de la Société de biologie (Paris), 150 (11): 1972-1974. 1956. In French. DLC (QP1.S7, v. 150)

Guinea pigs exposed 6 hours daily for 1 or 5 days to pure tones of 2400 or 520 c.p.s. at 100 db. showed an increase in neutrophils and eosinophils, and a decrease in lymphocytes immediately after exposure. The effect was apparently greater in animals exposed to the higher frequency.

6062
Blanchet, R.
[CONTRIBUTION TO THE STUDY OF THE HUMORAL SYNDROME CAUSED BY NOISE] Contribution à l'étude du syndrome humoral dû au bruit. — (Thesis, Faculté de médecine de Nancy.) 63 p. Bar-le-Duc: Du Barrois, 1956. In French. DNLM (W6P3, Pamphlet vol. 6354)

Sonic vibrations transmitted by air produce, by their effect on hearing, a general body syndrome in both man and animals. Hematological changes produced in guinea pigs by two pure sounds, at an intensity of 100 decibels, consisted of neutrophilic leukocytosis and eosinophilia at a frequency of 2400 hertz, with less significant results at a frequency of 520 hertz. It appears that these changes are mediated by the autonomic nervous system and adrenal cortex which play an active role in the general adaptation syndrome. In addition, experiments concerned with noise, its nature, measurement, general physiological effects, and effects on the ear and blood composition in man and animals are reviewed. (70 references)

6063
Broadbent, D. E.
THE EFFECTS OF NOISE ON PERFORMANCE. — Flying Personnel Research Committee (Gt. Brit.). FPRC no. 964.1, Jan. 1956. 1 p.
AD 96 383 UNCLASSIFIED

A sudden strange noise produces a startle effect, which is likely to impart a variety of functions. This effect dissipates with time and or habituation. In experiments on chronic exposure to noise of 115 db

functions such as distance judgment, dark adaptation, hand steadiness, etc. were found unaffected. A question is raised whether these findings may be a function of the sensory tests employed. Recently it was shown that performance is impaired in continuous high intensity noise if the signal is faint and presented at unpredictable times, or with a rapid series of stimuli presented in random order. These effects do not appear with short work periods and noise of 90 db or below. They are more likely to appear with high-frequency noise than with lower frequencies.

6064
Bugard, P.,
and J. D. Romant
EFFECTS OF NOISES ON THE NEUROMUSCULAR ACTIVITY [Abstract]. — Jour. Acoust. Soc. Amer., 28 (4): 772-773. July 1956. DLC (QC221.A4, v. 28)

The sound produced by an electric bell (100 to 125 db.) was observed to induce in the guinea pig an increase in the excitability of the sciatic nerve. The excitability was apparently caused by a central rather than a peripheral stimulation (sensitive motor reflex). In animals exposed to ether anesthesia, sciatic excitability was not noticeably altered by a sound stimulus. The elimination of the effect by anesthesia is attributed to either an elimination of psychological stress or an inhibition of the transmission of the nervous impulse through the via auditoria and the cerebral circuits. Anesthesia did not reduce the destructive effect of intense airborne ultrasonics on the skin, the underlying tissue, and the nervous centers.

6065
Coleman, P. D.,
and J. Krauskopf
THE INFLUENCE OF HIGH INTENSITY NOISE ON VISUAL THRESHOLDS. — Army Medical Research Lab., Fort Knox, Ky. Report no. 222, Feb. 22, 1956 ii+26 p. (AMRL Project no. 6-95-20-001). AD 86 351
UNCLASSIFIED

Using the psychophysical method of limits, thresholdr for three visual stimuli were determined during noise (intensities between 110 and 140 decibels). Noise had no general or differential effect on the thresholds for visual stimuli. Consistent individual differences were observed in visual threshold during noise. Absence of any demonstrable general effect of noise was due to cancellation of opposite effects in individuals. A possible factor contributing to these individual differences was investigated by showing the subjects' spurious curves, purported to represent their performance during previous sessions. The subject's performance was apparently influenced by the fake curves, although statistical significance was not demonstrated. (Authors' results and conclusions, modified)

6066
Davis, R. C.
ELECTROMYOGRAPHIC FACTORS IN AIRCRAFT CONTROL: MUSCULAR ACTIVITY DURING STEADY NOISE AND ITS RELATION TO INSTRUCTED RESPONSES EVOKED BY AUDITORY SIGNALS. — Indiana Univ., Bloomington; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-124, Dec. 1956. 14 p. AD 126 285
PB 128 460

Electromyographic action potentials were recorded in thirty-two subjects performing muscular activity according to auditory signals which were delivered approximately one per minute in both noise (1000 cycles tone at 90 decibels) and quiet conditions. It was observed that the total background of muscular activity declined through the sitting in both noise and quiet. Muscular activity during prolonged noise did not reveal evidence of adaptation, in contrast to the effects of brief tone. Moreover, prolonged noise inhibited rather than facilitated an instructed response. (Author's summary, modified)

6067
Davis, R. C.
ELECTROMYOGRAPHIC FACTORS IN AIRCRAFT CONTROL: RESPONSE AND ADAPTATION TO BRIEF NOISES OF HIGH INTENSITY. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-127, Dec. 1956. 7 p. AD 126 290
UNCLASSIFIED

The effects on muscle action potentials of brief auditory stimuli varying from 100 to 117 decibels were examined for their relation to stimulus intensity and repetition. Sixteen subjects were used. Within this range of intensity, the muscle action potential was directly proportional to the decibel level of the stimulus. Mean pre-stimulus tension decreases through the experimental period. Adaptation also occurs to stimulus repetition, the size of the muscle action potential decreasing with successive stimuli. (Author's abstract)

6068
Dindinger, H.
[RESEARCH ON A MEASURE OF THE INTENSITY OF SENSATION OF VIBRATIONS OF THE HUMAN BODY: VIBRON-SCALE] Untersuchungen über ein Empfindungsstärkemass für Vibrationen des menschlichen Körpers: Die Vibronskala. — (Thesis, Medical Faculty of Friedrich-Alexander Univ., Erlangen) München: Mikrokopie, 1956. 33 p. In German.
DNLM

A scale was developed for the measurement of sensations of vibration in the frequency range of 50-200 c.p.s. at threshold to medium intensities. The Vibron-scale follows in general the Veg-Scale developed by S. S. Stevens for the perception of weights. If the vibron values are arranged in a geometric series, the progression follows Stevens' law (sensation increases as the cube root of stimulus energy). Practical application of this scale is envisioned for the quantitative measurement of vibration stress on the human organism during flight and car travel.

6069
Doerfler, L. G.
HOW WE HEAR...AND HOW NOISE AFFECTS OUR HEARING. — National Safety News, 74 (1): 24-25, 145-146. July 1956. DNLM

Ear damage from noise may occur in the conductive mechanism of the ear, consisting of damage

to the ear drum or to the ossicles which transmit vibratory energy across the middle ear to the inner ear. Tearing of the ear drum is the more common result of excessive pressure variations caused by intense sounds. The maximum hearing loss caused by conduction involvement is approximately 50 decibels. Regardless of whether or not the shift of auditory threshold is temporary or permanent, the structures involved are the hair cells against which the verve endings terminate on the basilar membrane. Continued exposure to noise following initial damage around 4,000 cycles may result in further hearing loss for 4,000 cycles, in addition to gradual increase or spread in the direction of increasing loss for frequencies lower than 4,000 cycles, until hearing loss invades frequencies concerned with speech.

6070
Eldred, K. M.,
and D. T. Kyrazis
NOISE CHARACTERISTICS OF AIR FORCE TURBOJET AIRCRAFT. — Wright Air Development Center. Aero Medical Lab., Wright-Patterson Air Force Base, Ohio. WADC Technical Note no. 56-280, Dec. 1956. v + 31 p. (Project no. 7210, Task no. 71705). AD 110 680 UNCLASSIFIED

A summary of the noise characteristics of all operational Air Force turbojet aircraft is presented for the use of Air Force base personnel in the establishment of zones in which personal protective devices for maintenance personnel are required to avoid permanent hearing damage. The data include plots of the over-all sound pressure levels of aircraft along the angle of maximum noise radiation versus distance from the aircraft engine exhaust, contours of equal sound pressure levels, and over-all levels at maintenance positions. Generalized noise characteristics are given in order to simplify the evaluation of maintenance operations involving more than one aircraft type.

6071
Franke, E. K.,
and K. M. Hildreth
LOCAL VASCULAR RESPONSE TO VIBRATIONS. — Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio. WADC Technical Report note no. 56-297, July 1956. iv+9 p. (Project no. 7210). AD 97 106 PB 121 567

An increase in heat flow (vasodilatation) was measured by means of a flow calorimeter in subjects after stimulation of the hands by mechanical vibrations (frequency range between 2000 and 20,000 c. p. s.). Individual differences in vasodilatation were investigated, and statistically demonstrated. The relation of these findings to vascular damage produced by long-term exposure to vibrations is discussed. (Authors' abstract, modified)

6072
Gibson, G. R.
JET ENGINE NOISE AND ASSOCIATED PROBLEMS. — Canad. Aeronaut. Jour. (Ottawa), 2 (8): 284-290. Oct. 1956. DLC (TL501.C2713, v. 2)

The damaging effects of noise on electronic equipment, aircraft structures, and the human body are briefly described. Measures of personnel protection and maintenance of efficiency in noise are discussed, including elimination of susceptible individuals, use of ear protectors, and control of the short- and long-term duration of exposure to noise. Methods for the prevention of aircraft noise annoyance are considered, including elimination of the transmittal of noise to people by insulation, absorption, or segregation and elimination of the noise at its source. The criteria of community noise annoyance levels in use by the U.S. Air Force are briefly described.

6073
Krauskopf, J.,
and P. D. Coleman
THE EFFECT OF NOISE ON EYE MOVEMENTS. — Army Medical Research Lab., Fort Knox, Ky. Report no. 218. Feb. 15, 1956. 1+8 p. (AMRL Project no. 6-95-20-001, Subtask S-2) AD 86 352 UNCLASSIFIED

Recordings of eye movements were made during monaural and binaural stimulation with 137 decibels (re threshold) noise and in the absence of noise. When compared to the records obtained in quiet, the binaural records showed a greater amount of movement, but monaural did not. Analysis of eye movement recordings suggested that the increase in total movement was due to an increase in the high frequency tremor movements. (Author's abstract)

6074
Lehmann, G.
[NOISE DAMAGE AND ITS ABATEMENT IN INDUSTRY] Lärmschäden und ihre Bekämpfung in Betrieb. — Therapiewoche (Karlsruhe), 6 (7/8): 181-187. Jan. 1956. In German. DNLM

Noise measurement in terms of decibel, phon, and sone scales is discussed in relation to loudness perception according to the Weber-Fechner law. It is difficult to distinguish between hearing losses due to the aging process and those due to damage from long-term exposure to noise, as both appear in the older age group and may overlap. Audiometric curves for noise damage show a steep rise in decibels around 4000 c.p.s., while age influence manifests itself as gradual loss of hearing at the high end of frequency spectrum. Permanent hearing loss frequently bars employment of former military pilots in civil aviation. Noise prophylaxis may be noise abatement at the source or individual protective measures. In addition to the direct effect on hearing, noise acts as nervous stress to elicit typical cardiovascular reactions. These are not a fear response and are independent of the individual's subjective attitude to noise.

6075
Lehmann, G.,
and J. Tamm
[ON CHANGES OF CARDIOVASCULAR DYNAMICS OF MAN AT REST UNDER THE INFLUENCE OF NOISES] Über Veränderungen der Kreislaufdynamik des ruhenden Menschen unter Einwirkung von Geräuschen. — Internationale Zeitschrift für angewandte Physiologie (Berlin), 16 (3): 217-227. April 19, 1956. In German. DNLM

Ballistocardiographic investigations of the cardiovascular function and Wezler-Boger circulatory

system analysis were conducted with 34 subjects under noise stress. White noises in the octave ranges of 200-400 c. p. s., 400-800 c.p.s., 800-1600 c.p.s., and 3200-6400 c.p.s., and industrial noises were employed. Most subjects reacted to all noises of 90 phon with a rise of the arterial flow resistance and a depression of stroke volume. With noise of 800-6400 c.p.s. circulatory reactions decreased only when the loudness level was reduced to 60 phon. At a loudness level of 70 phon or higher circulatory reactions take place without a conscious negative subjective sensation, while in the range of 60 phon autonomic reactions are observed only in association with a subjective dislike of noise. (Authors' summary, modified)

6076
Lehmann, G.,
and D. Dieckmann
[THE EFFECT OF MECHANICAL OSCILLATIONS (0.5 TO 100 C.P.S.) ON MAN] Die Wirkung mechanischer Schwingungen (0.5 bis 100 Hertz) auf den Menschen. — Forschungsberichte des Wirtschafts- und Verkehrsministeriums Nordrhein-Westfalen (Köln und Opladen), no. 362. 92 p. 1956. In German. DNLM

Subjects were stimulated with vertical, horizontal, and transverse sinusoidal vibrations, in the frequency range of 1-70 c.p.s. in sitting and standing positions. Physical measurements of acceleration and direction of vertical vibration showed differential resonance of various body parts. The trunk resonates at frequencies around 5 c.p.s., the head at 20 to 30 c.p.s. Transverse vibration was perceived by subjects as the most unpleasant. Amplitudes of head movements at the above vibrations were large and ellyptical. Nausea and gastric complaints which accompanied transversal vibrations suggest a relation between ellyptical head movements and kinetoses by the way of endolymph movement in labyrinths. Considering vibration stresses on man, from the standpoint of vibration-mechanics man should be regarded as a damped-mass-spring system rather than pure mass. His elastic properties are to be considered also. (52 references.)

6077
•MEDICAL ASPECTS OF HIGH INTENSITY NOISE: EAR DEFENSE [Motion picture]. — U. S. Navy, 1956. Made by De Frenes Co.
Distributor: Navy (MN 9318-c)

Points out the hazards associated with high noise levels produced by jet aircraft and other noisy equipment found ashore and aboard ship. Describes the nature of noise, its effects on hearing, and various devices that are used for the protection of hearing. (Duration, 21 min.; sound track; black and white; 16 mm.) (From Film Reference Guide, National Library of Medicine, 1961)

6078
•MEDICAL ASPECTS OF HIGH INTENSITY NOISE: GENERAL EFFECTS [Motion picture]. — U. S. Navy, 1956. Made by De Frenes Co.
Distributor: Navy (MN 9318-a)

Explains the increasingly serious hazards of high intensity noise; describes the nature of noise and some of its physiological and psychological effects; and gives examples of sounds of extreme intensity approximating conditions found near jet aircraft, artillery, and other noise-producing equipment. (Duration, 21 min.; sound track; black and white; 16 mm.) (From Film Reference Guide, National Library of Medicine, 1961)

6079
•MEDICAL ASPECTS OF HIGH INTENSITY NOISE: PREVENTION OF HEARING LOSSES [Motion picture]. — U. S. Navy, 1956. Made by De Frenes Co.
Distributor: Navy (MN 9318-b, Medical Dept. only)

Shows how to recognize symptoms of acoustic trauma resulting from exposure to high intensity noise. Demonstrates the methods for detecting hearing losses and describes the effectiveness of various ear protection devices. (Duration, 20 min.; sound track; black and white; 16 mm.) (From Film Reference Guide, National Library of Medicine, 1961)

6080
Monaenkov, A. M.
[EFFECTS OF PROLONGED SOUND STIMULATION BY AN ELECTRIC BELL ON THE CONDITIONAL REFLEX ACTIVITY OF ANIMALS] Vliianie dlitel'nogo razdrazhenila zvukom elektricheskogo zvonka na uslovnoreflektornuiu deiatel'nost' zhivotnykh. — Zhurnal vysshei nervnoi deiatel'nosti (Moskva), 6 (6): 891-897. Nov.-Dec. 1956. In Russian. DLC (QP351.Z65, v. 6)

Excessive acoustic stimuli exert a strong effect on the higher nervous activity of white rats as studied by the conditional reflex activity established by the motor-alimentary method of L. I. Kotliarevsko. In some of the animals it takes the form of steady, protective inhibition of the cerebral cortex (symptoms of convulsions); in others it is manifested by appearance of pathological signs and partial interruption of the excitatory processes. In addition to the above, all rats showed disturbances of autonomic functions. It is concluded that prolonged sound stimulation leads to serious disturbances of the central nervous system activity of the type of "disintegration" of higher nervous acitivity. (Author's summary, modified)

6081
NOISE CONTROL. — National Safety News, 73 (3): 99, 101-103. March 1956. DNLM

Noise is discussed, as regarded by the industrial engineer and hygienist. Measurable noise components are: intensity or loudness, frequency or pitch, and quality or timbre. Limits for injurious noise are vague and uncertain, but it is postulated that hearing damage is likely to occur at noise levels above 90 decibels. Remedies for the noise problem are considered in two classes: engineering control and medical control. Engineering noise control methods include: (1) noise control at the source; (2) substitution of noisy area with a less noisy operation if possible; (3) isolation of noise source; (4) use of resilient mountings; (5) use of sound-absorbing materials; and (6) use of personal protective ear devices (molded ear plugs, ear muffs, ear valves). Medical control consists chiefly of the supervision

of pre-employment and periodic post-employment audiometry and prescription of hearing aids.

6082
Parrack, H. O.
NOISE, VIBRATION, AND PEOPLE. — Noise Control, 2 (6): 10-24. Nov. 1956. DLC (TA365.N6, v. 2)

The physiological effects of acoustic energy are considered in relation to mechanical damage to the body and functional impairment of sense organs. An attempt is made to evaluate the percentage of population who will develop hearing loss due to aging alone, those who will develop hearing loss due to exposure to noise, and those who will develop it for other reasons. Persons who are susceptible to permanent hearing damage from exposure to noise may be detected by an unusually large temporary threshold shift for a given noise exposure. Less direct effects of noise include interference with communication and arousal of antagonistic emotions. Problems created by noise fields found in practical situations are considered for the air crew, passengers, aircraft maintenance crew, other ground support personnel, and people outside an air base.

6083
Peters, R. W.
EFFECT OF ACOUSTIC ENVIRONMENT UPON SPEAKER INTELLIGIBILITY. — Jour. Speech and Hearing Disorders, 21 (1): 88-93. March 1956. DNLM

Same as item no. 3307, vol. III.

6084
Portmann, M.,
and M. Durucoa
[THE EFFECT OF JET ENGINES ON THE EAR] A propos de l'action des moteurs à réaction sur l'oreille. — Médecine aéronautique (Paris), 11 (4): 363-394. 1956. In French, with English summary (p. 388-389). DLC (TL555.M394, v. 11)

Histological examination of the ears of guinea pigs exposed to jet engine noise for 3 to 1000 hours showed degeneration of the organ of Corti, beginning at the second spiral and extending, with increasing exposure, to the first spiral and finally to the apex; exudation of the cochlea; degeneration of the cells of Hensen; swelling of Reissner's membrane; and transudation of the eardrum. Audiometric examination of aircraft mechanics exposed for short daily periods to noise revealed no hearing loss, while workers exposed for 2-3 hours a day showed a hearing loss in one year of 10-15 decibels. Installation of a soundproof cabin apparently resulted in the prevention of further hearing loss (tested 3 years later) in partially-deaf workers. No vestibular disturbance was observed in any noise-exposed personnel. The results are similar to those found by other investigators for exposure to complex noise. (122 references)

6085
Roggeveen, L. J.,
and H. A. E. van Dishoeck
VESTIBULAR REACTIONS AS A RESULT OF ACOUSTIC STIMULATION. — Practica oto-rhino-laryngologica (Basel), 18 (4): 205-213. July 1956. In English. DNLM

Literature on vestibular reactions caused by sound stimuli is reviewed. The description of a similar case is added, in which the lesion responsible for vestibular symptoms was demonstrated in the roentgenogram. The lesion consisted of a hiatus in the bony wall of the left superior semicircular canal, a localization not described before. (Authors' summary)

6086
Romani, J. D.,
and P. Bugard
A FURTHER STUDY OF THE INFLUENCE OF SOUNDS ON THE ENDOCRINE SYSTEM [Abstract]. — Jour. Acoust. Soc. Amer., 28 (4): 773. July 1956. DLC (QC221.A4, v. 28)

Two-thirds of guinea pigs subjected to sounds of 100 to 125 db. died after 12 to 18 hours of exposure. Examination showed congestion of the pituitary glands, with degranulation of the acidophil cells; inhibition of the thyroid and inability to react to overstimulation; and a decrease of lipoids in the adrenals. From these data and from previous observation the following is demonstrated: (1) Ultrasonics of 22.5 kc. at 160 to 165 db. for 1 to 4 minutes induce a destruction of the medullar adrenal area, with the cortical area intact; death occurs in several minutes, with an increase in body temperature. (2) Sounds of 100 to 125 db. for 15 to 25 minutes induce an alarm reaction at the stage of exhaustion; death occurs in 12 to 48 hours. (3) Sounds of 1 to 4 kc. at 130 to 140 db. for 1 to 4 hours induce a well-compensated alarm reaction in the dog and rabbit; after 200 hours adaptation occurs, with recuperation of the normal functions of the endocrine system.

6087
Spieth, W.
ANNOYANCE THRESHOLD JUDGMENTS OF BANDS OF NOISE. — Jour. Acoust. Soc. Amer., 28 (5): 872-877. Sept. 1956. DLC (QC221.A4, v. 28)

Annoyance threshold judgments were made by subjects who were asked to adjust the intensity of noise during a three-minute exposure to a level immediately below that which would be annoying if it were present during work. Thirteen bands of noise covering the frequency range from 50 to 13,000 c.p.s. were matched for equal loudness and utilized as stimulating sounds. Noise band frequency had no apparent effect on annoyance threshold judgments when subjects made judgments of all thirteen bands of noise; the threshold of the highest band (6600-9000 c.p.s.) was lower than that of other bands when subjects made judgments of only one band. Subjects who worked or had worked in noisy situations gave thresholds 15 db. higher than subjects who had worked only in office situations. Of the latter group, subjects who attempted to imagine themselves in an actual working situation during the experiment gave thresholds 15 db. higher than those of subjects who did not.

6088
Staab, F.
[SOUND AND ULTRASOUND WAVES GENERATED BY JET MOTORS: EFFECTS AND ABATEMENT]

Von Strahlantrieben ausgesandte Schall- und Ultraschallwellen: Wirksamkeit und Verminderung. == Jahrbuch der Wissenschaftlichen Gesellschaft für Luftfahrt (Braunschweig), 1955: 265-275. 1956. In German, with English summary (p. 275).
DLC (TL503.W5563, v. 1955)

Noise intensities produced by various types of jet-engines, their dependence on the angle relative to the jet and on the distance, are discussed as well as the ultrasonic radiation generated by pulsejet engines. The damage to human health inflicted by intense ultra-sound waves is considerable as revealed by animal experiments and workers in jet engine industries. Various attempts to reduce noise emission are described.

6089
Stýblová, V.
[EFFECT OF MECHANICAL VIBRATION ON THE NERVOUS SYSTEM] Vliv mechanických otřesů na nervový system. — Pracovní lékařství (Praha), 8 (4): 262-265. Aug. 1956. In Czech, with English summary (p. 265). DNLM

In workers exposed to mechanical vibrations, neurological changes of the neuritic, polyneuritic, or neuritic amyotrophic types were observed, especially in the arms. Mention is made of the participation of the nervous system in the development of occupational vasoneuroses. (Author's summary, modified)

6090
Swartzel, K. D.,
and M. Kamrass
AIRCRAFT NOISE CAN BE MEASURED...AND ITS EFFECT ON HUMAN ACTIVITIES DETERMINED. == SAE Jour., 64 (4): 63-69. March 1956.
DLC (TL1.S5, v. 64)

Procedures in the noise analysis of aircraft include: (1) establishment of the characteristics of the actual sound radiated from the aircraft under study; (2) determination of the intensity of sound at a distance from the aircraft, by consideration of the attenuation suggested by the inverse-square law, air damping, turbulence, wind, temperature, ground attenuation, and the effect of walls; (3) description of the spatial patterns of sound levels at various directions and distances from the aircraft; and (4) prediction of community response to noise by consideration of factors such as type of noise, duration and frequency of occurrence, time of day, type of neighborhood, and previous noise exposure, or by reference to criteria based on the interference of noise with speech intelligibility (Beranek).

6091
Wilbanks, W. A.,
W. B. Webb, and G. C. Tolhurst
A STUDY OF INTELLECTUAL ACTIVITY IN A NOISY ENVIRONMENT. = Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 104 100, Report no. 1, Oct. 31, 1956. [12 p.]
DLC - Sci.

Four tests from the Differential Aptitude Tests were administered to naval cadets in a quiet environment and with an ambient background noise of 110-114 decibels. Significantly higher scores were obtained under noise on the clerical speed and accuracy test. This effect could be demonstrated only when ability differences among the cadets were controlled. Individual subjects obtained about the same relative scores under both quiet and noise. This suggests that if individuals are to be chosen to perform some task in a noisy environment, selection is best made on the basis of the person's ability to perform this task rather than upon anything which might be termed "noise tolerance" at the levels tested. (Authors' summary, modified)

6092
Zeaman, D.,
and N. Wegner
CARDIAC REFLEX TO TONES OF THRESHOLD INTENSITY. == Jour. Speech and Hearing Disorders, 21 (1): 71-75. March 1956. DNLM

Same as item 5201, vol. IV.

h. Physical Work

6093
Dagianti, A.,
V. Pennetti, C. Polosa, and G. Angrisani
[PHOTOELECTRIC OXIMETRY: OXIMETRIC DETERMINATIONS IN NORMAL SUBJECTS AT REST AND DURING MUSCULAR WORK] Ossimetria fotoelettrica: determinazioni ossimetriche in soggetti normali in condizioni di base e durante lavoro muscolare. = Bollettino della Società italiana di cardiologia (Roma), 1 (1-2): 110-116. 1956. In Italian, with English summary (p. 115). DNLM

Following a brief review of the theory and technique of photoelectric blood oximetry, the method was applied to 10 persons at rest and during muscular work on an ergometer, and after breathing 100% oxygen. Oximetric determinations were also made on the subjects while seated, and in supine and erect positions. The following oximetric characteristics were observed: (1) oxygen saturation at rest oscillated from 94% to 97%; (2) saturation increased 2-5% after breathing of 100% oxygen; (3) maximum saturation time was between 1/2 minute and 1 minute and 30 seconds; and (4) muscular work or changes in position produced no effect or an insignificant effect on oxygen saturation.

6094
Dejours, P.,
Y. Labrousse, and A. Teillac
[EXISTENCE OF TWO GROUPS OF FACTORS IN THE VENTILATORY REGULATION OF MUSCULAR EXERCISE] Existence de deux groupes de facteurs dans la régulation ventilatoire de l'exercise musculaire. = Journal de physiologie (Paris), 48 (3): 484-488. May-June 1956. In French. DNLM

In very mild, moderate, and intense exercise, an instant increase is observed in ventilatory volume at the beginning of exercise and an instant decrease at the end of exercise. These changes depend on one of many nerve stimuli consisting of group A stimuli, which are related to motor activity and appear and disappear with it. Group A stimuli explain only one part of the adaptation of ventilatory volume to mus-

cular exercise; another stimulus, Group B, intervenes after the start of exercise, increasing progressively during exercise and combines with Group A to affect ventilatory volume. Group B alone intervenes only during the period of recuperation and explains hyperventilation existing with cessation of muscular exercise. Ventilatory decrease with cessation of exercise is more important than the increase at the beginning of exercise. These phenomena are related to changes in the state of the body between rest and exercise.

6095
Emanuel, I.,
J. W. Chaffee, and J. Wing
A STUDY OF HUMAN WEIGHT LIFTING CAPABILITIES FOR LOADING AMMUNITION INTO THE F-86H AIRCRAFT. — Antioch Coll., Yellow Springs, Ohio (Contract AF 18(600)-(00); and Wright Air Development Center. Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 7214). WADC Technical Report no. 56-367, Aug. 1956. v+12 p. AD 97 206 PB 121 687

The weight lifting ability of a sample of nineteen young men was studied. The lifting procedures were standardized and controlled in order to simulate a precise task, that of loading ammunition into the F-86H aircraft. An ammunition can with varying amounts of weight was lifted to platforms one, two, three, four, five, six, and seven feet above the floor. All subjects could lift the can in the prescribed fashion up to and including five feet above the floor. Only nine subjects could properly lift to six feet, and only one individual performed at the seven foot platform. Suggested maximum weights required for actual lifting tasks are presented. Based on the fifth percentile values, they are as follows: one foot: 142 pounds; two feet: 139 pounds; three feet: 77 pounds; four feet: 55 pounds; five feet: 36 pounds. (Authors' abstract)

6096
Ghiringhelli, G.,
and E. Bosisio
[RELATIONSHIPS BETWEEN VALUES OF THE SPIROMETRIC INDICES AT REST, OF THE MAXIMUM PULMONARY VENTILATION ATTAINED BY STRENUOUS EXERCISE, AND OF THE MAXIMUM AEROBIC EXERCISE IN A GROUP OF HEALTHY SUBJECTS OF DIFFERENT AGE AND SEX] Rapporti tra valori degli indici spirometrici a riposo, della ventilazione polmonare massima da lavoro esauriente e del massimo lavoro aerobico in un gruppo di soggetti sani di varia età e sesso. — Rivista di medicina aeronautica (Roma), 19 (4): 11-19-537. Oct.-Dec. 1956. In Italian, with English summary (p. 635). DLC (RC1050.R56, v. 19)

Spirometric values obtained at rest in 72 normal subjects of both sexes, between 16 and 74 years of age, showed a significant correlation to the values of maximum pulmonary ventilation attained during strenuous muscular exercise on a hand ergometer. From a statistical standpoint, these values were less significant when correlated to values for maximum aerobic exercise. (Authors' summary, modified)

6097
Grandjean, E.
[THE PHYSIOLOGICAL BASIS OF MUSCLE TRAINING] Die physiologischen Grundlagen des Muskeltrainings. — Schweizerische Zeitschrift für Sportmedizin (Genève), 4 (1): 1-5. 1956. In German, with English summary (p. 5). DNLM

With reference to physical training one may distinguish acquired factors related to the various nervous functions commanding muscular activity, and factors of morphologic, chemical, and functional adaptation of the musculature. Training produces an increase in the number of capillaries and raises the glycogen, phosphocreatine, and hemoglobin content in the muscle. Static and dynamic exercises, implying an increase in muscular tension of 1/3 to 2/3 of the maximal force, increase the muscular mass and strength. Static (isometric) exercises enhance endurance for anaerobic work (posture, etc.), while dynamic (isotonic) exercises with rapid movements develop muscular force which results in increased speed of movements. (Author's summary, modified)

6098
Hemingway, A.
THE CIRCULATION IN MUSCULAR EXERCISE. — In: R. J. S. McDowall. Control of the circulation of the blood. Supplemental volume, p. 205-223. London: W. Dawson and Sons, 1956. DLC (QP101.M33, v. 2)

This is a review of the literature concerned with the effects of muscular exercise on cardiac output and rate, pulmonary circulation, and blood flow and volume. Also considered are circulatory reactions in tests for physical fitness; effects of training on circulation; and the relationship of magnitude and duration of hyperemia to muscular contraction, and to the role of chemical factors in the mediation of hyperemia in active muscle. (122 references)

6099
Herbst, R.
[SPORTS AND HEART IN PHYSIOLOGY AND PATHOLOGY] Sport und Herz in Physiologie und Pathologie. = Ärztliche Wochenschrift (Berlin), 11 (40): 877-880. Oct. 5, 1956. In German. DNLM

The compensatory reactions of the normal heart to physical stress imposed by various athletic disciplines are reviewed. Further, the response of the pathologic heart is described in reference to stresses of physical work, flight stresses under conditions of sport and commercial flight, and stresses encountered in mountaineering.

6100
Holubář, J.,
and V. Seliger
[CHANGES IN PULMONARY VENTILATION DUE TO CONDITIONED STIMULI AND EXERCISE] Rabochie i uslovnoreflektornye izmenenija legochnoi ventilatsii. = Physiologia bohemoslovenica (Praha), 5 (2): 170-176. 1956. In Russian, with German summary (p. 175-176). DNLM

Pulse rate, respiratory rate, and pulmonary ventilation were registered in 10 men during and after exercise on a bicycle ergometer. Changes in the pulmonary ventilation during and after physical stress did not run parallel to those of the respiratory rate. The increase in ventilation persisted much longer after exercise than the increase in respiratory rate.

This proves that, to compensate for the oxygen debt, ventilation is increased primarily by depth of respiration. Violent fluctuations of ventilation during and after physical stress were interpreted as a chemoreceptor reflex mechanism for the regulation of pulmonary ventilation. The establishment and characteristics of conditioned reflexes of these functions are discussed.

6101
Kirchhoff, H. W.,
H. Reindell, and A. Gebauer
[INVESTIGATIONS OF THE OXYGEN UPTAKE, CARBON DIOXIDE EXCRETION, RESPIRATORY MINUTE VOLUME, RESPIRATORY EQUIVALENT, AND THE RESPIRATORY QUOTIENT DURING PHYSICAL STRESS IN AVERAGE INDIVIDUALS AND TOP ATHLETES] Untersuchungen über die Sauerstoffaufnahme, Kohlensäureabgabe, das Atemminutenvolumen, Atemäquivalent und den respiratorischen Quotienten während körperlicher Belastung bei Normalpersonen und Hochleistungssportlern. — Deutsches Archiv für klinische Medizin (München), 203 (4): 423-447. 1956. In German. DNLM

The "Metabograph" developed by A. Fleisch permits simultaneous and continuous registration of oxygen uptake, CO_2 excretion, respiratory minute volume, respiratory quotient, and the respiratory equivalent at rest and during physical stress. Normal values were obtained by the above method for 80 normal individuals at different levels of physical stress and compared with those obtained for 40 selected top athletes. The authors point to the significance of different ventilation values for the determination of the range and limits of performance in the experiment with physical work. The rise of the respiratory quotient to values around one is to be regarded as a work-limiting factor. The work respiratory equivalent allows important observations of the respiratory economy. (Authors' summary, modified)

6102
Kostial, K.,
Lj. Božović and Lj. Purec
[ADAPTATION TO MUSCULAR WORK AFTER A LONG PERIOD OF REST] Adaptacija na mišični rad nakon dužeg odmora. — Arhiv za higijenu rada i toksikologiju (Zagreb), 7 (1): 23-25. 1956. In Croatian, with English summary (p. 25).

In albino rats previously adapted to muscular work the decrease of eosinophils and ascorbic acid content of the adrenal gland after exercise is less pronounced than in control animals, even after a resting period of one month. According to the eosinophil reaction and ascorbic acid test, the animals seem to remain adapted to muscular work in spite of the long rest. (Authors' summary)

6103
Lehmann, G.
[MUSCLE WORK AND MUSCLE FATIGUE IN THEORY AND PRACTICE] Muskelarbeit und Muskelermüdung in Theorie und Praxis. — Arbeitsgemeinschaft für Forschung des Landes Nordrhein-Westfalen (Köln und Opladen), no. 56: 62-88. 1956. In German. DNLM

The author discusses the cellular metabolism of muscle tissue and vasomotor reactions within muscle during static work, dynamic work, and at rest. From the viewpoint of economy there is an optimal speed of movement. As the speed increases, more energy is used by the active muscles and their antagonists for braking the movement. Muscle circulation is also decreased since the contraction phases are relatively lengthened at the expense of the recovery phases. Similar changes are observed at speeds below the optimal speed. At the beginning of work the muscle is hypoxic until the metabolic breakdown products stimulate capillary dilatation and intramuscular circulation improves. The latter fact influences the length of rest periods, work intensity, and recovery time. Industrial applications of these findings are discussed at some length.

6104
Lomonaco, T.,
L. Forti, F. Rossanigo, and B. Tagliamonte
[SOME RESPIRATORY DATA OBSERVED IN A GROUP OF SUBJECTS UNDERGOING INTENSE MUSCULAR WORK PROLONGED UNTIL EXHAUSTION] Alcuni dati respiratori osservati in un gruppo di soggetti sottoposti a lavoro muscolare intenso protratto fino all' esaurimento. — Rivista di medicina aeronautica (Roma), 19 (1): 42-66. Jan.-March 1956. In Italian, with English summary (p. 60-61). DLC (RC1050.R56, v. 19)

Using a bicycle ergometer, twenty-five males between 20-45 years of age were subjected to intense muscular exercise prolonged until the point of exhaustion. The following observations were made: (1) The increase in pulmonary ventilation depended more upon tidal volume than respiratory frequency. (2)The maximum oxygen consumption in 18 subjects corresponded to the maximum value of pulmonary ventilation; in 7 subjects it occurred one minute before the end of effort; the highest values were observed during the last minutes of the exercise. (3) The maximum value of the Cal/L ratio (energy consumption to ventilation) and the minimum value of the ventilation equivalent for oxygen, never appeared at the same time with the maximum values of oxygen consumption and pulmonary ventilation which occurred much earlier. (4)Decrease in the Cal/L ratio, and the corresponding increase of the ventilation equivalent for oxygen, occurred at the moment when the value of respiratory exchange ratio equaled or exceeded one, and when the values of metabolic consumption averaged 10,196 Cal/min. (From the authors' summary)

6105
Lomonaco, T.
[USE OF PHYSICAL EXERCISES TO INCREASE THE PHYSIO-PSYCHIC RESISTANCE TO MODERN FLIGHT] Utilità degli esercizi fisici per aumentare la resistenza fisio-psichica al volo moderno. — Rivista aeronautica (Roma), 32 (1): 25-36. Jan. 1956. In Italian. DLC (TL504.R54, v. 32)

Physical exercise is recommended for aviators flying at high altitudes as a means of increasing respiratory capacity and cardiovascular function, and improving blood crasis. Consideration is given to sports activities (bob sledding, mountain climbing), exercise (gymnastics, double wheel exercise), and physiological training exercises in anoxia, de-, compression, and acceleration, which are used to increase the physiological and mental performance of pilots.

6106
Losada, A.,
R. Florenzano, H. Donoso, and G. Prieto
[SOME CARDIOVASCULAR AND RESPIRATORY ASPECTS IN A GROUP OF ATHLETES] Algunos aspectos cardiovasculares y respiratorios en un gruppo de deportistas. = Revista clínica española (Madrid), 62 (5): 311-322. Sept. 15, 1956. In Spanish, with English summary (p. 321). DNLM

Cardiovascular and respiratory function tests were found to be within normal limits in trained athletes. Of the 45 persons examined, 46.4% exhibited systolic murmurs, and in 49.1% the electrocardiogram showed a characteristic pattern of athletic activity when it had been prolonged and intense.

6107
Marshak, M. E.,
and T. A. Maeva
[HYPOXIC PHENOMENA IN MUSCLE ACTIVITY] O gipoksicheskikh iavleniiakh pri myshechnoi deiatel'nosti. = Biulleten' eksperimental'noi biologii i meditsiny (Moskva), 41 (6): 13-15. June 1956. In Russian. DLC (R91.B56, v. 41)

To prevent reduction of the oxygen saturation of arterial blood during muscular work after the warm-up period, subjects breathed oxygen while riding an ergometer bicycle. In all cases, despite oxygen breathing, the oxygen saturation dropped after the first five minutes of work, although not as much as in subjects breathing atmospheric air. The hypoxic phenomena were found to be related to functional shifts in the respiratory and cardiovascular systems indicative of disruption of coordination of functions in physical work which approaches the threshold intensity for that individual.

6108
Masés, P.,
R. Falet, and Martinot
[CONTRIBUTION TO THE STUDY OF THE URINARY ELIMINATION OF CREATINE DURING ACTIVITY AND REST] Contribution à l'étude de l'élimination urinaire de la créatine au cours de l'activité et du repos. = Revue de pathologie générale et comparée (Paris), 56 (677): 641-642. April 1956. In French. DNLM

Young men between 21 and 23 years of age showed an increase in the hourly urinary excretion of creatine during periods of exercise. Untrained subjects displayed a greater increase in creatine excretion then trained subjects. Nyctohemeral variations studied in one subject (diurnal activity 6-21 hours, sleep 21-6 hours) revealed a constant and progressive increase in the hourly urinary elimination of creatine during the period of activity, and a decrease during the period of rest.

6109
Monagle, J. E.,
F. Grande, E. Buskirk, J. Brozek, H. L. Taylor, and A. Keys
BODY TEMPERATURE DURING WORK IN MAN ON RESTRICTED WATER INTAKE AND LOW CALORIE CARBOHYDRATE DIET [Abstract]. = Federation Proceedings, 15 (1, part I): 132. March 1956. DLC (QH301.F37, v. 15)

Rectal temperatures of 12 clinically healthy soldiers were measured during a 1-hour walk on a motor-driven treadmill at 3.5 miles/hour on a 10% grade before (control), during (experimental) and after (recovery) a period of water and calorie restriction. The conditions were rigidly controlled and the men lived and worked in an environment of 78° F. and 65% relative humidity. The daily water intake during the experimental period was 900 cc. for each of 6 men (Group I) and 1800 cc. for the other 6 (Group II). Each man in both groups received 1000 cal./day of pure carbohydrate as the only food and used 1200 cal. for 2 hours of treadmill work daily. In Group I, there was a continuous increase in rectal temperature at the end of 1 hour's work until, after 5 days of water restriction, the average was 1.6° C. higher than before water restriction. In Group II only a small increase of 0.6° C. over the value before water restriction was found on the 3rd day and by the 6th day this value had returned to prestarvation levels and remained essentially unchanged to the end of the water restriction period. Administration of water ad libitum to Group I brought temperatures back to the prerestriction levels and produced no important change in Group II. It is concluded that the water deficit in Group II was insufficient to produce a persistent alteration in thermoregulation as observed in Group I. (Authors' abstract)

6110
Monod, H.,
R. Moynier, J. Scherrer, and C. Soula
[STUDY OF ARTERIAL PRESSURE AND PULSE IN STATIC WORK] Étude de la pression artérielle et du pouls dans le travail statique. = Journal de physiologie (Paris), 48 (3): 662-666. May-June 1956. In French. DNLM

Eighty subjects of an average age of 21 maintained a load at a constant level for as long as was possible (static work). Under these conditions there was demonstrated an elevation of arterial pressure and an acceleration of pulse rate independent of the group of active muscles; an important phenomenon since fatigue appeared within a short time.

6111
Nitz, H. T.,
and F. L. Schmidt
[THE ORTHOSTATIC EKG CHANGES IN THE ATHLETE] Die orthostatischen EKG-Veränderungen des Leistungssportlers. = Sportmedizin (Freiburg im Breisgau), 7 (1): 13-17. Jan. 1956. In German. DNLM

A review of several thousand physical examinations of athletes showed a considerable number of athletes who exhibited orthostatic regulation disturbances on the electrocardiogram. These changes were not significantly related to the subjective well-being, clinical findings, nor tests of circulatory function. Fully trained top athletes, who had trained continuously under a strenuous program, seldom showed electrocardiographic signs. A significant number of deviations were found in athletes with labile autonomic nervous systems and in young individuals during abrupt change of the pace of training. It is concluded that the orthostatic ECG manifestations may reflect a neurophysiological adaptational process of the circu-

latory system during training. This phenomenon may be considered as a symptom of overtraining or early circulatory damage only when subjective complaints and diagnostic tests indicate processes beyond adaptation.

6112
Sertorelli, E.
[RELATION BETWEEN PULMONARY VENTILATION AND ENERGY EXPENDITURE DURING WORK] Rapporto tra ventilazione polmonare e consumo energetico durante il lavoro. — Medicina del lavoro (Milano), 47 (5): 350-355. May 1956. In Italian, with English summary (p. 354-355). DNLM

Pulmonary ventilation and energy expenditure were measured in an open circuit during work at various intensities (walking on a treadmill at different speeds and inclinations) in 10 subjects between the ages of 18 and 35, and 14 subjects between the ages of 40 and 62. Formulas were established from the experimental data for normal young and normal middle-aged subjects which can be used to calculate the values of energy expenditure under conditions of work from the corresponding values of pulmonary ventilation. Both of these formulas can be reduced to a single one which is valid for both young and adult subjects: Energy expenditure (as Calories/minute) = 0.20 x Pulmonary ventilation (as liters/minute). (Author's summary, modified)

6113
Semer, J. M.
THE EFFECT OF STRESS ON THE SODIUM AND POTASSIUM CONCENTRATION IN MIXED SALIVA. — (Dissertation, Medical Faculty of the University of Zürich.) 15 p. Zürich: Karl Schippert and Co., 1956. DNLM (W4Z96, 1956)

The Na and K concentrations in the saliva and the blood eosinophiles were studied in six children before and after an operation and also in five adults before, during, and after an exactly measured amount of muscular work. The surgical stress led to a massive fall in eosinophiles, but had no effect on the saliva electrolytes. The muscular work led to a small fall in the blood eosinophiles and to a marked drop in the (Na K) concentration ratio in saliva. As cause for these conflicting results, the author considers the different age groups, the different qualitative secretions of the adrenal cortex, and the secretions of adrenalin, noradrenalin, and pitressin as being important factors. (Author's summary)

6114
Slonim, N. B.,
D. G. Gillespie, and W. H. Harold
PEAK OXYGEN UPTAKE OF TRAINED HEALTHY YOUNG MEN AS DETERMINED BY A TREADMILL METHOD. — Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 105 104, Report no. 1, Oct. 8, 1956. ii+11 p. AD 119 597 UNCLASSIFIED

The peak oxygen uptake of 50 healthy, young, white men (naval aviation cadets) has been determined by a treadmill method. The treadmill speed was held constant at 3.5 m.p.h., and the tests at each treadmill grade were of six minutes duration. Peak oxygen uptake is defined arbitrarily for the purposes of this study as the highest value obtained for rate of oxygen uptake as determined by measurement and analysis of expired gas collected during the sixth minute of exercise. The mean peak oxygen uptake was found to be 4.05 liters per minute, with a standard deviation of 0.39 and a range of 3.22 to 5.17. The mean expiratory minute volume was found to be 147 liters per minute, with a standard deviation of 20 and a range of 95.2 to 201. These values exceed those generally accepted as occurring during muscular work. The mean expiratory minute volume was 83 per cent of the mean maximal breathing capacity in 33 subjects in whom the latter was determined. (Authors' abstract)

6115
Vanderbie, J. H.
THE PHYSIOLOGY OF LOAD-CARRYING. VIII. SIMULATED SLED PULLING ON THE TREADMILL. — Quartermaster Research and Development Center, Environmental Protection Div., Natick, Mass. Technical Report no. EP-21, Jan. 1956. iv+10 p. AD 85 574 PB 122 898

A laboratory study was conducted on the feasibility of simulating sled-pulling by applying posterior drag through a harness to men walking on a treadmill. The effects of walking at two different speeds with posterior pull and the effects of light and heavy clothing were also studied. The energy cost of pulling a simulated sled appears to be less than that for pulling a sled in the field. It was found that application of posterior pull is an extremely convenient method for producing a considerable increase in metabolic rate during exercise and may, therefore, be useful in varying heat production when several men are walking on one treadmill. (From the author's abstract)

6116
Wade, O. L.,
B. Combes, A. W. Childs, H. O. Wheeler, A. Cournand, and S. E. Bradley
THE EFFECT OF EXERCISE ON THE SPLANCHNIC BLOOD FLOW AND SPLANCHNIC BLOOD VOLUME IN NORMAL MAN. — Clinical Sci. (London), 15 (3): 457-463. Aug. 1956. DNLM

In a study of 5 normal subjects, splanchnic blood flow, measured by bromosulphalein clearance and extraction, decreased during light exercise in the recumbent position by 250-450 ml./min. (mean, 355) and the circulatory splanchnic blood volume (measured by a regional dilution technique) was reduced by 300-700 ml. (mean, 400). Splanchnic oxygen consumption diminished in proportion to the fall in blood flow. The increase in splanchnic vascular resistance and the resultant diversion of blood to other tissues supplemented cardiac output and served to reduce the work of the heart during exercise. Similarly the decrement in splanchnic oxygen uptake made available a greater proportion of the total oxygen uptake to supply the increased oxygen requirement. The redistribution of blood evident in the fall of splanchnic blood volume may be important in augmenting venous return to the heart and in permitting a more rapid adjustment in cardiac output. (From the authors' summary)

6117
Wells, J. G.,
D. Balke, and D. D. Van Fossan
LACTIC ACID ACCUMULATION AS A FACTOR IN

DETERMINING WORK CAPACITY. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-121, Nov. 1956. 9 p. AD 126 288
PB 128 456

Blood lactate production in man was correlated with respiratory and circulatory adaptations resulting from physical exercise during an established work capacity test. On the basis of physiologic criteria observed, a general classification of work intensity was outlined. Three distinctly different increments of lactic acid accumulated in the blood during gradually increased work indicate the following classification: I. Light work: pulse rate not exceeding 120 beats per minute; no lactic acid increase significantly above the resting level. II. Heavy work: pulse rate between 120 and 160 beats per minute; lactic acid increase of approximately 20 to 40 mg. per cent III. Severe work: pulse rate above 160 beats per minute; lactic acid increase of 40 to 100 mg. per cent. (Authors' abstract)

6118
Wheeler, H. O.,
O. L. Wade, B. Combes, A. W. Childs, A. Courand, and S. E. Bradley
EFFECT OF EXERCISE ON SPLANCHNIC BLOOD FLOW AND SPLANCHNIC BLOOD VOLUME IN MAN [Abstract]. — Federation Proceedings, 15 (1, part I): 198-199. March 1956.
DLC (QH301.F37, v. 15)

Splanchnic blood flow (EHBF) fell in five subjects during exercise (alternate leg raising) by 240-460 ml./minute and returned during recovery toward control levels in all but one. Resting splanchnic blood volume (SBV) averaged 1160 ml. (17-25% of total blood volume) and decreased during exercise in all subjects by 285-700 ml. so that only 10-15% of total blood volume remained in the splanchnic bed. During recovery SBV increased in all subjects but not to the control levels in three. During exercise total oxygen consumption increased. Splanchnic oxygen consumption fell slightly in all subjects but rose above control levels during recovery. Since blood pressure tends, if anything, to increase during exercise, the reduction in EHBF indicates splanchnic vasoconstriction. This response serves to supplement blood flow to active muscle by diverting blood from the splanchnic bed. The decrease in SBV represents a significant "autotransfusion" of blood into the general circulation. As a result, venous return may be augmented early in exercise, thereby facilitating a more prompt increase in cardiac output. (Authors' abstract, modified)

6119
Winsmann, F. R.,
and F. Daniels
THE PHYSIOLOGY OF LOAD-CARRYING. X. PACK CARRYING IN THE DESERT. — Quartermaster Research and Development Center, Environmental Protection Research Div., Natick, Mass. Technical Report no. EP-28, May 1956. iv+27 p. AD 106 661
PB 124 962

The energy cost of walking, climbing, and carrying loads over three different types of desert terrain (level hard surface, level sandy surface, and sand dune slopes) has been studied. Pulse rates and rectal temperatures were measured, along with oxygen consumption, as indicators of stress. The energy expenditure of walking, climbing, and carrying loads expressed as Calories per square meter body surface area per hour (Cal./m.^{2}/hr.) shows a striking increase from hard surface to sandy areas (mean increase 104%). The increased pulse rates and rectal temperatures over the sand and slope (dune) areas are also indicative of added stress. The 40-pound pack carried at a rate of 2.5 m.p.h. continuously for one-half hour would appear to represent the extreme upper load limit to carry in any sandy area on the desert. It is expected that the quantitative measurements of heat production contained herein will be useful in the calculation of total heat load on a man under desert conditions. (Authors' abstract)

i. Fatigue

6120
Bujas, Z.,
and B. Petz
[COMPARATIVE STUDY OF CERTAIN TESTS OF FATIGUE] Étude comparative de certains tests de fatigue. — Travail humain (Paris), 19 (3-4): 193-207. July-Dec. 1956. In French, with English summary (p. 207). DLC (T58.A2T7, v. 19)

A comparative study was made of tests of fatigue produced by mental calculation, step-test exercise, weight lifting, team sports, or lack of sleep (30 hours). No significant effects of fatigue were observed on stereoscopic acuity, dynamic visual accommodation, the phosphene threshold or adaptation to dazzle produced by intermittent electrical simulation, persistence of consecutive images, perception of consecutive movement, fluctuation of perception of ambiguous images (cubes), reproduction of movement, or pointing accuracy. Fatigue decreased the illusion of weight differences produced by objects of similar weight but of different volumes, and impaired the capacity for stability of pressure exerted by the hand. The electroencephalogram of subjects following work showed an increase in the frequency and amplitude of alpha waves (particularly from the occipital lead), and increased irregularity of the alpha pattern. Spontaneous electrodermal reactions of the Tarchanoff type were reduced after work. It is concluded that the changes observed cannot serve as criteria of fatigue because of their inconsistency and the necessity to perform work until exhaustion in order to produce an effect. It is suggested that fatigue criteria should be sought in the disintegration of the structure of mechanisms included in specific tasks rather than in the performance of isolated mechanisms.

6121
FATIGUE. — Far East Air Forces Command Surgeon's Newsletter, 2 (5): 1-4. May-June 1956. DNLM

Fatigue in flying personnel is discussed in terms of both physiological and psychological changes. Physiological changes include any increase in toxic substances in the blood or exhaustion of energy reserves. Psychological changes include deterioration of skill, or the occurrence of boredom and anxiety. The im-

portant variables influencing fatigue in aircrews are the type of equipment, number of aircrew members, length of time of operations, terrain, night flying, weather, and inadequate accommodations for rest and relaxation before and after flying. Mental fatigue may be increased by physiological stresses such as hypoxia, hyperventilation, or mild chronic carbon monoxide exposure. Clinically described fatigue may cause unreliable reports by crewmen; excessive complaints of seating discomfort, of warmth and cold and other environmental inconveniences; manifestations of sighing and mild expletives; forgetfullness; and a tendency to ignore details. The flight surgeon must familiarize himself with the character and personality of the aircrews for which he is responsible in order to detect the onset of fatigue symptoms.

6122
Fraser, D. C.,
and G. D. Samuel
AIRCREW FATIGUE IN LONG RANGE MARITIME RECONNAISSANCE. X. EFFECTS ON VIGILANCE. — In: Flying Personnel Research Committee (Gt. Brit.), Physiological and psychological studies, p. 59-64. Report no. FPRC 907.10, Aug. 1956.
AD 112 727 UNCLASSIFIED

This paper describes the effects on post-flight vigilance of flying four 15-hour sorties at night with one day's rest between each flight in RAF Coastal Command long range reconnaissance aircraft. The method of vigilance employed was the Fraser z-function technique, which measures variability of judgment under vigilance conditions; previous research has shown that a rise in z-function tends to be associated with fatigue. Post-flight vigilance tended to deteriorate progressively after each sortie; this deterioration becomes statistically significant after the third sortie. A significant correlation ($p \leq 0.001$) was found between scores on the vigilance task and the subjective reports of fatigue by the subjects. (From the authors' abstract)

6123
Furchtgott, E.,
and W. W. Willingham
THE EFFECT OF SLEEP-DEPRIVATION UPON THE THRESHOLDS OF TASTE. — Amer. Jour. Psychol., 69 (1): 111-112. March 1956.
DLC (BF1.A5, v. 69)

Taste thresholds for sour, salt, and sweet were determined for 18 subjects a day before experimental sleep deprivation, immediately preceding the period of sleep deprivation, and after 24, 48, and 72 hours of sleep deprivation. Only the threshold for sour was significantly increased after 24 and 48 hrs. of sleep deprivation.

6124
Gatineau, A.
[FATIGUE OF TECHNICAL FLYING PERSONNEL IN COMMERCIAL AVIATION] Fatigue du personnel navigant technique de l'aviation marchande. — Médecine aéronautique (Paris), 11 (4): 413-423. 1956. In French, with English summary (p. 422-423). DLC (TL555.M394, v. 11)

The problem of fatigue in commercial flying personnel differs from the classic problem of the man-machine relationship by the lack of repetition of work in flying, the performance of duties by a crew rather than by an individual, and its neural and psychic origin. Flying fatigue is apparently independent of physical comfort and hours of flight, but is affected by the distance flown, the actual time spent working or waiting on the ground, and contributing factors such as night flying and the fear or emotion produced by age and possession of a family. It is recommended that a study of actual flight duties be conducted to allow a total evaluation of fatiguing factors and a solution to the problem.

6125
Lavandier, M.
[CLINICAL ASPECT OF OPERATIONAL FATIGUE IN PILOTS OF A FIGHTER GROUP IN THE FAR EAST] Aspect clinique de la fatigue opérationnelle chez les pilotes d'un groupe de chasse en Extrême-Orient. — Médecine aéronautique (Paris), 11 (1): 107-118. 1956. In French. DLC (TL555.M394, v. 11)

An analysis of laboratory diagnostic methods, medical treatment, and results of cases of fatigue among fighter pilots stationed in Indochina is presented. The effect of the administration of adrenochrome on eosinophil level was found to coincide well with the clinical classification of cases of fatigue. Adrenochrome or ACTH produced a low degree of eosinopenia in cases of simple performance decline, common (somatic) fatigue, and neurovegetative dystonia, but produced a decline above 50% in cases of fatigue with psychoneurotic manifestations. Simultaneous or successive administration of hormones (ACTH, androgens, desoxycorticosterone, adrenal cortical extract), vitamins (C and B), and neurotropic drugs (phenergan, largactil, bromide, calcium, glutamic acid, adrenochrome) brought improvement in all subjects except psychoneurotic cases.

6126
Moynier, R.
[STUDY OF FATIGUE AND ABNORMAL FATIGABILITY] Étude de la fatigue et des fatigabilités anormales. — Société de médecine militaire française, Bulletin mensuel (Paris), 50 (7): 239-247. July 1956. In French. DNLM

Studies were made in subjects who were non-fatigued, fatigued, or susceptible to fatigue, by means of a technique utilizing a quartz piezoelectric detector. This apparatus easily detected and registered neuromuscular equilibrium disorders not detected by clinical examination, as well as fatigue and abnormal pathological fatigability in these subjects. It is recommended that this technique be used for the elimination of fatigue-prone employees (car operators, pilots, etc.) from responsible positions.

6127
Pearson, R. G.,
and G. E. Byars
THE DEVELOPMENT AND VALIDATION OF A CHECKLIST FOR MEASURING SUBJECTIVE FATIGUE. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-115, Dec. 1956. 16 p. AD 128 756 PB 128 449

Two 13-item equivalent-form fatigue checklists were developed by the scale discrimination method. In a laboratory study both an experimental group (100 subjects tested 4 1/2 hours on a fatiguing, perceptual-motor task) and a control group (100 subjects-no task) became significantly "tired" in terms of checklist data, but such data were able to reflect a significantly greater decline in feeling-tone for the experimental group. Equivalent-form reliability was .92 and .95 for experimental and control groups, respectively. The data adequately satisfied the requirements of scale analysis as to unidimensionality. In a related study checklist data reflected the expected differences in affective state for 120 subjects assigned equally to analeptic, depressant, and placebo drug treatment groups and observed 4 1/2 hours under control (no-task) conditions. (Authors' abstract)

6128
A PRELIMINARY STUDY OF OPERATIONAL FATIGUE VARIABLES IN A SQUADRON IN THE FAR EAST. — Far East Air Forces Command Surgeon's Newsletter, 4 (2): 1-5. April 1956. DNLM

A study was made of operational fatigue in flight with emphasis on low-level flying. A flight surgeon participated in a 25-day exercise and flew 90 hours with the unit, during which period he observed and evaluated crew experiences. Analysis revealed the following to be outstanding factors contributing to fatigue: (1) total duty hours in excess of 14 a day without adequate rest before the next flight; (2) total flight hours in excess of 10 a day; (3) high temperatures in the aircraft; (4) constant alertness with resulting tension; (5) noise and inadequate space to rest, and (6) lack of relief of crew members. Physical exertion did not result in exhaustion to the extent of impairing performance. Corrective measures to alleviate fatigue are suggested.

6129
Wilkinson, R. T.
EFFECTS OF LACK OF SLEEP. — Flying Personnel Research Committee (Gt. Brit.). FPRC no. 961.3, Jan. 1956. 3 p. AD 96 383 UNCLASSIFIED

Performance after sleep deprivation of 30 to 100 hours does not significantly deviate from normal in accuracy and constancy on the following tests: reaction time (visual and auditory), mental arithmetic, visual acuity, color naming, intelligence tests, naming of opposites, naming letters, aiming accuracy, card sorting, body positioning, rote learning, auditory Kays test, and forward and backward writing. Significant deviations were noted in: body steadiness, finger tremor, extended color naming, pain threshold, unpaced five-choice tracking, pursuit-meter tracking, and prolonged vigilance at visual displays. Interpretations of the differential effects of sleep deprivation on performance include a lowering of the level of vigilance and perseverance on semi-automatic responses.

k. Mental Stress

6130
Gherarducci, D.,
and P. Fabian
[BEHAVIOR OF PROTEINS AND OF THE ELECTROPHORETIC SERUM PICTURE IN RABBITS EXPERIMENTALLY SUBJECTED TO A STATE OF PROLONGED EMOTION] Il comportamento delle proteine e del quadro elettroforetico del siero di conigli sperimentalmente sottoposti ad uno stato di emozione protratta. — Bollettino della Società italiana di biologia sperimentale (Napoli), 32 (3-5): 268-270. March-May 1956. In Italian. DNLM

An increase in the total blood protein concentration was electrophoretically determined in rabbits in a state of anxiety induced by their prolonged exposure to various noises. The percentage of a_2 globulin showed a great increase, whereas percentages of serum albumin and serum globulin fractions a_1, β, and γ showed only slight variations.

l. Isolation and Sensory Deprivation

6131
Clark, B.,
and A. Graybiel
THE BREAK-OFF PHENOMENON: A FEELING OF SEPARATION FROM THE EARTH EXPERIENCED BY PILOTS AT HIGH ALTITUDE. — San Jose State Coll., Calif.; and Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 110 100, Report no. 43, Aug. 6, 1956. ii+6 p. AD 128 202 UNCLASSIFIED

Pilots of jet aircraft when flying alone to high altitudes have reported an unusual experience which has been termed "break-off", or physical separation from the earth. This report investigated the occurrence of the break-off phenomenon in 137 jet pilots by means of individual interviews. A content analysis of the data revealed that the break-off phenomenon is clearly defined and is experienced by about 35 per cent of the jet pilots. It is a condition of spatial orientation in which the pilot conceives himself to be isolated, detached, and physically separated from the earth. Factors associated with the effect and the implications for flying are discussed. (Authors' abstract)

6132
Heron, W.,
B. K. Doane, and T. H. Scott
VISUAL DISTURBANCES AFTER PROLONGED PERCEPTUAL ISOLATION. — Canad. Jour. Psychol., 10 (1): 13-18. March 1956. DLC (BF1.C3, v. 10)

Three observers were kept in a monotonous sensory environment for six days. On returning to a normal environment, they experienced the following perceptual disturbances: (1) there was fluctuation, drifting and swirling of objects and surfaces in the visual field; (2) the position of objects appeared to change with head or eye movements; (3) shapes, lines, and edges appeared distorted; (4) after-images were accentuated; (5) colours seemed very bright and saturated, and there seemed to be an exaggeration of contrast phenomena. (Authors' summary)

6133
Lilly, J. C.
SYMPOSIUM: MENTAL EFFECTS OF REDUCTION

OF ORDINARY LEVELS OF PHYSICAL STIMULI ON INTACT HEALTHY PERSONS. — Psychiatric Research Reports of the American Psychiatric Association, no. 5: 1-9. June 1956.
DNLM (W1PS263, 1956)

A review of published autobiographies of people surviving extreme isolation and interviews with survivors suggests that individuals in isolation experience many symptoms associated with mental illness. These symptoms may be reversible and may be supplanted by a reintegration of personality on a deeper level. Isolation experiments carried out at McGill University by reducing the patterning of stimuli, and water-immersion isolation at the National Institutes of Mental Health aimed at reducing the intensity of all physical stimuli, demonstrated mental processes similar to those occurring in isolation. In terms of the libido theory the total amount of libido increases with time of deprivation. An attempt is made to discharge body-libido first somatically, then through fantasy; that failing, symptoms of regression appear. This stage may be followed by either re-establishment of more secondary processes on the part of ego or reorganization.

6134
Vernon, J.,
and J. Hoffmann
EFFECTS OF SENSORY DEPRIVATION ON LEARNING RATE IN HUMAN BEINGS. — Science (Washington), 123 (3207): 1074-1075. June 15, 1956.
DLC (Q1.S35, v. 123)

Four subjects were confined for 48 hours to a lightproof and relatively soundproof room, 4 by 9 ft. in size. They were fitted with ear plugs and cardboard gauntlets. Isolation was interrupted only for meals, tests, and toilet needs. The subjects used lightproof goggles whenever they were taken outside. Smoking was permitted at test time. The tests consisted of 12-item adjective lists presented aurally. Each subject was tested for ability to learn by the anticipation method with a 2-second interstimulus interval, before confinement, after 24 and 48 hours of confinement, and 24 and 48 hours after release from confinement. The findings of this (Princeton) study contradict those of the McGill study in that the ability to learn adjective lists improved with continued sensory deprivation, and the accounts of subjective experiences during isolation were negative in regard to hallucinations, focusing difficulties, lack of concentration, etc.

m. Restraint

6135
Bartlett, R. G.,
and M. A. Miller
THE ADRENAL CORTEX IN RESTRAINT HYPOTHERMIA AND IN ADAPTATION TO THE STRESS OF RESTRAINT. — Jour. Endocrinol. (London), 14 (2): 181-187. Oct. 1956. DNLM

Rats exhibited an increase in ascorbic acid and a less marked increase in cholesterol content of the adrenals following a week's exposure to the stress of light restraint (to produce adaptation). A decrease was found in adrenal ascorbic acid and cholesterol levels accompanying a marked drop in body temperature of the animals restrained and subjected to cold (0° C.). Changes in adrenocortical activity were not of a sufficient magnitude to account for either the increased thermostability after the adaptive procedure or the thermolability of animals exposed to short-term stress. After a 7-day exposure to light restraint, adrenalectomized animals maintained with isotonic salt solution or desoxycorticosterone acetate (DOCA) could not maintain a normal body temperature when restrained in the cold. Cortisone, administered alone or with DOCA, permitted adrenalectomized, adapted animals to maintain essentially normal body temperatures when exposed to restraint in the cold, indicating that adaptation had occurred. (Authors' summary, modified)

6136
Bartlett, R. G.,
V. C. Bohr, and R. H. Helmendach
COMPARATIVE EFFECT OF RESTRAINT (EMOTIONAL) HYPOTHERMIA ON COMMON LABORATORY ANIMALS. — Physiol. Zool., 29 (3): 256-259. July 1956. DLC (QL1.P5, v. 29)

The thermolability attributable to restraint in mice, hamsters, rats, guinea pigs, and rabbits was determined by comparison of the decline in body temperature of dead animals, restrained animals, and non-restrained animals during exposure to cold. Mice were found to be considerably more thermolabile during restraint than the other animals studied, of which hamsters were the least thermolabile. The decline in body temperature of control animals was very small in comparison with that of restrained animals. Since emotionality is one factor in the heat loss produced by restraint, it is suggested that the results may be indicative of the relative emotionality of the species studied.

6137
Bartlett, R. G.,
V. C. Bohr, G. L. Foster, M. A. Miller, and R. H. Helmendach
GROSS MUSCULAR ACTIVITY AND TEMPERATURE REGULATION IN THE RESTRAINED RAT. — Proc. Soc. Exper. Biol. and Med., 92 (3): 457-459. July 1956. DLC (QP1.S8, v. 92)

Kymograph tracings of the gross movements of restrained rats exposed to a temperature of 0° C. showed a positive correlation of body temperature decline with body movement. Marked and prolonged struggling apparently limited the extent of the decrease in body temperature. It is concluded that restraint hypothermia cannot be attributed to restricted muscular activity.

6138
Haist, R. E.,
H. Schachter, S. Sidlofsky, J. R. Hamilton, and D. G. Baker
EFFECT OF PREVIOUS COLD ACCLIMATIZATION IN RATS SHOCKED BY A CLAMPING TECHNIQUE [Abstract]. — Federation Proceedings, 15 (1, part I): 86. March 1956.
DLC (QH301.F37, v. 15)

In rats, shocked by a clamping technique, previous acclimatization to a cold environment (1° C.) led to a slower fall in body temperature than in non-acclimatized rats. The survival times were lengthened and the fall in oxygen consumption was slower in the previously acclimatized rats as compared to the non-acclimatized controls. (Authors' abstract)

n. Radiations

6139
Barron, C. L.,
and A. A. Baraff
PHYSICAL EVALUATION OF PERSONNEL EXPOSED TO MICROWAVE EMANATIONS. — IRE Trans. Med. Electronics, 1956 (PGME-4): 44. Feb. 1956. DLC (R895.I25, v. 1956)

This is a reprint of the summary of item 3782, vol. IV.

6140
Borstlap, A. C.
[COSMIC RADIATION] Cosmische straling. — Nederlands militair geneeskundig tijdschrift ('s Gravenhage), 9 (3): 77-88. March 1956. In Dutch. DLC (RC971.N4, v. 9)

This is a review of the current findings in regard to cosmic radiation. The topics mentioned include: primary cosmic radiation, secondary radiation, positive rays, penetrating radiation showers, soft radiation showers, negative radiation (cascade showers), electromagnetic rays, uncharged particles; different methods of lowering the organism's sensitivity to radiation, e. g., cysteine; basic locus of action of radiation within the cell; radiation hazards at different altitudes; and the protection of space crews from cosmic rays.

6141
Brody, S. I.
MILITARY ASPECTS OF THE BIOLOGICAL EFFECTS OF MICROWAVE RADIATION. — IRE Trans. Med. Electronics, 1956 (PGME-4): 8-9. Feb. 1956. DLC (R895.I25, v. 1956)

Little is known of the effects of exposures to high-power outputs of microwave radiation on humans, and data based on animal studies are difficult to extrapolate with confidence when applied to man. In spite of the lack of positive evidence of damage to personnel from radar exposure, the military intends to take precautions which will preclude adverse effects on both personnel and equipment (metals, fuel vapors).

6142
Chase, H. B.,
and J. S. Post
DAMAGE AND REPAIR IN MAMMALIAN TISSUES EXPOSED TO COSMIC RAY HEAVY NUCLEI. — Jour. Aviation Med., 27 (6): 533-540. Dec. 1956. DLC (RC1050.A36, v. 27)

A thin-down from a cosmic ray heavy nucleus can cause a hair follicle to produce a white hair instead of a colored one, the cells supplying pigment granules to the hair being in a cluster of small size and not replaceable. If the ionization track is at certain acute angles relative to the surface of the skin and has sufficient range, several hair follicles can be affected. The capacity of other mammalian cells to be damaged by such tracks of high rates of energy lost is discussed with relation to the redundancy and replaceability of such cells. Although damage from thin-downs can occur at high altitudes toward polar latitudes, the health hazard from such thin-downs for man and his descendants is perhaps relatively slight compared with the hazard from other ionizing and nonionizing factors to be encountered in stratosphere and space travel. (From the authors' summary)

6143
Daily, L.,
K. G. Waldm, J. F. Herrick, E. M. Parkhill,
and W. L. Benedict
THE EFFECTS OF MICROWAVE DIATHERMY ON THE EYE. — IRE Trans. Med. Electronics, 1956 (PGME-4): 25-26. Feb. 1956. DLC (R895.I25, v. 1956)

A study was made of the effects of microwaves (various durations of exposure, distances, and power output) on intact and enucleated dog and rabbit eyes. In every group of experiments, except one, the actual temperatures of the vitreous and aqueous humors after exposure of the eye to microwaves were consistently higher than those of deep orbital tissues. From the cooling curves, it was observed that in many eyes the temperatures did not return to control values but formed a new base line above the original level. Repeated ocular exposure to microwaves resulted in opthalmoscopically observable anterior or posterior cortical cataracts in various experiments. Certain enzymes in the lenses of rabbit eyes were also affected.

6144
Ely, T. S.,
and D. E. Goldman
EFFECTS OF TOTAL PROFILE AND RESTRICTED AREA EXPOSURE TO 10-CM MICROWAVES [Abstract]. — Federation Proceedings, 15 (1, part I): 57-58. March 1956. DLC (QH301.F37, v. 15)

Live mice, rats, rabbits and dogs were exposed under relatively free field conditions to 10-cm. microwave energy from a pulsed radar transmitter. Field intensity and distribution, time, local or rectal animal temperature, animal profile area and weight were measured in a manner which permitted the estimation of an absorption efficiency, steady-state heat dissipation ability at elevated temperature and cooling time constant. Experience indicated that the body as a whole, the eye and the testis were more sensitive than any nonspecific restricted area and consequently formed the limiting factors. Cooling time constant and steady state heat dissipation ability of each of the 3 areas enabled the formulation of figures which relate time and intensity to biological effect. (From the authors' abstract)

6145
Ely, T. S.,
and D. E. Goldman
HEAT EXCHANGE CHARACTERISTICS OF ANIMALS EXPOSED TO 10-cm MICROWAVES. — IRE Trans. Med. Electronics, 1956 (PGME-4): 38-43. Feb. 1956. DLC (R895.I25, v. 1956)

Rats, rabbits, and dogs were totally exposed to a calibrated S-band microwave field. Rectal temperature recordings during exposure provided data on the rate of power absorption and on the ability of the animals to dissipate the heat absorbed. The average absorption of each species was roughly 40 per cent of the power in the animal's geometrical profile, and the heat dissipation ability was such that a field of 25 milliwatts per square centimeter could be dissipated at a body temperature increase of about 1 C°. The data further demonstrated that at high body temperatures the heat loss mechanisms of the animal body become less effective, and at a very high temperature a net heat gain results. (Authors' conclusions)

6146
Golden, A.,
and H. J. Schaefer
MICROPHOCAL ALPHA IRRADIATION AS A MEANS OF SIMULATING EXPOSURE TO HEAVY NUCLEI OF THE PRIMARY COSMIC RADIATION. — Jour. Aviation Med., 27 (4): 322-327. Aug. 1956. DLC (RC1050.A36, v. 27)

Definition of a permissible exposure dose to the heavy nuclei of the primary cosmic radiation is of major importance because of the known cellular injury produced by these particles. Direct determination of this dose is at present impossible due to the limitations of balloon and rocket techniques. Methods of simulating exposure to heavy nuclei with laboratory sources of radiation are discussed. Incorporated alpha-emitters in particulate form may produce in tissue an ionization pattern strikingly similar to that of heavy nuclei. An example of such an alpha-active deposit is demonstrated in the intestinal mucosa of a rabbit injected with colloidal thorium dioxide. The observation of cellular injury suggests the selectively destructive effect of high dosage in close proximity to this deposit. This experimental approach may prove useful in determining a permissible dose for the heavy primaries. (Authors' summary)

6147
Greene, L. C.
PHYSICAL CONSTANTS OF HUMAN SKIN FOLLOWING THERMAL INJURY [Abstract]. — Federation Proceedings, 15 (1, part I): 81-82. March 1956. DLC (QH301.F37, v. 15)

From direct measurements of skin temperature made during thermal irradiation for measured times the physical constants of the skin, thermal conductivity (k), density (ρ), and specific heat (c), were determined as the product $k\rho c$, representing thermal inertia of the skin. This value remains within normal limits during and after heating of the skin when the pain threshold is not exceeded and the tissue is undamaged. After the skin is damaged the $k\rho c$ increases as much as 7-fold, depending upon the severity of the injury. The elevation of the $k\rho c$ is greatest when full blisters are formed and slightest when only hyperemia results. Thus, the changes in $k\rho c$ may be attributable to infiltration of fluid into the irradiated site, possible convection within the blister fluid, and changes in local blood flow. (Author's abstract, modified)

6148
Hardy, J. D.,
A. M. Stoll, L. C. Greene, D. Cunningham, and W. M. Benson
RESPONSES OF THE RAT TO THERMAL RADIATION. — Naval Air Development Center. Aviation Medical Acceleration Lab., Johnsville, Pa. Report no. NADC-MA-5613, Oct. 30, 1956. v+15 p. (Project no. NM 001 103 301, Report no. 11). AD 117 897 PB 128 145

An average thermal inertia or $k\rho c$ (k=thermal conductivity, ρ=density, c=specific heat) value of $84 \pm 18 \times 10^{-5}$ cal.^{2}/cm.^{4}/sec./°C.^{2} was obtained in the skin of lightly anesthetized rats exposed to known amounts of thermal radiation. Administration of azapetine phosphate, a potent adrenolytic agent, was accompanied by a marked drop in skin temperature (4-5° C.), but no statistically significant change was observed in the $k\rho c$ values when compared with the controls. Unanesthetized animals exposed to high-intensity thermal radiation displayed both skin twitch and escape or withdrawal reaction at average skin temperatures of 45-46° C. and 51-52° C. respectively. A possible correspondence of these reactions to those previously observed to occur in man at these temperatures, i.e., pain threshold and wince threshold, was noted. (Authors' abstract, modified)

6149
Hirsch, F. G.
THE USE OF BIOLOGICAL SIMULANTS IN ESTIMATING THE DOSE OF MICROWAVE ENERGY. — IRE Trans. Med. Electronics, 1956 (PGME-4): 22-24. Feb. 1956. DLC (R895.I25, v. 1956)

An attempt was made to characterize quantitatively the biological hazard of any given microwave radiation dose from the formula C (concentration) x t (time) = k (the hazard level). The amount of heat produced in tissue was chosen to substitute for the amount of absorbed radiation energy C, since the latter value is dependent on complex variables such as the relative power density of the free space occupied by the organism, the ability of various tissues to absorb the energy, and the depth of the tissue beneath the surface of the organism. Preliminary measurements of the temperature gradient in excised cows' eyes and in

various eye tissue models during exposure to microwave radiation indicate the potential value of the technique when the optimum simulant is devised.

6150
Meahl, H. R.
PROTECTIVE MEASURES FOR MICROWAVE RADIATION HAZARDS: 750 TO 30,000 MC. [Abstract]. — IRE Trans. Med. Electronics, 1956 (PGME-4): 16. Feb. 1956. DLC (R895.I25, v. 1956)

Continuous exposure to a field intensity of 0.001 watt per square centimeter appears to cause no harmful effects to either animals or men. It is neither difficult nor expensive to make and use monitoring instruments to find out whether or not fields in excess of 0.001 watt per square cm. exist in an area. It is well to remember that microwaves may be greatly intensified by reflections from objects which do not reflect light well. (From the author's summary)

6151
Petschke, H.
[ON THE BIOLOGICAL EFFECTS OF COSMIC RADIATION] Über die biologischen Wirkungen der kosmischen Strahlung. — Hippokrates (Stuttgart), 27 (11): 340-346. June 15, 1956. In German. DNLM

The biological effects of cosmic radiation are reviewed. On the basis of biological experiments, a distinction has to be made between the damaging action of the heavy particles in primary showers and the life-stimulating action of secondary showers. The life processes seem to be adapted to a certain optimal range of environmental radiation. These findings are discussed in relation to specific experiments on the cancerogenic and cancer-retarding action of cosmic rays.

6152
Schaefer, H. J.
EXPOSURE HAZARDS FROM COSMIC RADIATION IN FLIGHT IN EXTRA-ATMOSPHERIC REGIONS. — IRE Trans. Med. Electronics, 1956 (PGME-7): 38-44. Dec. 1956. DLC (R895.I25, v. 1956)

Exposure hazard from the primary cosmic radiation in extra-atmospheric flight rests upon the microbeam effects from the ionization peaks of low-energy heavy nuclei (so-called thindowns). This type of nucleus is present only at the top of the atmosphere and only in the polar region beyond about 50° latitude. While so far irreparable damage from the cellular destruction by thindowns has been experimentally verified only for the pigment cells in hair follicles of the black mouse, such destruction is likely to occur equally in other types of cells. Whether it will widen here also into general radiation injury seems questionable save for a few possible exceptions of lesser importance. (From the author's summary)

6153
Schaefer, H. J.
GRAPHS AND TABLES FOR THE HIT FREQUENCIES FROM THE HEAVY NUCLEI OF THE PRIMARY COSMIC RADIATION. V. THE INTRA-TARGET DOSAGE FIELD FOR THINDOWN HITS IN SPHERICAL SPECIMENS OF TISSUE COMPOSITION. — Naval School of Aviation Medicine, Pensacola, Fla. Research Report no. NM 001 101 100, Report no. 13, 1956 [21] p. UNCLASSIFIED

Isodose charts for thindown hits from heavy nuclei of the primary cosmic radiation in spherical targets of tissue composition and of various diameters exposed at various altitudes are presented and discussed. The field configuration is very sensitive to pressure altitude and highly structural to the point where in the center of smaller targets a discontinuity develops in which the forbidden region with no thindowns is directly adjacent to the region of maximum intensity. As a consequence, type and number of thindowns scored in an exposed biological specimen should always be monitored directly rather than computed from pressure altitude and general spectral data. (Author's abstract)

6154
Schaefer, H. J.
OPTIMUM ALTITUDES FOR BIOLOGICAL EXPERIMENTATION WITH THE PRIMARY COSMIC RADIATION. — Naval School of Aviation Medicine, Pensacola, Fla. (Research Project no. NM 001 101 100). Report no. 12, June 5, 1956. ii+15 p. DLC-Sci.

Also published in: Jour. Aviation Med., 27 (6): 512-521. Dec. 1956. DLC (RC1050.A36, v. 27)

Animal experiments have shown that cellular damage results mainly, if not exclusively, from giant absorption events which produce high local ionization dosages in the microstructure of exposed tissue. Among these events the so-called thindown hits seem of particular importance. It is shown that the depth of penetration of thindown hits into the air ocean follows a peculiar curve exhibiting pointed maxima at certain altitudes. Quantitative analysis of intratarget dosage fields for thindowns discloses that for exposure close to the top or entirely outside the atmosphere these maxima appear as focal spots within the target. Pertinent isodose charts for a few characteristic cases are shown. Utilization of the phenomenon for animal experimentation requires at least exposure at a pressure altitude about 3 g./cm.^{2} corresponding to 132,000 feet. Recent measurements of the low-energy part of the heavy spectrum in that altitude region indicate that the hitherto assumed, extrapolated intensity values seem considerably too low. Whereas classic geomagnetic theory postulates a low-energy cutoff of 0.3 Bev/nucleon at 55° latitude, particles of at least 0.2 Bev/nucleon seem to be present in the primary beam at the aforementioned extreme altitude.

Short duration as well as yearly changes due to solar activity seem to be superimposed on the energy spectrum, especially at the low-energy. (From the author's summary)

6155
Schwan, H. P.,
and K. Li
THE MECHANISM OF ABSORPTION OF ULTRA-HIGH FREQUENCY ELECTROMAGNETIC ENERGY IN TISSUES, AS RELATED TO THE PROBLEM OF TOLERANCE DOSAGE. — IRE Trans. Med. Electronics, 1956 (PGME-4): 45-49. Feb. 1956. DLC (R895.I25, v. 1956)

At frequencies lower than 400 megacycles and higher than 3,000 mc., the human body will absorb about 40 to 50 per cent of airborne radiation. Between 1,000 and 3,000 mc. the percentage of absorbed energy fluctuates between 20 and 100 per cent, depending on frequency, thickness of skin, and thickness of subcutaneous fat. Conservative estimates of tolerable amounts of energy should be based, therefore, on a possible 100 per cent absorption. At frequencies lower than 1,000 mc. most of the radiant energy is transformed into heat in the deep tissues. Frequencies higher than 3,000 mc. cause predominant surface heating. Intolerable temperature rise due to exposure to high frequency electromagnetic waves is less likely, therefore, at high frequencies above 3,000 mc. than at lower frequencies below 1,000 mc. A tolerance dosage of 0.01 watt/cm.^{2} is recommended for the total frequency range. It is expected that this figure can be replaced by a higher figure for frequencies above 3,000 mc. when more about the mechanism of heat regulation of the human body is known. (Authors' conclustons)

6156
Simons, D. G.
BIOLOGICAL EFFECTS OF PRIMARY COSMIC RADIATION. — Proc. International Astronautical Congress, VIIth (Rome, Sept. 17-22, 1956), p. 381-400. Roma, 1956. DLC (TL787.I44, v. 7)

Heavy primary cosmic particles constitute one of the potential hazards of Space Flight. More than 25 United States Air Force stratosphere balloon flights have carried biological specimens to altitudes above 30 kilometers at geomagnetic latitudes above 55° for as long as 30 hours. Experiments to detect indirect effects included comparison of pre- and post-flight performance ability and a longevity study. Experiments to determine effects upon specific identifiable tissues include study of tissue cultures, development effects, hair graying in black mice, and damage to brain cells. Streaks of gray hairs suggest radial spread of radiation effects 20 times predicted values. Other experiments indicate no somatic health hazard from 24 hour exposure to cosmic ray primaries. (Author's abstract)

6157
Simons, D. G.,
and D. P. Parks
IMPROVED TECHNIQUES FOR EXPOSING ANIMALS TO PRIMARY COSMIC RAY PARTICLES. — Jour. Aviation Med., 27 (4): 317-321. Aug. 1956. DLC (RC1050.A36, v. 27)

The 1955 series of animal-carrying balloon flights to investigate the biological hazards of primary cosmic radiation were launched from International Falls, Minnesota. Marked improvement in altitude performance as compared to previous flights was obtained by using larger balloons, lighter instrumentation, and reducing capsular weight from 165 to 70 pounds. These factors permitted exposure of three groups of biological specimens to heavy cosmic-ray primaries in the 5 millibar (120,000-foot) region. Efforts to achieve twenty-four-hour exposure of animals on the fringe of space emphasized the critical nature of excess weight. Emphasis is placed on maximum reliability of each component, and extensive test procedures were established to insure normal function of all systems.

6158
Singer, S. F.
COSMIC RAY EFFECTS ON MATTER AT HIGH ALTITUDES. — Jour. Aviation Med., 27 (2): 111-116. April 1956. DLC (RC1050.A36, v. 27)

There are two types of effects produced by the action of cosmic rays on matter at high altitudes. One of these effects is atomic in nature, and is caused when an electron is removed from one of the shells of an atom or an electron is lifted from a low level of activity to a higher level upon being struck by a cosmic-ray particle. The results of such action (breaking and rejoining of chemical bonds in molecules) have been carefully studied; however, the results of heavy cosmic ray primary hits are as yet unknown. Another type of hit is that which might occur when an atomic nucleus is hit by protons, neutrons, or pi-mesons at high altitudes. Nuclear interactions are expected to occur in the ratio of one to ten million compared to atomic interactions. The energy produced by such an interaction would be of the order of a million times more powerful than a reaction with an electron. The production rates for various nuclear fragments from bodies large enough to be effected by cosmic rays on only half the solid angle are: Protons, 1.4×10^6, Neutrons, 3.2×10^6, Deutrons, 0.21×10^6, Tritons, 0.25×10^6, He^2, 0.14×10^6, He^4, 0.56×10^6. Upon comparing these rates to the rate of production of these particles at 10,000 feet, it has been discovered that 100 days at 10,000 feet would be the equivalent of 1 day above the atmosphere. The optimum shield is a hydrogenous material, water, kerosene, etc.

6159
Sosna, M.
[EFFECTS OF COSMIC RADIATION ON LIVING ORGANISMS] Einflüsse der kosmischen Strahlung

auf die lebenden Organismen. — Urania (Leipzig), 19 (3): 102-103. March 1956. In German.
DLC (Q3.U4, v. 19)

Translated from the original Czech article which appeared in Vesmír (Praha), 34 (2), Feb. 1955.

The biological effects of cosmic radiation on the earth's surface are chiefly produced by secondary radiation from conversion of primary particles in the atmosphere. Experiments with animals raised in lead-insulated cages and on mountains show the radiation effect to be twofold--a positive life-stimulating one and a negative one. Most of the experimental techniques, however, involve a comparison between different intensities of cosmic radiation at sea level and at higher altitudes. However, the results are obscured by other environmental influences. Two theories concerning the mechanism responsible for radiation damage to the organism are briefly considered.

6160
Stoll, A. M.,
and J. D. Hardy
RELATION OF THERMAL PAIN AND TISSUE INJURY TO STIMULUS INTENSITY-TIME AND SKIN TEMPERATURE [Abstract]. — Federation Proceedings, 15 (1, part I): 180-181. March 1956.
DLC (QH301.F37, v. 15)

Direct measurements were made of the skin temperature before, during and after exposure to various thermal irradiances for measured times. From these data the strength-duration relationship for threshold burn production was determined and found to be analogous to that previously determined for threshold pain. When the intensity of stimulus productive of the endpoint was related to the reciprocal of time, each set of data yielded a straight line different from the other in slope. On extrapolation, both lines intercepted the ordinate at the same point indicating that radiation of an intensity of about 50 mc./cm.^{2}/sec. is the threshold irradiance for both pain and tissue damage. Injury produced during burning was evaluated in terms of the integral of the rate of protein inactivation at the temperature of the skin during irradiation, computed after the method of Hendriques and Moritz. Values thus obtained were approximately 0.1 as large as those obtained for comparable burns by these investigators. The discrepancy may be due to the difference in method of heat application indicating that formulations of data appropriate to prediction of injury from elevated skin temperature maintained at constant levels are not strictly applicable to situations in which skin temperature changes continuously throughout the thermal exposure. (Authors' abstract)

6161
SYMPOSIUM ON PHYSIOLOGIC AND PATHOLOGIC EFFECTS OF MICROWAVES. — IRE Trans. Med. Electronics, 1956 (PGME-4). 51 p.
DLC (R895.I25, v. 1956)

Pertinent papers presented at this symposium have been abstracted separately, see items no.

6162
(USAF Radiation Lab.)
[PHYSIOLOGICAL EFFECTS OF IONIZING RADIATIONS AND PROTECTIVE AGENTS]. — Univ. of Chicago, USAF Radiation Lab., Ill. (Contract AF 41(657)-25). Quarterly Progress Report no. 21, Oct. 15, 1956. 1+123 p. UNCLASSIFIED

This is a collection of eight papers concerned with (1) pharmacological and toxicological compounds as protective or therapeutic agents against radiation injury; (2) the effects of ionizing radiations on the biochemistry of mammalian tissues; and (3) the influence of exposure to low levels of gamma and fast neutron irradiation on the life span of mice. X-, gamma-, and fast neutron irradiations were administered in the laboratory. (73 references)

6163
Williams, D. B.,
J. P. Monahan, W. J. Nicholson, and J. J. Aldrich
BIOLOGIC EFFECTS STUDIES ON MICROWAVE RADIATION: TIME AND POWER THRESHOLDS FOR THE PRODUCTION OF LENS OPACITIES BY 12.3 CM. MICROWAVES. — Air Force Cambridge Research Center. Radiobiology Lab., Atomic Warfare Directorate, Cambridge, Mass.; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-94, Aug. 1955. 27 p.
AD 80 072 UNCLASSIFIED
Also published in: A.M.A. Arch. Ophthalmol., 54 (6): 863-874. Dec. 1955. DLC (RE1.A62, v. 54)
Condensation in: IRE Trans. Med. Electronics, 1956 (PGME-4): 17-22. Feb. 1956.
DLC (R895.I25, v. 1956)

The minimum exposure time and power requirements for the production of lens opacities by a single dose of microwave radiation (12.3 cm.) in rabbits was found to range between 5 minutes at 0.59 watt/cm.^{2} and 90 minutes at 0.29 watt/cm.^{2}. Ocular damage was also observed in two animals exposed to a power level of 0.22 watt/cm.^{2} for 4.5 hours, but not in two animals exposed to 0.12 watt/cm.^{2}. The threshold power densities for 5-90 minutes of exposure were equivalent to a thermal flux of 8.4-4.1 cal./cm.^{2}/min. The vitreous threshold temperatures of 53° and 49° C. recorded for exposures of 5 and 25 minutes, respectively, appear adequate to account for thermal denaturation and coagulation of lens protein or cellular injury in the capsule.

6164
Yagoda, H.
FREQUENCY OF THINDOWN HITS BY HEAVY PRIMARY NUCLEI IN EMULSION AND TISSUE. — Jour. Aviation Med., 27 (6): 522-532. Dec. 1956.
DLC (RC1050.A36, v. 27)

Data are evaluated from a series of high-altitude balloon flights carrying emulsion units in order to estimate the thindown hit frequency in tissue. Flights were launched from the Minneapolis area during 1950-1955, covering an altitude span between

78,500 and 122,000 feet. In small blocks of emulsion the frequency of thindown hits increased exponentially with decreasing atmospheric depth. Methods are described for the estimation of the charge of slow heavy primaries from their maximum delta-ray density area. Accurate measure of heavy primary terminal hit frequency in brain and eye tissue is proposed by means of emulsion embedded in a phantom of the human skull.

p. Posture

6165
Alberti, R.,
M. A. Dina, and G. M. Mariuzzi
[MODIFICATION OF SPERMATOGENESIS IN GUINEA PIGS SUBJECTED TO POSTURAL STRESS] Modificazione della spermatogenesi in cavie sottoposte a stress da postura. — Bollettino della Societa italiana di biologia sperimentale (Napoli), 32 (6): 352-353. June 1956. In Italian. DNLM

Spermatogenesis was suppressed in guinea pigs subjected to postural stress. The animals were kept on their backs for several hours during the day over a period of fifty days. Histological study revealed testicular atrophy and an inhibition of the mitotic processes which were initially greatly reduced. It is concluded that postural stress is a specifically dangerous stimulus because it suppresses testicular function and inhibits, more or less, the processes of cellular division.

6166
Colville, P.,
C. Shugg, and B. G. Ferris
EFFECTS OF BODY TILTING ON RESPIRATORY MECHANICS. — Jour. Applied Physiol., 9 (1): 19-24. July 1956. DLC (QP1.J72, v. 9)

Tilting the body in a foot-down direction was observed to produce changes in resting end-expiratory lung volume which were essentially linear with the sine of the angle of the trunk to the horizontal. Tilting in the head-down position produced slight and variable changes in the lung volume, indicating that when the trunk is horizontal the functional residual capacity is at or near its minimal volume. It is suggested that the magnitude of the shift in the resting end-expiratory position may be influenced by the compliances of the lung, the diaphragm, and abdominal wall with their attached structures, and the rib cage; the effective length of the abdominal column; and the angle of the trunk to the horizontal. (Authors' abstract quoted in part).

6167
Gaughran, G. R. L.,
and W. T. Dempster
FORCE ANALYSES OF HORIZONTAL TWO-HANDED PUSHES AND PULLS IN THE SAGITTAL PLANE. — Human Biol., 28 (1): 67-92. Feb. 1956.
DLC (GN1.H8, v. 28)

A nude subject, symmetrically placed on a seat without foot or back rest, exerted a steady two-handed pull or push at shoulder level in the mid-sagittal plane. Recordings were made of the subject's posture at the moment of a maximum force; the distribution of vertical forces at the front and rear of the seat, and the maximum horizontal reaction forces at the hand grip and at the seat. The data from the study show that the subject by muscle tensions, during hand pulls or pushes can change the location of the focus of a seat contact anywhere between the ischia and the lower thigh and thus alter the moment arm of the vertical force couple; the magnitude of the horizontal force is directly proportional to the moment arms of the body weight couple. The introduction of a foot rest changed the point of seat contact from the seat to the foot rest, increasing the moment arm of the vertical couple and causing a greater resultant horizontal force. This modification, did not alter the basic mechanics involved. The use of a back rest, in contrast, provided a means by which the subject could exert a direct compressive force by tensing muscles against the resisting contacts to augment force values obtained by dead weight alone. (From the authors' summary)

6168
Nickel, J. F.,
L. Levine, and J. A. Gagnon
EFFECTS OF ACUTE PASSIVE TILTING ON ARTERIAL PRESSURE, RENAL HEMODYNAMICS AND URINARY ELECTROLYTE EXCRETION IN THE DOG. — Jour. Applied Physiol., 9 (2): 176-184. Sept. 1956. DLC (QP1.J72, v. 9)

Renal hemodynamics, excretion of water and electrolytes, and mean arterial pressures in the abdominal aorta and in the carotid artery were studied in conscious and anesthetized dogs tilted at various angles, head-up or head-down, from the horizontal supine posture. Aortic pressure was observed to increase with head-up and decrease with head-down tilting. Carotid pressure changes were reversed in direction and of smaller magnitude. Autonomic ganglionic blockade (hexamethonium) abolished the lower aortic response to both head-up and head-down tilting, and adrenergic stimulation (l-norepinephrine) prevented further pressor response to head-up tilting. Thirty minutes in the 45 head-up or head-down position had no effect of renal plasma flow, glomerular filtration, or the rates of excretion of sodium, potassium, and water. In subsequent control periods renal plasma flow decreased, suggesting compensatory renal vasoconstriction. Renal circulatory autoregulation was demonstrated over a mean arterial pressure range of 40 mm. Hg, in which no evidence was found for an arterial baroreceptor concerned with the regulation of renal sodium excretion. (Authors' abstract, modified).

6169
Roddie, I. C.,
and J. T. Shepherd
THE REFLEX NERVOUS CONTROL OF HUMAN SKELETAL MUSCLE BLOOD VESSELS. — Clinical Sci. (London), 15 (3): 433-440. Aug. 1956. DNLM

Passively raising the legs of a recumbent subject induced a vasodilator reflex (increased blood flow) in skeletal muscle, but not in cutaneous blood vessels. In response to warming of the body, the skin blood vessels dilated but the skeletal muscle vessels were not affected. It is suggested that the vasomotor nerves to the skin and muscle vessels are functionally independent, the former participating in temperature regulation, the latter in the circulatory adaptations to changes in posture.

6170
Sundin, T.
THE INFLUENCE OF BODY POSTURE ON THE URINARY EXCRETION OF ADRENALINE AND NORADRENALINE. = Acta medica scandinavica (Stockholm), Suppl. 313. 57 p. 1956. DNLM

The urinary output of adrenaline and noradrenaline in various body postures was investigated in normal subjects and in subjects with orthostatic hypotension and essential arterial hypertension. During constant recumbency for 7 hours, healthy subjects showed only slight changes of pulse and blood pressure, an apparently rhythmic increase in the adrenal medullary production of adrenaline, and an insignificant increase in the output of noradrenaline. Tilting for 10 minutes caused an increase in pulse rate and a slight fall in systolic blood pressure which tended to increase with increases in tilting angle from 25° to 75°. The fall in diastolic blood pressure was increased with decreasing tilting angle. The urinary output of adrenaline and noradrenaline during tilting for 3-4 hours was conspicuously increased at an angle of 75° and less markedly increased at 25° and 50°. Similar results were observed in subjects who were supported by a bicycle saddle during tilting.

6171
Thomas, S.
RENAL ADJUSTMENTS TO CHANGE IN POSTURE [Abstract]. = Jour. Physiol. (London), 132 (3): 61P-62P. June 28, 1956. DLC (QP1.J75, v. 132)

The water and electrolyte excretion of three subjects was investigated during and up to 8 hours after changes in posture. Changes from recumbency to standing produced consistent declines in urine flow and sodium and chloride output, variable changes in potassium output, a decrease in sodium/anion output, and an increase in potassium/anion output. The change from standing to recumbency had a generally opposite effect. No consistent changes were observed in creatinine output, inulin clearance, and plasma sodium or potassium concentrations. It is concluded that the adjustment of the kidney to postural change includes alterations of renal tubular activity, particularly during the prolonged maintenance of a new posture.

6172
Toth, L. A.
WATER DIURESIS IN HEAD-DOWN POSITION IN MAN [Abstract]. = Amer. Jour. Physiol., 187 (3): 637. Dec. 1956. DLC (QP1.A5, v. 187)

The diuresis resulting from the ingestion of 500 ml. of water was studied in an adult male with no history of cardiovascular or renal disease before, during, and after three 12- or 15-minute periods in a 30-degree head-down position. Urine output was observed to decrease during the first 12-minute head-down period and to resume the diuretic trend in the remaining periods. No significant change was observed in systolic or diastolic brachial blood pressure in the head-down position.

q. Others

6173
Benjamin, F. B.
THE EFFECT OF PAIN ON PERFORMANCE. = Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pa. NADC-MA-5612, Sept. 19, 1956. vi+19 p. AD 112 771 PB 126 786

The effect of pain on performance was studied with various types and intensities of pain stimuli and with each subject serving as his own control. It was found that simultaneous pain affected performance tests as follows: (1) memory and speed of performing mental tasks were not changed, while the number of mistakes was increased; (2) time estimates in counts per minute were increased; (3) muscular coordination was impaired; (4) simple reaction time was not changed, while choice reaction time was prolonged; (5) the rate of work performance was not impaired, while the mechanical efficiency of performance was decreased. (Author's abstract)

6174
Domanski, T. J.
HUMAN STRESS RESPONSE IN CONTRASTING AIRCRAFT OPERATIONS [Abstract]. = Federation Proceedings, 15 (1, part I): 51. March 1956. DLC (QH301.F37, v. 15)

Training missions flown in B-47 and B-29 type aircraft were studied with respect to the incidence of strain in student aircraft commanders and in instructor pilots. The criterion of strain was the occurrence of a pre- to postflight eosinopenia. On this basis the incidence of strain for transition missions was: (a) 60% for B-47 instructor pilots; (b) 61% for B-47 student aircraft commanders; (c) 22% for B-29 instructor pilots; and (d) 28% for B-29 student aircraft commanders. The contrast between B-47 and B-29 subjects was statistically significant ($P < 0.01$). The eosinophil response findings were in accord with the evaluation of senior flying personnel as to the relative difficulty of the missions studied. In the study of instructor-student pairs, it was found that the incidence of strain for student aircraft commanders was higher but not significantly different from that of the corresponding instructor pilots. (Author's abstract)

7. PERSONNEL
[General Psychological Aspects Under 5]

a. General

6175
Harter, W.
[SELECTION AND TRAINING OF PARACHUTISTS OF THE AUSTRIAN AIR RESCUE SERVICE] Selezione ed addestramento dei paracadutisti del servizio di soccorso aereo austriaco. — Rivista di medicina aeronautica (Roma), 19 (1): 138-146, Jan.-March 1956. In Italian, with English summary (p. 145). DLC (1050.R56, v. 19)

The Austrian Air Rescue Service uses Parachutists for first aid and rescue purposes in emergency cases when it is necessary to reach the scene of an accident by air. Personnel are subjected to strict psychological and physical examinations by a physician, psychologist, and instructor prior to selection. Parachutists undergo rigorous ground training and are instructed in parachute jumping techniques.

6176
SYMPOSIUM ON AIR FORCE HUMAN ENGINEERING, PERSONNEL, AND TRAINING RESEARCH. — Ed. by G. Finch and F. Cameron. National Academy of Sciences-National Research Council, Washington, D. C. (Contract AF 18(600)-1457); issued by Air Research and Development Command, Baltimore, Md. ARDC Technical Report no. 56-8, 1956. v+316 p. DLC (UG633.A377163, no. 56-8, 1956)

Pertinent papers presented at this symposium held in Washington, D. C., November 14-16, 1955, are abstracted separately (see items no. 5484 5587, 5588, 5613, 5617, 5643, 5666, 5680, 5682, 5700, 5812, 6209, 6221, 6225, 6240, 6241, 6242, and 6657.

6177
[Webb, W. B.]
RESEARCH IN SELECTION AND TRAINING. — Naval School of Aviation Medicine, Pensacola, Fla. [Unnumbered report]. [22] p. DLC

Highlights are presented of the research mission of the Aviation Psychology Laboratory, Naval School of Aviation Medicine, in the procedures of procurement, selection, training, and control of naval aviators. Included are representative charts.

b. Selection, Classification, and Rating

[Physical examination under 8-f]

6178
(Air Proving Eglin)
FINAL REPORT ON EMPLOYMENT AND SUITABILITY TEST OF APPRENTICE AIRCRAFT EARLY WARNING RADAR REPAIRMAN GRADUATES OF TTAF COURSES NUMBER AB30132A-1 AND AB30132B-1. — Air Proving Ground Command, Eglin Air Force Base, Fla. Sept. 28, 1956. iii+37 p. (Project no. APG/ADC/1245-A). AD 109 188 UNCLASSIFIED

Aircraft Early Warning Radar Repairmen graduates were tested in a 90-day on-the-job situation to determine their ability to perform the duties of their specialty. It was found that they could perform inspection and maintenance tasks with relatively little assistance but could not perform trouble-shooting functions without extensive on-the-job training. It is recommended that the shredouts of the specialty be eliminated and changes in the training are proposed to meet the requirements of the job. (Author's abstract, modified)

6179
(Air Proving Eglin)
OPERATIONAL SUITABILITY TEST OF APPRENTICE INSTRUMENT REPAIRMAN GRADUATES OF TTAF COURSE NUMBER AB42230. — Air Prov. Ground Command, Eglin Air Force Base, Fla. (Project no. APG/CSC/884-A). Final Report, Jan. 12, 1956. AD 83 175 UNCLASSIFIED

Evaluation tests were conducted (1) to determine the performance ability of the apprentice instrument repairman graduate; (2) to provide data which will assist in the development of better qualified personnel, and (3) to provide data for optimum utilization of apprentice instrument repairmen. The four apprentices who were tested represented an academic cross section of a graduating class of the 17-week course; the men were part of a squadron assigned to instrument systems of B-47 and KC-97 aircraft. Results showed the existence of two separate areas of instrument maintenance which require different experience and skill; this division should be recognized by the development of separate career-ladder progressions for the instrument systems mechanic and technician (installed aircraft systems) and the instrument mechanic and technician (shop calibration, cleaning, and minor repair). Minor modifications are recommended for course subjects. (AD abstract)

6180
Ambler, R. K.
DIFFERENCES BETWEEN AVIATION OFFICER CANDIDATES AND NAVAL AVIATION CADETS ON THREE TESTS OF MENTAL ABILITY. — U. S. Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 108 100, Report no. 13, May 1, 1956. 3 p. AD 119 106 UNCLASSIFIED

Differences in mental ability between an incoming class of cadets and one of Aviation Officer Candidates at the U. S. Naval School of Pre-Flight were investigated by means of (1) the Aviation Qualification Test, (2) the American Council of Education Psychological Examination, and (3) the Wonderlic Personnel Test. The AOC group was significantly higher on all three tests. It is con-

cluded that both groups may not be considered comparable for research involving the trait of intelligence or mental ability.

6181
Bair, J. T.
RECRUITMENT RESEARCH. — Contact (Pensacola), 14 (1): 31-32. 1956. DNLM

A survey of motivation in relation to initial procurement conducted among Naval aviation cadets revealed that recruitment was most effective when done by officers from naval air reserve stations and trained service personnel in colleges and universities. In addition to procurement teams and procurement pamphlets, advertisements in national magazines and friends in the service motivated some cadets. Recruitment research in relation to procurement areas showed no difference in attrition rates among various areas when tested by the chi-square technique. Marked differences were observed in education and pre-flight grades of candidates among the procurement areas.

6182
Barry, J. R.,
S. C. Fulkerson, and S. B. Sells
ADAPTABILITY SCREENING OF FLYING PERSONNEL: RESEARCH ON THE MCKINNEY REPORTING TEST. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-5, March 1956. 7 p. AD 95 910 PB 123 666

The McKinney Reporting Test, a 315-item, paper-and-pencil test requiring simple perceptual-motor responses under nonspeeded and speed-stress conditions, was administered to 428 co-pilots entering B-29 combat crew training as part of an experimental personality screening battery. The test, while related to ability factors, also reflects to a small but statistically significant degree what appear to be emotional and motivational factors associated with adjustment in a flying training situation. The findings justify the further consideration of this test as part of an operational screening battery. (Authors' abstract and conclusions, quoted in part)

6183
Blake, R. R.,
and H. Helson
ADAPTABILITY SCREENING OF FLYING PERSONNEL: SITUATIONAL AND PERSONAL FACTORS IN CONFORMING BEHAVIOR. — Univ. of Texas, Austin; issued by School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-86, Sept. 1956. 61 p. AD 118358 PB 124 763

Experiments are reported which investigate situational and personal factors producing conforming behavior within the framework of the adaptation-level theory and employing the Simulated Group technique. The report consists of eight separate papers by various authors: (1) Introduction (p. 1-3); (2) Evaluation of the Simulated Group Technic for Studying Social Behavior, by R. R. Blake and J. S. Mouton (p. 5-14); (3) Attitudes as Adjustments to Stimulus, Background, and Residual Factors, by H. Helson, R. R. Blake, J. S. Mouton, and J. A. Olmstead (p. 15-86); (4) Generality of Conforming Behavior as a Function of Factual Anchorage and Difficulty of Task and Amount of Social Pressure, by R. R. Blake, H. Helson, and J. S. Mouton (p. 27-34); (5) An Experimental Investigation of the Effectiveness of the "Big Lie" in Shifting Attitudes, by H. Helson, R. R. Blake, and J. S. Mouton; (6) The Relationship Between Yielding, Submissiveness, and the Disclosure of Personal Identity, by J. S. Mouton, R. R. Blake, and J. A. Olmstead; (7) The Coercion Dynamics of Susceptibility to Counter-Norm Attitude Expressions in a Small Group Situation; and (8) Petition-Signing as Adjustment to Situational and Personal Factors.

6184
Brokaw, L. D.
TECHNICAL SCHOOL VALIDITY OF THE AIRMAN ACTIVITY INVENTORY. — Air Force Personnel and Training Research Center. Personnel Research Lab., Lackland Air Force Base, Tex. Development Report no. AFPTRC-TN-56-109, Aug. 1956. v+8 p. (Project no. 7700, Task no. 77012). AD 98 884 PB 124 789

Scores on a 200-item inventory designed to provide an objective evaluation of activity interests believed to be associated with airman classifications were validated against grades obtained by airmen in thirteen representative technical schools. The activity areas included in the instrument displayed little unique relationship with the intended job cluster. In several cases validities for schools outside the cluster were superior to those for schools in the cluster. The magnitude of intercorrelations of the scales showed an erratic variation among examinees. It is concluded that the instrument would not contribute favorably to the Airman Classification Battery.

6185
Cox, J. A.
and R. E. Christal
DEVELOPMENT AND VALIDATION OF THE PILOT INSTRUCTOR SELECTION EXAMINATION. — Air Force Personnel and Training Research Center. Personnel Research Lab., Lackland Air Force Base, Tex. (Project no. 7701, Task no. 77038). Development Report no. AFPTRC-TN-56-114, Sept. 1956. vi+24 p. AD 98 889 PB 126 625

Tests of English expression, pedagogical judgment, biographical inventory, opinions about flight instruction, word fluency, and controlled word association were administered to student instructors, and were correlated with grades from Pilot Instructor School and with student, instructor, and supervisor ratings of instructors. Test scores were found to be moderately related to grades in Pilot Instructor School, but not to ratings of success on the job.

6186
Fleishman, E. A.
PSYCHOMOTOR SELECTION TESTS: RESEARCH AND APPLICATION IN THE UNITED STATES AIR FORCE. — Personnel Psychol., 9 (4): 449-467. Winter 1956. DLC (HF5549.A2P53, v. 9)

The development and utilization of six psychomotor tests (Complex Coordination Test, Rotary

Pursuit Test, Rudder Control Test, Pursuit Confusion Test, Two Hand Coordination Test, and the Direction Control Test) for prediction of success in pilot training is described. It has been shown that the validity of the psychomotor tests approximates the composite validity of the printed tests. The combined validity of both types of tests is significantly higher than either type alone. However, the difficulties in administration of apparatus tests to large populations of ROTC students outweigh the gains. The use of psychomotor tests as selection devices for the helicopter pilots is investigated at the present time. Other research programs involve the development of manipulative tests for classifying airmen for training in various maintenance jobs, and basic research on psychomotor abilities.

6187
Fulkerson, S. C.
ADAPTABILITY SCREENING OF FLYING PERSONNEL: DEVELOPMENT OF A PRELIMINARY SCREENING BATTERY. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-84, Aug. 1956. 21 p. AD 128 472
UNCLASSIFIED

Five individual personality tests were selected for flight adaptability screening (Cornell Index, Cornell Word Form, McKinney Reporting Test, Minnesota Multiphasic Personality Inventory, and the Saslow Screening Test). The battery was administered during primary training to 472 aviation cadets for whom test scores and criterion data were available. The attrition rate within the group was 35.6%. An analysis of the data leads to the conclusion that the present battery of tests is a weak one, although it does discriminate significantly against both the pass-fail and a purified high-low criterion. The Cornell Index is recommended as the best predictor of the five measures.

6188
Gartmann, H.
[EXPERIENCES IN THE SELECTION OF AIRLINE PILOTS] Erfahrungen bei der Selektion von Linienpiloten. — Schweizerische medizinische Wochenschrift (Basel), 86 (10): 254-256. March 10, 1956. In German. DNLM

The pilot selection procedures of the Swissair are summarized as applied to the screening of 2000 applicants, including military pilots, private fliers with 100 flight hours, glider and small aircraft fliers with less than 100 hours flight experience, and individuals without flight experience. The candidates were first subjected to a battery of mass aptitude and general information tests based on the American selection methods. Then they were evaluated individually as to flight suitability by a team of specialists in the medical, psychological, and flight training areas (Swiss selection method). Both methods were essentially in agreement on the formal intelligence, organizing abilities, coordination, etc. of the candidate. The Swiss method was more revealing on certain personality aspects.

6189
Gerathewohl, S. J.
[THOUGHTS ON SELECTION OF MILITARY LEADERS] Gedanken zu einer militärischen Führerauslese. — Wehrkunde (München), 5 (3): 148-154. March 1956. In German. DLC (U3.W396, v. 5)

The modern methods of selection of military personnel are discussed with particular reference to selection of leaders or specialists. The limitations of using objective tests suitable to mass administration for prediction of officer-like qualities are their relatively low predictive value, a disregard of individual variations and factors operating at the testing time, and orientation toward achievement as such without considering the way it is arrived at. The author concludes that personnel and officer selection must be based on objective performance tests wherever it is feasible, sociometric techniques of leader choice, and personal responsibility that choosing and recommending of a candidate entails. The differential principles employed in selection of military personnel by Germany and U.S. during World War II are contrasted.

6190
Gilhooly, F. M.
PROFICIENCY TEST DEVELOPMENT AND RESEARCH FOR THE AIRMAN CAREER PROGRAM OF THE UNITED STATES AIR FORCE. — Amer. Psychologist, 11 (10): 547-553. Oct. 1956.
DLC (BF1.A55, v. 11)

This paper presents a brief description of the Airman Career Program of the United States Air Force with particular emphasis upon the development and utilization of paper-and-pencil tests in the assessment of airman proficiency. The procedures used by the 2200th Test Squadron in the development, control, and evaluation of proficiency and job knowledge tests are described in some detail. (Quoted in full)

6191
Hollander, E. P.
CONDITIONS AFFECTING THE MILITARY UTILIZATION OF PEER RATINGS: THE NEWPORT STUDY. — Carnegie Inst. of Technology. Psychological Labs., Pittsburgh, Pa. (Contract Nonr 760 (06)). Final Report, May 1956. 4 p. AD 89056.
PB 125 590

This is a summary of the results of an extensive study of peer ratings completed in 1955 with 23 sections at the Officer Candidate School in Newport. The study supports the administrative use of peer ratings early in training for supplemental screening data.

6192
Hollander, E. P.
CONDITIONS AFFECTING THE MILITARY UTILIZATION OF PEER RATINGS: THE NEWPORT STUDY. I. RELIABILITY. — Carnegie Inst. of Technology. Psychological Labs., Pittsburgh, Pa. (Contract Nonr 760 (06)). Navy Technical Report no. 1-56, Jan. 1956. [iv]+22 p. AD 89 669
PB 125 170

From research conducted with 23 trainee sections at the Naval Officer Candidate School in Newport, data are presented relative to the reliability of peer nominations as it is affected by:

the period of time the group has spent together; the nature of the set induced; and the quality of characteristic to be evaluated by the nominator in making his nominations. It is concluded that a peer nomination administered as early as the third week of training will yield substantially the same information as that which is now obtained at the sixth week, or later. The "administrative" set leads to neither more nor less reliable scores than those secured through the less threatening "research" set. (From the author's summary)

6193
Hollander, E. P.
CONDITIONS AFFECTING THE MILITARY UTILIZATION OF PEER RATINGS: THE NEWPORT STUDY. II. VALIDITY AGAINST IN-TRAINING CRITERIA. — Carnegie Inst. of Technology. Psychological Labs., Pittsburgh, Pa. (Contract Nonr 760 (06)). Navy Technical Report no. 2-56, Feb. 1956. [v]+29 p. AD 89 668 PB 125 564

Data are presented on the in-training validity of peer nominations obtained from 23 trainee sections at the Naval Officers Candidate School as affected by time, set, and form. Depending upon the criterion utilized, different forms were found to yield differential validity in prediction. The form requiring nominations on "probability of success in OCS" was the best predictor of the pass-fail and academic criteria. In keeping with the data on reliability report earlier, it is concluded here that--depending upon the purpose for which intended--an early peer nomination will yield an adequate approximation to the prediction obtained from later ratings. This is of particular importance in light of the marked tendency for certain forms to be progressively loaded with an academic performance factor. (From the author's summary)

6194
Hollander, E. P.
CONDITIONS AFFECTING THE MILITARY UTILIZATION OF PEER RATINGS: THE NEWPORT STUDY. III. FRIENDSHIP CHOICE. — Carnegie Inst. of Technology. Psychological Labs., Pittsburgh, Pa. (Contract Nonr 760 (06)). Navy Technical Report no. 3-56, April 1956. [iv]+22 p. AD 89 056 PB 125 590

From research completed with 23 trainee sections at the Naval Officer Candidate School in Newport, data are presented regarding the effect of friendship choice on the in-training validity of peer nominations using different characteristics to be rated, different instructional sets, and varying time levels of administration. The basic criterion was final academic average. The results support the view that peer nominations yield prediction of a performance criterion without adverse effects from friendship ties. The evidence suggests the possibility that this relationship may operate so as to favor as friends those of high status on other continua, rather than to simply create high status for friends. (From the author's summary)

6195
Hollander, E. P.
INTERPERSONAL EXPOSURE TIME AS A DETERMINANT OF THE PREDICTIVE UTILITY OF PEER RATINGS. — Psychol. Reports, 2 (4): 445-448. Dec. 1956. DLC (BF21.P843, v. 2)

Four types of peer rating forms were administered to 23 trainee sections of the Naval Officers Candidate School at orientation, in the third week, and in the sixth week of training. The results show that in terms of reliability and validity the peer ratings obtained in the third week yielded a stable and adequate approximation to the prediction obtainable from later ratings. The evidence from this study supports the use of early peer ratings in similar settings to supplement data for screening.

6196
Laboureur, P.,
and C. Jest
[PRESENTATION OF A SYNTHETIC TEST FOR THE SELECTION OF STUDENT PILOTS: ADAPTATION OF THE "VISUAL LINK TEST" OF THE R.C.A.F.] Présentation d'un test synthétique pour la sélection des élèves pilotes: adaptation du "Visual Link Test" de la R.C.A.F. — Médecine aéronautique (Paris), 11 (1): 101-106. 1956. In French. DLC (TL555.M3 f 1, v. 11)

A "Visual Link Test" of simulated flying for the psychological and psychomotor evaluation of student pilots is described. Significant correlations were observed between results of the test and (1) scores on several psychomotor tests, and (2) an evaluation based on psychological selection tests and behavior during clinical examination.

6197
MacKinnon, D.,
D. G. Woodworth, and F. Barron
VALIDITY OF RATINGS BASED ON LIFE HISTORY INTERVIEWS WITH 100 AIR FORCE OFFICERS [Abstract]. — Amer. Psychologist, 11 (8): 356. Aug. 1956. DLC (BF1.A55, v. 11)

A factor analysis of ten ratings made on the basis of life history interviews with 100 Air Force captains revealed four factors: (a) drive for professional achievement; (b) stability of present adjustment; (c) personal scope and capacity for achievement; (d) character structure and mode of adjustment. These factors are discussed in terms of their identifying rating variables and their correlations with other data in an extensive assessment program. Correlations of the four factor scores with Air Force criteria of officer effectiveness indicate that the factor scores are of value in predicting officer promise, Factor d being the best predictor. (Quoted in full)

6198
Morsh, J. E.,
and J. Schmid
SUPERVISORY JUDGMENT AS A CRITERION OF AIRMAN PERFORMANCE [Abstract]. — Amer. Psychologist, 11 (8): 431-432. Aug. 1956. DLC (BF1.A55, v. 11)

The purpose of the investigation was to see if noncommissioned officer supervisors' ability to estimate job knowledge of their airman subordinates is related to certain characteristics of the

supervisor. It was found that supervisors to some extent were able to estimate airmen's job knowledge as shown by proficiency tests. Supervisors tended toward overestimation. They were more severe with increase in their own rank. Accuracy of rating increased with supervisors' knowledge of the job which in turn was related to their education and experience. (Quoted in full)

6199
Preston, J. H.
PSYCHIATRIC SCREENING OF GROUNDCREW IN THE ROYAL CANADIAN AIR FORCE. — Canad. Services Med. Jour. (Ottawa), 12 (4): 265-272. April 1956. DNLM

Methods used for psychiatric screening of groundcrews in the Royal Canadian Air Force are outlined with emphasis on the interview procedure, case history, analysis of personnel recommended for release, and disposal of cases. Personnel are allocated in one of three groups or categories: (1) those considered fairly well integrated and capable of carrying out training and trade satisfactorily; (2) those who possess a degree of neuroticism which might interfere with their becoming successful airmen; and (3) those overtly neurotic, showing pathological personality traits, or having a high degree of latent neuroticism and giving no promise of future success. Included is an economic evaluation of psychiatric screening and a tabulation of the volume of psychiatric screening for 1954.

6200
Roby, T. B.
SOCIOMETRIC INDEX MEASURES AS PREDICTORS OF MEDIUM-BOMBER CREW PERFORMANCE. — Air Force Personnel and Training Research Center. Crew Research Lab., Randolph Air Force Base, Tex. (Project no. 7713, Task no. 77221). Research Report no. AFPTRC-TN-56-46, April 1956. iv+12 p. AD 105 957 PB 124 113

Sociometric questionnaire data may be considered from three rather different standpoints: the inferred role behavior of referent ratees; the inferred attitudes and information with respect to the group raters; and, the unique interactional relationships that may be implied between raters and ratees. Indexes based upon each of these approaches are derived for 30 B-29 crews in training. Relatively satisfactory validities are demonstrated for both ratee-oriented indexes. The results are discussed and several suggestions are offered for future research. (Author's summary)

6201
Rogers, O. E.
DIFFERENCES IN BASIC TRAINING GRADES BETWEEN SINGLE-ENGINE AND MULTI-ENGINE PILOTS. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-18, June 15, 1956. ii + 3 p. AD 101 292 UNCLASSIFIED

A significant difference was found to exist in the basic training flight grades between single- and multi-engine pilots. The average grade of single-engine pilots was higher than that of multi-engine pilots. The most important differences occurred in acrobatics, precision flying, night primary, and carrier qualifications. Causes for the lower grades are unknown.

6202
Rogers, O. E.
PRELIMINARY VALIDATION AND EMPLOYMENT OF THE PRE-FLIGHT PROGRESS GRADE. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-6, Feb. 24, 1956. ii + 5 p. AD 99 132 UNCLASSIFIED

Students with unsatisfactory pre-flight progress grades were found to be more susceptible to failing primary flight training and more likely to come before disposition boards because of primary flight training difficulties. The most effective time to utilize the pre-flight progress grade is when a student first comes before a Student Pilot Disposition Board. It is recommended that any student with an unsatisfactory pre-flight progress grade be referred to Basic with recommendations to drop, if he encounters training difficulties serious enough to warrant appearance before a Student Pilot Disposition Board.

6203
Rosenberg, S.,
and T. B. Roby
EXPERIMENTAL ASSEMBLY OF B-29 CREWS BY SELF-SELECTION PROCEDURES: A DESCRIPTION AND VALIDATION OF THE METHOD. — Air Force Personnel and Training Research Center. Crew Research Lab., Randolph Air Force Base, Tex. Research Report no. AFPTRC-TN-56-104, Aug. 1956. vi+38 p. (Project no. 7713, Task no. 77231). AD 98 879 PB 124 765

A method of crew selection was tested in which airmen chose their fellow crew members on the basis of self-descriptions (background information and general attitudes) and statements of attitude toward problems of crew functioning. Approximately half the crews in three successive classes of nine B-29 crews were assembled by this method, while half were assembled in a random manner. Analysis showed the method to be suitable, but not ideal, for the assembly of crews, regardless of the validity of the choices. The selection scores showed little correlation with later sociometric ratings and no correlation with instructor ratings.

6204
Seaquist, M. R.,
J. R. Barry, and S. B. Sells
ADAPTABILITY SCREENING OF FLYING PERSONNEL: LIFE HISTORY INQUIRY APPROACH BASED ON THE PERSONAL HISTORY AND BACKGROUND INFORMATION QUESTIONNAIRE. — School of Aviation Medicine, Randolph AFB, Tex. Report no. 56-45, June 1956. 20 p. AD 126 581 PB 126 888

A 25-item a priori key derived from the Personal History and Background Information Questionnaire was evaluated against training level criteria by means of a purified adaptability sampling plan. Three independent samples were studied, and a adaptability prediction validity was demonstrated.

This key makes a substantial contribution to prediction, which is generally independent of pilot stanine, and was demonstrated to be capable of reducing attrition at all pilot stanine levels in the samples studied. Late eliminees were predicted with nearly the same accuracy as early eliminees. The results suggest, but do not conclusively prove, that the key is equally effective in screening unadaptable student officers. (Authors' conclusions)

6205
Sells, S. B.
FURTHER DEVELOPMENTS ON ADAPTABILITY SCREENING OF FLYING PERSONNEL. — Jour. Aviation Med., 27 (5): 440-451. Oct. 1956.
DLC (RC1050.A36, v. 27)

A summary is presented of the research concerned with the development of a personality test for adaptability screening of flying personnel. Evidence is given on the validity of screening tests in relation to training-level criteria of adaptability; on the relation of these early criteria to post-training operational (Form 66) and combat criteria; and on the validity of four screening tests in relation to post-training criteria. Because of the increased importance of personality factors, once training is completed, the inclusion of a personality test battery in the total aircrew selection program is strongly indicated. (Author's summary, modified) (38 references)

6206
Strollo, M.
[PSYCHOLOGICAL SELECTION OF AIRPLANE PILOTS BY MEANS OF PSYCHOMETRIC METHODS] La selezione psicologica del pilota di aviazione ai limiti dei metodi "psicometrici". — Rivista aeronautica (Roma), 32 (3): 277-294, March 1956; 32 (4): 392-405, April 1956. In Italian.
DLC (TL504.R54, v. 32)

A review is presented of the psychological methods used in pilot selection. The topics discussed include those dealing with the general problems of selection in relation to work; the problem of methodology; the historical aspects of selection in aviation; the development of psychological thought, and psychometric methods as related to flying, along with their limitations.

6207
Vinacke, W. E.
THE ASSESSMENT OF OFFICER-LIKE QUALITIES IN NAVAL AIR CADETS. — Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 109 101, Report no. 6, Oct. 29, 1956. [35] p. LC (Sci.) UNCLASSIFIED

This report presents a "test case" for the validity of the officer-like qualities (OLQ) rating, together with analyses of the validity of other measures of "nontechnical" aspects of training. These include peer nominations, cadet officership, and records of delinquency and demerits. Certain internal properties of the OLQ rating are examined, especially the incidence of substandard checks. The criterion of validity was judgment of acceptability as an officer made by senior officers in the fleet. In general, evidence reveals that satisfactory men differ from unsatisfactory men throughout training. Available measures possess sufficient validity for prediction purposes. It is suggested that officerlikeness involves traits of military behavior, leadership, acceptability as a person, and devotion to duty. Proposals to improve the measurement of officerlikeness are considered. (Author's abstract)

6208
Voas, R. B.
A PROCEDURE FOR REDUCING THE EFFECTS OF SLANTING QUESTIONNAIRE RESPONSES TOWARD SOCIAL ACCEPTABILITY. — U. S. Naval School of Aviation Medicine, Pensacola, Fla. Project No. NM 001 108 100, Report no. 17, Sept. 15, 1956. 9 p.
UNCLASSIFIED

The Guilford-Zimmerman Temperament Survey and Minnesota Multiphasic Personality Inventory were administered to naval aviation cadets by a method in which both socially acceptable and self-descriptive answers were obtained contiguously. Self-descriptions obtained with socially acceptable responses were significantly less biased towards acceptability in 13 of the 24 scales than were the scores of controls who received these inventories under normal conditions. Thus, allowing subjects to give acceptable answers along with self-descriptions appeared to reduce the bias in the latter. (Author's abstract)

6209
Whitcomb, M. A.
EVALUATION OF A METHOD FOR THE CONSTRUCTION OF FACTOR-PURE APTITUDE TESTS. — In: Symposium on Air Force human engineering, personnel, and training research, p. 298-305. Air Research and Development Command, Baltimore, Md. ARDC Technical Report 56-8, 1956. DLC (UG633.A377163, no. 56-8, 1956)

Homogenous keying within an aptitude area is recognized as a valuable approach to test construction. The resulting keys are often not long enough to be of immediate use, but they do adequately indicate the direction for further item construction in order to attain sufficient length to be usable. The reliability and independence of the keys developed in the spatial relations area showed stability when tested on an independent sample. The independence attained was higher than was expected in view of that attained by similar batteries in past studies. However, this method is limited by its cost and the amount of time needed. (Author's summary, modified)

6210
Wrigley, C.,
J. E. Morsh, and R. Twerry
A FACTOR ANALYSIS OF THE AIR FORCE FACTOR REFERENCE BATTERY I. — Univ. of Illinois, Urbana (Contract no. AF33(038)-25726A); issued by Air Force Personnel and Training Research Center. Personnel Research Lab., Lackland Air Force Base, Tex. (Project no. 7700, Task no. 77016). Research Report no. AFPTRC-TN-56-137, Dec. 1956. v+13 p.
AD 98913 PB 128 107

The Factor Reference Battery I has been designed to provide for effective assessment of the aptitude

of personnel in the operating commands in shorter time than is required for the usual aptitude battery. Only about an hour is required for administration of the 14 tests in the battery. This study reports a factor analysis of the tests to determine how the battery might be further shortened. The tests were administered to 562 experienced aircraft and engine mechanics. From the point of view of this study, specific factors as well as common factors were of interest, so that the factor analysis was made with unities in the leading diagonal. Using Bartlett's test, there were found to be 11 significant principal axes factors. These were rotated by the quartimax method. Results indicate that 10 factors are represented in the Factor Reference Battery I, viz., Sensorimotor Speed, Spatial Aptitude, Fluency, Induction, Verbal Aptitude, Clerical Speed, Mechanical Knowledge, Associative Memory, Deduction, and Perceptual Reorganization. Suggestions are made as to tests which might be eliminated in revision of the battery. (Authors' summary)

6211
Zeidner, J.,
and L. G. Goldstein
EVALUATION OF FIXED-WING SELECTION TESTS FOR PREDICTING SUCCESS IN ARMY HELICOPTER PILOT TRAINING. — Adjutant General's Office (Army). Personnel Research Branch, Washington, D. C. (DA Project 29560000, Task 284; PRB Project A-3-284-01). PRB Technical Research Note 65, Oct. 1956. [14] p. AD 129 163 UNCLASSIFIED

The possibility was explored that Navy and Air Force tests, originally designed to select fixed-wing pilot trainees, might also be effective predictors of success in the Army Cargo Helicopter Pilot Course. Passing or failing the course appeared to be primarily dependent on proficiency or deficiency of flight performance, a criterion related to amount of previous flying experience. None of the partial validity coefficients against the flying criterion were as high as those ordinarily obtained for many of the same tests against fixed-wing criteria. However, within the limitations of this exploratory study, the results suggest that measures of aviation information, of mechanical comprehension, of practical reasoning, and of certain personality characteristics warrant consideration in selecting helicopter pilot trainees. (From the authors' abstract)

c. Training

[Flight simulators under 11-d]

6212
Albert, J.
WHAT'S DIFFERENT ABOUT FLIGHT NURSING? — Amer. Jour. Nursing, 56 (7): 873-874. July 1956. DLC (RT1.A5, v. 56)

A registered nurse with hospital experience must complete a course of intensive study at the U. S. Air Force School of Aviation Medicine in order to qualify as a flight nurse. Under the guidance of instructors trained and experienced in the field of air evacuation, proficiency is acquired in the techniques of caring for wounded and sick patients without the facilities of a well-equipped hospital. Examples are presented of the group preparation and flight nursing of patients with poliomyelitis, coronary thrombosis, paraplegia, tuberculosis, and psychoneuroses.

6213
Alurkar, M. Y.
PSYCHOLOGICAL ASPECTS OF INSTRUCTOR PUPIL-PILOT RELATIONSHIP. — Aero Med. Soc. Jour. (New Delhi), 3 (1): 1-3. April 1956. DNLM

A discussion of the psychological background of the Indian Air Force cadet is presented as a basis for an understanding of the problems of instructor-student pilot relationships and of the requirements for effective instruction. It is suggested that the lack of interest in flying, the fear of flying, and family conflicts among most cadets may result in inferior flying performance and in psychosomatic illnesses. It is recommended that (1) instructors and medical officers be trained in psychology, (2) medical officers cooperate with instructors in the encouragement of good instructor-student relations and in the promotion of an understanding of individual problems, (3) instructors be selected who are temperamentally suited to teaching, and (4) instructors be rewarded for producing above-average pilots.

6214
Ambler, R. K.,
and J. T. Bair
ATTRITION DIFFERENCES AMONG NAVAL AVIATION CADETS BY PROCUREMENT SOURCE. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-5 (Attrition Report no. 19), Feb. 24, 1956. ii+5 p. AD 99 131 UNCLASSIFIED

This report evaluated the differences in NavCad attrition rates by procurement areas. The results revealed no statistically significant differences in rates among the twenty-nine procurement areas when considered over a period of one fiscal year. Although there was a lack of statistical significance, Denver, Birmingham, Willow Grove, and New York maintained relatively high attrition rates in two separate rankings. No corresponding pattern of consistency was revealed for the lower attrition rates. (Authors' summary)

6215
Ambler, R. K.,
and J. T. Bair
DIFFERENCES IN ATTRITION RATES BY ORIGIN OF COMMISSION. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-31, Dec. 6, 1956. ii+3 p. AD 124 775 UNCLASSIFIED

This report compared the attrition rates for the different categories of flight students. These categories were cadets aviation officer candidates (AOC's) and the officers under instruction (OI) students grouped into 10 categories determined by the origin of their commissions. The study included all students who entered the program during the seven month period following the institution of the AOC program. For this period the AOC group and the group commissioned via the OCS/USNR program had

the highest over-all attrition rate. The high over-all rates were largely due to high voluntary attrition, as there were no significant differences for other types of attrition. The naval aviation cadet attrition rate did not differ significantly from the rates of the other types of officer students, and the other officer students did not differ significantly among themselves. (Authors' summary)

6216
Bair, J. T.,
and R. K. Ambler
A COMPARISON OF ATTRITION RATES AMONG AVIATION OFFICER CANDIDATES, OTHER OFFICER STUDENTS AND NAVCADS. — U. S. Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-19 (Attrition Report no. 20), June 29, 1956. 4 p. AD 101 291 UNCLASSIFIED

Attrition rates were computed for 3 different types of flight trainees: naval aviation cadets (NavCad), officers under instruction (OI), and aviation officer candidates (AOC). The AOC group had the highest rates, with the OI's and NavCad's following in that order.

6217
Bair, J. T.,
R. F. Lockman, and C. T. Martoccia
VALIDITY AND FACTOR ANALYSES OF NAVAL AIR TRAINING PREDICTOR AND CRITERION MEASURES. — Jour. Applied Psychol., 40 (4): 213-219. Aug. 1956. DLC (BF1.J55, v. 40)

Essentially the same as the report, item no. 2422, vol. III.

6218
Berkshire, J. R.
IMPROVEMENT AND SIMPLIFICATION OF PRE-FLIGHT PROGRESS GRADES. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-9, March 27, 1956. [13] p. AD 99 135 UNCLASSIFIED

A substantially improved progress grade is developed by: (1) weighting the formula for maximum prediction of flight failure; (2) including "Biographical Inventory" scores in the formula; and (3) re-weighting pre-flight grades to give maximum prediction of flight failure. At the same time, procedures for computing all pre-flight grades and pre-flight progress grades are simplified. (From the author's summary)

6219
Berkshire, J. R.,
and V. W. Lyon
PERFORMANCE IN NAVAL AIR TRAINING AS A PREDICTOR OF SUCCESS IN THE FLEET. PRELIMINARY REPORT: FOLLOW-UP STUDY OF GRADUATES SENT TO COMAIRPAC. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-14, April 30, 1956. ii+11 p. AD 99 139 UNCLASSIFIED

A follow-up study of a sample of naval air training graduates assigned to the Pacific Fleet identified 94 men as satisfactory and 44 as unsatisfactory. An analysis of various areas of the grading system showed that fleet success and failure could be predicted best from the student's grades in Primary A stage. Of the 17 men with the lowest grades only 2 were successful in the fleet. These 17 men required a total of 169 weeks more than normal to complete training. Subject to confirmation of these findings in the Atlantic Fleet, it is concluded that both the Training Command and the Fleet would profit from the early elimination of such men from training. Should the Atlantic Fleet data be in accord with the results herein, consideration should be given to establishing minimum standards of performance in Primary A stage that would eliminate men with extremely low grades. (Authors' conclusions)

6220
Berkshire, J. R.,
and V. W. Lyon
THE RELATION OF PERFORMANCE IN TRAINING TO SUCCESS AND FAILURE IN THE FLEET. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-27, Nov. 7, 1956. [19] p. AD 118 823 UNCLASSIFIED

One hundred and thirty-nine men were identified as being below the fleet's desired performance standards, either as pilots, as officers, or both. It is shown that the elimination of those students who are in the lowest 7 per cent in their primary A-stage grades would eliminate annually 93 men who attrite later in training (41 men who are unsatisfactory in the fleet, and 43 men who are satisfactory). If these men were attrited at the end of A-stage, and replaced in training by men whose A-stage grades were average or better, an annual savings of approximately $7,000,000 would result. At the same time the total number of unsatisfactory men in the fleet would be reduced by about 20 per cent. The grade weights now in use are demonstrated to be reasonably accurate for NavCad's but less so for officers. It is shown that land-based pilots who had below average training records are less likely to be considered unsatisfactory in the fleet than are carrier-based pilots with similar training records. Success or failure in the fleet was found to be unrelated to source of procurement or to level of education. (From the authors' summary)

6221
Briggs, L. J.,
and G. Besnard
EXPERIMENTAL PROCEDURES FOR INCREASING REINFORCED PRACTICE IN TRAINING AIR FORCE MECHANICS. — In: Symposium on Air Force human engineering, personnel, and training research, p. 48-58. Air Research and Development Command, Baltimore, Md. ARDC Technical Report 56-8, 1956. DLC (UG633.A377163, no. 56-8, 1956)

Two groups of Air Force students, matched on aptitude, were trained for a portion of a Fire Control System maintenance course by two different amounts of reinforced practice. In the experimental group, a variety of instruction techniques were used

in combination with a training device. In the control group the same instructor techniques were applied for less time and without the training device. Thus a lesser amount of reinforced practice was employed in the control group, in favor of relatively more use of lectures, demonstrations, and individual study. The experimental group scored higher than the control group on performance tests. There was a significant effect of aptitude level on performance scores. The difference in written test scores in the two methods of treatment was not significant. The correlations between morale scores and motivation and proficiency scores were very low. The results indicated that (a) performance may be raised by increasing the amount of reinforced practice in training, and (b) aptitude tests are of value in selecting students for training. (Authors' summary, modified)

6222
Creelman, J. A.
DEVELOPMENT OF AN INTERMEDIATE CRITERION OF SUCCESS IN NAVAL AIR TRAINING. — Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 108 100, Report no. 18, Oct. 10, 1956. ii+6 p.
UNCLASSIFIED

Pass-fail at the end of primary flight training was found to be a satisfactory substitute criterion for the present criterion of pass-fail upon completion of the entire program. Utilization of this intermediate criterion for determining the predictive validity of measures gives a satisfactory estimate of the final validity and is a time-saver.

6223
Evrard, E.
[AEROMEDICAL TRAINING OF FLYING PERSONNEL] L'instruction médico-aéronautique du personnel navigant. — Bulletin international des Services de santé des armées de terre de mer et de l'air (Liège), 29 (12): 515-523. Dec. 1956. In French, with English summary (p. 515-516).
DLC (RC970.B77, v. 29)

Aeromedical training of personnel of high-speed aircraft includes their familiarization with the pathological and physiological problems related to high altitude, explosive decompression, acceleration, hypoxia, changes in barometric pressure, noises, vibrations, and extreme temperatures. Personnel are also instructed in the use of protective equipment such as protective clothing, oxygen equipment, survival kits for various climates, ejection seats, etc. In order to obtain the best results, special teaching apparatus must be available including decompression chambers, ejection ramps, flying equipment, motion pictures, and books for medical instructors and flying personnel. It is emphasized that special care be given to the training of medical officers and technicians in charge of instructing air crews.

6224
Fitzpatrick, R.
TRAINING DEVICE VERSUS DIRECT TASK TRAINING: THE DISTRIBUTION AND SEQUENCE OF PRACTICE SESSIONS [Abstract]. — Amer. Psychologist, 11 (8): 446. Aug. 1956.
DLC (BF1.A55, v. 11)

When a given amount of total training time is divided between practice on a training device and practice at the actual task, training effectiveness may depend upon (1) distribution of training time between practice on the device and practice at the actual task, and (2) sequence of practice sessions on the device and at the task. This study was an attempt to determine how distribution and sequence would influence the effectiveness of transition training of pilots in two types of large cargo aircraft when electronic flight simulators were used for part of the training. Both distribution and sequence effects appeared. (Quoted in full)

6225
Flyer, E. S.,
and A. Carp
PREDICTION OF PILOT TRAINING PERFORMANCE: APTITUDE TESTS AND EARLY FLYING PROFICIENCY EVALUATIONS. — In: Symposium on Air Force human engineering, personnel, and training research, p. 152-159. Air Research and Development Command, Baltimore, Md. ARDC Technical Report 56-8, 1956.
DLC (UG633.A377163, no. 56-8, 1956)

The major implication of this research is that instructor evaluations of pilot proficiency made during light plane training are predictive of success in Primary and Basic training and that the most effective prediction of performance in Primary and Basic is obtained when these measures are used in conjunction with the Pilot Stanine. The analyses of the data presented here, therefore, support the contention by the Air Force that the introduction of light plane training into the AFROTC college curriculum would provide data useful for selection purposes. (Quoted in part)

6226
French, R. S.,
N. A. Crowder, and J. A. Tucker
THE K-SYSTEM MAC-1 TROUBLE-SHOOTING TRAINER. II. EFFECTIVENESS IN AN EXPERIMENTAL TRAINING COURSE. — Air Force Personnel and Training Research Center. Maintenance Lab., Lowry Air Force Base, Colo. (Project no. 7709, Task nos. 77152 and 37301). Development Report AFPTRC-TN-56-120, Oct. 1956. ix+41 p. AD 98 894 PB 126 758

An experimental training program was conducted to evaluate the effectiveness of a K-System MAC-1 trouble-shooting trainer, and to investigate the feasibility of teaching systematic trouble shooting as a separate discipline to apprentice K-System [electronic] mechanics. The results of the study support the conclusion that the MAC-1 Trainer, possibly with some modifications, can be used effectively in the classroom as a supplement to the equipment either in formal training courses or for on-the-job training. The study further demonstrated that apprentice mechanics can learn systemic trouble-shooting procedures based on a logical analysis of the data flow of the system. (From the authors' summary and conclusions)

6227
Frowein, E.
[BASIC PROBLEMS OF TRAINING AND EDUCATION OF FLIERS] Grundfragen fliegerischer Aus-

bildung und Erziehung. — 134 p. München: Johann Ambrosius Barth, 1956. In German.
DLC (TL761.F7, 1956)

The basic problems pertinent to education and training of fliers are scrutinized in an attempt to develop a concept of a "flier's personality" on basis of common factors in background and interests. The sections on the psychophysiology of flight include discussions of proprioception, spatial orientation, hearing, equilibrium, vision, perception of different types of motion, and distance perception in the air and at landing. The demands placed on the flier's intellectual processes, coordination of reflex and voluntary movements, thinking processes, and emotional makeup in flight are considered. The second part deals with applied research on the relation between flight performance and hobbies, educational interests, sports, artistic inclinations, professions, background, and heredity conducted with several groups of pilots and instructors, and famous aces of World War I. Flight safety, performance, training, age factors, and experience are reviewed as applied to glider flying.

6228
Gallagher, T. J.,
and J. R. Berkshire
THE EFFECTS OF MINIMUM PASSING GRADES IN PRIMARY A-STAGE TRAINING COSTS AND ATTRITIONS. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-21, Aug. 1956. ii+5 p. AD 117 670 UNCLASSIFIED

This study supplements Berkshire and Lyon's fleet follow-up studies (item no. of this volume). Data are presented showing the effects of getting an A-stage minimum passing grade at any level below an A-stage average of 2.90. It is shown that, if 2.84 is used as a minimum A-stage passing grade, an annual savings approximating $10,000,000 could be realized; or training time would be made available to train 155 average or better than average students yearly in place of 84 below average students now graduating. (From the authors' summary)

6229
Guibal, E.
[FLIGHT SURGEON: REPORT OF A STAGE OF INSTRUCTION AT PENSACOLA, FLORIDA]
Le médecin volant: Compte-rendu d'un stage d'instruction à Pensacola (Floride), U. S. A. — Revue de médecine navale (Paris), 11 (3): 237-240, 1956. In French. DNLM

Training of flight surgeons at the U. S. Naval School of Aviation Medicine, Pensacola, Florida, consists chiefly of courses in physiology, ophthalmology, neuropsychiatry, cardiology, otorhinolaryngology, nuclear physics, survival, tropical, industrial and arctic medicine, dermatology, dentistry, and surgery. Laboratory studies are included with the decompression chamber, human centrifuge, and ejection seat, along with training in the physical examination of flying personnel. Visits to aeromedical research centers and adequate flight training are also part of the curriculum. After graduation, the flight surgeon may serve aboard a ship's infirmary-hospital, as the head of emergency missions, as base squadron physician, in aeromedical research, as instructor of flight physiology, or take charge of selection and periodic control examination of flight personnel.

6230
Lay, M. F.
[PHYSIOLOGICAL TRAINING OF FLIGHT PERSONNEL IN THE ROYAL AIR FORCE] Physiologische training van vliegend personeel der Koninklijke Luchtmacht. — Nederlands militair geneeskundig tijdschrift (s'Gravenhage), 9 (1): 2-16. Jan. 1956. In Dutch. DLC (RC971.N4, v. 9)

The new physiological training program instituted in the Royal Dutch Air Force is described. Essentially it is similar to the American program. The training is divided into two phases. The first phase includes: (1) elementary flight training (composition of atmosphere, gas laws, respiration, circulation, sensory illusions, and night vision); (2) advanced flight training (hypoxia, dysbarism, acceleration, oxygen equipment, and night vision); and (3) jet flight training (pressure breathing, emergency procedures at high altitudes, seat ejection, pressure cabins, explosive decompression, and physiological disturbances in flight). The last two parts include ascents in the decompression chamber, a run on the Martin-Baker ejection seat trainer, and experience with the night vision trainer. The second phase is specialized training given once a year to jet fliers.

6231
Lomonaco, T.
[COURSES OF INSTRUCTION IN FLIGHT PHYSIOLOGY FOR FLYING PERSONNEL] Corsi di addestramento aerofisiologico per il personale navigante. — Rivista aeronautica (Roma), 32 (6): 619-624. June 1956. In Italian.
DLC (TL504.R54, v. 32)

A course in flight physiology for Italian flying personnel is offered at the Centro di Studi e Ricerche di Medina Aeronautica. It is formulated (1) to acquaint personnel with the physiological variations occurring during flight; (2) to increase the resistance to flight, especially under conditions surpassing normal physiological limits; and (3) to prevent the causes of flight accidents attributed to physical and psychological deficiencies and to errors made by flight personnel. Mention is made of various physiological training exercises including those dealing with the effects of anoxia, decompression, cold, and accelerations, and of instruction in night flying and the use of inhalators.

6232
Lomonaco, T.
[FIRST COURSE IN AVIATION MEDICINE FOR VOLUNTEER NURSES OF THE ITALIAN RED CROSS FOR USE ON MEDICAL AIRCRAFT] I° corso di medicina aeronautica per infermiere volontarie della Croce Rossa italiana da impiegare su velivoli sanitari. — Rivista di medicina aeronautica (Roma), 19 (4): 715-723. Oct.-Dec. 1956. In Italian.
DLC (RC1050.R56, v. 19)

Essentially the same in: Rivista aeronautica (Roma), 32 (11-12): 1281-1285. Nov.-Dec. 1956. DLC (TL504.R54, v. 32)

A brief discussion is presented on the initiation of a course in aviation medicine for volunteer nurses of the Italian Red Cross. Under the auspices of the Center of Studies and Research in Aviation Medicine, Rome, nurses were instructed in human flight physiopathology and aviation physiopathological techniques and hygiene, in order to assist in the care of wounded and sick persons transported by air.

6233
Martoccia, C. T.,
and W. H. Nelson
COMPARISON OF INSTRUCTOR GRADE AND INSTRUCTOR EXPRESSED OPINION AS PREDICTORS OF STUDENT SUCCESS IN NAVAL AIR FLIGHT TRAINING. — Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 108 107, Report no. 3, May 1, 1956. 4 p. AD 105 700 UNCLASSIFIED

An analysis of the flight instructor's grade on his student's flight proficiency, and his expressed opinion concerning the student's success in naval air basic training together with the actual success of the student, suggests that an instructor's opinion adds to the predictive value of the grade he assigns.

6234
(Office of the Surgeon General (Air Force))
TRAINING IN AVIATION MEDICINE LEADING TO SPECIALTY BOARD CERTIFICATION. — Office of the Surgeon General (Air Force), Washington, D. C. 28 p. [1956]. DNLM (UH398. A4q03t)

The Air Force training program in aviation medicine covers a period of five years and deals with the responses of the human mind and body to aerial flight. Pre-requisite for entry into the program is the satisfactory completion of a four-week Medical Indoctrination Course. Upon acceptance into the course, the first year of specialized study is designed to acquaint the student officer with the major problems in the specialty and prepare him for service as a squadron surgeon. The next two years include comprehensive instruction in clinical practice with emphasis on techniques for conserving health and sharpen efficiency of flyers. Also included are field trips to Air Force installations, side-by-side study with aviation cadets, and for selected students a one-year fellowship in aviation medicine at a civilian medical school. Upon completion of these phases the student is eligible for the designation of flight surgeon and ready for the final period of residency and supervised practice which provides additional training and experience for certification.

6235
Rivas Gutiérrez, O.
[IMPORTANCE OF PHYSICAL EDUCATION] Importancia de la educación física. — Revista aeronáutica (Bogotá), 10 (52): 17-21. Oct.-Nov. 1956. In Spanish. DLC (TL504.R5143, v. 10)

Following a brief review of the history of physical education, exercise methods, and the relationship between exercise and respiration, a physical efficiency program for aviators is recommended which consists of gymnastics, sports, exercises and marches. Group sports initiate the type of crew comradeship required for flight activities. Physical efficiency is also contingent upon a properly balanced diet, and adequate periods of recreation and rest. Consideration is given to military physical education programs.

6236
Rogers, O. E.
ANALYSES OF BASIC TRAINING STAGE GRADES FOR MULTI-ENGINE AND SINGLE-ENGINE AVIATORS. — Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 109 102, Report no. 3, Aug. 24, 1956. ii+14 p. AD 119 596 UNCLASSIFIED

Factor analyses of multi- and single-engine flight grades yielded similar factor patterns. Differences in flight grades favored single-engine students; however, weights for predicting advance flight performance were not different between the two groups. (Author's abstract)

6237
Seale, L. M.
RELATIVE FLIGHT PROFICIENCY OF THE SNJ TRAINED STUDENTS AND T34-T28-SNJ TRAINED STUDENTS: PERFORMANCE ON FIELD CARRIER LANDING PRACTICE AND CARRIER QUALIFICATIONS. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-30, Nov. 19, 1956. ii+7 p. AD 124 774 UNCLASSIFIED

Field carrier landing practice and carrier qualifications were compared for T34-T28-SNJ trained and SNJ trained student aviators. Differences in favor of the T34-T28-SNJ students were found in some aspects of field carrier landing practice, whereas many differences favoring SNJ students were found in carrier qualifications.

6238
Smith, Robert G.,
G. P. Wilson, and P. G. Salter
TRENDS OF ADJUSTMENT TO BASIC MILITARY TRAINING [Abstract]. — Amer. Psychologist, 11 (8): 420. Aug. 1956. DLC (BF1.A55, v. 11)

Seven measures considered related to adjustment to military life were used to study the time required to achieve adjustment during an eight-week Air Force basic military training program. Twelve flights (training units) totalling 305 airmen were used. Wherever significant differences were found, they support the conclusion that changes in adjustment occurred only during the first two weeks of basic training. Significant differences between flights occurred on a majority of measures. (Quoted in full)

6239
Stolurow, L. M.,
T. F. Hodgson, and J. Silva
TRANSFER AND RETROACTION EFFECTS OF "ASSOCIATION REVERSAL" AND "FAMILIARIZATION" TRAINING IN TROUBLE SHOOTING. — Psychol. Monographs, 70 (12): 1-23. 1956.
DLC (BF1.P8, v. 70)

A relatively large sample of Air Force trainees and mechanics was tested with miniature diagnostic problems and then subgroups were identified which differed in ways which were assumed to be psychologically significant. An analytical method was used which employed both a task analysis of jobs and training situations as well as biographical information provided by the examined airmen. This method, combined with the use of two types of problems, made possible: (a) the separation of transfer and retroaction effects of different sequences of technical school training and work experience, and (b) the determination of these effects under differing conditions. (Quoted from the authors' summary)

6240
Stolurow, L. M.
UTILIZATION OF CLASS-DESCRIPTIVE CUES IN THE LEARNING OF TECHNICAL INFORMATION—STUDIES IN TASK ENGINEERING. — In: Symposium on Air Force human engineering, personnel, and training research, p. 248-266. Air Research and Development Command, Baltimore, Md. ARDC Technical Report 56-8, 1956.
DLC (UG633.A37163, no. 56-8, 1956)

Three independent but conceptually interrelated studies on task learning are described and some of their more salient implications are considered with respect to Air Force training problems. The concept of the class-descriptive cue was differently employed in the analysis of three tasks. Each study therefore serves to illustrate a different application of this concept to a particular training program. The findings of these studies (a) support the described notions about stimulus processes in learning; (b) provide information which serves as useful guidance in task engineering under specified conditions; and (c) illustrate a generalizable research strategy that appears to be a useful means for generating fundamental research of importance to the Air Force. (From the author's summary)

6241
Thomas, F. H.,
E. G. French, and R. M. W. Travers
VARIABLES RELATED TO PROBLEM-SOLVING EFFECTIVENESS IN TWO DIFFERENT TYPES OF PROBLEMS SITUATION. — In: Symposium on Air Force human engineering, personnel, and training research, p. 276-285. Air Research and Development Command, Baltimore, Md. ARDC Technical Report 56-8, 1956.
DLC (UG633.A377163, no. 56-8, 1956)

Mechanical problems of two types were constructed. In one type level of difficulty was mainly a result of complexity, but in the other it was a product of an initial false set. These problems were administered together with tests of aptitude (Airman Classification Battery, ACB) and rigidity (Closure Test, Changing Figures Test, Einstellung Problems, Design Preference Test). The results, which were in accordance with prediction, indicated that ability to solve the complex problems was related to intellectual ability as measured by ACB tests and ability to solve the inhibitory-set problems was related to rigidity. In addition, it was shown that the degree to which a problem elicits inhibitory sets can be controlled in part by varying the antecedent conditions. (Authors' summary, modified)

6242
Torrance, E. P.
TECHNIQUES FOR STUDYING INDIVIDUAL AND GROUP ADAPTATION IN EMERGENCIES AND EXTREME CONDITIONS. — In: Symposium on Air Force human engineering, personnel, and training research, p. 286-297. Air Research and Development Command, Baltimore, Md. ARDC Technical Report 56-8, 1956.
DLC (UG633.A377163, no. 56-8, 1956)

From four studies described briefly it appears that there are four types of situations in which scientific information about individual and group adaptation in emergencies and extreme condition can be developed. The two techniques for studying groups, the Q sort and test-retest design, demonstrated that quantitative and qualitative data on group adaptation can be collected and that these data are useful in stimulating the development of theory and in planning more rigorous studies to investigate single hypotheses or a set of related hypotheses. The hypotheses formulated from the studies described provide only emergency guidance for training groups to adapt in emergencies and extreme conditions. (From the author's summary)

6243
White, M. S.
DEVELOPMENT OF AN AVIATION MEDICINE RESIDENCY PROGRAM. — Jour. Aviation Med., 27 (3): 226-230. June 1956.
DLC (RC1050.A36, v. 27)

A residency training program of one year's duration has been established in the specialty of aviation medicine at a military installation. The program's objective is to train, through a comprehensive clinical applicatory period, qualified physicians in the broad background of aviation medicine for further progress and practice in that specialty. The conduct of the program is similar to that standardized for residencies in other specialties. Clinical, laboratory and preventive medicine are related to the flyer in the air, on the flight line, in the hospital and on the outpatient service. Continuous and direct supervision is the most important ingredient of the training. Any organization, military or civilian, concerned with flying and the problems of aviation medicine, can establish a similar program. (Author's summary)

d. Performance and Fitness

[Physical fitness tests under 8-f]

6244
Borg, W. R.
LEADERSHIP REACTIONS IN SITUATIONAL TESTS [Abstract]. — Amer. Psychologist, 11 (8): 379. Aug. 1956. DLC (BF1.A55, v. 11)

This study compares performance of 41 six-man teams of AF officer candidates while participating in 12 situational problems. The first six problems were leaderless. Each team member was designated leader in one of the second six problems. Based on performance in leaderless problems, teams were divided into three groups: teams with one emerged leader, two emerged leaders, and no emerged leaders. One-leader teams were found to be significantly superior to teams with two leaders or no leaders. Effectiveness of emerged leader is significantly lower when another team member is designated leader. Leader scores were significantly correlated with team effectiveness. (Quoted in full)

6245
Graybiel, A.
PROBLEMS INVOLVING THE PILOT AND HIS TASK: THE CHANGING EMPHASIS IN AVIATION MEDICINE. — Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 105 106, Report no. 1, June 26, 1956. ii+12 p. AD 105 695 UNCLASSIFIED

Aviation medicine is a specialty which has undergone radical changes in emphasis during its brief existence. The critical problems involving the professional pilot are no longer medical in the usual meaning of this term but center around his task in the cockpit where the distinction between man the instrument and man the individual becomes artificial. The great complexity of this task places demands on the pilot in which mental qualifications are most important. Many agencies with interlocking interests play a part in the so ution of the problems encountered. A greater coordination among these agencies would be beneficial. Designers, engineers, research workers, the aviation examiner, and the pilot himself with a firm appreciation of what is truly involved in "success in flying" can make important contributions. (Author's summary)

6246
Hall, R. H.
PREDICTING BOMBER CREW PERFORMANCE FROM THE AIRCRAFT COMMANDER'S ROLE. — Air Force Personnel and Training Research Center, Crew Research Lab., Randolph Air Force Base, Tex. (Project no. 7713, Task no. 77223). Research Report no. AFPTRC-TN-56-28, Feb. 1956. v+16 p. AD 98 198 PB 124 149

Examinations were made of the predictive relationships between three dimensions of the B-29 aircraft commander's interpersonal role during training (nurturance, intimacy, and militariness) and the effectiveness of his crew's later performance. Measures of nurturance and intimacy furnished better than chance prediction of later crew performance in combat and of motivation and morale as indicated by the attitude scales. Militariness, however, showed no utility for prediction. Predictions from dimensions of commander role behavior were demonstrated to be improved somewhat when the measures were adjusted for crew expectations of commander behavior.

6247
Hood, P. D.
CREW AGREEMENT ON RB-47 CREW OPERATING PROCEDURES AS A FUNCTION OF EXPERIENCE WITH THE AIRCRAFT AND WITH THE CREW [Abstract]. — Amer. Psychologist, 11 (8): 444. Aug. 1956. DLC (BF1.A55, v. 11)

Analysis of scores obtained from 147 RB-47 crews on a Crew Operations Procedures (COP) Test which was designed to assess potential for crew coordination (defined as the ability of crew members to anticipate correctly one another's actions in specified flight tasks) demonstrates that COP scores attained by crews may be attributable both to experience with the aircraft system and to experience with crew incumbents, but that the validity of the COP score as a measure of crew proficiency cannot be explained entirely on the basis of these factors. The test provides information regarding crew coordination, integrity, and operating procedures. (Quoted in full)

6248
Jackson, K. F.
AIRCREW FATIGUE IN LONG RANGE MARITIME RECONNAISSANCE: PILOT PERFORMANCE. — R.A.F. Inst. of Aviation Medicine (Gt. Brit.), Farnborough; issued by Flying Personnel Research Committee (Gt. Brit.). FPRC no. 907.2, Aug. 1956. 23 p. AD 203 302 UNCLASSIFIED

The performance of ten pilots was investigated by making continuous records of the altitude and heading of their aircraft at chosen times during a series in which each pilot undertook four 15-hour flights. The records, which concerned straight level flying only, were examined -- a 10-minute section at a time -- for both extent and variability of error, thus providing four measures for each 10-minute record. Turbulence was recorded in terms of vertical accelerations, and certain personal factors were also observed. When the records were grouped in various ways and the average values of the measures were compared among the groups, the following information was obtained. (1) Performance in maintaining a constant heading deteriorated during 40 minutes of continuous work. (2) Performance in both heading and altitude deteriorated during the first three of pilots' watches and partially recovered in the fourth. (3) In their first two watches, pilots tended to fly more accurately and consistently in rough air than in calm air, but in the last two watches they were adversely affected by turbulent conditions. (4) Performance did not change appreciably from flight to flight during a week in which four 15-hour flights were made on alternate nights. (5) The deteriorations which were observed could not be accounted for by increased turbulence. (Author's summary)

6249
Latham, F.,
and J. Spencer
AN ANALYSIS OF THE NAVIGATOR'S TASK. — Jour. Inst. Navigation (London), 9 (1): 56-65. Jan. 1956. DLC (VK1.15545)
Reprint also issued as Flying Personnel Research Committee (Gt. Brit.). Report no. FPRC 949. AD 96 382 UNCLASSIFIED

This study is an investigation of (a) the objective evidence of fatigue effects and (b) the effects of experience on the navigator's work pattern. Navigators having flying times from 300 to 3,000 hours were observed in flights of 7 to 8 hours duration, and their activities were recorded at 10-second intervals. Rest time was greater for more experienced navigators because of their faster plotting times and sextant and Gee operations. Logging times were about the same for all subjects. There was no evidence of significantly declining activity levels.

6250
Lewis, R. E. F.,
and M. Humphries
MEASUREMENT OF PILOT BEHAVIOUR: COMPARISON OF DAY AND NIGHT APPROACH AND LANDING TECHNIQUES. — Defence Research Medical Labs. (Canada), Toronto, Ontario (DRML Project no. 206). DRML Report no. 206-2, Nov. 1956. vii+15 p. AD 121 804 UNCLASSIFIED

To obtain objective measures of pilot behavior during day and night approach and landing procedures, a flight recorder was installed in an RCN Avenger aircraft. Eight pilots made each ten normal landings by day and by night. The results indicated that these pilots approach slower and lower, and land harder and shorter by night than by day. It is recommended that a larger sample of pilots flying different types of aircraft be tested before the results be interpreted in terms of pilots and aircraft in general. Although large individual differences were obtained, there appeared to be no relationship between the flying experience of the operational pilots and the measures obtained. The in-flight record revealed consistent differences between day and night flying behavior. (Authors' abstract, modified)

6251
Lomonaco, T.
[NECESSITY OF USING MODERN METHODS OF PHYSIOLOGICAL EVALUATION FOR DETERMINING THE PHYSICAL EFFICIENCY IN YOUNG ARMY PERSONNEL AFTER A CERTAIN PERIOD OF MILITARY ACTIVITY] Necessità dell' impiego di moderni mezzi di valutazione fisiologica per la conoscenza del rendimento fisico dei giovani alle armi dopo un certo periodo di attività militare. — Rivista di medicina aeronautica (Roma), 19 (1): 67-78. Jan.-March 1956. In Italian, with English summary (p. 77). DLC (RC1050.R56, v. 19)

The inadequacy is discussed of the methods and personnel used in the evaluation of the physical efficiency of armed forces personnel. A proposal is made for the use of mobile scientific laboratories moving between bases and equipped with adequate facilities and instruments for testing cardiovascular and respiratory functions. Each mobile laboratory will include a spirometer, cycloergometer, electrocardiograph, Pauling-type oximeter, and mercury sphygmometer. Consideration is given to the training of medical personnel and physicians in human physiology as well as in the techniques of physiological functional testing. Once trained, this personnel should be employed exclusively for evaluative and selective purposes.

6252
Mayo, G. D.,
and A. T. Siegel
A "NEW" TYPE OF TRUE-FALSE ITEM. — Psychol. Reports, 2 (2): 83-86. June 2, 1956. DLC (BF21.P843, v. 2)

A multiple-alternative, true-false item type test was developed in an attempt to construct a test measuring the ability of aviation electricians to discriminate between causes of electrical malfunctions in aircraft and plausible alternatives that could not cause the malfunction. Evidence was presented supporting the contention that the item type is suited to the task of measurement in the areas of diagnosis and hypothesis formulation. Further, following the construction of a key with the aid of an item analysis, the correlation between the test and a performance test criterion measure was .60 for a hold-out group used for purposes of cross-validation. (Authors' summary, modified)

6253
Morris, D. P.
REVIEW OF THE CURRENT PRE-FLIGHT PHYSICAL FITNESS AND SURVIVAL PROGRAM. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-24, Oct. 18, 1956. ii+10 p. UNCLASSIFIED

The purpose of this research was to evaluate the present pre-flight physical fitness and survival program and to determine if it were properly oriented to facilitate maintenance of a good level of physical fitness as the student progresses along his naval career. The degrees of physical fitness as observed in cadets graduating from pre-flight are good, but the cadet is not motivated nor oriented to maintain a good level of physical fitness. It is recommended that the pre-flight physical fitness and survival program be revised and oriented along lines so that the activities of pre-flight may be carried over in order to maintain a good degree of physical fitness throughout one's naval career. (Authors' summary)

6254
Newton, J. A.
AIR CREW FATIGUE AND FLIGHT TIME LIMITATION. — Jour. Royal Aeronaut. Soc. (London), 60 (543): 186-190. March 1956. DLC (TL501.R7, v. 60)

The fatigue of air crews may consist of: (1) the transient fatigue of healthy individuals which is responsive to normal rest, sleep, and freedom from stress; or (2) the cumulative fatigue resulting from unresolved anxiety associated with continuing tension, which does not respond to normal rest,

and which may produce a definite change in personality (aeroneurosis). Factors useful in the reduction of aircrew fatigue include limitation of flight time, maintenance of good physical and mental health by adequate exercise and rest, abstention from excessive consumption of tobacco and alcohol, maintenance of a balanced diet, confidence in the conditions of flight, provision of adequate health services and counsel for emotional problems, proper scheduling, good arrangement of instruments and equipment, good ground services, and detailed meteorological briefings.

6255
Roby, T. B.,
and J. T. Lanzetta
AN INVESTIGATION OF TASK PERFORMANCE AS A FUNCTION OF CERTAIN ASPECTS OF WORK-GROUP STRUCTURE. — Air Force Personnel and Training Research Center, Crew Research Lab., Randolph Air Force Base, Tex. Report no. AFPTRC-TN-56-74, June 1956. vi+12 p. (Project no. 7731, Task no. 77436). AD 109 174 PB 125 230

Groups of three airmen were required to perform a simulated general aircrew task under communication structures ranging in complexity from the condition of direct access by control agents to none of the information required for the operation of controls to a condition of direct access to information for all but one of the controls. Differences in team performance were found to be related to task communication structures, with performance efficiency increasing as transmission of information was more direct. Possible factors in the effect of structure differences on number of errors are: (1) the appearance of cognitive factors (memory) under complex conditions; (2) conflicts in the dual role of subjects as response agent and information source; (3) overloading of communication channels; and (4) procedural difficulties.

6256
Smith, F. E. W.
THE PILOT'S COMMAND FUNCTION. — Air Line Pilot, 25 (7): 2-4; 13-14. July 1956.
DLC (TL501.A5537, v. 25)

In addition to manual technique in a pilot's command function aboard an aircraft, mature judgment, responsibility, and leadership are also necessary. The success of a captain's and first officer's command in normal operating flights is related to the efficient organization of a flight-plan and aircrew team activity, elimination of aircrew fatigue by pacing activity, and giving equal treatment to all members. Consideration is given to the command function of the first officer of the aircraft, and his responsibility in assuming command in the event of incapacitation of the captain.

6257
Sparks, B. W.,
and O. K. Niess
PSYCHIATRIC SCREENING OF COMBAT PILOTS. — U. S. Armed Forces Med. Jour., 7 (6): 811-816. June 1956. DLC (RC970.U7, v. 7)

Psychiatric screening of pilots for combat duties, based on training-level group-psychologic test data and/or clinical appraisals, appears to be unable to screen out the failures or to identify the successes in combat flying. Careful, on-the-spot psychiatric evaluations by a psychiatrist, collaborating with a flight surgeon who lives and flies with these pilots, can probably give the best psychiatric opinion available on the combat proficiency of a given pilot on a given combat tour or mission. (From the authors' summary)

6258
Webb, W. B.,
and J. C. Kaspar
THE ABILITY TO REPRODUCE TASK CUES AND THE ABILITY TO PERFORM THE TASK. — Perceptual and Motor Skills, 6 (4): 291-294. Dec. 1956.
DLC (BF311.P36, v. 6)
Also issued as: Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 108 101, Report no. 2, Aug. 31, 1956. ii+8 p.
UNCLASSIFIED

73 students in flight training were asked to estimate the position of the horizon as seen from a cockpit when a number of aircraft maneuvers were specified. These estimates were given by sketching horizons in booklets which contained representations of cockpit views. The responses of 20 subjects were analyzed. 10 of these subjects had shown high proficiency in the actual flight task of landing on a training carrier; 10 had demonstrated low flight proficiency. On 7 of the 8 scorable items, the less proficient group drew the horizon lower than the high proficiency group. This may reflect a general tendency in the low proficiency group to fly in a nose high attitude and hence recall the horizon in this manner or a tendency to perceive the horizon in a lower position and, therefore, actually have a tendency to fly nose low. In both groups there was a tendency to represent the angle of bank more flatly than the actual angle required. The average angle of bank was consistently more shallow for the low group than for the high group. Differences were obtained at the 1% level of confidence in the representations of the two proficiency groups on picturing the 40° bank maneuver. It was further noted that there was an individual consistency from maneuver to maneuver to draw the horizon high or low and the angle of bank to be shallow or flat. (Authors' summary)

e. Duties

6259
Cavitt, R. E.
[THE PROGRAM OF MEDICAL MAINTENANCE OF FLYING PERSONNEL AT A JET FIGHTER BASE] Le programme de maintien en condition du personnel navigant d'une base de chasse à réaction. — Médecine aéronautique (Paris), 11 (1): 125-129. 1956. In French. DLC (TL555.M394, v. 11)

The U.S.A.F. medical program emphasizes the following activities of flight surgeons to ensure optimum conditions for the medical maintenance of flying personnel: (1) acquaintance with the occupational duties of airmen (piloting, navigation, radio, radar); (2) familiarity with the special medical

problems of aviation through frequent infirmary visits; (3) daily contact with the men; (4) participation in training programs in safety, use of equipment, and escape from aircraft; and (5) participation in the group social activities of the men.

6260
Dhiraputra, S.
[FLIGHT SURGEON]. — Royal Thai Air Force Med. Gaz. (Bangkok), 5 (1): 30-37. Feb. 1956. In Thai, with English abstract (p. 37). DNLM

The duties of a flight surgeon are to (1) formulate standard physical and mental requirements for flying personnel; (2) give physical and mental examinations to flight personnel and applicants for flight training; (3) call on the sick and advise flying personnel; (4) care for sick and wounded at the scene of an aircraft accident including first aid treatment and evacuation to the hospital; (5) supervise the air evacuation of wounded and sick patients; (6) recommend proper nutrition for flying personnel; (7) plan programs for flight safety and aircraft accident prevention; and (8) act as medical consultant to the air base commander. The organization of an Air Force medical division is outlined. (Author's abstract, modified)

6261
Diringshofen H., Von
THE PREVENTIVE PSYCHOSOMATIC CONCEPT OF THE FLIGHT SURGEON IN ACTIVE AIR DEFENSE. — Jour. Aviation Med., 27 (2): 153-155. April 1956. DLC (RC1050.A36, v. 27)

This is a generalized discussion of the pilot and the personnel who support him and his machine so that the flight mission may be accomplished with success. The author stresses the role of the flight surgeon in this scheme; he states the need for competent diagnosis of neuropsychiatric disease before symptoms appear in the pilot's conscious personality. This same preventive care must be extended to the other persons involved in the flight mission, no matter how slight their contribution. In order to achieve this goal, the flight surgeon must be dedicated to his work, and he must be, also, a very tactful individual.

6262
Jolly, J. D.
THE FLYING NURSES OF SCOTLAND. — Amer. Jour. Nursing, 56 (6): 732-734. June 1956. DLC (RT1.A5, v. 56)

Experiences are described of volunteer nurses on flights with the Scotch Air Ambulance Service. Patients transported by air include the newborn, the aged, accident cases, surgical and medical emergencies, maternity and gynecological emergencies, patients with infectious diseases and psychiatric patients. The importance is stressed of the teamwork and cooperation of all personnel involved in the air ambulance service.

f. Attitudes and Morale

6263
Bair, J. T.,
and W. F. O'Connor
ANXIETY AND FLYING. III. CORRELATES OF PRE-SOLO STUDENT ATTITUDES TOWARD FLIGHT INSTRUCTORS. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-25, Oct. 18, 1956. [8] p. AD 118 824 UNCLASSIFIED

Principal findings of an investigation of beginning flight student attitudes toward their instructors and towards flying were: (1) students with unsatisfactory instructor relationships were also threatened by the hazards of flying, and (2) students desirous of instructor approval of flight performance revealed a desire to excel in training. Students who were most involved with the task of flying perceived relations with their instructors as an important part of this involvement. This was true for those threatened by flying as well as those wanting to excel in flying.

6264
Berkowitz, L.
GROUP NORMS AMONG BOMBER CREWS: PATTERNS OF PERCEIVED CREW ATTITUDES, "ACTUAL" CREW ATTITUDES, AND CREW LIKING RELATED TO AIRCREW EFFECTIVENESS IN FAR EASTERN COMBAT. — Sociometry, 19 (3): 141-153. Sept. 1956. DLC (HM1.S8, v. 19)

Measures of aircrew members' perceptions of the task-oriented motivation of their fellow crew members were obtained for crews in combat in the Far Eastern Air Force. In addition, attitude items were administered measuring the crew members' "actual" motivation to perform their designated tasks and the liking of the crew members for each other. Criteria of crew effectiveness were also obtained, based on either superiors' ratings or the incidence of task-avoidance behaviors (the percentage of assigned missions in which all the crew's bombs were not dropped at the primary target). The relationships between the attitude measures on the one hand, and criteria of superiors' ratings and percentage of failed missions on the other, tended to be similar and statistically significant. Under conditions of high cohesiveness the better crews were those motivated to conform to a group norm stressing effective task performance. Under conditions of low cohesiveness the better crews were those with smaller discrepancy between actual and perceived crew motivation. (Author's summary, modified)

6266
Bowers, N. D.,
and H. P. Kelley
VOCATIONAL INTERESTS OF NAVAL FLIGHT INSTRUCTORS. I. COMPARISONS WITH NAVAL AVIATION CADETS. — Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 108 107, Report no. 1, May 1, 1956. 4 p. AD 105 696 UNCLASSIFIED

Vocational interest preferences of entering, successful, and voluntary-withdrawal cadets were compared with those of naval flight instructors. The Kuder Preference Record, Vocational, Form BM (1) was used to obtain raw score means and standard deviations for both instructor aviators and for the 3 cadet groups. Results showed that vocational interests of the instructor group were

statistically similar to those of entering and successful cadets. However, the instructor group showed significantly greater interest in mechanical and scientific activities, and less interest in persuasive activities than the cadets who voluntarily withdrew from the training program. These results give support to the idea that the Kuder interest patterns obtained at the time a cadet enters the training program might be helpful in making board decisions to retain or eliminate cadets. (AD abstract)

6267
Bowers, N. D.,
and H. P. Kelley
VOCATIONAL INTERESTS OF NAVAL FLIGHT INSTRUCTORS. II. COMPARISONS WITH NATIONAL NORMATIVE GROUPS. — Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 108 107, Report no. 2). AD 105 699 UNCLASSIFIED

A comparison was made of the vocational interest preferences of naval flight instructors, Kuder's aviator normative group, and Kuder's vocationally unselected normative population. Data from the Kuder preference tests were used to: (1) tabulate raw score means and standard deviations for the nine areas measured on the three groups, (2) plot a standard profile sheet, and (3) tabulate the results of t-tests of the significance of differences between mean interest scores for the three groups. Results indicate that individuals working with Kuder interest scores for naval aviation personnel should be aware of, and keep in mind, the significant differences found between the naval aviators and the two normative groups, as well as the absence of significant differences between the flight instructors and the entering and successful cadets. (AD abstract)

6268
Clark, C.,
and A. Graybiel
A NOTE ON THE EXPRESSED REASONS FOR PREFERENCE FOR DUTY IN JET AIRCRAFT. — San Jose State Coll., Calif.; and Naval School of Aviation Medicine, Pensacola, Fla. Research Project NM 001 109 100, Report no. 12, Aug. 12, 1956. ii+6 p. AD 119 593 UNCLASSIFIED

One hundred and one jet pilots were asked to state whether they preferred duty in jet aircraft or in propeller aircraft and to indicate the reasons for their preference. All of the pilots except one expressed a preference for duty in jet aircraft. An analysis of the reasons for their preference indicated that the pilots liked jet aircraft for four principal reasons: Jets are high performance aircraft; jets are more comfortable; there is a greater sense of accomplishment and prestige in flying jets; and jets are easier to fly. (Authors' abstract)

6269
de Rivera, J.
THE UTILIZATION OF STUDENT'S SPARE TIME DURING WORKING HOURS. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-2, Jan. 6, 1956. ii+7 p. AD 99 089 UNCLASSIFIED

Interviews of aviation cadets revealed that their spare time was filled with watches, code practice, talk about flying, and relaxation. It was also found that much time was taken up with loafing, particularly when the weather was poor. Included are suggestions for utilization of spare time by training units.

6270
Guba, E. G.,
and J. W. Getzels
INTEREST AND VALUE PATTERNS OF AIR FORCE OFFICERS. — Educational and Psychol. Measurement, 16 (4): 465-470. Winter 1956. DLC (BF1.E3, v. 16)

The Kuder Preference Record and the Allport-Vernon-Lindzey Study of Values were administered as a part of a large battery of psychological tests to a sample of approximately two hundred Air Force officers serving as instructors. The general conclusions reached were: (1) a general interest pattern exists for Air Force officers independently of their flying status; (2) their interest pattern differs markedly from that for men in general; (3) the interest pattern for officers on flying status differs from that for civilian pilots on the Kuder scales; (4) the pattern of values for the officer group on the Study of Values differs from that of college students; and (5) the findings on both scales support each other.

6271
Highland, R. W.
A STUDY OF THE RELATIONSHIP OF ATTITUDES TO SUCCESS IN A TECHNICAL TRAINING COURSE. — Air Force Personnel and Training Research Center, Maintenance Lab., Lowry Air Force Base, Colo. (Project no. 7714, Task no. 77246). Research Report AFPTRC-TN-56-99, July 1956. viii+32 p. AD 98 875 PB 127025

The extents were investigated to which preacademic attitudes predict success in radio-operator training to which actual contact with radio-operator training induces attitudes related to eventual success or failure in training. Results indicated that (1) validities of the Signal Corps Code Aptitude Test and the Radio Operator Aptitude Index did not differ significantly from the validity of precourse scores on the attitude forms; (2) general favorableness scores and scores based on attitude questionnaires showed significant relationships with success in the course (these relationships were larger in the case of in-course administrations than for precourse administration and were larger for scores based on attitude questionnaires than for general favorableness scores), and (3) less favorable in-course attitudes toward training are caused by contact with training, especially where this contact involves failure experience. (From the AD abstract)

6272
Iverson, M. A.,
and H. Tomlinson
ATTITUDES TOWARD FLYING TRAINING AMONG

HIGH-SCHOOL SENIOR BOYS. — American Inst. for Research, Pittsburgh, Pa. (Contract AF 18 (600)-422); issued by Air Force Personnel and Training Research Center. Personnel Lab., Lackland Air Force Base, Tex. (Project no. 7701, Task no. 77040). Technical Memorandum no. PL-TM-56-18, Nov. 1956. iv+38 p. AD 209 949
UNCLASSIFIED

A survey was made of the attitudes, beliefs, and personal characteristics of high-school senior boys in six different communities to determine the status of military flight training in the boys' plans for the future, to determine unattractive and attractive features of flight training, and to establish criteria for the differentiation of boys interested in military flight training from those who are not. The results indicate that approximately half the boys graduating from the nation's high schools are potential applicants for flight training when they report for military service. Groups interested in flight training showed few significant differences in personal and background information, but they were less likely to have definite vocational plans, and they had more experience with flying. Prominently mentioned reasons in favor of learning to fly were the future vocational value of flying skills, and interest in flying. The most frequently mentioned reasons against learning to fly were preference for non-flying activities and lack of the knowledge needed to make a decision. The group as a whole expressed favorable opinions about the Air Force and its program of flight training. About half the boys would consider enrolling in a high-school course in aviation, but most of these would be students already oriented towards flying.

6273
Knoell, D. M.
RELATIONSHIPS BETWEEN ATTITUDES OF BOMBER CREWS IN TRAINING AND THEIR ATTITUDES AND PERFORMANCE IN COMBAT. — Air Force Personnel and Training Research Center. Crew Research Lab., Randolph Air Force Base, Tex. (Project no. 7713, Task no. 77220). Report no. AFPTRC-TN-56-49, April 1956. viii+44 p. AD 104 323 PB 124 130

Attitudes of 42 B-29 bomber crews expressed in 1953 relative to a combat situation were compared to those expressed by the same crews previously in training. Crew attitudes in training and in combat were assessed as predictors of the crews' combat performance ratings. Both attitude surveys were factor-analyzed to find common factors suitable for prediction purposes. In addition, the item composition of the attitude scales and the attitude structures shown by factor analysis were compared for the 1952 and 1953 combat-crew samples. The results support earlier studies in that crew attitudes measured in training predict rated crew combat performance significantly, and that crew attitudes measured in combat are correlated significantly with the crews' rated combat performance. Crew attitudes were relatively stable from the training to the combat situation when membership remained unchanged. Certain differences were found in the item composition of the scales and in the attitude structure shown by factor analysis when two different samples of combat crews were compared. (From the author's sumamry)

6274
Maag, C. H.,
and J. T. Bair
RELIGIOUS VALUES AS DIFFERENTIATING CHARACTERISTICS OF NAVAL AVIATION CADETS. — U. S. Naval School of Aviation Medicine, Pensacola, Fla. (Research Project no. NM 001 108 100) Report no. 15, May, 1956. 7 p. AD 105 692
UNCLASSIFIED

A religious values questionnaire was constructed of 17 statements representing positions ranging from the orthodox to the agnostic and atheistic. Each subject was required to assign these statements to a five-point Likert-type scale. The questionnaire was administered to a terminal population of 106 DOR (drop on request) cadets at the termination of the training program and to a group of 130 successful cadets at the completion of their basic flight training. Cross-validation was carried out on a sample of 540 cadets. The results were negative, in that the instrument did not significantly differentiate between the religious attitudes of those who completed the training program and those who voluntarily withdrew, provided there existed real differences in their religious attitudes.

6275
Richey, H. W.,
and F. R. Ratliff
THE PRESTIGE OF AIR FORCE CAREER FIELDS. — Air Force Personnel and Training Research Center. Lackland Air Force Base, San Antonio, Tex. Development Report AFPTRC-TN-56-78, June 1956. v+14 p. AD 113 642 PB 125 885

Career field prestige was found to be a highly reliable concept with airman, Non-Commissioned Officer, and company grade officer judge groups. Agreement was almost complete among the three groups regarding the rank order of 38 career fields on prestige. Career fields with titles and duties implying "professional" and "semi-professional" status received the highest ratings. Intermediate ratings were given career fields engaged in "skilled," clerical, and distribution functions. Those career fields concerned with "semi-skilled," and "unskilled" services stood relatively low on prestige. (From the authors' summary)

6276
Rosenberg, S.
SIMILARITY OF INTEREST AND ATTITUDE MEASURES AS A PREDICTOR OF INTERPERSONAL RELATIONSHIPS IN A MEDIUM-BOMBER CREW. — Air Force Personnel and Training Research Center. Crew Research Lab., Randolph Air Force Base, Tex. Research Report no. AFPTRC-TN-56-103, Aug. 1956. v+22 p. (Project no. 7713, Task no. 77226). AD 98 878 PB 127 026

A study was made of the value of interest and attitude similarity in the prediction of sociometric choices among B-29 crew members. Similarity between pairs of persons was defined as the correlation between their scores on a 108-item inventory administered before crew training. The sociometric measure was derived after two months of training from the preferences of crew members for other crew members in five different activities. Similarity of interest and attitude was found to have a

small but statistically significant correlation with sociometric ratings. The average correlation of officer and airman ratings when officers were ratees was .28, while that for airman ratees was only .05.

6277
Voas, R. B.
CAREER PLANS OF STUDENT AVIATORS. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-22, Aug. 10, 1956. ii+5 p. AD 117 812 UNCLASSIFIED

The career plans of 639 naval cadets and 208 aviation officer candidates were analyzed to determine the proportion who were considering service careers. Fifty-five per cent of the cadets were considering service careers compared to only 36 per cent of the officer candidates. In contrast, 51 per cent of the officer candidates had career plans which did not include regular service, compared to only 26 per cent of the cadets in the same category. These differences appeared to be based primarily on the procurement source (enlisted service or civilian life) and the educational level of the students in each program. (Author's summary)

6278
Voas, R. B.,
and L. S. Marvin
COMPARISON OF THE REASONS FOR ENTERING FLIGHT TRAINING GIVEN BY OFFICERS, AOC'S, AND NAVAL CADETS. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-29, Nov. 13, 1956. ii+7 p. AD 118 825 UNCLASSIFIED

This report gives the results of a survey of the reasons given by 423 student pilots for volunteering for aviation training. Enlisted students gave the desire to fly, the value of the experience and training gained in the program, the opportunity to be an officer, the opportunity to fly the most modern planes, and good pay as primary reasons for entering the program. One-fourth of the cadets and one-third of the aviation officer candidates indicated that the draft had an important influence on their decision. Officer students differed from cadets in that, aside from interest in flying, they primarily stressed the opportunities for extra pay and shore duty. (Authors' summary, modified)

6279
Voas, R. B.,
and L. S. Marvin
REASONS GIVEN BY STUDENT PILOTS FOR AND AGAINST A SERVICE CAREER. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-28, Nov. 8, 1956. ii+11 p. AD 118 826 UNCLASSIFIED

As indicated by a survey of student pilots, the reasons for choosing a service career were: desire to keep flying, financial security, and pride in the service. Most frequently mentioned as reasons for leaving the service were: dislike of regimentation, belief that living conditions were detrimental to family life, and belief that advancement was more rapid in civilian life.

6280
Webb, W. B.,
and E. P. Hollander
COMPARISON OF THREE MORALE MEASURES: A SURVEY, POOLED GROUP JUDGMENTS, AND SELF-EVALUATIONS. — Jour. Applied Psychol., 40 (1): 17-20. Feb. 1956. DLC (BF1.J55, v. 40)

Essentially the same as the report, item no. 3610, vol. III.

g. Personal Factors (age, sex, race, body measurements, etc.)

6281
Anderson
HOW BIG IS THE PROBLEM OF AGING IN MILITARY AVIATION? — In: Aviation medicine symposium: the aging pilot, p. 1-4. U. S. Air Force. [Unnumbered report], 1956. DNLM (W3.AV16, 1956)

The Air Force will be faced with an increasing pilot aging problem over the next 10 to 15 years which will level off as the present 30 to 40 year group retires from active flying. Following this period will be a drop off corresponding to the decreased training period following World War II. With the changes occurring in aircraft and missions, the older pilot may never be needed. The need for ground officers with flying training and experience is the real justification for the older pilot on flying status.

6282
AVIATION MEDICINE SYMPOSIUM: THE AGING PILOT. — U. S. Air Force. [Unnumbered Report, no place], 1956. 73 p. DNLM (W3.AV16, 1956)

This is a series of papers presented at the Aviation Medicine Symposium of March 15-16, 1956, held at Headquarters Air Materiel Command, Wright-Patterson Air Force Base, Ohio. Pertinent papers are abstracted separately, see items no. 5536, 6281, 6284, 6285, 6300, 6301, 6302, 6303, 6304, 6308, and 6310.

6283
Birren, J. E.
PSYCHOLOGICAL LIMITATIONS THAT OCCUR WITH AGE. — Public Health Reports, 71 (12): 1173-1178. Dec. 1956. DLC (RA11.B17, v. 71)

One of the most significant results of research on age changes in the nervous system is the implication of a generalized slowing of all voluntary responses. Evidence indicates that there are grounds for regarding the age change in response latency as a general property of the central nervous system. The longer response latencies appear to have their greatest consequence for complex or serial activities. (From the author's summary)

6284
Byrnes, V. A.
PRACTICAL VISUAL STANDARDS FOR AGING PILOTS. — In: Aviation medicine symposium:

the aging pilot, p. 10-15. U. S. Air Force. [Unnumbered report], 1956. DNLM (W3.AV16, 1956)

The only frequent visual effect of aging that requires specific consideration from the standpoint of visual standards for flying is decreased accommodative function. Since this can be corrected, it is reasonable to retain individuals on flying status if suitable corrective lenses are worn. In general, the wearing of presently designed presbyopic corrections is not compatible with the flying task in jet aircraft. If a single standard is to be required for all pilots, it is reasonable to disqualify all individuals as pilots when they are unable to read maps and small print at 20 inches from the eye under dim illumination. With the advent of an all-jet Air Force an adequate optical means of correction for the accommodative defect must be produced or else the termination of the useful flight careers of personnel must coincide with the need for presbyopic correction.

6285
Carlson, W. A.
MENTAL ADAPTATION OF THE AGING PILOT TO FLYING IN THE JET AGE. — In: Aviation medicine symposium: the aging pilot, p. 44-57. U. S. Air Force. [Unnumbered report], 1956. DNLM (W3.AV16, 1956)

Psychological changes (intelligence, fatigue, reaction time, attitude, involutional period) associated with aging are briefly reviewed in relation to the aging pilot. Mental adaptation to the jet flying age is a particular situation aging pilots face and shows individual variation ranging from good to poor. The methods of adaptation (by sublimation, rationalization) also vary greatly.

6286
Clay, H. M.
AN AGE DIFFICULTY IN SEPARATING SPATIALLY CONTIGUOUS DATA. — Jour. Gerontol., 11 (3): 318-322. July 1956. DNLM

The task of arranging fifty numbered counters in five rows and five columns of squares to add up to the marginal total printed for each on a checker board was given under two display conditions to 66 subjects between twenty and sixty years of age. The task was carried out correctly by almost all subjects when the rows and columns were clearly separated in the display. When the task was presented for the second time under conditions in which the two sets of squares for rows and columns overlapped, there was a significant decline in accuracy with age, accompanied by a rise in time taken. Some of the older subjects seemed to have difficulty in separating relevant from irrelevant, but similar, items in close proximity. (Author's summary)

6287
Coates, T. A.
THE "AGING" AIR LINE PILOT. — Air Line Pilot, 25 (6): 2; 14-15. June 1956. DLC (TL501.A5537, v. 25)

In dealing with the aging pilot, emphasis is placed on the importance of functional age instead of chronological age in the measurement of safe and efficient performance of flight duties. Mention is made of the changes in vision, hearing, and psychomotor function associated with aging. An older pilot who is mentally and physically alert and well versed in aircraft operation is considered safer than a younger, inexperienced pilot.

6288
Dagorn, R.,
and G. Soussen
[AGING OF THE AIRCRAFT PILOT] Le vieillissement du pilote d'avion. — Revue française de gérontologie (Paris), 2 (3): 123-131. June 1956. In French. DNLM

The stress of high speed, high altitude flight is associated with the organic changes of aging. Evaluation of the early psycho-physiological signs of aging is very complex. Consideration is given to visual, cardiovascular, psychosomatic, and psychic changes occurring with age. The latter two changes indicate unfitness for flight duty. Major individual variations in the aging process indicate that adequate physical tonus and health, plus absence of excess, permit the prolongation of flight activity.

6289
Di Macco, G.
[AGE AND RESISTANCE TO HYPOXIA] Età e resistenza alla ipossia. — Rivista di medicina aeronautica (Roma), 19 (2): 311-315. April-June 1956. In Italian, with English summary (p. 314). DLC (RC1050.R56, v. 19)

Adult guinea pigs of about 300 grams weight were more resistant to hypoxia (simulated altitude of 270 mm. Hg) than older animals weighing over 500 grams. These findings may be considered as an expression of the gradual decrease in the limitations of organic adaptation involving both central and peripheral processes.

6290
Dupertuis, C. W.,
and I. Emanuel
A STATISTICAL COMPARISON OF THE BODY TYPING METHODS OF HOOTON AND SHELDON. — Western Reserve Univ., Cleveland, Ohio (Contract AF 18(600)-30); and Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 7214). WADC Technical Report no. 56-366, Aug. 1956. vi+26 p. AD 97 205 PB 121 686

Body type component ratings made according to the standards of Hooton and Sheldon were compared in a sample of 500 Air Force flying personnel. Correlation coefficients for the two ratings of the same components are as follows: first component, .82; second component, .83; third component, .86; gynandromorphy, .66; dysplasia, .05. On the average, the Hooton ratings were .51 unit more than the Sheldon ratings for the first component, 1.00 unit less for the second component, and .67 unit more for the third component. For all three primary components identical ratings were given in 33.7% of the cases, while an absolute deviation of one unit occurred in 50.3% of the cases, a deviation of

two in 15.5% of the cases, and a deviation of three units occurred in .6% of the cases. Six subjects were given identical body type ratings according to both systems. Regression equations are given for the relationships between the primary components, but the standard errors of estimate are too high to permit accurate equation of body type assessments on the same individual. (Authors' abstract)

6291
Durnin, J. V. G. A.,
and V. Mikulicic
THE INFLUENCE OF GRADED EXERCISES ON THE OXYGEN CONSUMPTION, PULMONARY VENTILATION AND HEART RATE OF YOUNG AND ELDERLY MEN. — Quart. Jour. Exper. Physiol. (London), 41 (4): 442-452. Oct. 1956.
DNLM

Oxygen consumption, pulmonary ventilation, and heart rates were recorded in two groups of healthy men, one aged 20-30 years and the other aged 55-65, performing graded exercise on an arm and a treadmill ergometer. No significant differences in these measurements were found, nor in oxygen extraction or ventilation equivalent for oxygen between the groups with arm exercises. Light exercise on the treadmill gave significantly different values for the elderly. The latter used more energy, had a lower respiratory efficiency and a higher pulse rate for walking than the young men. Heavier treadmill exercise further increased these differences between young and old. Elderly men performed difficult exercise efficiently while stationary, whereas walking caused marked lowering of efficiency. (Authors' summary, modified)

6292
Falzone, J. A.,
and N. W. Shock
PHYSIOLOGICAL LIMITATIONS AND AGE. — Public Health Reports, 71 (12): 1185-1193. Dec. 1956. DLC (RA11.B17, v. 71)

A review of experimental studies on physiological changes with age indicate that, under resting conditions, the aged human is usually able to maintain uniformity of the internal environment. However, when increased demands are placed on a number of organ systems, impairment of function can often be detected. Thus, the primary characteristic of the older individual is a reduction in reserve capacities which makes him more vulnerable to stresses. These changes take place gradually and may be attributed to a loss of functioning tissue and alterations in cellular metabolism. The causes of this loss have not been identified. (From the authors' summary)

6293
Ghiringhelli, G.,
E. Bosisio, and M. Repaci
[CONTRIBUTION TO THE KNOWLEDGE OF RESPIRATORY PHYSIOLOGY IN CONDITIONS OF REST AND MUSCULAR WORK IN PRESENILE AND SENILE SUBJECTS] Contributo alla conoscenza della fisiologia respiratoria, in condizioni di riposo e di lavoro muscolare, nei soggetti in età presenile e senile. — Rivista di medicina aeronautica (Roma), 19 (3): 486-510. July-Sept. 1956. In Italian, with English summary (p. 505-506). DLC (RC1050.R56, v. 19)

A detailed study was made of the respiratory function of 32 normal old men (mean age, 68 years) during rest and exercise, as compared to that of younger subjects. Numerical and graphic data are given for all values investigated. Maximum pulmonary ventilation and maximum expiratory volume per second were lower than the theoretic values. The available fraction of vital capacity was reduced in comparison with young subjects. Pulmonary ventilation increased with increasing muscular exercise and oxygen consumption; at muscular work above 50 watt the ventilation progressively exceeded the oxygen consumption and partial hypoxemia developed.

6294
Heglin, H. J.
PROBLEM SOLVING SET IN DIFFERENT AGE GROUPS. — Jour. Gerontol., 11 (3): 310-317. July 1956.
DNLM

One hundred subjects in each of three age groups (median ages of 60.02, 31.75, and 16.05) were compared for differences in susceptibility to set, ability to surmount set, and trainability in avoiding set. The two tests used were (1) a variation of Luchin's water jars test, and (2) adaptation of an alphabet maze test. In four analyses of variance, age differences were found to be significant on both susceptibility and surmounting scores for both tests. Analyses of t-ratios and the mean trends revealed that on the first test given, the older group showed generally more set on all measures. The middle-age group showed less set and the younger group least. The middle-age group showed least set after training. The older subjects improved least with training. (Author's summary, modified)

6295
Hellon, R. F.,
and A. R. Lind
OBSERVATIONS ON THE ACTIVITY OF SWEAT GLANDS WITH SPECIAL REFERENCE TO THE INFLUENCE OF AGEING. — Jour. Physiol. (London), 133 (1): 132-144. July 27, 1956.
DLC (QP1.J75, v. 133)

Palmar sweat gland activity during exposure to a hot or cool environment was estimated by examination of finger imprints in young (18-23 years) and older (44-57 years) men. Exposure to heat resulted in both age groups in a marked reduction in "fully active" palmar glands and an increase in "partially active" glands, with a reduction of 25% in the total number of glands during the change from a cool to a hot environment. General body sweat appeared significantly later after exposure to heat, and showed slower changes in response to work load, in older subjects. In both age groups, the onset of sweating was associated with a rise in skin temperature without a rise in rectal temperature; with continued heat exposure a correlation was observed between rectal temperature and sweat rate.

6296
Hellon, R. F.,
A. R. Lind, and J. S. Weiner
THE PHYSIOLOGICAL REACTIONS OF MEN OF TWO AGE GROUPS TO A HOT ENVIRONMENT. = Jour. Physiol. (London), 133 (1): 118-131. July 27, 1956.
DLC (QP1.J75, v. 133)

A comparative study was made of the circulatory and thermoregulatory responses of young men (mean age 26 years) and older men (mean age 43 years) during the performance of a four-hour work and rest task in heat (37.8° C. dry bulb and 29.4° C. wet bulb). Older subjects showed a small but consistently greater rise in body temperature, a lower sweat rate during work and a higher sweat rate during rest, a higher pulse rate, and a greater mean forearm blood flow. No significant intergroup differences were observed in metabolic rate or blood pressure, and no correlation was found between forearm blood flow and pulse rate or blood pressure.

6297
Kumnick, L. S.
AGING AND DECAY OF PUPILLARY PSYCHOSENSORY RESTITUTION. = Jour. Gerontol., 11 (1): 46-52. Jan. 1956. DNLM

Pupillographic data from 94 apparently normal subjects between the ages of 7.5 and 90.8 years revealed that decay of pupillary psychosensory restitution was greater in pupillary dilation than was constriction for all age groups, and greater for the middle age range (18 to 50 years) than for the youngest and the oldest groups. Changes in parasympathetic-sympathetic relationship seem to be reflected in this phenomenon. (Author's summary, modified)

6298
Kumnick, L. S.
AGING AND PUPILLARY RESPONSES TO LIGHT AND SOUND STIMULI. = Jour. Gerontol., 11 (1): 38-45. Jan. 1956. DNLM

The following conclusions were drawn from results of a pupillographic study of pupillary response to light and sound stimuli in 94 subjects between 7.5 - 90.8 years of age: (1) no significant difference in rate of change occurs with age in mean maximum and minimum diameters, extent of constriction, and response velocity as revealed by the tests of deviation from linear regression; (2) age, as well as fatigue and restitution, affects the velocity of pupillary response to light and sound stimuli dissimilarly in parts (0.1 seconds) of the total process of constriction; and (3) age does not affect the relative control of the iris over the amount of light striking the retina for the older pupil, in proportion to initial size, constricted as much as the young. Conditions of fatigue and restitution, however, influence the relative control. The older eye apparently does not react as feebly as is generally assumed. (From the author's summary)

6299
Kumnick, L. S.
AGING AND THE LATENCY AND DURATION OF PUPIL CONSTRICTION IN RESPONSE TO LIGHT AND SOUND STIMULI. = Jour. Gerontol., 11 (4): 391-396. Oct. 1956. DNLM

Data obtained by means of pupillography for 94 apparently normal subjects between the ages of 7.5 and 90.8 years revealed the following: (1) the latency and duration of pupil constriction is not affected by increasing age (except in the initial response) but by the pupillary conditions of fatigue, restitution and decay of restitution at certain age levels; (2) the two latencies (constriction and dilation) behave differently in relation to original diameter (at onset of light stimulation), the latency of pupil constriction showing much less increase than the latency of pupil dilation with increase of original diameter; and (3) the average duration of pupil constriction varies with original diameter, increasing with increase of original diameter. The size of the original pupil diameter decreases with increasing age. The average velocity per 0.1 second decreases with increasing age and occurs later in the second of stimulation in older groups. (Author's summary, modified)

6300
Lautzenheiser
DISCUSSION OF NAVY POLICY FOR USING NAVY PILOTS. = In: Aviation medicine symposium: the aging pilot, p. 71-73. U. S. Air Force. [Unnumbered report], 1956. DNLM (W3.AV16, 1956)

The Navy classifies pilots according to age and visual acuity. Should any pilot fail to meet the physical requirements prescribed for his group, one of the following dispositions apply: (1) continuation of unrestricted flying subject to waiver of defects; (2) restriction to flight duties of the next service group; (3) restriction to duties of lessened tempo; (4) restriction to limited flight duties; (5) temporary suspension of flight status; and (6) cessation of flight status.

6301
McCann, J. P.
AIR FORCE POLICY AND THE AGING PILOT. = In: Aviation medicine symposium: the aging pilot, p. 65-70. U. S. Air Force. [Unnumbered report], 1956.
DNLM (W3.AV16, 1956)

At the present time, no specific Air Force policy on age exists. However, several directives have a direct bearing on it. The most important one to the pilot is that of the Central Flight Status Selection Board. It is responsible for (1) paying flight money only to fliers with the best combat potential in time of war, (2) screening-out rated officers failing to meet this requirement, and (3) keeping those remaining on status proficient in the most current aircraft. Closely allied to the screening process is the policy of rotation of flying officers. Every six years each pilot is given a flying job as his primary assignment. It is recommended that aircraft and pilots be objectively evaluated as to who is better qualified to fly what type of aircraft at what age. Much of this will depend on the pilot's personal motivation and physical condition.

6302
Moritz, H. C.
THE PSYCHIC STRESSES OF THE JET AGE. = In: Aviation medicine symposium: the aging pilot, p. 35-43. U. S. Air Force. [Unnumbered report], 1956.
DNLM (W3.AV16, 1956)

A brief review is presented of the mental-stress-producing factors affecting aviators generally and older pilots (over 35 years of age) specifically. The aging pilot's performance is affected by slowness of mental functions; poor judgment, especially under pressure and if exercised in high-performance aircraft; physical and mental fatigue; anxiety produced by the introduction of new aircraft types; dislocation or alteration of personal goals; and the general vicissitudes of military life causing motivational fluctuations. Utilization of the older military pilot revolves around four things: (1) the maintenance of good physical status and physical reserves; (2) the maintenance of high levels of positive motivation; (3) the maintenance of active, curious, and acquisitive mental attitudes; and (4) providing a planned career including a planned retirement.

6303
Norris, A. H.,
N. W. Shock, M. Landowne, and J. A. Falzone
PULMONARY FUNCTION STUDIES: AGE DIFFERENCES IN LUNG VOLUMES AND BELLOWS FUNCTION. — Jour. Gerontol., 11 (4): 379-387. Oct. 1956. DNLM

Lung compartments and bellows function of 135 males between the ages of 20 and 90 years showed significant increase in the fixed lung spaces (residual volume) at the expense of mobile lung spaces (vital capacity) with increasing age. The average reduction of 17.5 cc. per square meter per year in vital capacity and increase of 13.0 cc. per square meter per year in residual volume were significant. The decrease of 4.5 cc. per square meter per year in total lung capacity was commensurate with body size. Reduction in maximal breathing capacity was attributed primarily to lesser augmentation of breathing rate in the older subjects. (From the authors' summary) (28 references)

6304
Olson
DO ENT PROBLEMS POSE A THREAT TO OLDER FLYERS? — In: Aviation medicine symposium: the aging pilot, p. 23-34. U. S. Air Force. [Unnumbered report], 1956. DNLM (W3.AV16, 1956)

The necessity is emphasized for flight surgeons to constantly endeavor to establish an early diagnosis and institute appropriate treatment of all otorhinolaryngological conditions. Some of the symptoms and signs to be watched in older pilots are: (1) deafness, especially when both low and high frequencies are involved and previous tests showed good hearing, indicating serous otitis; (2) persistent otalgia with no local cause evident, indicating early nasopharyngeal malignancy; (3) any nodule or ulceration indicating a potential malignancy until proven otherwise by biopsy; (4) bleeding from the ear canal, nose or throat; (5) marginal drum perforation; and (6) chronic otorrhea.

6305
PSYCHOLOGICAL ASPECTS OF AGING: PROCEEDINGS OF A CONFERENCE ON PLANNING RESEARCH, BETHESDA, MD., APRIL 24-27, 1955. — Ed. by J. E. Anderson. viii+323 p. Washington, D. C.: American Psychological Association, Inc., 1956. DLC (BF724.8.C6, 1955)

This volume encompasses 32 papers by various authors, some of which deal with topics of aeromedical interest, i. e., Assessment of aging, by J. E. Anderson (p. 75-80); Physiological and anatomical changes in the central nervous system with age, by E. Streicher (p. 94-96); The significance of age changes in speed of perception and psychomotor skills, by J. E. Birren; Problems of aging in perceptual and intellective functions, by Harold E. Jones (p. 135-139); Psychological aspects of aging: perceptual research, by I. N. Mensh (p. 140-146); and Age and functional efficiency, by J. Brozek (p. 245-248). (380 references)

6306
Sandgren, N.
[CONSIDERATIONS ON THE AGING AIRLINE PILOT] Synpunkter på den åldrande trafikflygaren i flygtjänsten. — Meddelanden från flyg- och navalmedicinska nämnden (Stockholm), 5 (3): 66-71. 1956. In Swedish, with English summary (p. 70). DNLM

A pilot is capable of fulfilling his functions as an airline traffic pilot at least up to the 55th year. Several American airlines have pilots on duty up to 60 years of age. However, in many cases it seems advisable not to exceed the 55-year age limit in regard to flight safety. Above this age there may be limits to a pilot's ability to perform his duties, particularly in complicated situations where there is a short time at disposal for judgment and decisions in flight operations. Frequent and thorough physical examination and checks on efficiency including simulator flights are suggested for pilots above 50 years of age. Also pilots in that age group should not fly newer types of aircraft. (Author's summary, modified)

6307
Valentin, H.,
H. Venrath, H. von Mallinckrodt, and M. Gürakar
[MAXIMAL OXYGEN UPTAKE IN DIFFERENT AGE GROUPS: A CLINICALLY IMPORTANT TEST OF CARDIOVASCULAR FUNCTION IN THE VITA MAXIMA AREA] Die maximale Sauerstoffaufnahme in den verschiedenen Altersklassen: eine praktisch wichtige Herz-Kreislauf-Funktionsprüfung im Vita-maxima-Bereich. — Zeitschrift für Alternsforschung (Leipzig), 9 (4): 291-309. Feb. 1956. In German.

Ergospirographic investigations of the maximal capacity for oxygen uptake were carried out for approximately 500 normal individuals in various age groups, as well as top athletes and non-athletic subjects. The maximum capacity for oxygen uptake with increasing age exhibits a characteristic curve. The values are also affected by the state of physical training. It is concluded that in quantitative measurements of cardiovascular performance which involve stress, age and physical condition of the subject should be considered.

6308
Westerbeck, C. W.
ENT PROBLEMS IN HIGH PERFORMANCE AIRCRAFT. — In: Aviation medicine symposium: the aging pilot, p. 16-22. U. S. Air Force. [Unnumbered report], 1956. DNLM (W3.AV16, 1956)

Ear, nose, and throat problems (aerotitis media, vertigo, motion sickness, noise-induced hearing disorders) in the aging pilot are essentially the same as those found in flyers of any age. The main differences are found in high-performance aircraft. Prevention and elimination of these problems is advocated by proper selection and maintenance of air crews and by dissemination of knowledge on human physiological limitations. Included is a brief discussion of the effects of noise on hearing acuity and of auditory signals in communications and warning devices.

6309
White
CAN THE AGING PILOT COMPENSATE FOR HIS MEDICAL SHORTCOMINGS. — U. S. Air Force, Vol. II. [Unnumbered Report], 1956. 16 p.
DNLM (W3.AV16, 1956)

This is a brief review and panel discussion of the papers presented at the Aviation Medicine Symposium dealing with the aging pilot, on March 15-16, 1956, at Wright-Patterson Air Force Base, Ohio.

6310
Yerg, R. A.
COMMON MEDICAL DISORDERS WHICH HAVE AEROMEDICAL IMPLICATIONS. — In: Aviation medicine symposium: the aging pilot, p. 58-64. U. S. Air Force. [Unnumbered report], 1956.
DNLM (W3.AV16, 1956)

As pilots approach and go beyond the age of 40 they become subject to increasing illnesses (cardiovascular, gastrointestinal, respiratory, metabolic, blood) requiring closer medical surveillance and evaluation. No fixed chronological age can be established to limit the performance of duty as a pilot. There are medical, psychological, operational, and economic factors each of which must be established on an individual basis. The physical stresses encountered (accelerations, reduced barometric pressure, temperature changes) affect the decision in some cases. The need is emphasized for reliable, valid, reproducible, objective tests which will indicate when a pilot is no longer able to pilot aircraft safely, efficiently, and with no threat to his own well-being.

8. MEDICAL PROBLEMS AND PHARMACOLOGY

[Medical personnel under 7]

a. General

6311
Braswell, L. R.
SOME MEDICAL ASPECTS OF UNITED STATES MILITARY AIR TRANSPORTATION. II. AIR CREWS. — World Med. Jour., 3 (1): 13-16, 22. Jan. 1956.
DLC (R5.W66, v. 3)

The Air Force Medical Service exercises medical control over the air crews involved in military air transportation by: (1) selection of aircrew candidates possessing the physical and psychological qualities necessary for the performance of flight duties; (2) supervision of the ground and air environment of personnel; (3) instruction of crews in first aid and the physiological aspects of flight at high altitude and high speed; (4) prohibition of flight after drinking, immunizations, or substantial loss of blood; (5) immunization of personnel in accordance with international regulations; (6) regulation of factors contributing to fatigue in air crews, including flight duties, flight time, and hours of rest and liberty; (7) provision for inspection of escape exits, oxygen equipment, and rescue equipment before flight; (8) disinfection of aircraft involved in international flights; (9) control of cockpit lighting during night flying; (10) requirement of the use of oxygen by air crews before landing after prolonged flights at 8,000-10,000 feet; and (11) prohibition of deep-fat cooking during flight to prevent fires.

6312
Braswell, L. R.
SOME MEDICAL ASPECTS OF UNITED STATES MILITARY AIR TRANSPORTATION. III. AIR PASSENGERS. — World Med. Jour., 3 (2): 111-117. March 1956.
DLC (R5.W66, v. 3)

No medical facilities are provided aboard passenger aircraft used for the transportation of U. S. military personnel and their dependents, but preventive medical procedures, including physical inspections for communicable diseases and checks of immunization and medical records, are emphasized. Special restrictions are placed on the travel of pregnant women, children, and aged or infirm dependents. The procedure for the transportation or evacuation of patients includes screening of patients to eliminate those in a condition in which air evacuation may be unsuccessful or harmful (severe anemia, quarantinable disease, shock, or heart injury) and to identify patients to whom special consideration must be given (mental patients, cases of heart disease, pneumothorax, acute asthma, recent severe internal hemorrhage, intrathoracic or intraabdominal wounds, skull fractures, and maxillo-facial injury). Established procedures are followed for the care of mental patients, patients in the infectious stage, and litter patients, and for the unloading of patients in emergencies.

6313
Powell, T. J.
EPISODIC UNCONSCIOUSNESS IN PILOTS DURING FLIGHT: REPORT OF NINE CASES. — Jour. Aviation Med., 27 (4): 301-316. Aug. 1956.
DLC (RC1050.A36, v. 27)

Nine cases of unconsciousness of ten seconds to six minutes, occurring in pilots while flying, have been observed and the patients investigated. Apart from hypoxia, and a few other external causes, the reason for unconsciousness is considered to

be a summation of physiological factors. The factors noted in these cases are: (1) anger or anxiety; (2) probable hypoglycemia; (3) increased prolonged g; (4) probable hyperventilation; and (5) paroxysmal type of EEG. The condition could not be reproduced under laboratory conditions. (Author's summary)

6314
Strughold, H.
MEDICAL PROBLEMS INVOLVED IN ORBITAL SPACE FLIGHT. — Jet Propulsion, 26 (9): 745-748. Sept. 1956. DLC (TL780.A613, v. 26)

The physical basis and implications of the medical problems of space flight are discussed, including (1) the effect of weightlessness on the general body functions, the sensory perception of body position in space, and the sensorimotor control of body movement; (2) the visual hazard of unshielded sunlight; (3) maintenance of an adequate physiological day-night cycle; (4) control of the oxygen and carbon dioxide concentrations, humidity, and barometric pressure of the space cabin atmosphere; and (5) the danger of decompression.

6315
Tobin, J. L.
WHY YOUNG MEN DIE: A REVIEW OF DEATHS OCCURRING IN A GROUP OF AIR FORCE RECRUITS. — New York State Med. Jour., 56 (13): 2084-2088. July 1, 1956. DNLM

Over a period of four years (1951-1955) 45 deaths occurred in trainees at an air force recruit training base. Approximately 240,000 young men between 17-22 years of age were stationed there for a period of three months of training. An analysis of the deaths revealed that 27 were due to disease, of which meningococcus meningitis was the most frequent single cause; 18 were due to accidents, 9 of which were caused by automobiles; 11 were sudden and unexpected deaths, of which 11 had intracranial lesions, 2 acute infection, 1 a heart lesion, 1 diabetic coma, 1 asphyxia, and 3 showed unconclusive findings at autopsy. Included are representative tables and case reports. (Author's summary, modified)

b. Sicknesses

[Motion sickness drugs under 11-c]

6316
Cuba Caparó, A.
[COMPARATIVE STUDY OF MOUNTAIN SICKNESS] Estudio comparativo del mal de montaña. — Anales de la Facultad de medicina, Universidad nacional mayor de San Marcos de Lima (Peru), 39 (3): 1104-1127. 1956. In Spanish. DNLM

A comparative review is presented of the literature on mountain sickness of man, sheep, and cattle, with special reference to the clinical, hematological, anatomical, and pathological aspects. Polycythemia is considered as the most important manifestation of mountain sickness in all three species. However, the lamb at altitude does not present modifications in the blood picture as observed in man and cattle. Hypotocopherolemia, a factor which may explain the transitory polycythemia in lambs, is also related to the myocardial lesions affecting this species. The most important symptoms and lesions (myocardial and adrenocortical) found in cattle and sheep are similar to those found in man.

6317
A DISCUSSION ON AEROEMBOLISM. — U. S. Naval Aero-medical Safety Jour., 1 (4): 4-5; 17. March 1956. DNLM

Aeroembolism is defined as a condition produced by exposure to low atmospheric pressure at high altitude, which leads to the formation of gas bubbles in the tissues, blood, and other body fluids. Following a brief discussion of its symptoms, etiology, and therapy, preventive measures are presented. These are muscular inactivity at low-pressure altitudes, pre-selection of personnel, and denitrogenation by breathing pure oxygen before ascent to altitude.

6318
Evrard, E.
[CURRENT CONCEPTS OF DECOMPRESSION SICKNESS IN THE AVIATOR (AEROEMBOLISM)] Concepts actuels sur la maladie des décompressions chez l'aviateur (aéroembolisme). — Force aérienne, Service de santé, Bulletin technique d'information [Bruxelles], 1956 (March): 1-9. In French. DNLM

The mechanism of production of decompression sickness, its pathological aspects, its symptoms, individual and environmental factors in the production of the disease, its treatment, and measures of protection against the disease are described.

6319
Haymaker, W.,
A. D. Johnston, and V. M. Downey
FATAL DECOMPRESSION SICKNESS DURING JET AIRCRAFT FLIGHT: A CLINICOPATHOLOGICAL STUDY OF TWO CASES. — Jour. Aviation Med., 27 (1): 2-17. Feb. 1956. DLC (RC1050.A36, v. 27)

Two cases of fatal decompression sickness occurred in two obese individuals during jet airplane flights. There was no evidence of oxygen lack in either case. The following pathological conditions were observed upon autopsy of the two bodies: evidence of circulatory collapse; generalized lipemia and fat emboli in the kidney in one case, and fat emboli in the lungs and brain in the other; a patent foramen ovale in both heart septa together with cardiac enlargement in one case; ischemic necrosis in the brain, like that caused by air embolism; acute ischemic changes in the spinal cord of one body. It is believed that the following pathological occurences took place culminating in death: fat deposits in the body became supersaturated with gas as a result of fairly rapid decompression; rupture of the fat cells occurred, and small fat particles thus gained access to the venous circulation; gas bubbles from the fatty areas were carried to the right side of the heart and to the lungs, many bubbles and fat emboli were filtered out causing a tamponade of the pulmonary circulation, resulting in an elevation of pulmonary blood pressure, which in turn caused a short-circuiting of the blood from the right side of the heart to the left side through the patent foramen ovale; this blood laden with bubbles reached the brain and caused circulatory collapse and death.

6320
Henry, F. M.
EFFECTS OF EXERCISE AND ALTITUDE ON THE GROWTH AND DECAY OF AVIATOR'S BENDS. — Jour. Aviation Med., 27 (3): 250-259. June 1956. DLC (RC1050.A36, v. 27)

The pain intensity curves of aviator's bends follow the growth and decay form of a theoretical gas bubble. The pain grows with rapidity, remains high for 20-60 minutes, then trends downward toward complete remission. A group of individuals exposed to high altitude, and viewed as a composite individual, also follow the theoretical pattern. The exponential symptom decay factor has a time constant characteristic of nitrogen excretion measured directly in individuals or indirectly by the effect of denitrogenation on bends occurrence in groups of individuals. Using a two-component exponential equation, the author predicts the number of cases of bends which might be expected for any designated length of time or type of exposure; the rate of occurrence reaches a maximum within 10-30 minutes and decreases thereafter. Of the two variables, altitude and muscular activity, the former is quantitatively more important than the latter. Exercise influences the total incidence of bends, but its greatest effect is the causing of earlier appearance and regression of the symptoms. Exercise probably functions through the mechanisms of local carbon dioxide production, modified by faster nitrogen elimination due to increased local circulation. The location of the bends symptoms is influenced by the site of the muscular work. Individual differences in susceptibility, however, are systemic and reflect differences in whole body gas elimination ability. (Author's summary, modified)

6321
Holtermann, H.
[REFLECTIONS ON SEA-SICKNESS AND EXPERIENCES WITH SOME NEW TREATMENT METHODS] Gedanken zur Seekrankheit und Erfahrungen mit einigen neueren Behandlungsmethoden. — Münchener medizinische Wochenschrift (München), 98 (7): 229-231. Feb. 17, 1956. In German, with English summary (p. 231). DNLM

A report is given on susceptibility to seasickness, the incidence of which is estimated at 90%. Habituation to the conditions at sea does not develop in 5-10% of the subjects. The symptoms generally occur in a certain sequence. There appear to be two different kinds of seasickness: (1) the well-known form with nausea and vomiting, and (2) instead of these symptoms a severe headache. Both kinds are attributed to differential irritability of the cerebral nuclei. The etiological causes of seasickness are outlined and fear is considered an important factor. Several therapeutic measures are discussed. Administration of Nestargel was tried as a supplementary medication. Its effects are based on its thickening action on the stomach contents. After its administration vomiting was reduced. Megaphen has been effective in cases confined to bed. The beneficial effect of Benadon (vitamin B_6) was confirmed, particularly when administered by suppositories. Its harmlessness and lack of side-effects are emphasized. (From the author's summary)

6322
Hurtado, A.
[PATHOLOGICAL ASPECTS OF LIFE AT HIGH ALTITUDES] Aspectos patológicos de la vida en las grandes alturas. — Anales de la Facultad de medicina, Universidad nacional mayor de San Marcos de Lima (Peru), 39 (3): 957-976. 1956. In Spanish. DNLM

[An English translation of this paper had appeared in 1955, see item no. 4389, vol. IV]

6323
Jaulmes, C.,
and A. Bénitte
[TRAVEL SICKNESS] Le mal des transports. — Revue médicale française (Paris), 37 (6): 321-330. June 1956. In French, with English summary (p. 330). DNLM

A brief review is presented of motion sickness, its clinical aspects, frequency, susceptibility of persons, and etiology. The etiological factor necessary for motion sickness is stimulation of the non-auditory labyrinth (caused by angular movements and change of head position around a vertical axis in an airplane). Consideration is given to nervous centers (vomiting center, chemoreceptor zone) and to psychological and visual factors related to motion sickness. Breathing exercises, oxygen inhalation, cotton ear plugs, and nutritional factors are mentioned as preventive measures. Drug treatment is advocated using belladonna alkaloids, barbiturates, synthetic antihistaminics, and pheonothiazine and derivatives.

6324
Johnson, W. H.
HEAD MOVEMENT MEASUREMENTS IN RELATION TO SPATIAL DISORIENTATION AND VESTIBULAR STIMULATION. — Jour. Aviation Med., 27 (2): 148-152. 1956. DLC (RC1050.A36, v. 27)

By exposing several hundred Royal Canadian Air Force flight cadets to the motion of a simple swing, it was demonstrated that laboratory-induced motion sickness is directly correlated with vestibular sensitivity. A high correlation exists between the overall magnitude of the head movements and the incidence of motion sickness. Studies of susceptible individuals revealed much precessional head movement when exposed to complex movement. By fixing the head of the subject, swing sickness was prevented. This paper is concerned with evidence obtained by forcing head movements; one of the experiments consisted of placing the subject in a supine position upon a stretcher, mounted upon a turntable; the subject was rotated at a rate of 30 r.p.m. about a vertical axis. At the time of rotation, the subject rotated his head from side to side; a sickness rate of 95% is possible under these conditions, sometimes developing in 15 seconds. Gyroscopes rotating in three planes were fixed to helmets worn by the subjects; a precessional tumbling occurs in the affected gyroscope when there is any head rotation. The "cross product" of two angular accelerations applied simultaneously in any two orthogonal planes indicates the magnitude and the direction of the resulting subjective sensations of disorientation in the subject.

6325
Keist, B. F.,
W. F. Sheeley, J. M. Byers, and H. I. Chinn
EFFECT OF HEAD IMMOBILIZATION ON INCI-

DENCE OF AIRSICKNESS. — Jour. Applied Physiol., 8 (4): 369-370. Jan. 1956.
DLC (QP1.J72, v. 8)

Paratroopers on simulated combat jumps were randomly distributed aboard C-119 aircraft and divided evenly into four groups receiving, respectively: (a) 0.65 mg. of hyoscine hydrobromide together with head support, (b) 0.65 mg. of hyoscine but no head support, (c) placebo plus head support and (d) placebo without head support. Hyoscine afforded striking protection against airsickness whether or not it was supplemented with head support. Head support, on the other hand, gave no protection. (Authors' summary)

6326
Luckner, H.
[STERILITY DUE TO ALTITUDE SICKNESS IN FLIERS] Sterilität durch Höhenkrankheit bei Fliegern. — Medizinische Klinik (München), 51 (35): 1494-1495. Aug. 31, 1956. In German. DNLM

On the basis of animal experiments, sterility in fliers exposed to hypoxia may be possible. However, a few weeks after high altitude flights are discontinued, normal fertility will return.

6327
Marbarger, J. P.,
W. Kadetz, J. Paltarokas, D. Variakojis, J. Hansen, and J. Dickinson
GASEOUS NITROGEN ELIMINATION AT GROUND LEVEL AND SIMULATED ALTITUDE AND THE OCCURRENCE OF DECOMPRESSION SICKNESS. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-73, Feb. 1956. 21 p.
AD 95 149 PB 124 612

Nitrogen elimination and amount of oxygen used were estimated during 2 hours of breathing oxygen in 33 subjects resting at ground level and at simulated altitudes of 8,000, 12,000, 18,000, and 22,000 feet. It amounted to 3,598, 2,580, 2,148, 1,774, and 1,603 cc. (standard temperature pressure dry) respectively. The incidence of bends at 38,000 feet simulated altitude after preoxygenation at these various altitudes was compared to those without prebreathing of oxygen. The results indicated that fewer descents were necessary after denitrogenation at ground level or any altitude than were necessary without denitrogenation. The data obtained confirmed the results of others in that at simulated altitude, less supply oxygen was used with denitrogenation than at ground level. (Authors' abstract)

6328
Monnier, A. J.
[SEASICKNESS: RECENT DATA ON PATHOGENESIS AND TREATMENT] Le mal de mer: notions récentes de pathogénie et de traitment. — Vie médicale (Paris), 37 (2): 119-128. Feb. 1956. In French.
DNLM

A brief review is presented of the etiology of seasickness and motion sickness with special emphasis on the predisposing vestibular, central nervous system, and extra-labyrinthine (visual, visceral, humoral, psychological) factors. Consideration is given to drug therapy using belladona derivatives, barbiturates, and antihistaminics. Mention is made of a new type of curative and preventive treatment using a suppository containing a combination of Bellafolline (belladona alkaloid), phenobarbital, and dexamphetamine.

6329
Monnier, [A. J.]
[SEASICKNESS: PATHOGENESIS AND TREATMENT] Le mal de mer: pathogénie et traitement. — Revue de pathologie générale et comparée (Paris), 56 (683): 1800-1830. Dec. 1956. In French.
DNLM

A comprehensive review of the literature on seasickness is presented including such topics as the place of seasickness in relation to motion sickness; incidence; individual predisposition; motion sickness; and clinical aspects. Special consideration is given to the etiology of seasickness in terms of determinant factors (vestibular, position, central nervous system); predisposing factors (visual, visceral, humoral), and psychological factors. Therapy is discussed from the standpoint of previous therapeutic measures; major therapeutic measures (antihistaminics, barbiturates, belladona derivatives, and drug combinations), and lesser therapeutic measures (position, diet, psychotherapy). (63 references)

6330
Navarrane, P.
[TRAVEL SICKNESS] Le mal des transports. — Revue du praticien (Paris), 6 (19): 2095-2104. July 1, 1956. In French. DNLM

A general discussion is presented of motion sickness with emphasis on its etiology and pathogenesis, clinical aspects, and susceptibility of persons. Preventive measures considered in during airplane flight include the use of the seat belt in turbulent weather, use of ear plugs to eliminate vibrations, and the use of dark glasses. Chemical measures used in prevention and therapy include central nervous system depressants (barbiturates); parasympathicolytics (belladonna and hyoscíamine alkaloids); synthetic antihistaminics (dramamine, nautamine), or chlorpromazine. The following measures are recommended for persons susceptible to motion sickness during airplane flight: chlorpromazine or antihistaminics prior to departure and use of belladenal-dexamphetamine suppository at the first symptom.

6331
(Office of Naval Research)
BIBLIOGRAPHY ON MOTION SICKNESS. — Office of Naval Research, Physiological Psychology Branch, Psychological Sciences Division, Washington, D. C. Joint Services Committee for the Study of Motion Sickness, Report no. 2. ONR Report no. ACR-3, Jan. 1956. ii+29 p. AD 103 549
PB 127 186

A title bibliography containing selected references pertinent to an evaluation of the protective effects of drugs in motion sickness is presented. The references represent the literature which appeared up to and through the year 1954.

6332
Poos, E. E.
OTOLOGIC PROBLEMS IN AVIATION MEDICINE. — Eye Ear Nose and Throat Monthly, 35 (5): 312-315. May 1956. DNLM

A brief review is presented of otologic problems such as otitis externa, cerumen, and aerotitis media incident to aviation. The etiology and clinical manifestations of airsickness are discussed, and its control considered in terms of the environment (design, loading and control of aircraft, selection of atmospheric conditions for flight), the selection of persons for flight, and drug therapy with belladonna, hyoscine, scopolamine, and antihistaminics. Mention is made of the ear in relation to blind flight and noise. Otologic problems in aviation may be prevented by expert medical examination, advice, and care of the aviator.

6333
Renzi, A. A.,
and L. J. Milch
EFFECTIVENESS OF PAGITANE (CYCRIMINE HYDROCHLORIDE) AND KEMADRIN (PROCYCLIDINE HYDROCHLORIDE) IN PREVENTION OF AIRSICKNESS [Abstract]. — Federation Proceedings, 15 (1, part I): 473. March 1956.
DLC (QH301.F37, v. 15)

Results based on groups of airmen subjected to a 60-minute flight consisting of motion patterns to produce emesis indicated that the incidence of sickness was highest in the placebo group (38.1%), and that the incidence in the Kemadrin (procyclidine hydrochloride)-treated subjects (17.5%) was far less than in the Pagitane (cycrimine hydrochloride) group (28.5%). In terms of protection, 5 mg. of Kemadrin was 54% effective, while 5 mg. of Pagitane was only 25% effective. Kemadrin compared very favorably with Benadryl which itself showed 50% protection against airsickness. The preparations demonstrated no untoward side effects at the dose level employed. (Authors' abstract, modified)

6334
Wang, S. C.,
and H. I. Chinn
EXPERIMENTAL MOTION SICKNESS IN DOGS: IMPORTANCE OF LABYRINTH AND VESTIBULAR CEREBELLUM. — Amer. Jour. Physiol., 185 (3): 617-623. June 1956. DLC (QP1.A5, v. 185)

Bilateral labyrinthectomy or ablation of the nodulus and uvula of the cerebellum was observed to eliminate vomiting responses to prolonged swinging motion in dogs selected for their normal susceptibility to motion sickness. Incomplete extirpation of these structures produced partial or total resistance to motion sickness. The animals operated upon exhibited generally normal responses to intravenously administered apomorphine or to orally administered copper sulfate. The results indicate that the vestibular impulses produced by motion traverse the nodulus and uvula of the cerebellum and the chemoceptive emetic trigger zone before reaching the medullary vomiting center.

6335
Wünsche, O.
[DYSBARISM OF THE HIGH ALTITUDE FLIER] Die Druckfallkrankheit des Höhenfliegers. — Wiener medizinische Wochenschrift (Wien), 106 (32/33): 686-689. Aug. 11, 1956. In German. DNLM

This is a general review of the developments in research on dysbarism in flights above 8000 m. altitude, and on prophylactic measures, such as oxygen breathing 1/2 to 1 hr. prior to flight.

c. Diseases and Injuries

[Mental diseases under 5-d]

6336
AIR LIFT WHOOPING COUGH. — What's New, No. 197: 8-11. 1956 DNLM

A review is presented of the background and rationale of air-lift therapy of whooping cough in infants and children. It is stated that (1) best results from airplane flights are obtained in the fifth and sixth weeks of the disease; (2) several flights are no better than one; (3) an altitude higher than 10,000 feet is rarely necessary; and (4) the great cold at high altitude is harmful to some patients.

6337
Amdur, R. D.
RECURRENT SPONTANEOUS PNEUMOTHORAX CAUSED BY AERIAL FLIGHT: REPORT OF CASE. — Jour. Aviation Med., 27 (5): 456-459. Oct. 1956. DLC (RC1050.A36, v. 27)

A case is presented of recurrent episodes of spontaneous pneumothorax due to decreased barometric pressure as a result of actual or simulated aerial flight. The only symptoms noted were left anterior chest pain which occurred at altitudes above 12-15,000 feet. With the aid of chest roentgenograms made before, during, and after altitude chamber flights, a pneumothorax was demonstrated about the apex of the left upper lobe which absorbed quickly at ground level. (Author's summary)

6338
Berry, L. J.
SUSCEPTIBILITY TO INFECTION AS INFLUENCED BY ACCLIMATIZATION TO ALTITUDE AND KREBS CYCLE INHIBITORS AND INTERMEDIATES. — Jour. Infectious Diseases, 98 (1): 21-26. Jan.-Feb. 1956. DNLM

Female mice exposed to simulated altitude of 20,000 feet for 3 weeks and groups of ground-level mice were infected intraperitoneally with Salmonella typhimurium. Altitude mice survived significantly shorter times than ground-level mice when injected with oxaloacetate, citrate, or arsenite. Both groups given saline survived shorter times than the corresponding groups given any one of the compounds. In similar groups of mice infected with pneumococci, altitude mice injected with malonate had a mean survival time significantly lower than that of any other group. Comparisons between mice given saline and those given one of the Krebs cycle inhibitors or intermediates, revealed that for altitude mice, shorter survival times accompanied injections of fluoroacetate, succinate, or arsenite, while at ground level only citrate failed to reduce survival time. Groups of uninfected altitude and ground-level mice were injected with the same substances as infected mice. Arsenite killed 14 of the 20 altitude mice and 1 of 20

normal mice, indicating that the results with this substance in infected mice were due to hypoxic stress alone. This was not true of malonate. Fluoroacetate killed 3 of 30 normal mice and none of the 30 altitude mice. All mice survived injections of citrate, succinate, and oxaloacetate. (Author's summary, modified)

6339
Carayon, A.,
and V. André
[NOTE ON CRANIO-CERVICAL INJURIES CAUSED BY PARACHUTING] Note sur les accidents cranio-cervicaux du parachutage. — Société de médecine militaire française, Bulletin mensuel (Paris), 50 (4): 124-126. April 1956. In French. DNLM

Cases are recorded of cranio-cervical injuries (fractures, dislocations, closed injuries, contusions) occurring during parachute jumps. Lesions are attributed to either a faulty jump due to bad terrain, violent winds, or bad body position, and to the shock produced by the opening parachute. Lesions caused by the shock of an opening parachute are not usually evident during rapid physical examination and lead to painful manifestations. Mention is made of therapeutic techniques.

6340
Cicala, A.,
and G. Assensi
[HERNIA OF THE INTERVERTEBRAL DISK CAUSED BY POSITIVE ACCELERATION: CASE REPORT] Ernia del disco intervertebrale da accelerazione positiva: osservazioni su di un caso clinico. — Rivista di medicina aeronautica (Roma), 19 (3): 511-519. July-Sept. 1956. In Italian, with English summary (p. 518). DLC (RC1050.R56, v. 19)

A case is reported of intervertebral disk hernia caused by positive acceleration in a military diver pilot. Following surgery, the pilot returned to flight duty. Consideration is given to the anatomy and physiology of the intervertebral disk, and to the medico-legal aspects of the disorder.

6341
COLLOID CYST OF THE THIRD VENTRICLE AS A CAUSE OF SUDDEN DEATH IN AIRCREW. — Joint Committee on Aviation Pathology, Washington, D. C. Memorandum no. 2, 1956. DNLM (WIJ01815)

Rare cases are presented of colloidal cysts of the third ventricle causing sudden death in two pilots and one passenger. Excrutiating headache which appeared and disappeared suddenly, accompanied by nausea and vomiting, was the most striking feature. Headache was either precipitated or ameliorated by changes in head position. The necessity for careful examination of the brain for colloidal cyst in flying personnel is emphasized.

6342
D'Andretta, J. C.
[FIRST RESULTS WITH THE LIPASE INDEX IN AERONAUTICS] Primeiros resultados com o "índice de lipase" na aeronáutica. — Revista brasileira de tuberculose (Rio de Janeiro), 24 (165): 43-58. Jan. 1956. In Portugese, with English summary (p. 58). DNLM

On the basis of blood lipase determinations, 202 persons in the Brasilian Air Force were classified as normal, tuberculous, cured or suspected of pulmonary tuberculosis. In normal persons the blood lipase index tends to rise above 7, whereas in tuberculous and suspected subjects the index falls below 7. This test is recommended for use by the air force in detection and confirmation of tuberculosis. Case reports are included, and the diagnostic correlation between the lipase index and x-ray and sputum tests is pointed out.

6343
Dickson, E. D. D.,
and P. F. King
RESULTS OF TREATMENT OF OTIC AND SINUS BAROTRAUMA. — Jour. Aviation Med., 27 (2): 92-99. April 1956. DLC (RC1050.A36, v. 27)

Same as item no. 4057, vol. IV.

6344
FLIGHT SURGEONS AND TUMOR BOARDS. — Office of the Surgeon, Headquarters Air Materiel Command, Wright-Patterson Air Force Base, Ohio. Information Bulletin no. 63: 13-14. April 1, 1956. DNLM

Malignancy in flyers is a cause for suspension from flight duty until treatment is complete. The flight surgeon bases his decision in reinstating flight status on such factors as the type of tumor, location, extent, and statistical probability of clinical cure. The problem of adequate follow-up evaluation has been eliminated by the establishment of tumor boards that work jointly with the flight surgeon. He evaluates the patient for probable recurrence of metastatic activity at time intervals recommended by the board, and maintains primary control over the patient's flight status.

6345
Freyvogel, T.
[EFFECTS OF HIGH ALTITUDE CLIMATE ON THE COURSE OF ACUTE MALARIA] Zur Frage der Wirkung des Höhenklimas auf den Verlauf akuter Malaria. — Acta tropica (Basel), 13 (1): 1-57. 1956. In German, with English summary (p. 56-57). DNLM

Experimental infection of chickens with fowl malaria was carried out at low altitude at 280 m., in a low-pressure chamber, and on Jungfraujoch (3457 m.). The course of the infection was essentially the same at low altitude and in the low-pressure chamber, but was retarded in the early stages at high altitude. It is concluded that the enhanced resistance of the host to the first pre-erythrocytic forms is due to conditions prevailing at high altitude. However, the increased resistance lasted for only a short time. It was succeeded by a high number of parasites in the internal organs — double that found in chickens at low altitudes. The course of blood infection at high altitude was similar to that at low altitude, which demonstrates that the increase in the erythrocyte mass is not the retarding factor.

6346
Freyvogel, T.
[MALARIA IN LOW AND MEDIUM ALTITUDES:

INVESTIGATIONS IN THE ENDEMIC REGIONS OF TANGANYIKA] Malaria in tiefer und mittlerer Höhenlage: Untersuchungen in endemischen Gebieten Tanganyikas. — Acta tropica (Basel), 13 (1): 58-81. 1956. In German, with English summary (p. 81). DNLM

Erythrocytic changes were investigated in 9 healthy natives after transfer to 1000 m. altitude. The results confirmed that erythrocyte number and hemoglobin content increase at this level the same as at higher altitudes. A statistical survey of malaria incidence in villages of Ifikara (230 m. above sea level) and Kwiro (1000 m.) in the endemic areas of southern Tanganyika showed a higher rate of infection in the valleys; on the other hand inhabitants of the mountain areas had the same severe symptoms and even more relapses than patients from the valley. The author suggests that high altitude increases organismic resistance, particularly to pre-erythrocytic stages of the Plasmodia. The statistical findings on human malaria in Africa are compared with the experimental findings on chicken malaria in Switzerland (item no. 6345). (Author's summary, modified)

6347
Geuns, H. A. van
[ASTHMA AT HIGH ALTITUDES: A HISTORICAL REVIEW] Astma in het hooggebergte: een historisch literatuur-overzicht. — Nederlandsch tijdschrift voor geneeskunde (Amsterdam), 100 (26): 1861-1864. June 30, 1956. In Dutch. DNLM

After reviewing the published literature on asthma cures in high-mountain resorts, the author concludes that the primary factor leading to cure is the stress-evoked reorganization of the autonomic nervous system equilibrium, rather than the allergenfree mountain air.

6348
Harter, W.
[CURE OF WHOOPING COUGH BY MEANS OF HIGH ALTITUDE FLIGHTS] Cura della pertosse mediante voli in quota. — Rivista di medicina aeronautica (Roma), 19 (2): 351-358. April-June 1956. In Italian, with English summary (p. 357). DLC (RC1050.R56, v. 19)

A discussion is presented on the treatment of whooping cough by means of high altitude flights. Out of 156 cases in children treated in this manner, 29.7% recovered completely within 3 days after the flight; 54% improved; 8.3% improved slightly, and 8% showed no signs of improvement 10 days after the flight. The biophysiological mechanisms upon which the therapeutic results are based are related to stimulation of hematopoietic function, potentiation of respiratory activity, functional activation of the pituitary-adrenal system in the sense of Selye's stress syndrome, and possible psychological factors. (Author's summary, modified)

6349
Manschiebel, A.,
and J. Siegl
[HIGH-ALTITUDE FLIGHT FOR TREATMENT OF WHOOPING COUGH] Zur Höhenflugbehandlung des Keuchhustens. — Wiener klinische Wochenschrift (Wien), 68 (38/39): 761-763. Sept. 28, 1956. In German. DNLM

Flights at 3000 m. altitude without pressurization were conducted with 186 children with pertussis, age range 4 months to 14 years. In a follow-up on 160 of these cases the beneficial effects of flight treatment were evident in the relatively rapid subsiding of the coughing spells (10-12 days) for those in the first and second weeks of the stadium convulsivum. Measurements in three cases showed a steep fall of eosinophil values and an elevated 17-ketosteroid excretion 24-48 hours after flight, with corresponding clinical improvement in two cases. In the third child who flew in the 4th week of stadium convulsivum, the coughing spells worsened after the flight. In this case the eosinophil values rose significantly after the flight and the excretion of 17-ketosteroids did not change. It is suggested that high-altitude flight constitutes a stress which hastens the recovery process. Flight treatment is contraindicated in pertussis cases with complications.

6350
Perri, F. A.
MILITARY OTOLOGY AND AVIATION MEDICINE. — U. S. Armed Forces Med. Jour., 7 (11): 1643-1647. Nov. 1956. DLC (RC970.U7, v. 7)

Barotitis media (aero-otitis media) may be diagnosed from the history, inspection of the tympanic membrane, and by insufflation of the middle ear if necessary. If there is no transudate in the middle ear, therapy consists of reducing congestion at the nasal end of the eustachian tube and equalizing the pressure on the two sides of the tympanic membrane. If a transudate is present, these measures must be preceded by aspiration. If inadequately treated, barotitis may result in permanent hearing loss. Traumatic central perforation of the tympanic membrane heals rapidly if treated with topical applications of 50% trichloroacetic acid. Barosinusitis responds to treatmen' with topical vasoconstrictors. Minor otolaryngologic conditions attain extreme importance when they occur in flying personnel. When not treated promptly and adequately they cause the loss of highly trained personnel. (Author's summary, modified)

6351
Perry, D. R.,
and L. C. Dyer
INCIDENCE, NATURE, AND EXTENT OF INJURY IN CRASH LANDINGS AND BAILOUTS. — Arctic Aeromedical Lab., Ladd Air Force Base, Alaska. Report no. 1, Nov. 1956. iii+101 p. (Project no. 8-7956). UNCLASSIFIED

A statistical survey is presented on the incidence, nature, and extent of injury during crash landings and bailouts. The data are further analyzed to establish the effects of terrain, weather, and type of aircraft upon the number and extent of injury in each of the two situations.

6352
Raboutet, J.,
and M. Darcy
[SURGICAL TREATMENT OF ULCEROUS DISEASE AND APTITUDE OF FLYING PERSONNEL: 16 CASE

REPORTS] Traitement chirurgical de la maladie ulcereuse et aptitude au personnel navigant: à propos de 16 observations. — [Paris? 1956?] 18 p. In French. DNLM (W6P3, pamphlet vol. 6396)

On the basis of 16 reported cases of gastric or duodenal ulcers, which occurred in flying personnel, it was observed that the best therapeutic results were achieved by surgery (gastrectomy, gastroenterostomy). Following temporary postoperative incapacitation of about 6 months, and favorable results from clinical examination and decompression chamber tests, pilots were permitted to return to flight duty.

6353
Stürup, H.
[ORTHOSTATIC HYPOTENSION AFTER PHYSICAL EXERTION: DIAGNOSIS BY MEANS OF A COMBINED STEP TEST AND ORTHOSTATIC TEST] Orthostatisk hypotension efter fysisk anstrengelse: diagnose ved hjaelp af en udvidet orthostatisk prøve. — Ugeskrift for laeger (København), 118 (45): 1327-1329. Nov. 8, 1956. In Danish, with English summary (p. 1329). DNLM

A common orthostatic test was performed on 59 of 100 patients at the military hospital at København (age range, 19-26). Seventy-nine of these had had one or more fainting spells in their history; the rest had symptoms of dizziness and headaches. Three tests were positive (abnormal). Later on in the same series a standardized physical strain (a step test) followed by a common orthostatic test was administered to 56 unselected patients: 9 were positive. Both the common and the combined orthostatic tests were given to 15 patients. In five cases the combined test was positive, while the common orthostatic test was normal. It is concluded that a combined orthostatic test is indicated in all cases of fainting of doubtful origin (where the common orthostatic test is normal), and in some cases of headache and vertigo with orthostatic aggravation. (Author's summary, modified)

d. Pharmacology

6354
Ankermann, H.
[PROPAPHENIN AND ANOXIA] Propaphenin und Anoxie. — Pharmazie (Berlin), 11 (8): 542-547. Aug. 1956. In German. DNLM

The survival time of white mice enclosed in 335 ml. flasks was shortened by small doses of Propaphenin (N-(3-dimethylamino) propyl-3-chlorphenothiazine). Larger doses, however, lengthened the survival times. This effect is attributed to the sedative action of Propaphenin at higher doses, rather than to a true increase of resistance to anoxia. In regard to metabolism, Propaphenin blocks the shift to pure carbohydrate metabolism with mobilization of liver glycogen under anoxic stress.

6355
Baldini, L.
[EFFECT OF CHLORPROMAZINE AND HEXAMETHONIUM ON THE ELECTROCARDIOGRAM OF THE HYPOTHERMIC RAT] Azione della chlorpromazina e dell'esametonio sull'ECG del ratto ipotermico. — Bollettino della societa italiana di biologia sperimentale (Napoli), 32 (12): 1625-1628. Dec. 1956. In Italian. DNLM

Electrocardiograms were recorded from rats cooled to a body temperature of 18-20° C. in 40 minutes and receiving an intraperitoneal injection of chlorpromazine (25-50 mg./kg.). Aside from the effects of hypothermia, chlorpromazine produced no electrocardiographic changes. Electrocardiograms of the hypothermic animals following an intraperitoneal injection of hexamethonium (25 mg./kg.) showed a prolongment of the A-V conduction time. It is concluded that hexamethonium possesses a certain cardiotoxicity in hypothermia whereas chlorpromazine exercises a protective action on the heart of the hypothermic rat.

6356
Bauer, R. O.,
and R. G. Pearson
THE EFFECTS OF MORPHINE-NALORPHINE MIXTURES ON PSYCHOMOTOR PERFORMANCE. — Jour. Pharmacol. and Exper. Therapeutics, 117 (3): 258-264. July 1956. DLC (RS1.J85, v. 117)

Graded dosage mixtures of morphine and nalorphine (N-allylnormorphine) and saline (placebo) were administered intravenously to subjects havin, received preliminary training on a compensatory pursuit task involving simulated aircraft instruments and controls. Task performance of the morphine-treated group was no poorer than the group given saline. Groups given morphine-nalorphine mixtures, or nalorphine alone, exhibited a decrement in performance much greater than either the morphine or saline groups. Nalorphine appeared to exert a soporific effect in proportion to the dosage. The morphine-nalorphine-treated group complained of drowsiness and sleepiness. Nalorphine augmented the toxic side effects of morphine (diaphoresis, retching, vomiting) when combined with it in a mixture. Performance of the group receiving motivational feedback was superior to the group receiving no feedback. (Authors' summary and conclusions, modified)

6357
Bergstrom, O.,
and H. Koch
THE EFFECT OF CHLORPROMAZINE ON THE VESTIBULAR FUNCTION. — Acta oto-laryngologica (Stockholm), 46 (6): 484-498. Nov.-Dec. 1956. In English. DNLM

Administration of chlorpromazine generally produced a substantial prolongation of postrotatory nystagmus in guinea pigs and cats. In some animals total subsidence of postrotatory nystagmus was observed some time after injection, and this was usually preceded by a considerable prolongation. Both conditions were correlated to the degree of somnolence observed. Continuous chlorpromazine administration for relatively long periods had no effect on the vestibular apparatus. Administration by the intracarotid route and directed to the right half of the brain stem via the vertebral artery produced a typical intracarotid syndrome with torsion and sometimes spontaneous

nystagmus. Chlorpromazine is shown to have a central effect on the vestibular function. The probability is discussed of the occurrence of a nystagmus inhibitor in the brain stem (reticular formation) and of the observed prolongations of postrotatory nystagmus being due to inactivation of that inhibitor by the administered chlorpromazine. (From the authors' summary).

6358
Chinn, H. I.
EVALUATION OF DRUGS FOR PROTECTION AGAINST MOTION SICKNESS ABOARD TRANSPORT SHIPS. — Jour. Amer. Med. Assoc., 160 (9): 755-760. March 3, 1956. DLC (R15.A48, v. 160)

Twenty-six compounds were tested as to effectiveness in the prevention of motion sickness in 16,920 soldiers and airmen crossing the North Atlantic aboard troop transport ships. Best results were obtained by using 50 mg. of meclizine once or thrice daily, 50 mg. of cyclizine thrice daily, or 25 mg. of promethazine thrice daily. Buclizine (Vibazine), benztropine methanesulfonate (Cogentin), Sandostene, and UCB 158 (N-benzhydryl-N-m-methylbenzylpiperazine) were demonstrated for the first time to be effective against motion sickness. Single doses of scopolamine hydrobromide were effective, but on continued use produced distressing side-effects. For continued use, meclizine was the most satisfactory. Motion sickness was twice as frequent in those having it before as in those with no previous history of it. It occurred less frequently in older men, and in those who had crossed before.

6359
Cugurra, F.,
and L. Baldini
[CAPACITY OF SO-CALLED GANGLIOPLEGICS TO BLOCK THE HYPERMETABOLIC ACTION OF COLD. IV. EFFECT OF NOVOCAINE] Sulla capacità dei cosiddetti gangliopegici di bloccare la spinta ipermetabolica da freddo. IV. Azione della novocaina. — Bolletino della Società italiana di biologia sperimentale (Napoli), 32 (3-5): 182-183. March-May 1956. In Italian. DNLM

Novocaine (0.0875 g./kg.) had no effect on the oxygen consumption of rats at normal temperature (20° C.). With doses of 0.175 g./kg., and decreasing doses, oxygen consumption decreased about 50% for 90 minutes after the beginning of the experiment, then tended to normalize. In animals exposed to cold (+8°, -10° C.) no dosage of novocaine was capable of inhibiting the normal hypermetabolic activity. It is concluded that novocaine is capable of decreasing oxygen consumption in the rat at normal temperature but not when exposed to cold.

6360
Cugurra, F.,
and L. Baldini
[CAPACITY OF SO-CALLED GANGLIOPLEGICS TO BLOCK THE HYPERMETABOLIC ACTION OF COLD. V. EFFECT OF HEXAMETHONIUM COMBINED WITH NOVOCAINE] Sulla capacità dei cosiddetti gangliopegici di bloccare la spinta ipermetabolica da freddo. V. Azione della associazione esametonio-novocaina. — Bolletino della Società italiana di biologia sperimentale (Napoli), 32 (3-5): 183-184. March-May 1956. In Italian. DNLM

Rats living in a cold environment (+8°, -10° C.) received a subcutaneous injection of hexamethonium combined with novocaine. These drugs did not inhibit the normal hypermetabolic effects (oxygen consumption) of cold.

6361
Cugurra, F.,
and L. Baldini
[CAPACITY OF SO-CALLED GANGLIOPLEGICS TO BLOCK THE HYPERMETABOLIC ACTION OF COLD. VI. EFFECT OF CHLORPROMAZINE] Sulla capacità dei cosiddetti gangliopegici di bloccare la spinta ipermetabolica da freddo. VI. Azione della clorpromazina. — Bolletino della Società italiana di biologia sperimentale (Napoli), 32 (12): 1624-1625. Dec. 1956. In Italian. DNLM

Subcutaneous administration of chloropromazine (50-25 mg./kg.) to rats kept at +18°C. brought about a conspicuous decrease of oxygen consumption especially during the first 30 minutes of the experiment; doses of 12.5 mg./kg. produced a slight decrease in oxygen consumption in the first 30 minutes with successive normalization; lower doses produced no changes. Rats exposed to cold (-10°C.) after subcutaneous injection of chlorpromazine (25 mg./kg.) demonstrated total inhibition of oxygen consumption; death followed within an hour. Untreated rats at -10°C. showed an increase in oxygen consumption. Doses of 12.5, 6.25, and 4.166 mg./kg. produced a notable decrease, followed by death shortly thereafter. It is concluded that chlorpromazine is active in opposing the hypermetabolic effects of cold.

6362
Frank, E.,
and E. Heymans
[THE EFFECT OF FLAVONE FROM CRATAEGUS ON THE GAS EXCHANGE IN HYPOXIA] Der Einfluss von Flavon aus Crataegus auf den Gaswechsel bei Sauerstoffmangelatmung. — Ärztliche Forschung (München-Gräfelfing), 10 (6): 305-310. June 10, 1956. In German. DNLM

The effects of flavone from Crataegus were investigated in 10 healthy trained men in reference to gas exchange. Indices of gas exchange were measured (oxygen uptake, CO_2 release, respiratory minute volume, respiratory rate, and the depth of respiration) as well as the arterio-venous differential at rest, during hypoxia, and in recovery. Flavone injections resulted in most subjects in a more purposive adaptation of the gas exchange (lowered oxygen utilization, CO_2 output, and respiratory minute volume) during hypoxic stress and in the recovery phase. The feed-back effects of gas exchange on the circulatory system are discussed. There were no subjective or objective undesirable side effects after intravenous injection of Fl-3.

6363
Goethe, H.
[CONSIDERATIONS ON THE EXPERIMENTAL AND FIELD TESTING OF SEA-SICKNESS MEDICAMENTS] Gedanken zur experimentellen und praktischen Prüfung von Seekrankheitsmitteln. — Ärztliche

Praxis (München-Gräfelfing), 8 (3): 8. Jan. 21, 1956. In German. DNLM

Several types of apparatus and methods in use for testing of motion sickness remedies are described. The Canadian-built motion sickness simulator was recommended as producing accelerations and decelerations most analogous to natural conditions on the ship. Other testing methods include combination of below-threshold doses of apomorphine (central nervous system stimulant) and Barany rotating-chair stimulation. This method has certain drawbacks since there are individual differences in the reaction to the drug. The above methods are suitable primarily for exploration of the therapeutic properties of the drug. Field tests are invaluable for determining the therapeutic properties since long-term simulation of sea conditions is almost impossible. Certain suggestions are offered for better control of field-test conditions.

6364
Greiner, T.
THE EFFECT OF A VASOCONSTRICTOR, METARAMINOL, ON HUMAN TOLERANCE TO ACCELERATION. — Wright Air Development Center. Aero Medical Lab., Wright-Patterson Air Force Base, Ohio. WADC Technical Report no. 56-575, Nov. 1956. iv+6 p. (Project no. 7216+71712). AD 110 545 UNCLASSIFIED

Metaraminol (a vasoconstrictor drug) in oral doses of 1 mg. per kg. increased tolerance to positive acceleration an average of 0.7 g-unit in 8 volunteers tested on the human centrifuge. This protection was far below that provided by the g-suit or by gradual induction of acceleration. Combination of metaraminol with either of these two systems provided no additional advantage. (Author's summary)

6365
Hauty, G. T.,
R. B. Payne, and R. O. Bauer
EFFECTS OF NORMAL AIR AND DEXTRO-AMPHETAMINE UPON WORK DECREMENT INDUCED BY OXYGEN IMPOVERISHMENT AND FATIGUE. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-125, Dec. 1956. 6 p. AD 125 755 PB 128 463

Following extensive practice at a complex perceptual-motor task, subjects were given either a placebo or 5 mg. of d-amphetamine and then required to perform the task for 4 hours. With the exception of the third hour of work, the entire experimental population was subjected to an insufficiency of oxygen (12%). The counteractive effects of d-amphetamine upon work decrement were evident up to the end of the 4-hour period of work. For both drug groups, normal air had the effect of completely arresting proficiency decline which otherwise would have occurred during the period that normal air was administered. Returning to oxygen impoverishment resulted in proficiency decline which progressed at about the same rate for both groups. (Authors' abstract)

6366
Heymans, E.,
and E. Frank
[CLINICAL CIRCULATION STUDY OF THE EFFECT OF FLAVONE FROM CRATAEGUS DURING HYPOXIC BREATHING] Klinische Kreislaufstudie über die Wirkung von Flavon aus Crataegus bei Sauerstoff-Mangelatmung. — Ärztliche Forschung (München-Gräfelfing), 10 (5): 248-254. May 10, 1956. In German. DNLM

Cardiovascular function was measured in 10 healthy trained men (laborers) at rest, during breathing of a hypoxic mixture (8% O_2 and 92% N_2), and during the recovery phase. The results confirm the beneficial effects of flavone of Crataegus on the circulatory system seen in the lowered heart rate, increased stroke and minute volume, constancy and less rise of the mean arterial pressure, and absence of hypoxemic signs on the electrocardiogram.

6367
Holterman, H.
[ON THE TREATMENT OF SEASICKNESS WITH BENADON (VITAMIN B_6)] Beitrag zur Behandlung der Seekrankheit mit Benadon (Vitamin B_6). — Wiener medizinische Wochenschrift (Wien), 106 (13): 312. March 31, 1956. In German. DNLM

Administration of Benadon (Vitamin B_6) in the amounts of 300 to 600 mg. daily to 430 seasick subjects gave excellent results in 45% of the cases, and satisfactory results in an additional 40%; it was unsuccessful in 15% of the cases. There were no unpleasant side-effects.

6368
Kan, G. S.
[EFFECT OF STREPTOMYCIN ON RESISTANCE OF ALBINO MICE TO OXYGEN LACK] Vliianie streptomitsina na ustoichivost' belykh myshei k kislorodnomu golodaniiu. — Biulleten' eksperimental'noi biologii i meditsiny (Moskva), 41 (3): 29-31. March 1956. In Russian. DLC (R91.B56, v. 41)

Experiments were performed with 212 albino mice placed in hermetically sealed flasks approximately 40-50 min. after each of the test animals had been injected with 5000 units of streptomycin. The experimental group were matched for weight with the control group, since the survival times were found to be correlated with body weight. In the first series, where each mouse was placed separately in a hermetically sealed flask, the mean survival time of the experimental group exceeded that of the control group by 46.3%. In the second series, where two mice were placed in a single flask, the mean survival time for the experimental group again exceeded the controls by 45.8%. The survival times of the heavier animals exceeded those of controls by a lesser amount than the survival times of the lighter animals. It is concluded that streptomycin increases the resistance to oxygen lack by a dual mechanism: (1) lowering the oxygen consumption by depressing respiration, and (2) increasing the organism's tolerance to oxygen lack.

6369
Malmejac, J.,
P. Plane, and E. Bogaert
[RESISTANCE OF THE HIGHER NERVOUS CENTERS TO HYPOTHERMIA: EFFECT OF ADRENALINE] Résistance des centres nerveux supérieurs à l'hypothermie: influence de l'adrénaline. — Comptes rendus de l'Academie des sciences (Paris), 242 (23): 2764-2767. June 4, 1956. In French. DLC (Q46.A14, v. 242)

Continuous venous infusion of epinephrine in dogs and apes with severe bradycardia produced by cooling to a body temperature below 20° C., resulted in an increase in heart rate and blood pressure allowing successful reanimation. Epinephrine was also found to accelerate the recovery of higher cerebral functions in rewarmed apes.

6370
Pearson, R. G.,
and R. O. Bauer
THE EFFECTS OF MORPHINE-NALORPHINE MIXTURES ON PSYCHOMOTOR PERFORMANCE. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 55-137, June 1956. 8 p.
AD 115 324 PB 124 976

Ninety-six subjects received preliminary training on a complicated compensatory pursuit task involving simulated aircraft instruments and controls, then continued work for four hours under conditions designed to appraise the side effects of certain opiate-antagonist treatments. Performance of the group given 8 mg. morphine was no poorer than that of the group given saline, while those groups given morphine-nalorphine mixtures (8:1, 8:2, 8:4 mg.) exhibited much greater performance decrement. Performance was poorest for the group given 4 mg. of nalorphine alone. Nalorphine seemed to exert a soporific effect in direct proportion to the amount present in the treatment. (Authors' abstract)

6371
Rubin, L. S.
THE EFFECT OF ATROPINE ON THE DARK ADAPTATION THRESHOLD. — Chemical Warfare Labs., Army Chemical Center, Md. (Project no. 4-08-02-019-01). CWLR Report no. 2019, April 20, 1956. v+15 p. AD 97 094 UNCLASSIFIED
Essentially the same as the article, EFFECT OF ATROPINE ON DARK ADAPTATION, Jour. Applied Physiol., 9 (3): 409-413. Nov. 1956.
DLC (QP1.J72, v. 9)

No significant change was observed in the absolute threshold or the course of dark adaptation in 12 subjects receiving an intramuscular injection of 2 mg. of atropine sulfate. Practice significantly reduced the dark-adaptation threshold and the course of dark adaptation. Although the dose of atropine employed did not significantly affect the scotopic visual threshold, it cannot be concluded that it does not impair vision, without taking into account peripheral effects (i.e., cycloplegia, mydriasis) relative to the military task under consideration. At least two dark-adaptation practice trials are recommended before an attempt is made to ascertain the effect of any variable on the dark-adaptation process. (Author's abstract, modified)

6372
Salonna, F.,
and L. Carbonara
[EFFECT OF SOME SEDATIVES ON VESTIBULAR REFLEXES] Azione di alcuni farmaci sedativi sulla reflettività vestibolare. — Archivio italiano di otologia rinologia e laringologia (Milano), 64 (4): 507-513. July-Aug. 1956. In Italian, with English summary (p. 513). DNLM

The administration of a barbiturate, Luminal (phenylethylmalonyl uric acid), and a para-aminobenzoic acid derivative, Nevanide (diethylammonium para-aminobenzoate) to guinea pigs prior to rotatory stimulation induced a decrease in post-rotatory nystagmus. Vestibular reflexes were more pronounced and of shorter duration for Luminal, and moderate and of longer duration for Nevanide. The dosage required to obtain a decrease in vestibular reflexes was higher for Luminal than for Nevanide.

6373
Schwarz, M. J.,
P. Webb, and L. N. Garlington
ATROPINE-INDUCED BEHAVIOR ABNORMALITIES IN MEN UNDER HEAT STRESS [Abstract]. — Amer. Psychologist, 11 (8): 402. Aug. 1956.
DLC (BF1.A55, v. 11)

The present study was concerned with the influences of atropine intoxication upon the reactions of men undergoing heat and altitude stress in a climate pressure chamber. Various psychological and physiological responses were carefully and continuously recorded. The principal psychological changes associated with atropine were feelings of euphoria, disturbances in attention, concentration and speech, and marked distortions in visual perception. These findings are considered in the light of the known action of other psychosomimetic drugs which produce more central effects, e.g., the occurrence of hallucinatory phenomena with lysergic acid. (Quoted in full)

6374
Sells, S. B.,
J. R. Barry, D. K. Trites, and H. I. Chinn
A TEST OF THE EFFECTS OF PREGNENOLONE METHYL ETHER ON SUBJECTIVE FEELINGS OF B-29 CREWS AFTER A TWELVE-HOUR MISSION. — Jour. Applied Psychol., 40 (6): 353-357. Dec. 1956. DLC (BF1.J55, v. 40)

Same as the report, item 4936, vol. IV.

6375
Weiss, B.
THE EFFECTS OF VARIOUS MORPHINE-N-ALLYL-NORMORPHINE RATIOS ON BEHAVIOR. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-4, March 1956. 6 p. AD 102 673 PB 124541

The present study was an attempt to gage some of the effects of various combinations of morphine and N-allylnormorphine (nalorphine) on complex behavior in the rat. The behavioral criteria were rate and distribution of lever-pressing responses in the Skinner box, a device in which the delivery of food reinforcement can be correlated in various ways with these responses. Nalorphine was found to impair performance in two ways. First, it tended to produce a depression in response rate. Second, it tended to produce a more linear distribution of reponses between reinforcements, whereas a more optimal distribution would show a concentration of effort nearer the time when the reinforcement is due to be made available. These results are somewhat comparable to a recent study concerned with optimal dosages of nalorphine. (From the author's summary)

e. Transportation and Hospitalization of Patients

6376
AIRCRAFT ACCIDENT AND EMERGENCY PLAN. — U. S. Air Force Medical Service Digest, 7 (5): 17-18. May 1956. DNLM

An aircraft emergency accident plan for an air force hospital is presented which consists of converting effort into three basic areas of operation: the emergency treatment of the patient; the initial assembling of blood donors and drawing of blood, and the administrative and monitoring activities required throughout the hospital. Within these areas, teams are formed, responsibilities established, and required supplies and equipment prepackaged and made ready for the emergency.

6377
Armstrong, H. G.
AIR TRAVEL AND THE AMBULATORY PATIENT. — Therapeutic Notes (Parke, Davis & Co.), 63 (1): 13-16. Jan. 1956. DNLM

As a general rule, ambulatory patients can fly on commercial airlines without suffering any ill effects. Patients with a contagious disease or incapable of caring for themselves without assistance are not acceptable for air travel. Possible airsickness is considered in relation to the effects of resultant nausea and vomiting on patients with severe valvular heart disease, angina pectoris, coronary thrombosis, hypertension, peptic ulcer threatened by perforation, and immobilized jaws. Mention is made of the expansion of body gases at high altitude which may cause distention and strangulation of large, unsupported hernias, rapid filling of colostomy bags, and discomfort in appendicitis and pneumothorax patients. Persons with symptom-free and compensated heart diseases, angina pectoris, coronary thrombosis, chronic anemia, leukemia with hemoglobin of 60% or above, and pulmonary diseases, can fly if oxygen is used. Patients in status asthmaticus, infants less than 10 days old and elderly persons are not considered suitable air passengers.

6378
AVIATION MEDICINE SYMPOSIUM: CIVILIAN AND MILITARY PROBLEMS IN AEROMEDICAL EVACUATION. — U. S. Air Force. [Unnumbered Report, no place, 1956 ?] [76] p. DNLM (W3.AV16, 1956a)

This is a series of papers presented at the Aviation Medicine Symposium of November 6-7, 1956, held at Headquarters Air Materiel Command, Wright-Patterson Air Force Base, Ohio. Pertinent papers are abstracted separately; see items no. 6381, 6386, 6388, 6393, 6394, 6398, 6401, 6402, 6404, 6409, and 6412.

6379
Berg, F. H.
[AIR TRANSPORTATION OF WOUNDED AND SICK] Transporte aéreo de heridos y enfermos. — Revista de la Fuerza aérea (Santiago de Chile), 16 (63): 19-23. Oct.-Dec. 1956. In Spanish. DLC (UG635.C5A32, v. 16)

Air transportation of wounded and sick in Chile is discussed using helicopters and one- and multi-engine aircraft. Consideration is given to construction of landing fields for all types of aircraft near the disaster areas; provision of medical equipment and personnel on aircraft (stretcher bearers, physicians, nurses) adequate to medical problems associated with air transportation. The following disorders and injuries which require special medical care are not suitable for flight: transportation: craniocerebral injuries; penetrating thoracic and abdominal wounds; anemia caused by recent hemorrhage or of long duration; nasopharyngeal disorders; gastroduodenal ulcer; cavitary pulmonary tuberculosis; uncompensated heart diseases; severe arterial hypertension; pulmonary emphysema; myocardial infarct; contagious diseases; and mental disorders.

6380
Berry, C. A.
CRASH AMBULANCE MODIFICATION. — Med. Technicians Bull., 7 (6): 267-270. Nov.-Dec. 1956. DLC (RC970.U72, v. 7)

A simple and inexpensive modification of the field crash ambulance is described which provides for the easy accessibility of medical supplies and equipment. Partitioned aluminum drawers for fluids and dressings are designed to fit under the tool compartment of the vehicle. These supplies are supplemented by items carried in the flight surgeon's bag. A portable oxygen-supply box has also been designed for placement within the litters in the ambulance.

6381
Braswell, L. R.
PROGRESS IN AEROMEDICAL EVACUATION. — In: Aviation medicine symposium, [article 9]. 6 p. U. S. Air Force, [Unnumbered Report, no place, 1956?] DNLM (W3.AV16, 1956a)

Medical science and aviation have combined to produce both efficient carriers and workable techniques for aeromedical evacuation. Preventive medicine practices have minimized the danger of spreading communicable disease by aircraft, and flight surgeons have participated in design of military air transport planes and equipment used in evacuation. Mention is made of a new portable respirator, accompanied by a highly specialized medical team, which assures the safe, worldwide transfer of poliomeylitis patients.

6382
Breitenkamp, R. N.
IMPROVISED LITTER FOR L-19 FIXED WING AIRCRAFT: FOR USE IN EMERGENCY EVACUATION. — Med. Technicians Bull., 7 (5): 213-215. Sept.-Oct. 1956. DLC (RC970.U72, v. 7)

A litter is described and diagrammed, fabricated from iron pipe covered with masonite (frame), with a felt padding. This litter was improvised for use in L-19 fixed wing aircraft for the emergency evacua-

tion of patients. It can be adapted to fit other types of aircraft.

6383
Čapek, D.
[AIR TRANSPORTATION OF PATIENTS] Cestování nemocných letadlem. — Časopis lékarů českých (Praha), 95 (4): 89-93. Jan. 27, 1956. In Czech. DNLM

A general discussion is presented of the indications and contraindications for the air transportation of pregnant women, and of patients with kidney, cardiovascular, nervous, gastrointestinal, and respiratory diseases; liver cirrhosis with and without ascites; tumors; thyroid dysfunction; and wounds. Mention is made of the effects of atmospheric pressure and of various drugs on these conditions.

6384
Chippaux, C.,
A. Salvagniac, and R. Lapalle
[THE AERIAL EVACUATION OF WOUNDED DURING THE INDOCHINA CAMPAIGN] De l'évacuation des blessés par voie aérienne au cours de la Campagne d'Indochine. — Médecine aéronautique (Paris), 11 (2): 227-239. 1956. In French, with English summary (p. 239). DLC (TL555.M394, v. 11)

The experience gained during the Indochina campaign in the aerial transportation of wounded emphasizes the need for close cooperation between ground and air surgeons and the necessity of highly trained medical flight attendants. Useful information was acquired concerning the use of oxygen, the treatment of shock occurring during flight, and the feasibility and techniques of the aerial transportation of patients with skull, maxillo-facial, abdominal, and thoracic injuries. Administration of neuroplegics was found to be helpful in all cases, but artificial hibernation therapy was unsuccessful. Aerial evacuation is contraindicated for patients in shock, anemic patients, and for wounded in danger of hemorrhage.

6385
Chippaux,
Salvagniac, and Cornet
[NOTES ON THE EARLY AERIAL EVACUATION OF PATIENTS WITH CHEST WOUNDS IN INDOCHINA] Notes sur les évacuations aériennes précoces des blessés du thorax en Indochine. — Bulletin international des Services de santé des armées de terre de mer et de l'air (Liège), 29 (6): 247-251. June 1956. In French, with English summary (p. 247-248) DLC (RC970.B77, v. 29)

During the campaign in Indochina, aeromedical evacuation of patients with chest wounds was executed with a Dakota medical transport plane flying at altitudes of 1500-1800 meters (2000 meters when necessary), usually for a period of 4 hours and 30 minutes. As a rule, evacuation is recommended on the third day in the case of a closed thoracic wound if no important hemo- or pneumothorax is present; between the third and eighth day for all other cases, providing the patient is in satisfactory condition after early puncture (between the third and fourth day) of pneumo- or hemothorax; or from the twenty-first day on for patients with large thoracotomies, and cases which cannot be evacuated during the other periods.

6386
Claro, J. J.
AIR EVACUATION OF HEAD INJURY CASES. — In: Aviation medicine symposium, [article 4]. 4 p. [U. S. Air Force. Unnumbered Report, no place, 1956?] DNLM (W3.AV16, 1956a)

The salient aspects of the effects of air transportation on patients with craniocerebral trauma are discussed. Important is maintenance of the airway (tracheotomy), oxygen supply, and body temperature as well as control of sedatives, stimulants, and fluids. Air evacuation of head-injury cases is considered a practical procedure, provided that good clinical judgment is employed, the patients are properly prepared, and adequate supportive care is maintained during flight.

6387
Curd, D.
MOBILE MEDICS. — Tactical Air Command Surgeon's Bull. (Headquarters Tactical Air Command, Langley Air Force Base, Va.), 6 (6): 1-8. June 1956. DNLM

The activity is reported of the Tactical Air Command's mobile medical unit which is designed to care for 36 patients for a period of 72 hours. All components and assigned officers fit into an Air Force C-124 and can be air transported quickly and easily anywhere in the world. Once on the ground and unloaded at their destination, the hospital can be in working order in less than four hours. Illustrations are included of the infirmary in operation. Mention is made of training procedures for all infirmary officers and airmen.

6388
Estes, H. D.
AEROMEDICAL EVACUATION OF CARDIORESPIRATORY PATIENTS. — In: Aviation medicine symposium, [article 10]. 4 p. U. S. Air Force, [Unnumbered Report, no place, 1956?] DNLM (W3.AV16, 1956a)

Cardiorespiratory patients may be transported by modern pressurized cabin aircraft with adequate routine and emergency medical equipment and trained medical personnel. Consideration is given to the aerial transport of patients with myocardial infarct, angina pectoris, hypertensive cardiovascular diseases, mild to moderate congestive heart failure, shock, pulmonary edema, pneumothorax, open chest wounds, mediastinal emphysema, pneumonia, pneumonitis, and bronchial asthma.

6389
Evrard, E.
[FUNDAMENTAL CONCEPTS OF MEDICAL AVIATION] Notions fondamentales sur l'aviation sanitaire. — Force aérienne, Service de santé, Bulletin technique d'information [Bruxelles], 1956 (May): 1-14. In French. DNLM

Fundamental principles of the use of aircraft for the evacuation or transportation of patients in peace and war are discussed. Consideration is

given to the duties of the medical flight attendant in the care of patients, factors in the choice of air transportation of individual patients as a function of distance, terrain, and climate, the advantage of the helicopter in the evacuation of small numbers of patients, the medical use of planes and airbases in time of war, principles of aircraft immunity contained in the Geneva convention, contraindications to the use of air transportation in cases of gastrointestinal, cardiovascular, rhinopharyngeal, and mental disturbances, and priorities for the air transportation of patients in time of war.

6390
Hadley, D. L.
THE HELICOPTER AS AN AMBULANCE. — Jour. Royal Naval Med. Service (London), 42 (1): 8-13. 1956. DNLM

Advantages of using the helicopter as an ambulance are speed, comfort, and independence of restrictions imposed by land or water. The Whirlwind helicopter is considered as the best type for use as an ambulance since it can be fitted with six litters. Disadvantages of helicopter operation mentioned are its difficult operation under conditions of wind and fog, and at night. Three cases are presented illustrating the use of the helicopter ambulance.

6391
Huber, J.
[CONTRAINDICATIONS FOR FLYING] Contre-indications du voyage en avion. — Bulletin de l'Académie nationale de médecine (Paris), 140 (24-25): 447-450. Oct. 2, 1956. DLC (R45.P2, v. 140)

Flight is contraindicated for persons with cardiovascular diseases (angina pectoris, myocardial infarct, coronary thrombosis, myocarditis); pulmonary diseases (tuberculosis, abscess, cancer or emphysema); acute and chronic nephritis; gastrointestinal disorders; liver disease; fever; severe hemorrhage; anemia of less than 50% hemoglobin; nasopharyngeal disorders, and severe nervous and mental disorders. Pregnant women and aged persons are also cautioned against flying. Under certain conditions it is advantageous for wounded and surgical patients to travel by air. Persons with immobilized bone injuries tolerate flight.

6392
Jarniou, A. P.,
and A. Moreau
[THE AERIAL TRANSPORTATION OF PULMONARY TUBERCULOSIS PATIENTS] A propos du transport aérien des tuberculeux pulmonaires. — Médecine aéronautique (Paris), 11 (2): 241-247. 1956. In French, with English summary (p. 246-247). DLC (TL555.M394, v. 11)

Of 402 tuberculous patients evacuated by air from Indochina to France in 1953-1954, only four showed radiological evidence of aggravation, with evolutive outbreaks, and two showed bilateral spreading of lesions within two months after the flight. No changes were observed during the flights or up to 48 hours thereafter. The relapse of evacuated patients was similar to that of an equivalent non-flying tuberculous group. It is concluded that air transportation of tuberculous patients is safe under the following conditions: (1) elimination of persistently hemoptysic or bilaterally excavated cases; (2) antibiotic treatment of active cases for at least one month prior to flight; (3) determination of the status of untreated lesions before flight; (4) deflation of pneumothorax and avoidance of inflation of pneumoperitonitis cases five days prior to flight; (5) flight at a maximum altitude of 3000 meters, with slow ascent; and (6) provision of a qualified attendant and therapeutic equipment.

6393
Jenkins, R. T.
TROOP CARRIER AERO-MEDICAL EVACUATION (TACTICAL INTRA-THEATER). — In: Aviation medicine symposium, [article 13]. 6 p. U. S. Air Force, [Unnumbered Report, no place, 1956?] DNLM (W3.AV16, 1956a)

The tactical or intra-theater aeromedical evacuation system operated by the Troop-Carrier Command within a specific theater is composed of two types: the assault and the intermediate. The assault phase of aeromedical evacuation occurs when casualties are removed from drop zones and assault landing areas in airborne Army objective areas. These casualties are removed by helicopter or assault transport. Intermediate aeromedical evacuation occurs from points of initial treatment in the rear combat area of the Army to any point in the communication zone as requested by the Army or established by theater policy.

6394
Knight, L. A.
AIR EVACUATION OF THE TUBERCULOUS PATIENT. — In: Aviation medicine symposium, [article 1]. 5 p. U. S. Air Force, [Unnumbered Report, no place, 1956?] DNLM (W3.AV16, 1956a)

The main problems encountered in the air evacuation of pulmonary tuberculous patients are (1) regulation of the amount and composition of air breathed en route, and (2) prevention of contagion of aircrew and passengers. In actual practice the problems of altitude are handled by cabin pressurization, and contagion by the use of careful communicable disease techniques. It is recommend d that the section of the plane occupied by the patient be separated by screening or by space allotment from those portions of the cabin accommodating non-tuberculous patients, and that special storage facilities be allocated for eating utensils and oxygen masks used by the patient. It is suggested that flight surgeons accompany air evacuation missions.

6395
Kriehuber, E.
[FLIGHT SUITABILITY EVALUATION WITH REGARD TO CARDIAC AND CIRCULATORY DISEASES FROM THE STANDPOINT OF INTERNAL MEDICINE] Intern-medizinische Beurteilung der Flugtauglichkeit im Hinblick auf Herz- und Kreislaufer-krankungen. — Wiener Zeitschrift für innere Medizin (Wien/Innsbruck), 37 (8): 329-336. Aug. 1956. In German. DNLM

After a brief review of aviation physiology and technology, the author discusses flight travel by patients with cardiac and circulatory pathology, congenital and acquired cardiac defects, angina pectoris, myocardial infarct, and hypertension.

Specific precautions are suggested for flight transport of patients with fresh myocardial infarcts.

6396
Monnier, R.,
and G. Wernert
[CURRENT STATUS OF MEDICAL EVACUATIONS BY MEANS OF HELICOPTERS] État actuel des évacuations sanitaires par hélicoptères. — Société de médecine militaire française, Bulletin mensuel (Paris), 50 (4): 116-123. April 1956. In French.
DNLM

A general discussion is presented on the use of helicopters in the field of medicine, with special reference to their use in the evacuation of wounded and sick persons in times of war and peace. Helicopters are easy to handle on various terrains, provide a rapid, safe, and comfortable means of transportation, and contribute to the morale of the patients. Medical helicopters are also used to transport personnel and medical and surgical supplies to distress areas, as well as to rescue persons involved in aircraft crashes. Examples are included of the use of helicopters in the Korean and Indochinese campaigns.

6397
Monnier, R.,
and G. Wernert
[MEDICAL HELICOPTER] L'hélicoptère sanitaire. — Revue du Corps de santé militaire (Paris), 12 (3): 341-368. Sept. 1956. In French. DNLM

Essentially the same as item no. 6396. An additional description is included, with illustrations, of a removable glass-covered litter which is attached to the helicopter fuselage and can be used to transport either patients or equipment.

6398
Page, T. N.
ARMY CONCEPTS OF FORWARD AEROMEDICAL EVACUATION. — In: Aviation medicine symposium, [article 6]. 8 p. U. S. Air Force, [Unnumbered Report, no place, 1956?] DNLM (W3.AV16, 1956a)

Within the Army, forward aeromedical evacuation is considered to include the aerial movement of patients from points of injury to points of initial treatment, and subsequent movement to hospitals. Supporting aeromedical evacuation includes the movement of patients by air from hospitals located within the field army area to medical facilities outside the combat zone. The use of high-performance fixed-wing aircraft and helicopter ambulances for emergency evacuation is discussed and Army aeromedical evacuation experiences during the Korean campaign are noted.

6399
Perdriel, G.
[EYE AFFECTIONS AND AIR TRANSPORTATION] Les affections ophthalmologiques et le transport par voie aérienne. — Médecine aéronautique (Paris), 11 (2): 215-224. 1956. In French, with English summary (p. 224).
DLC (TL555.M394, v. 11)

Air transportation of patients with eye injuries or diseases is recommended in all cases except in certain traumatic injuries of the eyeball or sclera, in glaucoma, and in hemorrhagic vascular conditions. It is recommended that aerial transportation of eye patients be preceded by an ophthalmologic examination and preparation for special care during flight, and that measures be taken in flight to maintain comfort, to protect patients against exposure to light, to change bandages daily, to administer prescribed eye salves, and to provide substantial but not excessive nourishment.

6400
Pillsbury, R. D.,
P. E. Teschan, and C. P. Artz
FACILITIES FOR MILITARY PATIENTS WITH BURNS OR ACUTE RENAL FAILURE: AIR EVACUATION AND SPECIALIZED TREATMENT. — U. S. Armed Forces Med. Jour., 7 (8): 1190-1192. Aug. 1956. DLC (RC970.U7, v. 7)

The Patient Movement Control Section of the Military Air Transport Service expeditiously transports either a burn team or a renal team to the bedside of military patients with burns or acute renal failure. The team provides assistance in treatment of the patient and supervises air evacuation to Brooke Army Hospital, Texas, where specialized therapeutic services are available.

6401
Schreuder, O. B.
IN-FLIGHT MEDICAL EMERGENCIES IN AIRLINE OPERATION. — In: Aviation medicine symposium, [article 12]. 11 p. U. S. Air Force, [Unnumbered Report, no place, 1956?] DNLM (W3.AV17, 1956a)

Medical emergencies occur in-flight in airline operation but the occurrence is rather infrequent, the type of emergencies being varied and usually of minor nature. Anticipating these occurrences, flight service attendants are given instruction in the care of medical emergencies and certain medical supplies are provisioned aboard the aircraft. In addition, rules formulated for guidance of traffic personnel are presented in order that certain types of passengers not be accepted for air travel.

6402
Shirley, R. E.
AIR EVACUATION PRIOR TO WORLD WAR II. — In: Aviation medicine symposium, [article 8]. 4 p. U. S. Air Force, [Unnumbered Report, no place, 1956?] DNLM (W3.AV16, 1956a)

The history of medical air evacuation extends as far back as 1870, and has gradually increased up to the present time. The principles and practices established prior to World War II were essential in making possible the widespread use of medical air evacuation in World War II and the Korean campaign. The present policy of air evacuation has gradually been developed through the formative years. It has been recommended for many years that liaison and transport planes be made convertible to evacuation aircraft. (Author's summary, modified)

6403
Shirley, R. E.
AIR TRANSPORTATION OF POLIO PATIENTS.

— In: Aviation medicine symposium, [article 5]. 3 p. U. S. Air Force. [Unnumbered Report, no. place, 1956?] DNLM (W3. AV16, 1956a)

An outline is presented of the problems associated with air transportation of acutely and chronically ill patients with poliomyelitis. Use of the ventilometer and nomogram devised by Dr. E. P. Radford is discussed. The Air Force and Military Air Transport Service are responsible for the transportation of United States citizens suffering from polio. It is stated that patients may be transported safely provided proper medical care is available and sufficient and reliable equipment is used.

6404
Snowden, W. M.
NAVY CONCEPTS —FORWARD AEROMEDICAL EVACUATION. — In: Aviation medicine symposium, [article 3]. 7 p. U. S. Air Force. [Unnumbered Report, no place, 1956?] DNLM (W3. AV16, 1956a)

The Navy's experiences are presented in the broad aspects of aeromedical evacuation in the Korean conflict. The capabilities and limitations of helicopter evacuation of casualites are noted.

6405
Strickland, B. A.
[EMERGENCY AEROMEDICAL EVACUATION OF WOUNDED AND SERIOUSLY ILL] Evacuations aéro-médicales d'urgence de blessés et de malades graves. — Médecine aéronautique (Paris), 11 (1): 131-140. 1956. In French.
DLC (TL555.M394, v. 11)

Analysis of data concerning 421 cases of aerial transportation of sick and wounded by the U.S.A.F. reveals that: (1) 96 patients were transported by H-19 Bell helicopter, and the remainder by Douglas C-47 transport; (2) more than half the patients suffered from trauma, incurred most often in automobile accidents, with 92 suffering from head wounds, 84 from fractures of bones other than the head, and 6 from burns; (3) most patients were transported 1-12 hours after being wounded, and 23 were unconscious; and (4) 123 patients required treatment in flight, such as inhalation of oxygen, intravenous administration of plasma or other fluid, and administration of drugs. No harmful effects of aerial transportation were observed.

6406
Tabusse, L.,
and A. Salvagniac
[MEDICAL AFFECTIONS AND AERIAL TRANSPORTATION] Affections médicales et transports aériens. — Médecine aéronautique (Paris), 11 (3): 330-337. 1956. In French.
DLC (TL555.M394, v. 11)

Observations of the pathological effects of air evacuation from Indochina to France in unpressurized aircraft flying at 2500-3000 meters, or in aircraft pressurized to an altitude of 1500-1800 meters, showed that flight was badly tolerated in seven-months-pregnant women; some infants as a result of dehydration; cardiopaths; patients with pneumothorax, hepatic or renal diseases, dysentery, malaria, or anemia; mental patients; asthmatics; and post-operative (particularly abdominal) patients. Flying restrictions and precautionary measures are recommended for particular cases of heart disease, lung disease, digestive affections, and disturbances of the sense organs.

6407
Tabusse, L.,
and R. Mainard
[PRINCIPAL MEDICAL CONTRAINDICATIONS OF AIRPLANE TRAVEL] Les principales contre-indications médicales au voyage par avion. — Revue médicale française (Paris), 37 (5): 331-335. June 1956. In French, with English summary (p. 335).
DNLM

Altitude, reduced atmospheric pressure, cold, the airplane, and flight techniques are factors capable of affecting persons with various illnesses during flight. Flight is not recommended for children between 2-6 years of age, the aged, and women in advanced stages of pregnancy. Flight is contraindicated also for persons with evolutive heart diseases accompanied by functional disorders, lung diseases (pulmonary tuberculosis, asthma, pulmonary emphysema, pneumothorax), digestive disorders (ulcers, megacolon, liver diseases, cholecystitis), glaucoma, oto-rhino-laryngological diseases, severe anemia, intracranial hypertension, mental disorders, severe diabetes, hypothyroidism, and contagious diseases.

6408
Varela, J. L.
[AEROMEDICAL EVACUATION] Evacuación aérea sanitaria. — Revista de la Fuerza aérea (Santiago de Chile), 16 (63): 15-17. Oct.-Dec. 1956. In Spanish. DLC (UG635.C5A32, v. 16)

The organization and function are discussed of Chilean aeromedical rescue services which operate in times of flood, earthquake, volcanic eruption, and other land or sea disasters. Aeromedical evacuation is considered, using helicopters for inaccessible areas and difficult terrain, lightweight aircraft for transporting ambulatory or stretcher patients, and multi-engine air transports, for example the C-47. The use of airplanes in times of disaster provides rapid evacuation of refugees and wounded from the stricken areas, decreases the incidence of disease and complications arising from injuries by providing medical corpsmen and medical treatment, and is of great psychological value to both patients and evacuees.

6409
Ward, J. E.
AIR EVACUATION OF THE NEUROPSYCHIATRIC PATIENT. — In: Aviation Medicine symposium, [article 2]. 4 p. U. S. Air Force. [Unnumbered Report, no place, 1956?] DNLM (W3. AV16, 1956a)

Contraindications to air travel of neuropsychiatric patients are quite rare. Patients are divided into three groups (Class I) including (A) those severely disturbed, locked-ward patients requiring the use of restraint apparatus; (B) locked-ward patients who bear close supervision but usually require no restraint; and (C) open-ward patients, usually ambulatory, not requiring constant vigilance. Probably most, if not all, Class IA and IB patients should

receive regular and periodic pre-medication of sedative or tranquilizing drugs beginning 12 or more hours before and continuing throughout the flight. It is suggested that (1) the armed services standardize the use of the patient classification system for air evacuation, and that (2) flight nurses and orderlies be adequately trained to understand the meaning and significance of neuropsychiatric diagnostic nomenclature in order to direct proper care and attention to these patients.

6410
Whittingham, H.
CORONARY THROMBOSIS AND AIR TRAVEL. — Practitioner (London), 176 (1052): 179-180. Feb. 1956. DNLM

The great majority of patients who have recovered from coronary thrombosis are fit to make a short flight of under five hours duration. But those with even a minor degree of coronary disease should not undertake any journeys by air unless they have been free of symptoms for at least three, and preferably six, months. Their condition should be revealed to the medical department of the airline for a decision regarding advisability to travel and to enable appropriate instructions to be issued to all concerned for their care and welfare along the route. (Author's summary)

6411
Wing, J. E.,
and J. A. Addison
HELICOPTER MOBILE MEDICAL COMPANIES: IN THE FLEET MARINE FORCE. — U. S. Armed Forces Med. Jour., 7 (12): 1802-1808. Dec. 1956. DLC (RC970.U7, v. 7)

Experiments are described of the medical collecting and clearing companies of the Fleet Marine Force Medical Service using Sikorsky transport helicopters HRS 1 and 3. The Helicopter is visualized not only as a rapid means of casualty evacuation, but also under certain tactical situations as an essential agent for increasing the mobility of medical units. (Authors' summary, modified)

6412
Wright, C. C.
TRANSPORTATION OF SICK AND INJURED IN CIVILIAN AIRCRAFT. — In: Aviation medicine symposium, [article 7]. 11 p. U. S. Air Force. [Unnumbered Report, no place, 1956?] DNLM (W3. AV16, 1956a)

Due consideration of the total distance to be traveled, elapsed travel time, and whether or not the patient may travel by some other means often determines whether or not flight should be undertaken by the individual patient. With modern aircraft equipment for pressurization and ventilation, temperature and humidity control the commercial airliner offers swift, comfortable, economical, and safe transportation for the vast majority of patients required to travel. The comfort and safety of the passenger in flight will be greatly enhanced if the physician furnishes a medical certificate and letter to the flight stewardess, outlining generally the patients condition and needs. Flight is contraindicated for patients with penumothorax, mediastinal or subcutaneous emphysema, and women in an advanced stage of pregnancy.

f. Physical and Neuropsychiatric Examination

6413
Bouman, M. A.,
P. L. Walraven, and H. J. Leebeek
ANOTHER COLORIMETER FOR STUDYING COLOR VISION. — Ophthalmologica (Basel), 131 (3): 179-193. March 1956. In English. DNLM

A trichromatic colorimeter of a very simple design has been developed for a more extensive exploration of defective color vision. The possibility of introduction of a mass test for personnel selection providing more quantitative information about color-discriminating capacities is discussed. The apparatus can be developed further for group testing.

6414
Brogan, F. A.
A DISCRETE-FREQUENCY AUTOMATIC AUDIOMETER SIMULATING MANUAL TECHNIC. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-123, Sept. 1956. 12 p. AD 113 697 PB 121 594

An automatic audiometer is described which utilizes discrete frequencies, offers 1-second tones at random, and simulates manual audiometry. The time required for testing both ears is approximately 5 minutes for 5 frequencies. Present equipment can test up to 12 frequencies. The intensity range utilizing IBM recording equipment is 55 decibels, but this range can easily be extended an additional 30 decibels without changing the test time. A unique feature of this equipment is that it prevents the subject from directly controlling the test results. (From the AD abstract) (34 references)

6415
Cox, J. R.,
R. W. Benson, and A. F. Niemoeller
A MOBILE LABORATORY FOR GROUP HEARING TESTS. — Central Inst. for the Deaf, St. Louis, Mo. (Contract Nonr-11151(02)); issued by Naval School of Aviation Medicine, Pensacola, Fla. Project no. NM 001 102 502, Report no. 3, Nov. 30, 1956. iii+15 p. UNCLASSIFIED

A mobile laboratory has been constructed as a part of a Navy program to investigate the auditory and non-auditory effects of the noise exposure received by jet engine mechanics and members of the flight deck crew aboard aircraft carriers. This laboratory has proved to be a useful facility for making hearing measurements in the field. It contains a group audiometer of new design that is simple, fast, reliable, and not particularly costly.

6416
Ebbenhout, R. W. F.
[THE X-RAY STATUS OF TEETH IN FLIERS] De röntgenstatus van het gebit bij vliegers. — Neder-

sign after induced hyperpnea or by the presence of Trousseau's phenomenon. Personnel with spasmophilic tendencies should be rejected from flight duty.

6422
Tompkins, V. H.
THE SIGNIFICANCE OF THE ABNORMAL ELECTROENCEPHALOGRAM IN AIRCREW. — Flying Personnel Research Committee (Gt. Britain), Report no. FPRC 986, May 10, 1956. 7 p.
AD 143 193 UNCLASSIFIED

An abnormal electroencephalogram (EEG) may be related to accident liability and to failure in military flying. There is insufficient statistical evidence to indicate what proportion of failure the EEG will select; however, information at hand shows that a highly abnormal record of the paroxysmal type at rest is so closely linked with physical or psychological breakdown that candidates with such records should not be accepted for training. Follow-up of experienced pilots with such records indicates that any related symptoms are revealed before completion of training. Certain factors in an EEG, clinically within normal limits, may be related to anxiety reactions of the type interfering with efficient performance of flight duties. These should be studied so that the EEG may be effective in grading reactions to anxiety-provoking situations. (From the author's conclusions)

6423
Ward, W. D.
THE METHOD OF "SINGLE DESCENT" IN GROUP AUDIOMETRY. — Central Inst. for the Deaf, St. Louis, Missouri (Contract Nonr-1151 (02)); issued by Naval School of Aviation Medicine, Pensacola, Fla. Project no. NM 001 102 502, Report no. 2, Oct. 26, 1956. [20] p. UNCLASSIFIED

Various methods for determining threshold in a group-testing situation were compared. No significant differences in reliability were found between the method of adjustment (either direct or indirect) and the method of "single descent," in which the listener presses a button "just when the beeps disappear." However, the method of single descent is independent of individual differences in adjustment time and requires a minimum of apparatus. Thresholds determined by single descent were affected only slightly by rate of descent, starting level and practice factors. A comparison between single descent and the standard clinical technique showed the thresholds to be valid. Field performances of the method, in a 10-man group audiometer, has fulfilled expectations from the pilot studies. (Author's abstract)

6424
Wilbanks, W. A.
THE MEASUREMENT OF COLOR BLINDNESS. — Naval School of Aviation Medicine, Pensacola, Fla. Monograph Series, Report no. 2, Aug. 31, 1956. iv+44 p. AD 154 617 UNCLASSIFIED

An attempt is made to provide a reasonably nontechnical introduction to the theoretical basis of tests of color blindness for persons engaged in their administration. The physical basis of color, the measurement of color, and basic facts of color blindness are discussed. A number of tests of color blindness involving the use of printed colored plates are described, and the limitations of these polychromatic tests examined. (Author's summary, modified)

g. Sanitation and Hygiene (Exclusive of Cabins, for which see II-e)

6425
Bergin, K. G.
RAIL AND AIR TRAVEL: SOME PROBLEMS OF HYGIENE. (C) PROBLEMS OF HYGIENE IN AVIATION. — Royal Soc. Promotion of Health Jour. (London), 76 (8): 481-489. Aug. 1956. DNLM

A general discussion on the hygienic problems related to flight includes such topics as the air conditioning and pressurization of aircraft cabins, feeding and drinking in flight, washing and toilet facilities, and provision for invalid passengers. Those related to the ground include disinfection, disinsectization and deratization of aircraft; compliance with port health regulations; emptying and cleaning of toilets; and replenishing food and water supplies. Sanitary control of aircraft also includes regulating the following: (1) medical supervision of passengers and flying staff; (2) control, including quarantining, isolation, and disposal of infectious disease; and (3) surveillance of persons with known contacts in their homes or residences during the incubation period of a disease to which they have been exposed.

6426
Boyer, J.,
and M. V. Strumza
[PRÉCIS OF AVIATION HYGIENE] Précis d'hygiène aéronautique. Paris: Expansion scientifique française, 1956. 278 p. DLC (RC1077.B6)

This is a manual dealing with the hygienic problems associated with flight which affect flying personnel, passengers, and the general public. Hygiene aboard the airplane is discussed in terms of oxygen, humidity, and temperature control; deodorization; protection from extraterrestrial radiation and airplane vibration; toilet hygiene; and disinfection, disinsectization, and deratization of aircraft. Also included are chapters concerned with the general hygiene of passengers and flying personnel; sanitary aspects of airports; and international medical regulations for disease quarantine, especially plague, cholera, yellow fever, variola, exanthemic typhus, and relapsing fever.

6427
Braswell, L. R.
SOME MEDICAL ASPECTS OF UNITED STATES MILITARY AIR TRANSPORTATION. IV. AIR CARGOES. — World Med. Jour., 3 (3): 146-147. May 1956. DLC (R5.W66, v. 3)

Precautions taken on U. S. Military Air Transport Service (MATS) cargo flights to prevent the dissemination of disease and to ensure personal safety include prohibition of animals except those transported for scientific, educational, or military purposes;

Loose fitting garments are far more dangerous than tight when ignited, and resulting burns are many times as severe. These experimental results agree closely with similar clinical studies in a large emergency hospital. (Authors' abstract)

c. Bailout and Bailout Equipment

6497
Achiary, A.,
L. Servanty, A. Cabanon, and V. André
[DYNAMICS OF THE EJECTION SEAT] La dynamique du siège éjectable. — Médecine aéronautique (Paris), 11 (1): 55-58. 1956. In French.
DLC (TL555.M394, v. 11)

Characteristics of the accelerative forces imposed by ejection and the dynamic relation between accelerations of the seat and its occupant are discussed. It is shown that the discrepancies between accelerations of the seat and the body parts, as well as the physiological dangers of ejection, are dependent on the elasticity of the body and on seat cushion hardness.

6498
Alexander, C. B. J.
MEDICAL ASPECTS OF PARATROOPER TRAINING. — Aero Med. Soc. Jour. (New Delhi), 3 (1): 38-47. April 1956. DNLM

A brief description is presented of the history of parachuting in India and of the Indian Air Force program for the selection and training of paratroopers. Injuries encountered during training are discussed and classified by their occurrence during ground training and during jumping (at exit, during parachute development, and during landing). Data concerning the occurrence of various types of injuries in the years 1950 and 1951 are presented, and data from 1950 are compared with the injury rates of American, British, and French paratrooper schools.

6499
Bloetscher, F.
DESIGN AND DEVELOPMENT OF A GENERAL PURPOSE EJECTABLE SEAT-CAPSULE FOR SUPERSONIC AIRCRAFT. PHASE II: FINAL REPORT. — Goodyear Aircraft Corp., Akron, Ohio (Contract NOas 53-820-c). Report no. GER 7669, May 23, 1956, 113 p. AD 131 966 UNCLASSIFIED

An ejectable seat-capsule designed to provide a safe means of escape from aircraft traveling at Mach 1 at sea level and Mach 1.5 at 30,000 feet is described and illustrated. Discussion is included on ejection tests of full-scale dynamic models, flotation tests, various structural tests, and complete stress-weight analysis.

6500
(Continental Army Command)
ARCTIC TEST OF PARACHUTE JUMPING FROM ARMY AIRCRAFT (L-20 AIRPLANE). — Continental Army Command, Arctic Test Branch, Big Delta, Alaska (Project AB 2354 (Arctic)). Partial Report no. 1, Nov. 13, 1956. [32] p. AD 115 447 UNCLASSIFIED

Effort is made to determine safe procedures for making parachute jumps from the L-20 aircraft under arctic winter conditions. Jump techniques were developed from temperate climate jump techniques. A total of 32 jumps were made without difficulty at ambient temperatures of 27° to 14° F., in sticks of 1 and 2 parachutists. Over-all results indicated that, after modification, the L-20 airplane will be suitable for consecutive aerial delivery of parachutists and equipment at ambient temperatures below 0° F.

6501
(Continental Army Command)
PARACHUTE JUMPING FROM ARMY AIRCRAFT (H21C HELICOPTER). — Continental Army Command Board No. 5, Fort Bragg, N. C. (Project no. AB 2354). Partial report no. 3, Sept. 5, 1956. [22] p. AD 113 658 UNCLASSIFIED

Jumps were performed by parachutists to determine safe procedures for the H-21C helicopter. The H-21C forward door was concluded to be suitable for the aerial delivery of a maximum of 10 parachutists wearing combat equipment. Safe jump procedures are outlined. (From the AD abstract)

6502
Conway, S. M. P.,
and B. J. Cremin
SOME MEDICAL PROBLEMS OF PARACHUTING IN MALAYA. — Jour. Royal Army Med. Corps (London), 102 (1): 70-72. Jan. 1956. DNLM

A 4.6% casualty rate was found in 995 operational or training parachute jumps of troops and medical personnel over the Malayan jungles. The hazards of jumping in the jungle include parachute hook-up and catching in branches and trees, or giving-way of the parachute after initial hook-up. The most common injuries occurred in the back, usually crush fractures of the lumbar and thoracic vertebrae. Other injuries occurred in the ankle, ribs, pelvis, clavicles, or any other bones which come in contact with direct violence by branches or the ground. Lacerations and bruises were usually treated on the spot, but more serious injuries were evacuated by helicopter. Casualties were reduced by air reconnaissance of the terrain prior to jumps.

6503
Coy, R. G.
INVESTIGATION OF THE RELATIVE EFFICIENCY OF PILOT PARACHUTES. — Univ. of Dayton, Ohio (Contract no. AF 33(616)-3271); issued by Wright Air Development Center, Equipment Lab., Wright-Patterson Air Force Base, Ohio (Task no. 61491). WADC Technical Report no. 56-147, March 1956. viii+74 p. AD 89 095 UNCLASSIFIED

The relative efficiency of pilot parachutes MA1, MA1A, MA1B, and MA1C was evaluated by measuring and determining the forces, impulses, and time to deployment when deploying a portion of the main canopy from a dummy mounted in a vertical wind tunnel. Pressure distribution tests were completed by measuring the total pressures during simulated free fall in a vertical wind tunnel. The results indicated that Pilot Chute Type MA1A deploys in a shorter time than the

other three types tested for a dummy angle of zero degrees. Types MA1 and MA1B transmit less energy to the test rig and have smaller average and peak force values than Types MA1A and MA1C at dummy angles of 0, 45, and 90 degrees. (Author's abstract, modified)

6504
EJECTION EQUIPMENT FOR MACH 3. = Flight (London), 70 (2497): 856. Nov. 30, 1956.
DLC (TL501.F5, v. 70)

An ejection seat designed by Lockheed Aircraft for downward ejections at speeds up to Mach 3 features: (1) brackets to hold the pilot's helmet steady and to reduce loads on the neck; (2) knee guards to prevent splaying of the legs, with a webbing harness to restrain the arms; (3) automatic straps to prevent flailing of the legs; (4) fins extending beneath and beside the seat to provide stabilization; and (5) an airflow deflector plate forming an "atmosphere capsule" to reduce transverse forces and air blast.

6505
Elzufon, E. E.,
and P. Goldberg
ANALYSIS OF COMPONENTS INVOLVED IN AN EJECTION SEAT MALFUNCTION. — Naval Ordnance Lab., White Oak, Md. NAVORD Report no. 4319, June 6, 1956. [35] p. AD 113 862
UNCLASSIFIED

An investigation is reported of the functional characteristics of a pilot ejection catapult which malfunctioned during a fatal accident. Conditions under which the accident occurred were such that reliable functioning should have been expected. Undeterminable factors may have contributed to the accident. Analysis of the firing mechanism showed poor design of several components. Examination of sample firing mechanisms revealed components out of tolerance in critical dimensions. Recommendation is made for the redesign of cartridge and firing mechanism.

6506
Fairbanks, D. H.,
and B. Moore
DOUGLAS A4D SEAT-EJECTION TESTS. = Naval Ordnance Test Station, Supersonic Track Division Test Department, China Lake, Calif. Report no. NOTS 1068, Feb. 3, 1956. xi+25 p. AD 105 846
UNCLASSIFIED

A series of aircraft seat ejection tests were conducted on a rail track to investigate the operational characteristics of the A4D ejection system at speeds approaching 600 knots. Data were obtained concerning the time-motion relationship of the sled; the ejection characteristics of the canopy, seat, and dummy, including ejection velocity; and the trajectory of the canopy, dummy, and seat relative to the airplane. The tests gave no indication of collision of the canopy with the dummy, and revealed a minimum safe clearance by the dummy of the tail. Dismemberment of the dummy, loss of personal equipment, and blowing of parachute panels was observed, indicating the high air loads encountered at these velocities. As a result of the tests, the A4D was released for further flight tests with the standard Navy seat gun and cartridge.

6507
Gard, P. W.,
and L. B. Cochran
INSTALLATION AND EVALUATION OF TV-2 TYPE ARM RESTS ON SPECIAL DEVICE, 6-EQ-2a, EJECTION SEAT TRAINER. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-16, April 24, 1956. [15] p.
UNCLASSIFIED

The modification of the 6-EQ-2a ejection seat trainer to incorporate a direct TV-2 type trigger arm rest firing mechanism is described and illustrated. The modified seat trainer proved to work successfully, utilizing either face curtain or arm rest firing technique. This training device is used to indoctrinate student and naval aviators in escape procedures from high speed aircraft.

6508
Gero, D. R.
EJECTABLE AIRCRAFT SEAT CAPSULE. = U. S. Patent 2,733,027. Jan. 31, 1956. 6 leaves. DP

An ejection seat for occupants of high-speed airplanes consisting of a capsule or enclosure for such seats and providing an airtight means of protecting the occupant to safely escape from the airplane in flight is described and illustrated. Capsule operation is automatic and can be initiated from a single lever or switch. This is to insure safe escape of an occupant who is wounded and who could not perform the normal escape functions in an open ejection seat. The capsule includes as standard equipment an armor plate, an adjustable seat parachute for the occupant, a recovery drogue chute, oxygen supply, and ejection guns, track, and support structures. The capsule is capable of floating when landing on water.

6509
Goodrich, J. W.
ESCAPE FROM HIGH PERFORMANCE AIRCRAFT. = Wright Air Development Center, Directorate of Research, Wright-Patterson Air Force Base, Ohio. WADC Technical Note no. 56-7, Jan. 9, 1956. [14] p. AD 81 562
UNCLASSIFIED

The information presented by this study may be summarized as follows for the conventional ejection seat system: The maximum linear deceleration is essentially constant for a given calibrated airspeed regardless of altitude. At constant calibrated airspeed the rate of tumbling increases with altitude and approaches a value proportional to the inverse of the square root of the density ratio. At constant calibrated airspeed the duration of g forces is approximately proportional to the inverse of the square root of the density ratio. The maximum linear deceleration forces increase as the 2.47 power of the velocity. The maximum linear deceleration rapidly approaches the limit of human tolerance as the speed of the aircraft at time of ejection is increased above 550 knots calibrated airspeed. The aerodynamic and physical characteristics defined by the parameter ($C_D A/W$) are such as to limit the usefulness of the conventional ejection seat system to the lower part of the speed range of the "Century Series" fighter. Only by optimization of these parameters, such as may be obtained by the use of a low drag capsule, can successful escape be expected

in the extreme speed range capability of the "Century Series" aircraft and beyond. (Author's summary)

6510
Harper, E. D.
AIRCREW RECOVERY FROM AIRBORNE MISHAPS. — Canad. Aeronaut. Jour. (Ottawa) 2 (5): 151-153. May 1956. DLC (TL501.C2713, v. 2)

The aircrew ejection devices presently in use in Canadian aircraft are considered largely inadequate for the special conditions of high altitude, low altitude, high speed, and low speed flight. The CF-100 possesses the most advanced escape equipment, including an automatic parachute operating system timed for ejections at any altitude above 200-300 feet, a barostatic operating device which opens the parachute at a predetermined altitude, maximum available support and protective devices, and a stabilization parachute to prevent tumbling. The problem of air blast, violent contortion, and high acceleration during ejection at high speeds has not been solved, and may require the development of an escape capsule.

6511
Hawkes, R.
AIR CRASH DEATH OR INJURY MAY BE PREVENTED BY SOUND DETAIL DESIGN. — Aviation Week, 65 (19): 61-64, 67-70, 73, 77, 79. Nov. 5, 1956. DLC (TL501.A8, v. 65)

The concepts of crash survival design are based on the fact that the human body is capable of withstanding impacts greater than those which can be transmitted through the structure of a current airplane. The basic principles are centered around designing the tiedown of passengers and loose equipment up to the ultimate load factor of the aircraft frame. The study of forward-facing seats versus backward-facing seats is used to illustrate the fallacy of drawing conclusions from incomplete evidence.

6512
Hawkes, R.
NAVY INTEGRATING FLIGHT SYSTEM IN PILOT CAPSULE. — Aviation Week, 64 (18): 54-59. April 30, 1956.

The overall design concept is outlined for an interchangeable nose section ejection capsule which would contain the pilot and the sensing, interpreting, and communicating organs of a new integrated flight-control system. Some of the background work that culminated in the man-machine bearing capsule is related.

6513
Jäger, M.
[AT 2400 KM./HR.: EXIT...?] Bei 2400 km/st: Aussteigen...? — Flug-Revue (Stuttgart), 1956 (12): 18-20. Dec. 22, 1956. In German. DLC (TL503.C524, v. 1956)

American research and experiences with ejection at high altitudes and supersonic speeds are briefly described. It is recognized that the progressively increasing speeds and higher altitudes exceed the protection offered by further development of the ejection seat. Instead, the new safety design concept consists of a completely enclosed ejection capsule encompassing the pilot and the cockpit.

6514
Krutoff, L.
[VEGETATIVE DYSTONIA DUE TO DIVING DESCENTS AND PARACHUTE JUMPS] Vegetative Dystonie durch Sturzflüge und Absprünge. — Medizinische Klinik (München), 51 (18): 787. May 4, 1956. In German. DNLM

On the basis of his own experiences as a physician to paratroopers and as a research worker on medical problems of parachute jumping, the author affirms the possibility of parachute jumps as a causative factor in the etiology of vegetative dystonia. He views the process of the jump and landing as a stress which may lead to autonomic dysregulation. Certain injuries frequently sustained at landings may also be a contributory factor.

6515
Martin, J.
EJECTION FROM HIGH SPEED AIRCRAFT. — Jour. Royal Aeronaut. Soc. (London), 60 (550): 659-668. Oct. 1956. DLC (TL501.R7, v. 60)

Early studies to determine physiological acceleration limits on a ground ejection rig and to test operational designs of the Martin-Baker aircraft ejection seat in flight are described. The chief design features of the seat, including an automatic ejection device, main time release, ejection gun, leg restraining device, and duplex drogue system are described, and the peculiar conditions and methods of ejection at high altitude, high speed, and low altitude are discussed.

6516
Martin, J.
EJECTION SEAT AND PARACHUTE ASSEMBLY FOR A SINGLE PERSON. — U. S. Patent 2,762,588. Sept. 11, 1956. 5 leaves. DP

An ejection seat is described and illustrated, provided with two drogue parachutes. It is claimed that this assembly results in a gradual opening of the parachutes in the proper order.

6517
Millar, A.
EJECTION SEATS. — Aircraft (Toronto), 18 (4): 16-18, 21; (5): 33-34, 37, 84-85. April-May 1956. DLC (TL501.A56143, v. 18)

The development of ejection seats and the initial experiments dealing with ejection procedure are discussed. Flight experiments are reported and illustrated of dummy ejections using the automatic Martin-Baker seat. Consideration is given to the design of ejection seats, especially the Weber ejection seat, and to problems associated with downward supersonic ejection and capsule ejection. Mention is made of human ejection drills executed at low speeds. It is stressed that successful ejection

always depends on the airman's psychological reactions.

6518
Montagard, F.,
and R. Picamoles
[1500 SYSTEMATIC RADIOGRAPHS OF THE LUMBAR SPINAL COLUMN TO TEST EJECTION SEAT CAPACITY] 1.500 radiographies systématiques de la colonne lombaire pour aptitude au siège éjectable. — Médecine aéronautique (Paris), 11 (1): 59-69. 1956. In French. DLC (TL555.M394, v. 11)

Radiological examinations were conducted in 1552 French airmen to detect the presence of spinal anomalies which might increase the probability of injury during ejection. Minor malformations of the spine, including sacralization and spina bifida, were observed in 30% of the men, but were not considered dangerous. Malformations for which ejection-seat training was considered inadvisable were observed in almost 4% of the men and included spondylolisthesis (2.32%), intervertebral hernias, and vertebral osteochondrosis.

6519
(Naval Aviation Safety Center)
EJECTION SEAT STUDY: A REPORT OF EJECTIONS AND BAILOUTS, AUGUST 1949 THROUGH MAY 1956. — Naval Aviation Safety Center, Norfolk, Va. 23 p. AD 125 052 UNCLASSIFIED

A study is presented on the ejection seat in emergency escape from naval aircraft from the first ejection in August 1949 through May 1956. The findings demonstrate an increase in the ejection rate per unit hours flown, and a pronounced relationship between successful ejection and altitude and speed. Successful bailouts may be made at lower altitudes and slower speed than can ejections. Ejecting from F9F, F7U and TV model aircraft is significantly more dangerous than from F2H and FJ models. Bailing out from FAU model aircraft is more dangerous than that from AD and SNJ models. Injuries sustained during ejections occur mainly upon landing, by the forces involved in ejecting the seat and the pilot, and by the shock of the opening parachute. Injuries sustained during bailouts occur upon landing, in the cockpit, upon the fuselage, and by parachute shock. A large and significant difference was found in the number of injuries between trained parachute jumpers and untrained ones. (From the author's conclusions)

6520
Penny, A. R.
JUMPERS DOWN AND UP. — Med. Technicians Bull., 7 (4): 139-141. July-Aug. 1956.
DLC (RC970.U72, v. 7)

The personnel of a naval parachute unit conduct tests in connection with the design, use, improvement and adaptation to naval aircraft operations of parachute and ejection seat systems; pilot's personal safety equipment and flight gear; and aerial delivery of supplies and cargo. A medical corpsman equipped with medical kit is in attendance during all jumps to treat any injuries that may occur. Injuries sustained during test jumps are usually minor, consisting of bruises about the face and neck sustained from parachute lines and risers and due to opening shock forces. More serious injuries consist of leg sprains and fractures usually caused by ground impact.

6521
PRELIMINARY REPORT ON A SUBSTANTIATED SUPERSONIC EJECTION. — Med. Training Bull. (Continental Air Command, Mitchell Air Force Base, N. Y.), 3 (3): 1-5. Feb. 1956.
DNLM

Same as item 4820, vol. IV.

6522
"RESCU". — Flight (London), 70 (2496): 808. Nov. 23, 1956. DLC (TL501.F5, v. 70)

A RESCU rocket-assisted ejection gun was tested by Talco Engineering Company through ejection of dummies from a cockpit section mounted on a rocket-propelled sled. RESCU lifted the ejection seat 124 feet at a sled speed of Mach 0.3, while an M3 telescopic, cartridge-operated gun lifted the seat only 55 feet. At Mach 0.73, RESCU achieved an altitude of 60 feet. It is suggested that the rocket thrust tends to stabilize the seat after ejection and to reduce deceleration forces to a level within endurance limits.

6523
ROCKET-PROPELLED EJECTOR SEAT. — Engineering (London), 182 (4734): 691. Nov. 30, 1956.
DLC (TA1.E55, v. 182)

A rocket-propelled ejector seat is briefly described, designed to permit pilots of Convair TF 102A combat trainer aircraft to escape safely even at emergencies near ground level. The new Rescu Mark 1 seat combines a normal cartridge-actuated catapult with a rocket incorporated in the inner tube and brought into action by the cartridge catapult. Comparative tests with a standard M3 cartridge-actuated ejector seat indicate that rocket-propelled escape systems ensure greater clearance from the aircraft, a reduction in the deceleration rate as the man-seat mass is catapulted in the air, and a greatly increased "on-the-deck" escape probability.

6524
Ruff, S.
[VEGETATIVE DYSTONIA DUE TO DIVING DESCENTS AND PARACHUTE JUMPS] Vegetative Dystonie durch Sturzflüge und Absprünge. — Medizinische Klinik (München), 51 (4): 164. Jan. 27, 1956. In German. DNLM

In answer to a question concerning the role of frequent flights as a fighter pilot and parachute jumps in the etiology of subsequent vegetative dystonia or occipital neuralgia, the author replies that he has found no evidence on this subject after perusal of the German and foreign aviation medicine literature.

6525
Soule, C. W.
SAFETY SEAT LOWERING DEVICE FOR AIRCRAFT

PASSENGER. — U. S. Patent 2,749,065. June 5, 1956. 5 leaves. DP

A safety lowering device for aircraft passengers is described and illustrated whereby one or more passengers may be released from an airplane in flight and be safely delivered to the ground. He may be released singly and selectively at the will of the pilot or other attendant. The passenger being discharged has no control. Each device is equipped with a parachute that will not open until such time as the person is free of the airplane a sufficient distance to prevent entanglement with the aircraft. The device consists of a collapsible seat, surrounded by hinged hollow walls, collapsible passenger-receiving bag-like member, and hinged doors.

6526
Stapp, J. P.,
R. J. Heymans, and R. M. Stanley
PROGRESS IS STEADY TOWARD SOLUTION OF ACUTE PILOT-ESCAPE PROBLEMS. — SAE Jour., 64 (13): 44-48. Dec. 1956.
DLC (TL1.S5, v. 64)

Considerations of importance in the development of pilot escape devices from disabled aircraft at high speeds and altitudes include the possibility of incapacitation resulting from fear, injury, hypoxia, or tumbling; the necessity for a high escape velocity to avoid collision with aircraft parts and the possibility of attendant spinal injury; the effects of air blast and acceleration; the necessity for oxygen and perhaps pressure during descent; the danger of injury during parachuting either from enemy action or from impact; and the problem of the storage of survival equipment. It is suggested that a capsule or pod-type ejection device would provide protection against most dangers, but would present serious engineering difficulties, require a greater escape acceleration, and be more susceptible to survivable battle damage (with the necessity for a further escape system).

6527
Stone, I.,
and Clark, E.
USAF REVEALS NEW X-2 CRASH DETAILS. — Aviation Week, 65 (19): 26-27. Nov. 5, 1956.
DLC (TL501.A8, v. 65)

New details on the loss of the Bell X-2 rocket research plane and the death of USAF Capt. M. G. Apt are revealed. Apparently high-speed pitching of the aircraft caused the pilot to eject the capsule. There is some indication that blackout due to excessive negative g forces may have prevented the pilot from completing the ejection procedures.

6528
Wiant, H. W.
THE EFFECTS OF SIMULTANEOUS DECELERATION, TUMBLING AND WINDBLAST ENCOUNTERED IN ESCAPE FROM SUPERSONIC AIRCRAFT. — Cook Electric Co., Chicago, Ill. (Contract AF 33(616)-448); issued by Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 7218-71720). WADC Technical Note no. 54-18, March 1956. ix+142 p. AD 99656
UNCLASSIFIED

Two chimpanzees were emitted by ejection seats from missiles traveling at Mach 1.1 and 1.5 respectively at 21,500 feet. Physiological data were obtained from accelerometers, rate gyros, electromanometers, and heart and respiratory rate recorders attached to the seat during ejection. Maxima of 180 r.p.m. and 25 g were observed for brief periods. In each case, the recovery parachute failed and the animal free fell to earth. Maximum pressure change occurred at ejection at which time the pressure at the chest rose from 3.05 psi to 15.4 psi in 0.2 seconds. Findings on postmortem examination were inconclusive. Microscopic examination of the lungs revealed no signs of explosive decompression, although signs of trauma due to impact were diffuse and severe. A large angular impulse arising from the airloads was applied to the seat during ejection, which was of sufficient magnitude to cause the seat to rotate from its initial horizontal position to a nearly head-down attitude shortly after separation from the missile. The results indicate that tumbling is somewhat higher than might be reasonably tolerated by a human subject.

d. Survival and Rescue
(On Sea, Land, In the Desert, Arctic, etc.)

6529
Colin, A.
[RESCUE AND SURVIVAL IN THE EQUATORIAL ZONE] Sauvetage et survivance en zone équatoriale. — Forces aériennes françaises (Paris), 11 (118): 453-467. Aug.-Sept. 1956. In French.
DLC (UG625.F8F66, v. 11)

The functions and contribution of the Survival School established in 1953 at Pointe Noir in French Equatorial Africa are discussed. The School trains men in survival and rescue techniques, and serves as a research center for the study of signaling techniques, survival equipment, and the medical aspects of survival.

6530
Denois, E.
[SURVIVAL OF ACCIDENT VICTIMS ON LAND AND DESERT REGIONS] Supervivencia de los accidentados en tierra y regiones desérticas. — Ciencia aeronáutica (Caracas), 2 (14): 32-33. Jan. 1956. In Spanish.

In the event of an aircraft accident over land or desert regions, passengers and aircrew may survive until rescued by utilizing emergency provisions aboard the plane (food, beverage, water, first aid kits); by rationing the available water supply and locating new sources of water; by obeying the plane captain directing rescue and survival operations; nursing wounded persons; erecting shelters from environmental sources, or where possible utilizing the plane, and signaling ground position to rescue teams.

6531
Hall, A. L.
INDOCTRINATION IN USE OF THE REBREATHING APPARATUS, MULTI-PURPOSE (RAMP). — Na-

val School of Aviation Medicine, Pensacola, Fla. (Research Project no. NM 001 106 103). Report no. 3, [11] p. Dec. 5, 1956. UNCLASSIFIED

Twenty subjects were indoctrinated in the use of the Rebreathing Apparatus, Multi-Purpose (RAMP) in an indoor fresh-water swimming pool and aboard ship. Passage was possible through all normal openings aboard ship when a 182-pound man was wearing the RAMP. The rebreathing apparatus was developed for possible use as rescue apparatus in the special conditions encountered when aircrewmen are trapped in aircraft submerged in shallow water.

6532
Hall, A. L.
INSTALLATION AND EVALUATION OF A TRAINER FOR AVIATION UNDERWATER SURVIVAL. — Naval School of Aviation Medicine, Pensacola, Fla. Special Repor: 56-4, Feb. 23, 1956. 24 p. LC-Sci

A description is presented of the standard naval aviation oxygen equipment which was installed in a Dilbert Dunker modified for underwater breathing indoctrination. In addition, diving equipment was made for a safety diver. Consideration is given to the installation and evaluation of the trainer and to the equipment and personnel required for operation of the apparatus. Included is a sample lecture for indoctrination of aviation personnel in underwater survival.

6533
(Office of Naval Operations)
SURVIVAL TRAINING GUIDE. — Office of Naval Operations. Aviation Training Div., Washington, D. C. Report NAVAER 00-80T-56, Nov. 1955 [issued 1956]. [370 p.] DLC (TL553.7.U42)

This is a manual designed as a sourcebook for survival officers and as a textbook for naval aviators undergoing survival training. The early chapters deal with the basic survival skills in flight, and on land and sea, and later chapters cover survival in various areas (arctic, desert, tropics).

6534
Pippitt, R. G.
RATION, SPECIAL SURVIVAL, RS-1, FIELD TEST OF COMPONENT ACCEPTABILITY. — Wright Air Development Center. Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 7156). WADC Technical Note no. 56-216, April 1956. iii+14 p. AD 103 034 UNCLASSIFIED

The acceptability of the RS-1 special survival ration was evaluated on the basis of questionnaire responses from 1063 officers and airmen who lived under simulated survival conditions for 9-day periods. The RS-1 contains five 3-oz. meat product (pemmican) bars, one 3-oz. honey biscuit, one 3-oz. fruitcake bar, four 2.5-g. envelopes of soluble coffee, four 1.3-g. envelopes of soluble tea, two 2.5-g. envelopes of dehydrated onions, one 4-g. envelope of chilli powder seasoning, and eight 1/6-oz. cubes of sugar. All but 168 of subjects were issued 2 rations and supplementary beef and vegetables. The remaining 168 were issued 3 rations. All men were instructed to live off the land as much as possible. The subjects judged the meat bar as unacceptable when eaten cold and as more acceptable when heated with water or with water and spice powders, but not well liked. The honey biscuit was more acceptable than the meat bar, but not liked well. The coffee and tea were acceptable. The fruitcake bar was highly acceptable in all respects. The ratings of components were not affected by age of the subject or by the availability of water, except for the meat bar. The subjects attributed gastric disturbances to the meat bar. (AD abstract)

6535
Rodahl, K.
EMERGENCY SURVIVAL IN THE ARCTIC. — Jour. Aviation Med., 27 (4): 368-372. Aug. 1956. DLC (RC1050.A36, v. 27)

A general discussion is presented on emergency survival in the Arctic in relation to future Air Force cold-weather operations. Survival in the North Polar Basin is directly influenced by such environmental factors as macro- and microclimate, time distribution of temperature, wind-chill factors, precipitation and snow cover, and terrain and surface characteristics. Consideration of these factors is necessary in order to establish requirements for environmental protection. Mention is made of the problems of clothing, shelter, food, techniques, and physical and mental fitness associated with emergency survival.

6536
Sweeney, E. C.
MEDICAL DEPARTMENT PARTICIPATION IN DISASTER RELIEF: BRITISH HONDURAS-YUCATAN-TAMPICO DISASTER, 1955. — Med. Technicians Bull., 7 (3): 93-102. May-June 1956. DLC (RC970.U72, v. 7)

Helicopter aid is discussed to British Honduras and the Yucatan-Tampico areas of Mexico in 1955 during a hurricane disaster. Helicopters were used to transport medical officers, corpsmen, and supplies to stricken areas and to evacuate to safety survivors isolated in treetops, rooftops, and small patches of land. They also evacuated refugees, and wounded and sick persons.

6537
TINY INFLATOR OPENS "MAE WEST" IN 15 SECONDS. — Med. Technicians Bull., 7 (5): 225-226. Sept.-Oct. 1956. DLC (RC970.U72, v. 7)

A new life-saving device is described that automatically inflates a pilot's "Mae West" life jacket within 15 seconds of contact with water. The device cannot be set off accidentally by rainfall or accumulated moisture because a rubber flutter valve holds the opening closed until it is forced open by the pressure of a body of water on the outside.

6538
U. S. Air Force
SURVIVAL: TRAINING EDITION. — Dept. of the Air Force, Washington, D. C. Air Force Manual no. 64-3, Feb. 1956. 373 p. DLC (UG633.A3763, 1956)

This manual which amplifies Air Force Manual 64-5, Survival, is designed for use of students in the

Air Force survival training courses. It can be used also as a source book of survival information. In the initial chapters, discussions are given of the problems and techniques of general land survival (including psychological problems, immediate action, camping and woodcraft, travel, clothing, signaling, food) and related subjects. The ensuing chapters cover the special requirements for survival in the following areas: Arctic, desert, Tropics, sea, and sea ice.

6539
V-Five Association of America
HOW TO SURVIVE ON LAND AND SEA: INDIVIDUAL SURVIVAL. — 2nd revised edition. 368 p. Annapolis: United States Naval Institute. 1956.
DLC (TL553.7.V2)

This is a manual for teaching naval aviators and other flight personnel the techniques of survival on both land and sea. The table of contents lists the following chapters: survival hints; orientation and traveling; water; wild plant and animal food; fire-making and cooking; shelter; survival in special areas (ocean, seashore, tropics, far north); environmental hazards (physical and biological hazards, poisonous snakes, plants, aquatic animals, and harmful mammals); atomic, biological, and chemical warfare (nature, effects, symptoms, and individual protection); and the United States Naval Aviation Training Program on survival.

6540
Wolf, A. V.
THE CASTAWAY AT SEA. — Nutrition Reviews, 14 (6): 161-164. June 1956.
DLC (TX341.N85, v. 14)

Recent contributions to the question of the potability of sea water are reviewed, and the theoretical physiologic consequences of drinking sea water alone or in combination with fish juice or fresh water are discussed. It is concluded that sea water is of no ultimate value in the relief of thirst, and may be detrimental, except perhaps in dilute form.

e. Accidents and Accident Prevention

6541
Achiary, A.,
V. André, A. Cabanon, and J. Richet
[ANOXIA IN FLIGHT: STUDY OF FOURTEEN OBSERVATIONS] Anoxies en vol: étude de quartorze observations. — Médecine aéronautique (Paris), 11 (3): 283-305. 1956. In French, with English summary (p. 305). DLC (TL555.M394, v. 11)

Case reports of 14 anoxic incidents attributed to human error, mechanical failure, or icing are presented. Recommended measures based on an analysis of the incidents include: (1) a study of the complete installation of oxygen equipment in aircraft from the prototype to the testing stage; (2) inspection of the oxygen supply from manufacture to installation in aircraft; (3) development of methods for the control of oxygen humidity; (4) use of an alarm system; and (5) practical indoctrination of flying and ground personnel in the problems of anoxia.

6542
AIRCRAFT ACCIDENT PREVENTION. — Far East Air Forces Command Surgeon's Newsletter, 2 (6): 2-6. July 1956. DNLM

The majority of aircraft accidents are caused by human error which is usually due to one or a combination of the following factors: (1) physical limitations of the pilot or crew member, such as inability to reach controls or insufficient strength to overcome g forces; (2) pathological conditions, such as disease or toxicants; (3) physiological conditions, such as hypoxia, heat, cold, vibration and similar factors; or (4) psychological conditions, such as confusion, errors in judgment, fear, pain, or other factors. Many physical, physiological, and pathological factors which may have contributed to the accident can be discovered only by careful serology, tissue analysis, or autopsy. Procedures are outlined for medical investigators to follow at the scene of an aircraft accident.

6543
AIRCRAFT ACCIDENT PREVENTION. — Far East Air Forces Command Surgeon's Newsletter, 2 (8): 2-4. Sept. 1956. DNLM

Aircraft accident prevention is inherent in the responsibility of the base commander. He must evaluate the various activities contributing to the cause of an accident and must motivate subordinate commanders and staffs to reduce accident potentials without impeding the conduct of an assigned mission. The flight surgeon also plays an important role in accident prevention by evaluating contributing human factors (psychological, physiological, or both). Poor judgment, poor technique, lack of proficiency, and mental and physical fatigue are factors which may cause accidents. Discipline of the highest order is a prerequisite to accident prevention. Lack of individual or crew discipline can be an influencing or direct cause factor in an accident.

6544
Andrews, W. K.
ANALYSIS OF AIR LINE ACCIDENTS. — Air Line Pilot, 25 (2): 10-12. Feb. 1956.
DLC (TL501.A5537, v. 25)

An analysis is presented of accidents, accident rates, fatalities, and hours flown by aircraft in scheduled domestic passenger operation of aircraft in excess of 12,500 pounds from 1951-1953. Records indicate that pilots are able to cope with and overcome numerous hazards (turbulence in flight, collapse of landing gear, overshoots, ground-water collision, wheels-up conditions), and unforseen circumstances (fire in flight, mid-air collision) encountered in flight, thereby preventing accidents. It is noted that several factors are responsible for practically all accidents: weather, powerplant, runway, and pilot.

6545
AUTOPSY PERFORMED ON AN AIRCRAFT FATALITY. — Joint Committee on Aviation Pathology, Washington, D. C. Memorandum no. 1, Feb. 1956. [14] p. DNLM (WiJ01815)

The need for carrying out full autopsies on all aircrew and passenger casualties as a result of an aircraft accident is emphasized in order to eluci-

date the cause of accident, be it a pre-existing or acquired lesion of the pilot or defective or damaged aircraft. Steps for the pathologist to follow during accident analysis include (1) familiarization with the internal structure, seating arrangement, ejection mechanism and general layout of the plane involved; (2) observation of body position in relation to total wreckage, and condition in which body was found; (3) meticulous examination of exterior of the body and viscera, with necessary close-up photographs and X-rays, and removal of tissue for chemical, toxicological and histopathological examination; and (4) study of report of the accident itself.

6546
Balke, B.,
J. G. Wells, and R. T. Clark
IN-FLIGHT STUDIES OF HYPERVENTILATION. — School of Aviation Medicine, Randolph Air Force Base, Tex. Report no. 56-69, June 1956. 9 p.
AD 120 095 PB 121825

Unexplained jet aircraft accidents called for experimental investigations of some physiologic factors possibly leading to a pilot's incapacity for safe flying. Besides hypoxia, which, as is well known, occurs occasionally because of faults in the oxygen supplying system during flights at high altitude, hyperventilation was suspected of being a possible cause for a critical deterioration of flying performance. In laboratory experiments a progressive decrease of psychomotor performance was demonstrated when human subjects were exposed to passive hyperventilation. The symptoms accompanying hypocapnia were essentially the same as those in hypoxia. In-flight sampling of expired air during the first stage of jet pilot training verified the existence of in-flight hyperventilation. Of all the air samples collected 40 percent had estimated alveolar carbon dioxide tensions between 30 and 13 mm. Hg. (Authors' abstract)

6547
Berkshire, J. R.,
and T. J. Gallagher
THE RELATION OF PRIMARY A-STAGE GRADE TO SUBSEQUENT PILOT-ERROR ACCIDENTS. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-32, Dec. 14, 1956. 11+7 p. AD 124 772 UNCLASSIFIED

Men with Primary A-stage flight grades of 2.83 or below are shown to have about twice as many pilot-error accidents per capita as do men with A-stage grades above 2.90. It was also found that after a year and a half in carrier squadrons 35 per cent of the men with low A-stage grades had either been grounded, transferred to land-based aircraft, killed in accidents, or were being closely watched, for possible removal, by their commanding officers. This was true of only 7 per cent of the men with A-stage grades above 2.90. A policy of carefully screening men with low A-stage grades is expected to reduce training accidents by ten a year, fleet accidents by four a year, and reduce the need for fleet replacements by about twelve to seventeen men a year. (From the authors' summary)

6548
Berry, F. B.
ICARUS AND THE PHYSICIAN: REFLECTIONS ON AIRCRAFT ACCIDENTS AND THEIR PREVENTION. — Jour. Aviation Med., 27 (3): 197-207. June 1956.
DLC (RC1050.A36, v. 27)

This lecture is concerned with flight accidents and their prevention. There is a shortage of trained technical personnel in the medical sciences; constantly increasing demands are being made upon the pilot in order that the high-performance aircraft of today may be flown. Some examples are mentioned of carelessness and indifference on the part of flight control officers and flight surgeons which have contributed to accidents. A Joint Committee on Aviation Pathology has been formed by Canada, Great Britain, and the U.S. There has also been established a program called Medical Education for National Defense which at present has 25 medical schools participating, and courses in aviation medicine are being offered at Harvard School of Public Health, Ohio State University, Johns Hopkins University, and the University of California at Los Angeles. Also mentioned are the Flying Physicians Association, and the training programs of the Air Force and the Navy which are concerned with aviation medicine. A plea is made that more incentive be offered to young physicians to enter the specialty of aviation medicine. A final tribute is paid to the work of the human factors teams.

6549
[CALDARA, J. D.]
AIRCRAFT DEMANDS EXCEED PILOT CAPABILITIES. — Aviation Week, 64 (4): 48-49, 51, 53, 55-56, 58-59. Jan. 23, 1956.
DLC (TL501.A8, v. 64)

This is essentially a reiteration of a report given by Brig. Gen. J. D. Caldara, USAF Director of Flight Safety Research, at the meeting of the Los Angeles section of the Institute of the Aeronautical Sciences. Its central theme is that human error, which is blamed for a major part of aircraft accidents, may not represent negligence or deliberate violation by the pilot or crew. Rather, it indicates that the situational demands frequently exceed man's ability to respond adequately. This idea is substantiated by the disproportionately large percentage of accidents involving jet aircraft. Part of these may be prevented by integrating the aircraft design with the range of human capabilities and the operational requirements.

6550
Chemin, A.
[SOME CONSIDERATIONS OF THE OCCUPATIONAL ACCIDENTS AND SICKNESSES OF AVIATORS] Quelques aperçus sur les accidents du travail et les maladies professionnelles des aviateurs. — Archives des maladies professionnelles de médecine du travail et de sécurité sociale (Paris), 17 (5): 525-528. Sept.-Oct. 1956. In French. DNLM

A brief review is presented of the occupational hazards of modern pilots. Consideration is given to the principal types and causes of aircraft accidents, the importance of pilot selection and supervision to eliminate the lack of judgment and inattention commonly involved in air crashes, and the physiological hazards of flying, including rapid changes in air pressure, aeroembolism, noise-induced deafness, psychogenic fatigue, and neurological disturbances.

6551
Clark, R. T.,
S. S. Wilks, and D. D. Van Fossan
CHEMICAL ANALYSES OF HUMAN POSTMORTEM TISSUES AS AID IN DETERMINING PHYSIOLOGICAL STATUS OF FLYING PERSONNEL PRIOR TO AIRCRAFT ACCIDENTS [Abstract]. — Federation Proceedings, 15 (1, part I): 36. March 1956. DLC (QH301.F37, v. 15)

Methods of estimating the possibilities of the presence of hypoxia prior to a fatal accident have been applied to Air Force pilots in fatal crashes. The method consists of the measurements of lactic acid in brain and spinal cord as a test for hypoxia due to oxygen-lack and carbon monoxide concentrations in all tissues that are available. Sixty-six cases from aircraft accidents have been studied. Brain tissue from 20 of these cases has been analyzed for lactic acid. Ten showed lactic acid values to indicate hypoxia (above 180 mg.%) prior to death. Results from tissue analysis of the 66 cases indicated 27 with blood carbon monoxide values above 30% COHb. Control specimens have been obtained from local hospitals. (Authors' abstract)

6552
[Gerneth, G. J.]
A FLIGHT SURGEON'S APPRAISAL OF AN AIRCRAFT INCIDENT. — Far East Air Forces Command Surgeon's Newsletter, 4 (2): 5-7. April 1956. DNLM

An incident is reported of a fire in the number 3 engine of an aircraft prior to take-off which was rapidly extinguished. Fifty-eight passengers and 8 crew members were evacuated in 4-1/2 minutes from the plane via escape hatches. An appraisal of the situation by the flight surgeon at the scene revealed that (1) hand-baggage was piled under and in front of some escape hatches, somewhat obstructing approach to these openings; (2) of the two escape chutes present, only one on the port side of the aircraft was used, the chute on the starboard side was installed upside-down; (3) although the snaps on the chute straps which attach the escape chute to the wall of the plane were color-coded, the D-rings to which they attach were not, providing an avenue for error in installation; and (4) the top of the escape chute was not anchored firmly, requiring 4 men instead of 2 to anchor the bottom end at the ground in order to prevent the chute from swaying. Recommendations are presented for correcting these hazards to evacuation safety.

6553
Hasbrook, A. H.
DESIGN OF PASSENGER "TIE-DOWN": SOME FACTORS FOR CONSIDERATION IN THE CRASH-SURVIVAL DESIGN OF PASSENGER SEATS IN TRANSPORT AIRCRAFT. — Aviation Crash Injury Research, Cornell Univ., New York. (Contract Nonr-401(21)). Report no. AV-CIR-44-0-66, Sept. 1956. 51 p. AD 217 660 UNCLASSIFIED

The four requirements for passenger survival in air crashes include provision of hull and floor structures of sufficient crashworthiness to prevent the crushing of passengers under survivable crash-force conditions, adequate restraint of passengers to prevent their becoming missiles, prevention of the striking by passengers of lethal components immediately adjacent to the seat position, and prevention of the striking of passengers by lethal missiles. Effective passenger tie-down requires the effectiveness of the safety belt, its components, its anchorages, the seat, the seat anchorages, and the hull structure to which the seat is attached. Seats should remain attached to the aircraft structure, provide restraint to the body at force levels within the known tolerance limits, provide protection from missiles and from overhead and side structures, be incapable of inflicting injuries if struck by passengers or if the seat fails, and absorb crash energy. To achieve adequate attachment of the seat, consideration must be given to the direction, magnitude, and duration of decelerative loads, the effects of dynamic compared to static loads, and distortion of adjacent floor and wall structures. The use of aft-facing seats may provide a lesser degree of tie-down strength, unless attention is given to the integrated design of floor structure, seat attachment, and seats.

6554
Hasbrook, A. H.
DESIGNING FOR SURVIVAL IN VTOL AIRCRAFT. — Aviation Crash Injury Research, Cornell Univ., New York. Report no. Av-CIR-51-0-83, 1956. 4 p. AD 217 660 UNCLASSIFIED

The need for the crashworthy design and delethalization of VTOL (vertical take-off and landing) aircraft is discussed in relation to human tolerance to impact forces. It is suggested that the crashworthiness of cabin and cockpit structures be designed to approach or equal the strength of the human body, or at least 20 g in all directions. Death and injury in survivable accidents (in which the cabin or cockpit remains relatively intact) generally result from magnification of the vehicle's deceleration through lack of delethalization, inadequate strength of tie-down, and absence of design to decrease deceleration in the directions in which body tolerance is lowest. Delethalization can be achieved by the application of lower magnitudes of force over large areas of the body at low velocities (through tie-down design). Survival directly after impact can be assured by provision of non-jamming exits and by placement of fuel tanks in less vulnerable areas.

6555
McCann, J. P.
THE ROLE OF THE MEDICAL EXAMINER IN AIRCRAFT ACCIDENT INVESTIGATIONS. — Tactical Air Command Surgeon's Bull. (Headquarters Tactical Air Command, Langley Air Force Base, Va.), 6 (7): 1-15. July 1956. DNLM

The role of the medical examiner in aircraft accidents is re-emphasized, and the methods to determine and identify the dead are reviewed. Human factors causing or contributing to the accident are considered, with representative cases, such as pre-existing diseases (coronary disease, ruptured cerebral aneurysm, convulsive attacks, diabetes mellitus), pre-existing injury and physical defects, toxic agents (alcohol, carbon monoxide, barbiturates), and excedence of physiological limits. Particular attention is given to detection of these causes at post-mortem examination. Mention is made of the injuries sustained

during aircraft accidents. Factors hindering accident investigation include (1) a lack of well-trained medical examiners, (2) local laws, (3) urgency of caring for survivers, (4) disintegration of possible evidence, (5) destruction of evidence prior to arrival of medical examiner by well-meaning individuals, and (6) possible false correlations and wrong conclusions drawn by examiners.

6556
McFarland, R. A.
THE PREVENTION OF ACCIDENTS IN AVIATION GROUND OPERATIONS. — Shell Aviation News, no. 216: 14-17. June 1956. DLC (TL501.S55, no. 216)

Accident prevention in aviation ground operations is discussed in terms of human factors in the design of equipment and working areas, safeguarding machinery or equipment, and providing personal protective devices. In developing a successful accident-prevention program it is important to consider that accidents result from materials used, machines operated, working methods employed, and the men operating the equipment. It is recommended that (1) adequate in-plant medical services and first-aid facilities be provided to reduce the severity of injuries and aid in the control of occupational disease hazards; (2) periodic inspections of the plant be made by the safety engineer, medical officer, and foreman; (3) employees report hazardous conditions or equipment; (4) every accident be thoroughly studied; and (5) employees be instructed in safety measures.

6557
Mackie, R. R.,
L. Morehouse, and D. A. Clegg
MEASUREMENT OF FORCES AFFECTING HUMAN BODIES IN AIRCRAFT ACCIDENTS: A STUDY OF THE CRASHES OF FOUR INSTRUMENTED F6F DRONE AIRCRAFT. — Human Factors Research, Inc., Los Angeles, Calif. (Contract Nonr 1527(00)); issued by Office of Naval Research, Washington, D. C. (Project NR 118-381). Technical Report no. 3, April 1956. 29 p. AD 93 351 UNCLASSIFIED

Accelerometer recordings were analyzed for the crashes of four instrumented F6F drone aircraft. In two cases, the airplanes ran out of fuel and were crash-landed under control on the desert, one with wheels up (no. 3), and the other with wheels down (no. 4). In the other two cases, one crash occurred on take-off (no. 6), and one when control of the aircraft was lost and it crashed into a mountain ridge (no. 5). Results of crashes 3, 4, and 6 showed that the forces in the vertical axes of the aircraft exceeded those in the longitudinal axes; in crash 6, these forces approached human tolerance limits. Records of crash 3 indicated evidence of an oscillatory application of crash forces. Records of crashes 3 and 4 showed that both the g forces which were developed and the damage to the aircraft were greater in the wheels-down crash. (AD abstract, modified)

6558
Mackie, R. R.,
L. Morehouse, and D. A. Clegg
MEASUREMENT OF FORCES AFFECTING HUMAN BODIES IN AIRCRAFT ACCIDENTS. II. A STUDY OF THE CRASHES DURING LANDING OF TWO INSTRUMENTED F6F DRONE AIRCRAFT. — Human Factors Research, Inc., Los Angeles, Calif. (Contract Nonr 1527(00)); issued by Office of Naval Research, Washington, D. C. (Project no. NR118-381) Technical Report, Feb. 1956. [39] p. AD 93 352 UNCLASSIFIED

Research was undertaken to develop a method of recording deceleration forces in airplane crashes. Self-actuating accelerometers were mounted in the seats of two F6F drone aircraft prior to takeoff. Upon stimulation with a force of 8 g or more, the accelerometer starts and records the force patterns for 8 sec. Findings from two airplane crashes are presented which indicate the feasibility of placing accelerometers on airplanes to obtain recordings of the crash forces for subsequent study. Records showed that the application of g force varied with respect to time, with successive g's occurring at a frequency of 35-45 c.p.s. Although both crashes were survivable (cockpit area remained intact), the g forces were of such magnitude that a pilot would have been injured. The g forces which were recorded in the vertical and horizontal body axes were approximately equal (55.5 and 52 g and 32.1 and 48 g, respectively). Seats and protective devices should be designed for absorbing repeated shocks and for withstanding high, short-duration peak loads rather than only static ones. (AD abstract, modified)

6559
Martoccia, C. T.,
and W. H. Nelson
INSTRUCTOR PREDICTION OF STUDENT AIRCRAFT ACCIDENTS IN NAVAL FLIGHT TRAINING: A NEGATIVE FINDING. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-11, April 24, 1956. ii+4 p. AD 99 136 UNCLASSIFIED

No relationship was found between instructor prediction of student aircraft accidents on pre-solo flights and the subsequent occurrence of such accidents in naval air basic training.

6560
Miller, E. E.
A SUMMARY OF SOME AIRCRAFT ACCIDENT TRENDS. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-33, Dec. 17, 1956. ii+3 p. AD 124 773 UNCLASSIFIED

The accident rates for the various models of aircraft were found to be quite stable from year to year. The differences between accident rates for reserve and operational flying on various models show a moderately high correlation from year to year. For most models, reserve flying is safer than operational flying. The ratio of pilot error accidents to materiel failure accidents varies markedly with the model of aircraft even when the comparisons are restricted to jets not extensively used in training. (From the author's summary)

6561
Moser, J. C.,
and D. O. Black 1956
PROPOSED INITIATING SYSTEM FOR CRASH-FIRE PREVENTION SYSTEMS. — National Ad-

visory Committee for Aeronautics, Washington, D. C. Technical Note 3774, Dec. 1956. 18 p. DLC (TL521.A35)

An initiating system for crash-fire prevention systems is described and illustrated which was designed to meet the requirements of such a system as determined by a study of data obtained from fullscale experimental and accidental airplane crashes. An example of the application of these requirements for a twin-engined piston-powered airplane is given. The proposed system can be designed to act rapidly and so that accidental operation is improbable. If the system should operate accidentally, catastrophic results are also improbable. This system is selective in that it inerts only those damaged zones where combustibles are spilled. It can be used on all airplanes whether they are powered by reciprocating, turboprop, or turbojet engines. (Authors' summary, modified)

6562
Nelson, W. H.,
and W. B. Webb
FACTORS INVOLVED IN CARRIER TRAINING ACCIDENTS IN THE NAVAL AIR BASIC TRAINING COMMAND. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-8, March 23, 1956. [13] p. AD 99 134 UNCLASSIFIED

Major psychological factors causing naval aviation carrier training accidents are classified in the following groups: (1) errors in judgment and perception of distance and relative motion, (2) applied faulty technique, (3) failure to take corrective action, (4) confusion, and (5) faulty division of attention. Suggestions are included for the adoption of certain changes in manner and methods of instruction in carrier-landing techniques.

6563
Pesman, G. J.,
and A. M. Eiband
CRASH INJURY. — National Advisory Committee for Aeronautics, Washington, D. C. Technical Note 3775, Nov. 1956. 36 p. DLC (TL521.A35)

Data from full-scale experimental airplane crashes were studied to determine how impact injuries occur and how the chance of such injuries may be reduced. The following hazards were considered: (1) being crushed, (2) being struck by missiles, (3) striking objects by tearing loose or flailing about, and (4) being injured by the crash decelerations. Transport, cargo, fighter, and light airplane crashes were studied. (Authors' summary)

6564
Pleines, E. W.
[SAFETY IN AIR TRAFFIC] Die Sicherheit im Luftverkehr. — Forschungsberichte des Wirtschafts- und Verkehrsministeriums Nordrhein-Westfalen (Köln und Opladen), no. 201. 184 p. 1956. In German. DNLM

Safety in aviation is discussed under the following topics: (1) safety standards for aviation, (2) relative safety in aviation in the past and in the present-findings from analysis of foreign flight-accident statistics and comparison between air and land traffic accident rates, (3) damages incurred by aircraft and passengers and types of flight accidents, (4) causes of flight accidents including technical and human failure, and their prevention, (5) possible means for raising the relative safety in the air by safety-oriented seat and cabin construction, and prevention of fires during flight and at emergency landings.

6565
Pleines, E. W.
[SAFETY IN CIVIL AERONAUTICS] Die Sicherheit in der Zivilluftfahrt. — Jahrbuch der Wissenschaftlichen Gesellschaft für Luftfahrt (Braunschweig), 1955: 41-55. 1956. In German, with English summary (p. 54-55). DLC (TL503.W5563, v. 1955)

Relative safety and accident frequency in U. S. Civil Aviation is discussed for the period from 1938 to 1955, considering separately accident statistics for "Domestic Scheduled Passenger Air Carriers" and "General Aviation". Several decisive arguments call attention to the higher accident rate in other branches of civil aviation, particularly pleasure flying, as compared to transport. The main causes of accidents and losses due to accidents are neglect of regulations and lack of discipline in flying. Cabin design and special arrangements are treated from the point of view of improved protection against crash injuries and more favorable crash survival conditions. Examples obtained from accident investigations are presented to show the severity of forces operating in aircraft crashes and the impact on seats and occupants. Several recommendations based on realistic assessment of static and dynamic strength requirements are made for a more crash-resistant design of cabins and furniture. (From the author's summary)

6566
Poudou, F.,
L. Desrus, and J. Quercy
[CONCERNING AN ACCIDENT INVOLVING ASPIRATION BY A JET ENGINE] A propos d'un accident d'aspiration par réacteur d'avion. — Archives des maladies professionnelles de médecine du travail et de sécurité sociale (Paris), 17 (1): 105-106. Jan.-Feb. 1956. In French. DNLM

A brief report is presented of the accidental aspiration of a worker into the air intake opening of a jet engine. The shoulders of the victim prevented the entrance of his body into the opening, so that the only injuries suffered were a chest puncture caused by impact with a metal shaft, and a superficial ecchymosis of the face. The case is similar to others in which injuries were limited chiefly to those of violent impact, and in which the victim remained fully lucid, except at the instant of aspiration.

6567
Preti, L. A.
[AIRPLANE ACCIDENTS] Incidenti d'aeromobile. — Rivista aeronautica (Roma), 32 (7): 777-790. July 1956. In Italian. DLC (TL504.R54, v. 32)

Aircraft accidents may be attributed either to errors made by pilots or ground personnel, or to

defective aircraft equipment. Prevention of aircraft accidents is proposed utilizing disciplinary, educational, and specific approaches. Mention is made of the military aviation department of flight safety and the flight safety officer, who is responsible for the collection and examination of documents concerning aircraft accidents; for formulating rules applying to flight safety and accident prevention; distributing literature and instituting educational programs in flight safety; and periodically inspecting the functioning of aircraft base safety facilities.

6568
Richwine, D. W.
A PILOT REFLECTS ON "PILOT ERROR". — Air Line Pilot, 25 (8): 10-12. Aug. 1956.
DLC (TL501.A5537, v. 25)

Aircraft accidents attributed to pilot error are unjustifiable since they fail to reveal the real causes of the accidents and to prevent their recurrences. Factors contributing to pilot error include (1) poor cockpit visibility, borne out by the fact that most mid-air collisions and near misses occur under conditions of good weather; (2) inherently weak component systems in new aircraft, usually discovered after hours of actual operating experience; and (3) an outmoded system of air traffic control. It is stressed that aviation safety is the joint responsibility of various manufacturers, operators, pilots, and government agencies, and not of one in particular.

6569
Stambler, I.
DESIGNING SAFETY INTO HIGH SPEED JETS. — Aviation Age, 25 (3): 26-31. March 1956.
DLC (TL501.A8187, v. 25)

Jet aircraft accidents have contributed a considerable proportion to the total Air Force accident rate, which is far in excess of the proportion of jet flight hours to the total Air Force flight hours. Examples are given of safety-design aspects, both preventive and escape, which were incorporated in jet aircraft design after analysis of the major factors responsible for the high accident rate.

6570
Stone, R. A.
MID-AIR COLLISIONS: A PILOT'S VIEW. — Air Line Pilot, 25 (2): 3-5. Feb. 1956.
DLC (TL501.A5537, v. 25)

As a means of avoiding mid-air collisions, a suggestion is presented to increase the basic Visual Flight Rule visibility requirements from three to five miles. Visual avoidance of collision depends upon the pilot's ability to see approaching aircraft during both day and night, aircraft speed, and proximity to clouds. Preventive safety measures proposed include the establishment of speed control in terminal areas, air traffic control, positive airspace control, and the development of an automatic, electronic proximity indicator to alert the pilot when another aircraft enters the sphere.

6571
Strollo, M.
[THE ACT OF AUTOMATIZATION AS A POSSIBLE FACTOR IN AIR ACCIDENTS] L'atto "automatizzato" come possibile fattore di incidente aereo. — Rivista di medicina aeronautica (Roma), 19 (4): 659-668. Oct.-Dec. 1956. In Italian, with English summary (p. 667). DLC (RC1050.R56, v. 19)

Several flight accidents possibly caused by disturbances in the sphere of memory are analyzed within the framework of a few basic psychological principles of human behavior, and suggestions are given for their prevention. Factors responsible for pilot errors are examined as part of a greater problem and are expressed in terms of automatisms and the state of consciousness of the pilot in critical moments of psycho-physiological activity, such as occurs during landing operations.

6572
Webb, W. B.
THE PREDICTION OF AIRCRAFT ACCIDENTS FROM PILOT CENTERED MEASURES. — Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 106 100, Report no. 1, Jan. 27, 1956. ii+9 p. AD 96 380 UNCLASSIFIED
Also published in: Jour. Aviation Med., 27 (2): 141-147. April 1956. DLC (RC1050.A36, v. 27)

It is not possible on the basis of existent aptitude or performance tests to select and eliminate those persons who are going to have aircraft accidents. No additional selection aimed at accident reduction is possible with these types of measures. Attempts to predict aircraft accidents from such transitory variables as moods, inattentiveness, temporary physiological states, or changing levels of training have been little explored as determinants of aircraft accidents. The author concludes that a portion of "pilot error accidents" remain unpredictable. Such accidents result from conditions imposed upon the individual to which he cannot adequately respond. These accidents would be unpredictable from individual measures inasmuch as all individuals are equally incapable of adequate response. Another group of this type of accident would be due to inadequate responses related to the pilot's "state of readiness"; this "state of readiness" would, in turn, be related to the psychophysiological conditions mentioned earlier and it would be transitory. If the above reasonably describes the "pilot error situation", then the pertinent problem is to decide to what extent these individual "states of readiness" enter into accident production, and to what extent such states are predictable. (Author's summary, modified)

6573
WHERE WAS THE FLIGHT SURGEON? — Far East Air Forces Command Surgeon's Newsletter, 2 (7): 1-7. Aug. 1956.
DNLM

An investigation and analysis is presented of an aircraft accident in which the pilot was not injured but the aircraft sustained substantial damage. In discussing the flight with the lead pilot and wingmen after the accident it was determined that the leader of the flight experienced an abnormal physical condition during the final flight phase. Whether the cause was hypoxia (due to improper use of oxygen equipment), or the presence of a toxic agent (hydraulic fluid) in the cockpit it resulted in the pilot experiencing a severe buzzing of the head, a dangerous retarding of reaction time, and slight visual impairment. It is stressed that the flight surgeon is

responsible for the aircrew members' awareness of the symptoms and dangers associated with hypoxia, hyperventilation, noxious fume poisoning, carotid sinus syndrome, spatial disorientation, and vertigo due to head turning in high performance aircraft.

6574
White, M. S.
HUMAN ERRORS IN AIRCRAFT ACCIDENTS. — Tactical Air Command Surgeon's Bulletin (Headquarters Tactical Air Command, Langley Air Force Base, Va.), 6 (9): 1-13. Sept. 1956. DNLM

A study of aircraft accidents revealed that (1) human errors are divided equally among three factors: host, agent, and environment; (2) 49% of the accidents are precipitated by inflight emergencies; (3) 28% occur in landings and take-offs and are contributed to by the difficulty man has with visual aids in the landing pattern; (4) poor survival rate for escape is associated with low altitude and inadequate design for escape; and (5) physiological train ·g of the aircrew is deficient. It is recommended that (a) better escape and physiological training be given aircrews to meet in-flight emergencies; (b) in accident studies, more consideration be given to human factors associated with personnel other than the pilot, such as ground crew, supervisors, and other related persons; (c) requirements be submitted for better visual aids in landing; and (d) a possible integrated training period encompassing instrument examination, flight check, proficiency rating, physiological examination, and annual physiological training be adopted.

11. MAN-MACHINE INTEGRATION AND LIFE SUPPORT SYSTEMS

a. General

6575
Bergaust, E.,
and W. Beller
SATELLITE! — 287 p. Garden City, New York: Hanover House, 1956. DLC (TL796.B4)

This is a book concerned with the engineering and utility of space satellites and vehicles. Of special interest is the chapter, Mice and Monkeys—Then Men, concerned with the mechanical and physiological aspects of upper-atmosphere animal-carrying vehicle experiments. Another chapter, Survival in Space, deals with the physiological problems encountered in space flight, such as the state of weightlessness, accelerations, pilot's position in the vehicle, climatic and temperature changes, as well as the hazards posed by cosmic, solar, and ultraviolet rays.

6576
Bromiley, R. B.
HUMAN ENGINEERING--PSYCHOPHYSIOLOGY OR ENGINEERING? — Jour. Aviation Med., 27 (3): 231-235. June 1956. DLC (RC1050.A36, v. 27)

This article is concerned with the problem of integrating the work of the research teams of human engineering more effectively with the efforts of the practical design engineers. The two fields require different types of training; that of research needs a scientist with psychological and physiological training, while the practical aspect calls for a broad background in engineering. Today, the majority of equipment must be designed without the skill and knowledge of trained human engineers; this is so because of a continuing shortage of these professionals. However, the practical engineer must be reminded of his responsibility to the human who must function together with the system. This realization will eliminate many of the problems which are now in existence.

6577
Chapanis, A.
THE DESIGN AND CONDUCT OF HUMAN ENGINEERING STUDIES. — San Diego State College, Calif. (Contract Nonr-1268(01)); issued by Office of Naval Research, Washington, D. C. (Project no. NR 145-075). Technical Report no. 14, July 1956. iii+73 p. AD 122 247 PB 128 155

This a manual dealing with the design and conduct of human engineering studies. It is written for engineers and other technical specialists, who are not primarily psychologists, but are required to do experiments involving men and machines. Included are chapters on the methods of operational observation; methods for the study of accidents and near accidents; experimental methods; psychophysical methods; statistical methods, and some special problems of experimenting with people. (93 references)

6578
Christian, G.
MATING MAN TO NEW WEAPON SYSTEMS. — Aviation Week, 65 (6): 343, 345, 347-348, 351. Aug. 6, 1956. DLC (TL501.A8, v. 65)

The problems confronting human-factors scientists are described in general. Some of the major goals of human-factors research are enumerated in the areas of human engineering, personnel training, and aeromedicine.

6579
Gatti, J.
REPORTS OF RESEARCH IN THE FIELD OF ENGINEERING PSYCHOLOGY. — Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio. WADC Technical Report no. 56-154, April 1956. iii+35 p. (Project no. 7180). AD 95 235 PB 121 268

This bibliography lists by functional groupings the authors and titles of 360 reports published by the Psychology Branch, Aero Medical Laboratory, Directorate of Research, Wright Air Development

Center, since its inception in 1945. Reports are grouped under the following headings: design and arrangement of displays for ease of interpretation; orientation, attitude and position in space; legibility, visibility and lighting; emergency indications; human factors in communication; displays; design of controls; servo analysis of human-control system; unusual environmental and psychophysiological factors; controls; airborne systems; systems, general; flight research; training and transfer; engineering psychology consultation service; apparatus, methodology and statistics; and miscellaneous.

6580
Hawley, M. E.
SPEECH COMMUNICATIONS IN NOISE: SOME EQUIPMENT PROBLEMS. — Jour. Acoust. Soc. Amer., 28 (6): 1256-1260. Nov. 1956.
DLC (QC221.A4, v. 28)

The design of a speech communication system begins with an operations analysis of the communication problem. When speech has been chosen as the means and when the needed linkages have been determined, the designer chooses the best compromises among the frequently conflicting factors of intelligibility, safety, comfort, quality, reliability, and economy. Pressure gradient microphones, especially with noise shields, noise attenuating earcaps, and earplugs, are the primary acoustical devices that can be used to obtain high intelligibility through improvement of signal-to-noise ratios. If the listeners are in intense noise, headsets presently pose the major systems limitation. Automatic volume control and peak clipping are the audio techniques most frequently used to improve intelligibility. (From the author's abstract)

6581
Lambert, C. M.
HANDLING THE PRONE-PILOT METEOR. — Flight (London), 69 (2462): 345-348. March 30, 1956.
DLC (TL501.F5 v. 69)

The aerodynamic characteristics, instrument layout, control problems, and escape system of the Armstrong Whitworth Prone-pilot Meteor are described. The physical sensations of prone-position flight are discussed, including discomfort resulting from the prone position itself, and the stress of muscular exertion required to widen the field of visibility.

6582
Lauren, W.
THE HUMAN FACTOR. — Skyline, 14 (1): 22-25. Feb. 1956. DLC (TL724.5.N57N6, v. 14)

Human factors engineering is one of the industrial science's newest phases; it applies engineering to the human being rather than to the machine he operates. The members of the North American Aviation's Human Factors group (experts in subjects scattered from mathematics to physiology) are currently tackling a wide variety of problems (including noise inside the cockpit, layout, lighting, ease of operation and accessibility of controls, visibility, and a constant development of new and better safety and protective equipment for pilots). Descriptions are given of follow-up investigations of the miraculous escape of Test Pilot George Smith (the first man to survive a supersonic bailout at low altitude) wherein anthropomorphic dummies and various instruments were utilized with the subsequent provision of the most important information ever gathered about the actions and physical limits of a human body shot into the air above the speed of sound. The ever-increasing need for the engineers' concern with the human factor is also discussed.

6583
Lederer, L. G.
THE AEROMEDICAL ASPECTS OF TURBO-PROP COMMERCIAL AIRCRAFT: A STUDY OF VISCOUNT PASSENGER OPERATIONS IN THE UNITED STATES. — Jour. Aviation Med., 27 (4): 287-300. Aug. 1956. DLC (RC1050.A36, v. 27)

The aeromedical characteristics of the Viscount turbo-prop airliner are discussed as related to operation in commercial aviation in the United States. The differences between turbo-prop and conventional piston-powered aircraft are demonstrated particularly in the field of noise and vibration. The level of cabin pressurization is considered and shown to be more physiologically acceptable than other commercial aircraft operating in the United States. Consideration is given to pilot transition training, and a new type of instrumentation, namely the integrated flight system, is described. New concepts of interest to aeromedical specialists, arising in aviation in commercial operation, are cited, such as "hull life" and "metal fatigue". (Author's summary, modified)

6584
Lockard, R. B.
BIBLIOGRAPHY OF HUMAN ENGINEERING REPORTS ON TRACKING. — Naval Ordnance Test Station, Instrument Development Division, Test Department, China Lake, Calif. NAVORD Report no. 5272, April 15, 1956. vii+88 p. AD 111 459
PB 125 214

A title bibliography is presented of publications concerning the human engineering problems of tracking. The concept of a power-driven tracking instrument is implicit in the arrangement of the bibliography, with the order of categories following a theoretical tracking loop. Topics considered include target and display characteristics, the human sensory apparatus, integrative processes and motor responses, and tracking instrument controllers.

6585
LUCKY ESCAPE HIGHLIGHTS HUMAN FACTORS. — Aviation Week, 64 (11): 189-190. March 12, 1956.
DLC (TL501.A8, v. 64)

The major trends in the aircraft industry toward incorporation of the human factors field in aircraft design are outlined, as reflected by the work done by various human factors research groups at different aircraft companies.

6586
McCollom, I. N.,
and A. Chapanis
A HUMAN ENGINEERING BIBLIOGRAPHY. — San Diego State College Foundation, Calif. (Contract Nonr-1268(01)). Technical Report no. 15, Nov. 1956. viii+128 p. (Project no. NR 145-075).
AD 122 248 UNCLASSIFIED

This bibliography consist of 5,666 references concerned with human factors in equipment design. The bibliography is divided into the following categories: (1) general references, methods, facilities, and equipment; (2) man-machine systems; (3) visual problems; (4) auditory problems; (5) speech communication; (6) other sensory input channels; (7) comparison and interaction among sensory input channels; (8) design of controls and integration of controls with displays; (9) control systems; (10) design and layout of workplaces, equipment, and furniture; (11) body measurements and movements; (12) higher mental processes; (13) simulators and proficiency measuring devices; (14) environmental effects on human performance; (15) behavioral efficiency, fatigue, and human capacities, and (16) operator characteristics for specific jobs.

6587
McFarland, R. A.
HUMAN PROBLEMS IN JET AIR TRANSPORTATION. — SAE Transactions, 64: 437-452, 1956. DLC (TL1.S6, v. 64)

Human factors involved in the safety and comfort of jet travel and jet operation include the problem of hearing loss and communication interference by noise in ground personnel, the dangers of injury from jet blast and air intakes on the ground, inside noise and vibration during flight, acceleration tolerances during abrupt emergency maneuvers and in crashes, the problem of injuries to passengers through turbulence, sudden maneuvers, and faults in the design of cabin interiors, problems of the transportation of patients by air, the effects of cabin pressure failure in high-altitude operations, the ventilation, temperature, and humidity of cabin atmospheres, and the visual problems for the pilot resulting from changes in the illumination of the sky and the absence of reference points for judging distance and direction.

6588
Mayo, A. M.
ENVIRONMENTAL CONSIDERATIONS OF SPACE TRAVEL FROM THE ENGINEERING VIEWPOINT. — Interavia (Geneva), 11 (6): 435-438. June 1956. DLC (TL500.I555, v. 11)
Essentially the same in: Jour. Aviation Med., 27 (5): 379-389. Oct. 1956. DLC (RC1050.A36, v. 27)

The physiological problems of high-altitude and space flight and the engineering approaches required for their solution are briefly discussed. Areas of consideration include vision- and time-distance relationships, the temperature effects of high-speed flight, the loss of conductive and convective heat transfer and the prominence of radiative transfer at high altitudes, pressurizing and air purification systems, acceleration and weightlessness, cosmic radiation shielding, meteor collisions, and escape systems.

6589
Mookerjee, M. K.,
and M. N. Bhattacharya
BODY MEASUREMENTS IN RELATION TO COCKPIT DESIGN. — Aero Med. Soc. Jour. (New Delhi), 3 (1): 32-37. April 1956. DNLM

Data are presented concerning the body measurements and body weights of 691 members of the Indian Air Force.

6590
(Office of Naval Research)
BIBLIOGRAPHY OF HUMAN ENGINEERING REPORTS (UNCLASSIFIED). — Office of Naval Research, Special Devices Center, Port Washington, N. Y. Report no. NAVEXOS P-1491 (revised), Jan. 1, 1956. 18 p. DLC (Z6260.U54)

This is a list of 425 government sponsored reports on various aspects of human engineering.

6591
Pearson, V. A.
A BIBLIOGRAPHY ON HUMAN FACTORS. — Dept. of Civil Aviation (Australia). Aviation Medicine Memorandum no. 21, July 1956. 105 p. DNLM (W1.AV455)

This is a bibliography on human factors with 735 references. The material included deals with methods and apparatus, human operating characteristics, equipment design, anthropometry, cockpit and work space layout, vision, display design, perception, orientation, equilibrium, navigation and air traffic control, information theory, cybernetics, speed and hearing, environmental variables (noise, vibration, temperature, time variations), physiological variables (ageing, fatigue, effect of drugs), and safety and the human operator.

6592
Quastler, H.
[CONTROL SYSTEMS]. — Univ. of Illinois, Urbana. Control Systems Laboratory [Contract DA-36-039-SC-56695] Project no. 8-103A, D/A Project 3-99-10-101. Report no. R-71. 1956. 48 p.
AD 92 357 UNCLASSIFIED

This report consists of three papers: (1) A Survey of the Work Done by the Bio-Systems Group of the Control Systems Laboratory (on Bio-Systems, Man-Machine Systems, Human Information Processing, and Applied Mathematics); (2) Studies of Human Channel Capacity: (empirical channel capacity, examples of experimental studies, factors limiting human information transmission, and outlook); and (3) The Informational Limitations of Decision Making (making of decision and transmitting of information, situation, decision-maker and choice, production and destruction of information in decision processes, and complex decision systems).

6593
Stambler, I.
RESEARCHERS PROBE SECRETS OF FLIGHTS 40 MILES UP. — Aviation Age, 26 (3): 36-41. Sept. 1956. DLC (TL501.A8187, v. 26)

The aerotechnological problems of flight in the region of 100,000 to 200,000 ft. altitude are considered,

particularly those of entry and reentry. In order to prevent extreme temperature differential the ship will have to rotate. Gravity reference for the human occupant may be provided in form of an auditory stimulus or through simulated gravity. The effects of acceleration and deceleration may be held to a minimum by exposing the occupant only to transverse g in a rotating cockpit or having the entire ship rotate through 360° in all planes.

6594
Strughold, H.
ENGINEERING ASPECTS OF THE PHYSIOLOGICAL PROBLEMS OF PROVIDING FOR MAN IN SPACE. — Harvard School of Public Health. Guggenheim Center for Aviation, Health and Safety, Boston, Mass. No. 13, 27 p. 1956.
DNLM (W6.P3, Pamphlet vol. 6467)

The engineering aspects of the physiological problems associated with space flight are discussed in terms of anthropometric requirements, control of barometric pressure, temperature, humidity and oxygen, carbon dioxide removal, photosynthetic gas exchange, elimination and reutilization of wastes, odor elimination, visual comfort, day-night cycling, and protection against cosmic rays and meteorites. Included is a classification of space operations.

6595
Van Cott, H. P.,
and J. W. Altman
PROCEDURES FOR INCLUDING HUMAN ENGINEERING FACTORS IN THE DEVELOPMENT OF WEAPON SYSTEMS. — American Inst. for Research [Pittsburgh, Pa]. (Contract AF 33(616)-2986); issued by Wright Air Development Center. Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 5-(7-7192)). WADC Technical Report no. 56-488, Oct. 1956. vi+115 p.
AD 97 305 UNCLASSIFIED

Systematic procedures are suggested for the human engineering of developmental weapon systems. A brief discussion of man-machine systems and the role of human engineering in their design is followed by a design schedule. This schedule suggests at what points and in what ways human engineering should be accomplished. Following the design schedule, procedures that may be used to assess and solve human engineering problems are suggested. Finally, human capabilities and limitations are discussed from the point of view of the man as a system component. Ninety-eight references, a glossary, and a subject index are included. (From the authors' abstract)

b. Operational Aspects

6596
Anderson, N. H.,
D. A. Grant, and C. O. Nystrom
THE INFLUENCE OF THE SPATIAL POSITIONING OF STIMULUS AND RESPONSE COMPONENTS ON PERFORMANCE OF A REPETITIVE KEY-PRESSING TASK. — Jour. Applied Psychol., 40 (3): 137-141. June 1956. DLC (BF1.J55, v. 40)

Results are reported of an experiment investigating operator efficiency as a function of spatial positioning of the stimulus panel and response keyboard under two modes of stimulus presentation. With the self-paced procedure, response times were 10% to 15% greater when the stimulus and response units were on opposite sides of the subject than for the optimal arrangement where both units were in front of the subject. The corresponding increase for automatic pacing was 30% to 40%. For automatic pacing, half of the decrease in efficiency arose in the manipulatory process at the keyboard. The other half was associated with the additional movements necessary in the less efficient treatments. Position of the response keyboard exerted a significant effect on all three time measures, the centered position being preferred, and the left position giving the poorest results. For automatic pacing, the position of the stimulus panel and its interaction with response keyboard were also significant factors, the front position being best and the right position poorest. Generally, the placement of response keyboard was more important than location of the display. (From the authors' summary)

6597
Berest, N.,
A. P. Gibert, and G. Perdriel
[ANALYTICAL STUDY OF CAUSATIVE FACTORS IN ASTHENOPIA IN RADAR SCOPE OPERATORS] Étude analytique des facteurs d'asthénopie chez les lecteurs de scopes radar. — Médecine aéronautique (Paris), 11 (2): 197-214. 1956. In French, with English summary (p. 214).
DLC (TL555.M394, v. 11)

Etiological factors in the visual fatigue of radar operators include refractive error, disturbances of binocular vision, disturbances of the anterior periphery of the eye (accomodation), functional anomalies such as aniseikonia, glare, cold, wind, poor ventilation, alimentary affections, and intoxication by vapors, drugs, alcohol, and nicotine. Suggested measures of protection against visual fatigue in radar operators include establishment of rigorous qualifying standards for radar personnel, surveillance of dietary and general hygiene, periodic eye and general medical examination of operators, and establishment of favorable environmental conditions.

6598
Berest, N.,
A. P. Gibert, and G. Perdriel
[PREVENTION OF VISUAL FATIGUE IN RADAR OPERATORS] Prévention de la fatigue visuelle chez les lecteurs de scope-radar. — Médecine aéronautique (Paris), 11 (4): 403-412. 1956. In French, with English summary (p. 411).
DLC (TL555.M394, v. 11)

Analysis of the pathogenic factors in the visual fatigue of radar operators indicates the necessity for the following protective measures: (1) removal of or prevention of the formation of toxic vapors; (2) use of colored or dark glasses for adaptation to and from low levels of illumination; (3) elimination of the glare produced by a ratio of radar screen luminance to target luminance greater than one-third, or by a ratio of background object luminance to target luminance greater than one-tenth;

(4) the practice of the intermittent transfer of accommodation from the screen to a similarly lighted field; (5) development of psychic stability through compensatory extravocational activities (dynamic relaxation); and (6) the practice of various eye maneuvers.

6599
Briggs, G. E.,
and P. M. Fitts
TRACKING PROFICIENCY AS A FUNCTION OF VISUAL NOISE IN THE FEEDBACK LOOP OF A SIMULATED RADAR FIRE CONTROL SYSTEM. — Ohio State Univ. Aviation Psychology Lab., Columbus (Contract AF 18(600)-1201); issued by Air Force Personnel and Training Research Center. Interceptor Pilot Research Lab., Tyndall Air Force Base, Fla. Research Report no. AFPTRC-TN-56-134, Dec. 1956. v+7 p. AD 98 911
PB 126 674

Four skilled Air Force ROTC students received 40-sec. trials on each of seven amplitude levels of visual noise in an investigation of the functional relation between amplitude level of visual noise and tracking proficiency. The OSU Pilot Training Research Simulator served as the skill task. Time-on-target scores indicated that proficiency of performance is inversely related to the amplitude of noise level. The slope of the function was that of a negatively accelerated curve with a linear trend predominant over the lower levels of noise. Further, even the lowest amplitude level produced a significant decrease in tracking proficiency over that found for noise-free tracking conditions.

6600
Calvert, E. S.
VISUAL AIDS AND THEIR EFFECT ON LANDING SUCCESS AND SAFETY. — Jahrbuch der Wissenschaftlichen Gesellschaft für Luftfahrt (Braunschweig), 1955: 105-112. 1956. In English.
DLC (TL503.W5563, v. 1955)

In following a straight approach path, there are six quantities which have to be held simultaneously at zero: (1) the displacement in the vertical plane through the approach path, and the first and second derivatives of this displacement; and (2) the displacement in the glide slope plane, and the first and second derivatives of this displacement. In good weather a pilot can obtain these six quantities directly from natural visual cues with an accuracy which increases as the distance from the runway is reduced, and this enables him to control the aircraft within acceptable limits at each stage of the approach. The main visual cue is the horizon, and when it is hidden, the six quantities become confused unless the observer is on a stabilized platform. In an airplane the visual cues have to be supplemented by artificial visual aids which restore the missing guidance. With defective visual aids illusions may arise at the moment of transition from instrument to visual flight. Design principles for raising the efficiency of visual aids are discussed. (From the author's summary)

6601
[Central Inst. for the Deaf]
EVALUATION OF METHODS FOR REDUCING NOISE FROM JET ENGINES IN FLIGHT. — [Central Inst. for the Deaf, St. Louis, Missouri (Contract Nonr (151(01))]; issued by Armed Forces-National Research Council Committee on Hearing and Bio-Acoustics (Project NR 140-069). CHABA Memorandum Report no. 1, May 1956. 7 p.
DNLM (W2A1. A94ch)

To date no device for suppressing jet engine noise has been flight tested. Methods of suppressing jet engine noise being investigated include the use of teeth or notches at the jet exit, vortex generators inside the tail pipe, ejectors, slotted nozzles, multiple nozzles, and corrugated nozzles. The corrugated nozzle is considered the best since it gives a reduction in sound power radiated of 4-6 decibels with a reduction of 10-12 decibels in sound pressure level in the direction of maximum intensity.

6602
Chalmers, E. L.,
and M. Goldstein
PERFORMANCE MEASUREMENT IN PHOTO-INTERPRETATION [Abstract]. — Amer. Psychologist, 11 (8): 449. Aug. 1956.
DLC (BF1.A55, v. 11)

The results of a task analysis of the activity of aerial photointerpretation are presented together with performance measures developed from this analysis. Stimulus-categories resulting from the characteristics of aerial photography are discussed in conjunction with skills and knowledges expected to be important in photointerpretation performance. Special attention is given to techniques which (a) permit measurement of the task with a minimum of distortion, and (b) provide analytic information about the task, so that a content validity approach to the criterion problem may be used. (Quoted in full)

6603
Decker, J. L.
THE HUMAN PILOT AND THE HIGH-SPEED AIRPLANE. — Jour. Aeronaut. Sci., 23 (8): 765-770. Aug. 1956. DLC (TL501.I552, v. 23)

Mathematical expressions are developed rationalizing the dynamic responses of a human pilot and his aircraft in pitch stabilization. The analysis takes into account the pilot's reaction time and muscular lag time (0.25 sec. and 0.125 sec. taken as typical values) in conjunction with the aerodynamic characteristics of the aircraft. The results could not be taken completely literally since the human is adaptable to change his dynamic characteristics from the typical values used in the calculations. However, they do demonstrate that a reduction in aircraft size or period of pitch tends to make it uncontrollable by the human pilot by virtue of his dynamic characteristics, especially his reaction time.

6604
Ely, J. H.,
R. M. Thomson, and J. Orlansky
LAYOUT OF WORKPLACES. — Dunlap and Asso-

ciates, Inc., Stamford, Conn. (Contract AF 33(616)-419); and Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 7180, Task no. 71501), WADC Technical Report no. 56-171, Sept. 1956. viii+104 p. AD 110 507 PB 121 802

A critical factor affecting operator performance in any man-machine system is the layout of his workplace. This report provides a compilation of human engineering recommendations concerning various aspects of workplace layout. Whenever these recommendations are the direct outgrowth of research in this field, the appropriate research studies are cited. When no research has been done on a specific problem, the authors draw upon their own experiences to provide the necessary recommendations. All recommendations have been reviewed by a number of experts in the field prior to final publication. The report is divided into four main parts, entitled: General Considerations, Workplace Dimensions, Location of Controls and Displays, Direction-of-Movement Relationships. Check lists, figures and tables are used frequently as means of presenting recommendations. A table of contents and a subject index are also provided as aids to the user. (Authors' abstract)

6605
Hartman, B. O.,
and J. K. Wetherbee
"BETA": A SPECIAL PURPOSE COMPUTER FOR STUDIES IN THE HUMAN CONTROL OF COMPLEX EQUIPMENT. — Army Medical Research Lab., Fort Knox, Ky. Report no. 236, April 23, 1956. 1+52 p. AD 94 737 UNCLASSIFIED

A description is given of a special-purpose computer which was developed to study human performance in controlling complex equipment and systems. This instrument is a research tool featuring a considerable amount of automation. It generates target courses, displays them, receives and displays response signals, computes "error," and feeds the error signal to clocks, counters and graphic recorders, all on a predetermined schedule. Built-in calibrating, balancing and checking circuits are provided. The apparatus is built on the "plug-in" principle, so that additions can be made without major reconstruction. Except for the display and tracking control, all components are housed in a compact desk-type console. (Authors' abstract)

6606
Herrick, R. M.,
H. E. Adler, J. E. Coulson, and G. L. Howett
DETECTION OF SEPARATIONS BETWEEN ADJACENT SIGNALS ON A SIMULATED PPI RADAR SCOPE. — Jour. Optical Soc. Amer., 46 (10): 861-866. Oct. 1956. DLC (QC350.O6, v. 46)

A simulated Plan Position Indicator radar scope was used to evaluate the effects of background luminance, distance between signals, scan rate, and simulated phosphorescence decay on the minimum difference between signal luminance and scope face luminance (ΔI) required for the detection of a separation between two identical signals. Background luminance was found to be the most important determinant of the threshold log ΔI, while scan rate and the pattern of phosphorescence decay had little effect. In general, as background luminance was increased or as separation between signals was decreased, a greater log ΔI was required for the detection of signal separation.

6607
Hertzberg, H. T. E.,
I. Emanuel, and M. Alexander
THE ANTHROPOMETRY OF WORKING POSITIONS. I. A PRELIMINARY STUDY. — Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio. WADC Technical Report no. 54-520, Aug. 1956. iv+12 p. AD 110 573 PB 121 676

A sample of forty adult males was measured to ascertain new body size data for various representative working positions. Measurements were taken with the body in the standing, kneeling, crawling, and prone positions. Problems met in developing procedures for an anthropometry describing working positions are discussed, along with possible approaches for data gathering. (Authors' abstract)

6608
Jenks, A. E.
"THE BLACK HOLE". — Air Line Pilot, 25 (4): 7-13. April 1956. DLC (TL501.A5537, v. 25)

A discussion is presented of the visual portion of aircraft approach and landing under low visibility conditions. Included is a brief analysis of the eye, its function and limitations, in relation to the design configuration of visual aids.

6609
Kimmel, H. D.,
R. R. Mackie, and C. L. Wilson
LEARNING PROBLEMS IN SONARMEN TRAINING; TECHNICAL REPORT NO. 4: RECENT LITERATURE BEARING ON PSYCHOLOGICAL PROBLEMS ASSOCIATED WITH SONAR OPERATOR PERFORMANCE. — Human Factors Research, Inc., Los Angeles, Calif. (Contract NONR 1106(00) NR 154-140); issued by Office of Naval Research, Washington, D. C. July 1956. [2]+54 p. AD 108 264 UNCLASSIFED

Studies published since 1952 concerning the psychological problems associated with sonar detection and classification are reviewed. Chief areas of consideration are the detection of auditory and visual stimuli masked by a background of noise, the perception of various characteristics of auditory and visual stimuli, and the learning of complex discriminations and concepts. A bibliography containing 153 references is presented.

6610
Kraft, C. L.
A BROAD BAND BLUE LIGHTING SYSTEM FOR RADAR APPROACH CONTROL CENTERS: EVALUATIONS AND REFINEMENTS BASED ON THREE YEARS OF OPERATIONAL USE. — Ohio State Univ. Lab. of Aviation Psychology and OSU Research Foundation, Columbus (Contract AF 33(616)-3612); issued by Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Proj-

ect no. 7192). WADC Technical Report no. 56-71, Aug. 1956. vii+95 p. AD 118 090 PB 121 968

This report contains detailed specifications for the installation and use of Broad Band Blue (selective chromatic) lighting system for radar approach control centers. This lighting system provides (a) sufficient light for scope observers, maintenance personnel, and other individuals to work simultaneously in the operations room, thus allowing 24-hour-a-day operations, and (b) an element of flexibility that allows the scope observer the option of increasing his visual sensitivity, through dark adaptation, without decreasing the light provided for the work of other personnel. (From the author's abstract)

6611
Lane, J. C.,
and R. W. Cumming
THE ROLE OF VISUAL CUES IN FINAL APPROACH TO LANDING. — Aeronautical Research Labs., Melbourne, Australia. Human Engineering Note 1, May 1956. 48 p. AD 123 142 UNCLASSIFIED

Accidents due to errors in range of the location of the touchdown point in landing constitute a substantial proportion of all accidents to transport and military aircraft. Visual cues for regulating aircraft landing are examined and it is suggested that four cues (two for night flight) provide the information needed to track a straight line path. A simulator is described which might be suitable both for elementary training and for the transition to visual on instrument approaches. The choice of the aiming point on the runway is discussed and it is recommended that a definite aiming point be defined by painted marking and lights. Displays to provide tracking information more directly are also considered, both existing ground indicators and possible airborne indicators. Two possible airborne "sights" are considered in detail and are shown to be technically feasible. (From the authors' summary)

6612
Learner, D. B.,
and E. A. Alluisi
COMPARISON OF FOUR METHODS OF ENCODING ELEVATION INFORMATION WITH COMPLEX LINE-INCLINATION SYMBOLS. — Ohio State Univ. Lab. of Aviation Psychology and OSU Research Foundation, Columbus (Contract AF 33(616)-3612); issued by Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio. WADC Technical Note no. 56-485, Nov. 1956. v+21 p. AD 110 547 PB 131 001

Four groups of 20 subjects each decoded elevation information that had been encoded by the use of complex line-inclination symbols. Each group worked with a different one of four stimulus-response (S-R) ensembles that were called, respectively, the binary, the decimal, the wheel, and the clock codes. The first three of these codes were based on the same type of stimulus symbol (eight lines radiating at 45-deg. angular separations from a central hub), whereas the fourth code was based on a stimulus symbol consisting of a circle and two lines each of which could be positioned like the hands of a clock. The decimal and clock codes were decoded with a greater speed than the wheel and binary codes. The wheel code was inferior to the other three codes with regard to accuracy. These data are regarded as another demonstration of S-R compatibility effects, and of the importance of considering both the alphabet and the readout in selecting an S-R ensemble for encoding any specific type of information. (Authors' summary and conclusions)

6613
Olson, H. F.
ELECTRONIC CONTROL OF NOISE, VIBRATION, AND REVERBERATION. — Jour. Acoust. Soc. Amer., 28 (5): 966-972, Sept. 1956. DLC (QC221.A4, v. 28)

Electronic systems for the control of noise, vibration, and reverberation are described. The electronic vibration reducer consists of a sensor, amplifier, and driver connected either in negative or positive feedback fashion. The electronic sound absorber consists of a microphone, amplifier, and loudspeaker connected in an inverse feedback manner. By reducing the effective surrounding acoustical impedance, the absorber may serve as a conventional sound absorber or as a zone-type sound reducer. (Quoted in part)

6614
Pietrasanta, A. C.
JET NOISE PROBLEM IN AIRCRAFT CARRIER ISLANDS. — Jour. Acoust. Soc. Amer., 28 (3): 427-433, May 1956. DLC (QC221.A4, v. 28)

Measurements were made of the sound pressure levels (SPL) present in the important control and communication spaces of aircraft carriers during normal jet operations. It was found that the noise levels in important island spaces during jet run-up operations were such as to cause serious interference with speech communication. Noise levels could be estimated from a knowledge of jet engine operating conditions and from the physical properties of the structures involved. It is demonstrated that the amount of noise reduction required for a particular space in aircraft carriers can be determined by comparison of calculated noise levels with a speech communication design criterion.

6615
Ribner, H. S.
BOUNDARY-LAYER-INDUCED NOISE IN THE INTERIOR OF AIRCRAFT. — Univ. of Toronto Institute of Aerophysics, Canada. UTIA Report no. 37, April 1956. v+24+8 p. AD 104 059 UNCLASSIFIED
Also published in Canad. Aeronaut. Jour., 2 (10): 350-353. Dec. 1956. DLC (TL501.C2713, v. 2)

The acoustic effects of the running ripples formed in an airplane fuselage skin by the turbulent boundary layer at high speeds are calculated for an infinite sheet. It is shown that supersonically moving ripples radiate strong sound in the form of Mach waves, while subsonically moving ripples radiate no sound. Formulas for the mean square surface pressure and the energy flux are obtained for an assumed idealized turbulent pressure spectrum. The results are adapted to provide a tentative estimate of the noise generated at subsonic speeds in a practical fuselage by standing waves produced at

the frames and stringers through multiple reflection of the ripples. It is suggested that the cause of boundary layer noise at subsonic speeds may be eliminated by support of the fuselage skin without crosswise constraints. (Quoted in part).

6616
Schipper, L. M.,
J. Versace, C. L. Kraft, and J. C. McGuire
HUMAN ENGINEERING ASPECTS OF RADAR AIR TRAFFIC CONTROL. II AND III: EXPERIMENTAL EVALUATIONS OF TWO IMPROVED IDENTIFICATION SYSTEMS UNDER HIGH DENSITY TRAFFIC CONDITIONS. — Ohio State Univ. Lab. of Aviation Psychology and OSU Research Foundation, Columbus (Contract AF 33(616)-43); issued by Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 7192) WADC Technical Report no. 56-68, July 1956. vii+45 p. AD 110 527 PB 127 799

Radar air traffic controller performance was investigated in simulated return-to-base problems at several traffic densities with two improved identification systems (the Clock Code omnipresent system using a symbolic code attached to each blip and the Light Pencil interrogation system which gave on-demand identification). The two identification systems are equally satisfactory from an over-all human engineering viewpoint. With either system plus the use of information displays possessing certain other optimized characteristics, a single experienced controller appears to have little trouble moving very high density traffic through a 50-mile approach control zone safely and efficiently. (From the authors' summary)

6617
Schipper, L. M.,
J. Versace, C. L. Kraft, and J. C. McGuire
HUMAN ENGINEERING ASPECTS OF RADAR AIR TRAFFIC CONTROL. IV. A COMPARISON OF SECTOR AND IN-LINE CONTROL PROCEDURES. — — Ohio State Univ. Lab. of Aviation Psychology and OSU Research Foundation, Columbus (Contract AF 33(616)-3612); issued by Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 7192). WADC Technical Report no. 56-69, Sept. 1956. v+27 p. AD 110 528 PB 121 773

Two novice controllers worked alternately with a highly-skilled controller under two conditions of heavy traffic flow on a simulated problem of a return-to-base mission of 26 jet (bomber and fighter) aircraft. All measures of system efficiency except estimated excess delay buildup showed no differences between systems, controllers, or rates of entry. The delay criterion indicated a statistically significant difference between the two novice controllers in terms of time over and above a theoretical minimum landing time. At rates still higher than 60 per hour, the sector system of control may prove to be significantly superior to the in-line system.

6618
Schipper, L. M.,
and J. Versace
PREDICTIONS OF ARRIVAL SEQUENCES OF SIMULATED RADAR TARGETS AS A FUNCTION OF DISPLAY SIZE, TARGET SIZE, AND TARGET SHARPNESS. — Ohio State Univ. Lab. of Aviation Psychology and Research Foundation, Columbus (Contract AF 33(616)-3612); issued by Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio. WADC Technical Report no. 56-72, Nov. 1956. v+13 p. (Project no. 7192). AD 118 275 PB 131 179

The ability of observers to judge which of two aircraft would arrive at a fixed reference line first was investigated as a function of simulated display size, target size, and target sharpness. The effects of display size were measured for 10-in. and 20-in. displays and for target sizes of 1, 2, 4, and 8 mm. in diameter on the smaller display, and 2, 4, 8, and 16 mm. in diameter on the larger display. Targets were either sharply in focus or somewhat out of focus. A range of traffic situations was provided by using six speed combinations for the pairs of aircraft and nine values of differential times-to-go. The display was a static presentation of five equal-brightness blips in trail. It is concluded that (a) the accuracy of estimates of arrival sequences of two aircraft flying parallel courses is unaffected by display and target size and by blip sharpness within the ranges used here, and (b) response times are slightly increased with the larger display (relative to the smaller one) when the absolute size of the blip is the same on both. (From the authors' summary)

6619
Senders, J. W.,
and J. V. Bradley
EFFECT OF BACKLASH ON MANUAL CONTROL OF PITCH OF A SIMULATED AIRCRAFT. — Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio. WADC Technical Repor. no. 56-107, March 1956. iii+4 p. (Project no. 7182-71555). AD 95 404 PB 135 239

Five subjects, including two pilots, operated a simulated aircraft in pitch with various amounts of simulated backlash in the control system. Their integrated error, generated in attempting to compensate for an external disturbance, was determined as a function of backlash. The results suggest a straight line function at perceptible backlash values. No evidence of instability was seen for any of the conditions studied. The results, although tentative, have implications and applications in the fields of control design and trainer design. (Authors' abstract)

6620
Senegas, R.,
and G. Canton
[SPECIAL ASPECTS OF PILOTING JET AIRCRAFT DURING BLIND FLIGHT] Aspects particuliers du pilotage des avions à réaction au cours du vol sans visibilité. — Médecine aéronautique (Paris), 11 (1): 93-96. 1956. In French.
DLC (TL555.M394, v. 11)

From consideration of the sensations of disequilibrium and anxiety caused by "blind" flight, and their effect on performance, it is concluded that periodic, extensive training under actual blind flight conditions is required to increase confidence

and to familiarize pilots with the problem of instrument flying. It is suggested that the capacity of pilots for instrument flight be evaluated by medical, as well as by technical personnel.

6621
Squires, P. C.
THE SHAPE OF THE NORMAL WORK AREA. — Naval Medical Research Lab., New London, Conn. Report no. 275 (vol. 15, no. 4), July 23, 1956. iii+3 p. (Project no. NM 002 014.08.10).
AD 117 556 UNCLASSIFIED

The "normal" work area, as represented by two intersecting semicircles, found in standard texts and human engineering manuals, is incorrect. A species of epicycloid curve is proposed as the correct and desirable contour for the normal work area; the parametric equations of this curve are given, based on anthropometric data. The epicycloid contour recommended would be useful in situations where instruments and visual displays must be arranged compactly and operator movement is relatively restricted. The proposed work area contour is natural and comfortable for the operator. (Author's abstract)

6622
Teeple, J. B.,
H. J. Bond, and R. B. Sleight
HOW TO DESIGN A COCKPIT: "FROM THE MAN OUT". — Aviation Age, 25 (1): 18-25. Jan. 1956. DLC (TL501.A8187, v. 25)

The human engineering approach to cockpit design is elaborated. According to it the cockpit can be divided into a series of work areas on the basis of arm reach and visual capacity. Each of these areas is coded on conditions of visibility, reachability, degree of head motion involved, and the extent of arm movement. The pilot's tasks are coded on the basis of conditions under which they are performed, the frequency of performance, and characteristics of the controls employed. The proper placement of controls can then be determined by matching the code numbers of the task to the work area that duplicates the code.

6623
Turner, W. R.
FIGHTER AIRCRAFT OPERATIONS IN THE TROPICS. — Tactical Air Command Surgeon's Bulletin (Headquarters Tactical Air Command, Langley Air Force Base, Va.), 6 (2): 1-7. Feb. 1956. DNLM

Among the problems military aviators stationed in tropical areas are faced with the following are prominent: exposure to high air vapor pressure, which inhibits body heat discharge by evaporation-convection; loss of mental initiative; lack of seasonal changes; primitive types of shelter; insects and animals peculiar to the environment; fatigue; and boredom. Among the operational problems encountered by fighter pilots in the tropics are the long periods of alert pose and the extensive, elaborate personal equipment that must be worn at all times during the alert period. To alleviate this problem air-conditioned alert rooms and modified flight clothing are recommended. While airborne, the most important problem encountered is the decrease of ambient temperature with increasing altitude. Protection of the flier against cold under these conditions is suggested by either heat insulation of clothing, use of electrically heated suits, or warming the entire cockpit area. Mention is made of the problem of drowziness upon descent from cold altitudes to tropical heat and humidity, the necessity for protective sunglasses, and the prevention of sunburn.

6624
Versace, J.
THE EFFECT OF EMERGENCIES AND COMMUNICATIONS AVAILABILITY WITH DIFFERING ENTRY RATES: A STUDY IN HUMAN ENGINEERING ASPECTS OF RADAR AIR TRAFFIC CONTROL. — Ohio State Univ. Lab. of Aviation Psychology and OSU Research Foundation, Columbus (Contract AF 33(616)-3612); issued by Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 7192). WADC Technical Report no. 56-70, Dec. 1956. viii+72 p.
AD 118 320 PB 131 266

This experiment is the fifth in a series using the OSU electronic air traffic control simulator and conducted for the purpose of determining the capacities of human controllers for performing different control functions. The problem studied was that of two controllers in moving a group of 32 jet bombers and fighters through the terminal zone which extended for a radius of 50 mi. from the GCA gate. The three variables evaluated in the experiment were (a) presence vs. absence of direct, face-to-face communication between controllers, (b) presence vs. absence of emergencies, and (c) traffic load-average separation of 45, 60, and 90 sec. per aircraft. Partially optimized displays, providing identity coding, were used. Results indicated that system efficiency, measured by such criteria as fuel economy, control time, and safe separations at the GCA gate, decrease significantly as entry rate is increased. However, the presence of 10 percent emergencies, and the lack of face-to-face communication between controllers did not degrade the performance of the system. (Author's abstract)

c. Instruments and Controls (including Visual displays, Warning devices)

6625
Adiseshiah, W. T. V.,
and M. S. Prakash Rao
EFFECT OF CHANGES IN POINTER SHAPES ON SPEED AND ACCURACY IN ALTIMETER READING. — Aero Med. Soc. Jour. (New Delhi), 3 (1): 8-16. April 1956. DNLM

A comparative study was made of the speed and efficiency of altitude reading with a conventional three-pointer altimeter and with an altimeter in which (1) the small and medium pointers were replaced, respectively, with an arrow-shaped pointer and with a pointer containing a circle, to eliminate the eclipse of one pointer by another; (2) the rear elongation of the long pointer was fan-shaped, to prevent eclipsing, and (3) additional reference marks were inserted inside each numeral of the dial face. The modified design altimeter was found in instructor and student pilots

and navigators to increase the speed of dial reading by 30% and to reduce reading errors under time stress conditions by 29%. The reduction in time and errors of dial reading was independent of efficiency changes with age or flying experience. The most frequent reading error, that of misreading the setting by one thousand feet as a result of reading to the nearest numeral rather than to the lower adjacent numeral, was not reduced by the modified design altimeter. It is suggested that the single-pointer counter-type altimeter is a more efficient device for the provision of accurate and rapid altitude readings than either three-pointer design.

6626
Baker, C. A.,
and J. M. Vanderplas
SPEED AND ACCURACY OF SCALE READING AS A FUNCTION OF THE NUMBER OF REFERENCE MARKERS. — Jour. Applied Psychol., 40 (5): 307-311. Oct. 1956. DLC (BF1.J55, v. 40)

The study was designed to investigate the speed and accuracy of determining target position on a polar coordinate display as a function of the number of scale rings. Polar coordinate displays of 5, 7, 9, or 11 in. in diameter with 1, 3, 5, 10, 20, or 40 scale rings were used. Error of interpolation decreased as a function of the number of scale rings used. The frequency of gross errors (misidentification of scale rings) and the time required to make readings increased as a function of the number of scale rings. Increasing display size improved interpolation accuracy slightly and decreased the frequency of gross errors markedly. Constant errors of interpolation were found to be a function of the position of the target between scale rings and also a function of the number of scale rings used. An analysis of the practice effects reveals that the subjects continued to improve in both speed and accuracy throughout the experiment. (From the authors' summary)

6627
Bradley, J. V.
EFFECT OF KNOB ARRANGEMENT ON CONSUMPTION OF PANEL SPACE. — Wright Air Development Center. Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 7182-71514). WADC Technical Report no. 56-202, June 1956. iii+9 p. AD 107 257 PB 121 518

This report presents relative likelihood of accidental operation as a function of panel space required for a number of multiple-knob arrangements. Data are derived from two previously reported experiments. It is concluded that, of the arrangements compared, economy of panel space and unlikelihood of accidental operation are best combined by using a line of 1/2-inch diameter knobs mounted side by side with 3/4 to 1 1/4 inches between edges (preferably an inch or more if inadvertent operation is a serious consideration). Regardless of the number of knobs involved, this type of arrangement is preferred over those in which 1-inch diameter knobs are mounted side by side or shielded knobs are mounted on concentric shafts. Likelihood of inadvertent operation is inferred from the frequency of knob operations in which unprotected adjacent knobs were touched and, therefore, might have been thrown off their settings. Conclusions therefore can be considered as applying only to knobs capable of being operated by moderate torque. (Author's abstract)

6628
Bradley, J. V.,
and J. Arginteau
OPTIMUM KNOB DIAMETER. — Wright Air Development Center. Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Research Project no. 7182-71514). WADC Technical Report no. 56-96, Nov. 1956. v+17 p. AD 110 549 PB 121 852

For smooth operating (i.e. nondetented), single-rotation, cylindrical knobs, operation time will be minimized, regardless of frictional resistance, by using a knob diameter of 2 inches. A diameter as small as 1 inch can be used without greatly increasing operation time when frictional resistance is moderate (i.e. when 50 to 100 inch-grams of torque are required to turn the knob). When frictional resistance is heavy (so that 150 - 200 inch-grams of torque are required to turn the knob), diameter cannot be reduced below 1 1/2 inches without considerable increase in operation time. (Authors' conclusions)

6629
Brown, Fred R.,
and A. I. Siegel
CAUTION AND WARNING LIGHT INDICATORS FOR NAVAL AIRCRAFT. I. A REVIEW OF THE PRESENT STATE OF THE ART. — Applied Psychological Services, Villanova, Pa. (Contract N156s-33252); issued by Naval Air Material Center. Air Crew Equipment Lab., Naval Air Experimental Station, Philadelphia, Pa. Report no. NAMC-ACEL-313, Oct. 15, 1956. viii+72 p. AD 132 912 UNCLASSIFIED

A systematic inspection of the use of light indicators in eighteen different Naval aircraft types revealed extreme inter-aircraft variability in the location of lights, the items displayed by lights, the number of lights employed, and the manner of labeling lights. Newer aircraft types generally showed an increase in the number of lights employed, and changes in the operational malfunctions indicated by lights. Conflicting recommendations were found in a survey of pertinent literature concerning the use of lights, particularly in the use of flashing versus steady lights. It is suggested that studies be made of the desirable physical characteristics of cautionary and warning light indicators, the relative utility of centrally located warning light units with peripherally located caution light units, and the utility of auditory indicators.

6630
Burrows, A. A.,
and F. G. Cummings
EVALUATION OF A TACTILE WARNING DEVICE. — RAF Inst. of Aviation Medicine (Gt. Brit.), Farnborough; issued by Flying Personnel Research Committee (Gt. Brit.). Report no. FPRC 973, July 1956. 6 p. AD 107 627 UNCLASSIFIED

An aerodynamic warning device providing oscillatory motion of the control column grip as an indicator

of the necessity for control repositioning was tested on a flight simulator. No significant difference was observed in the speed of pilots' responses to the vibratory warning system or to a visual signal displayed directly before the eyes. The device apparently did not interfere with sensitive control action in extreme corrective flying.

6631
Campbell, C. J.,
L. J. McEachern, and E. Marg
AIRCRAFT FLIGHT BY AN OPTICAL PERISCOPE. — Jour. Optical Soc. Amer., 46 (11): 944-949. Nov. 1956. DLC (QC350.06, v. 46)

A binocular aircraft periscope was constructed and installed in the nose of a B-17 aircraft equipped with a duplicate set of controls. The periscope provided a 70-degree true field of view at a magnification of 1x and 180-degree scanning with mechanically operated azimuth and declination prisms. Flight instruments were included in the field of view. Flight tests with twenty Air Force pilots in a prone position indicated the adequacy of the periscope for most routine flight operations. Some difficulty was encountered in searching for other aircraft and in flying the conventional traffic pattern. (Quoted in part).

6632
Churchill, A. V.
COMPARISON OF TWO VISUAL DISPLAY PRESENTATIONS. — Jour. Applied Psychol., 40 (2): 135. April 1956. DLC (BF1.J55, v. 40)

Dial reading time and errors were compared for two modes of presentation employed for dial legibility studies, namely projection of slides on a screen and the presentation of actual dials. Analysis of the data justifies direct application of slide-projection data to actual displays represented by the slides.

6633
Churchill, A. V.
THE EFFECT OF SCALE INTERVAL LENGTH AND POINTER CLEARANCE ON SPEED AND ACCURACY OF INTERPOLATION. — Jour. Applied Psychol., 40 (6): 358-361. Dec. 1956. DLC (BF1.J55, v. 40)

Reading time and errors of interpolation decrease significantly as the scale-interval length is increased from 0.25 to 1.5 inches, with no improvement at the 2.0-inch interval length. Reading time and errors of interpolation decrease significantly as the pointer clearance is reduced from 2.0 to 0.125 inches, with no improvement at zero clearance. If the response to the first reading of a group is incorrect, there is a tendency toward more errors on the remaining readings in that group than there are when the initial response is correct. There is a tendency toward increased errors on a scale interval of a given length if it is preceded by a shorter scale interval. The majority of errors tend toward the interval extremes on the short scale intervals and pointer clearances, and toward the interval mid-point on the long scale intervals and pointer clearance. One inch appears to be the transition point for both scale-interval length and pointer clearance. (Author's summary)

6634
Coonan, T. J.,
and E. T. Klemmer
READING LINEAR SCALES: THE CONTRIBUTION OF EYE MOVEMENTS TO ACCURACY. — Air Force Cambridge Research Center, Operational Applications Lab., Bolling Air Force Base, Washington, D. C. AFCRC-TN-56-8, Oct. 1956. 10 p. AD 98 829 PB 126 760

Subjects were tested in two scale reading tasks: one allowing only a single eye fixation; the second allowing two or more fixations. Exposure duration was varied from 0.10 sec. to 1.00 sec. in both tasks. The results were as follows: (1) The median time of occurrence of the first eye movement was 0.17 sec. with a range from 0.11 sec. to non-occurrence. (2) There was a large decrease in the number of scale reading errors when exposure time was increased from 0.15 sec. to 0.30 sec. (3) There was a correlation of 0.92 between the stimulus point presented and the point fixated after the first eye movement. When the exposure duration was short, eye movement directly to the pointer usually occurred after the stimulus had disappeared. In this case the correlation between the stimulus point presented and the point fixated after the first eye movement was 0.87. And (4) at exposure durations of 0.15 sec. and less the single fixation and the eye movement tests produced about the same level of accuracy, but the single fixation case showed only slight improvement when the exposure duration was increased to 0.30 sec. and above. The eye movement curve showed great improvement when the exposure duration was increased from 0.15 sec. to 0.30 sec. (From the authors' abstract)

6635
Creelman, J. A.
COCKPIT DESIGN PROBLEMS OF TRAINING COMMAND AIRCRAFT. I. T34 AND T28 DIFFERENCES AS REPORTED BY TRANSITIONING STUDENTS. — Naval School of Aviation Medicine, Pensacola, Fla. Special Report no. 56-34, Dec. 14, 1956. [9 p.] AD 124 771 PB 130 844

A questionnaire was administered to students to determine the greatest sources of difficulty while making the transition from T34 to T28 aircraft, with reference to cockpit design and layout. It was found that students mention control inadequacies more frequently than problems in obtaining and interpreting visual data. The controls which cause the most trouble are the flap handle, T28 blower handle, and T28 magneto switch. (Author's summary, modified)

6636
Creelman, J. A.,
and E. E. Miller
EVALUATION OF A "MOVING AIRPLANE" ATTITUDE INDICATOR. — Naval School of Aviation Medicine, Pensacola, Fla. Research Project no. NM 001 109 107, Report no. 3, Sept. 12, 1956. [16] p. AD 147 131 UNCLASSIFIED

Under controlled field conditions the rates of student learning on two types of attitude gyro were compared. These were (a) an indicator in which the miniature airplane was the moving element,

and (b) an indicator in which the artificial horizon moved. The results indicated that there was only one significant difference on measures of student learning. The transition to the standard attitude gyro from the indicator with a small moving airplane was easier than the opposite transition. The small differences that did exist tended to favor the standard attitude gyro. (Authors' abstract)

6637
De Vienne, J.
PICTORIAL AIR TRAFFIC DISPLAY COULD ALERT PILOT TO POTENTIAL COLLISIONS. — SAE Jour., 64 (12): 38-41. Nov. 1956.
DLC (TL1.S5, v. 64)

An instrument is proposed for the pictorial display of approaching aircraft and the identification of aircraft on a collision course. Procedures and rules for the taking of evasive action on the basis of information presented by the display are discussed.

6638
Eckstrand, G. A.,
and R. L. Morgan
THE INFLUENCE OF TRAINING ON THE TACTUAL DISCRIMINABILITY OF KNOB SHAPES. — Wright Air Development Center. Aero Medical Lab., Wright-Patterson Air Force Base, Ohio. Project no. 7182-71513. WADC Technical Report no. 56-8, Jan. 1956. iv+16 p. AD 94 606
UNCLASSIFIED

An abstract of this paper was published in 1955 (see item no. 4094, vol. IV).

6639
Elkind, J. I.
CHARACTERISTICS OF SIMPLE MANUAL CONTROL SYSTEMS. — Massachusetts Inst. of Technology. Lincoln Lab., Lexington. Technical Report no. 111, April 6, 1956. vi+145 p.
AD 94 646 UNCLASSIFIED

A method for measuring and describing the characteristics of manual control systems is presented. The method is applied in an experimental study of the characteristics of simple manual systems. The experimental results are discussed and analytic models are derived that approximate the measured characteristics. An analogue computer developed to implement the measurement of the system characteristics is described. (From the author's abstract)

6640
Elliott, D. N.,
and E. F. Howard
EFFECT OF POSITION UPON WARNING LIGHT EFFECTIVENESS. — Perceptual and Motor Skills, 6 (2): 69-72, June 1956.
DLC (BF311.P36, v. 6)

Nineteen subjects were presented with a flat display panel with 16 red lights on it. Their task was to depress a foot pedal as quickly as possible whenever a light came on, while at the same time performing a compensatory pursuit task with a hand control. Peripheral lights elicited slower responses, and the effect of peripheral location was greatest for the lights located on the upper portion of the display panel. (Authors' summary)

6641
Ely, J. H.,
R. M. Thomson, and J. Orlansky
DESIGN OF CONTROLS. — Dunlap and Associates, Inc. (Contract AF 33(616)-419) and Wright Air Development Center. Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 7180, Task no. 71501). WADC Technical Report no. 56-172, Nov. 1956. ix+97 p. AD 118 023
PB 121 970

Proper design of controls is an important factor affecting operator performance in most man-machine systems. This report provides a compilation of human engineering recommendations concerning various aspects of control selection and design. Whenever these recommendations are the direct outgrowth of research in this field, the appropriate research studies are cited. Other recommendations, particularly those in Part 3, have been developed by the authors from their own experiences. The report is divided into three main parts: Selection of Proper Control; General Control Design Considerations; and Detailed Design Recommendations for Specific Controls. Tables and figures are used frequently as means of presenting recommendations. A table of contents and a subject index are also provided as aids to the user. (Authors' abstract) (85 references)

6642
Foley, P. J.
EVALUATION OF ANGULAR DIGITS AND COMPARISONS WITH A CONVENTIONAL SET. — Jour. Applied Psychol., 40 (3): 178-180. June 1956.
DLC (BF1.J55, v. 40)

A new set of digits designed to make maximum use of easily discriminated forms was studied. Data on confusion errors are given. The legibility of the new digits is not independent of whether they are presented as black on a white ground or as white on a black ground. At low illumination levels white on black is more legible, the reverse being true at high illumination levels. Comparisons with a conventional set, the Mackworth digits, at different illumination levels, exposure times, and angles of view, show the new set to be significantly more legible under all of these conditions. (Author's summary and conclusions)

6643
Fragola, C. F.,
and M. A. Sant Angelo
INTEGRATED FLIGHT EQUIPMENT SYSTEM WITH PRIMARY EMPHASIS ON INSTRUMENTATION AND CONTROLS. — Aeronaut. Engin. Rev., 15 (5): 62-69. May 1956.
DLC (TL501.A26, v. 15)

The integration of the pilot within the total flight control system is discussed within a servoanalysis framework modified to accommodate the physiological and psychological characteristics of the human operator. The problems of instrumentation and controls include full exploitation of the hierarchy of

control loops with clear differentiation of the monitor and stand-by types of instrumentation and the accompanying concepts of redundancy and duplication. The display requirements present the problems of symbolic versus pictorial presentation. Regardless of the degree of automatization achieved, the instrumentation must allow a rapid transition from automatic to manual controls with minimal adjustment for the operator.

6644
Gaito, J.
ELAPSED TIME CLOCKS, OPTIMUM PRESENTATION FOR: THE EFFECTS OF DIFFERENT METHODS OF PRESENTATION OF TIME INFORMATION ON LEGIBILITY. — Naval Air Material Center. Air Crew Equipment Lab., Philadelphia, Pa. Report no. NAMC-ACEL-271, May 25, 1956. [56] p. AD 114 674 UNCLASSIFIED

The present experiment is concerned with the effects on legibility of eight types of aircraft clock designs presenting both time of day and elapsed time by means of direct reading counters and/or pointers on one or two instruments. Using average number of errors, variability of errors, average time to read, and variability in time to read as the major criteria of legibility, a paper and pencil test administered to experienced pilots revealed that the types presenting both kinds of time information by means of counters on one instrument were superior to the others for quantitative readings. A questionnaire and group interview indicated that the main uses of both time of day and elapsed time information were quantitative and that the pilots preferred the types that had been shown to be superior in the test. (Author's abstract)

6645
Gallup, H. F.,
and W. C. Hambacher
HUMAN ENGINEERING INVESTIGATIONS OF THE INTERIOR LIGHTING OF NAVAL AIRCRAFT: INVESTIGATIONS INTO THE OPTIMAL CHARACTERISTICS OF VISUAL LIGHT INDICATOR SYSTEMS. AN EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF VARIATION IN TEMPORAL CHARACTERISTICS OF LIGHTS ON THEIR ATTENTION-GETTING VALUE, WITH REFERENCE TO MASTER WARNING AND CAUTION SYSTEMS. — Naval Air Material Center. Naval Air Experimental Station, Philadelphia, Pa. Report no. NAMC-ACEL-298, Aug. 17, 1956. xi+8 p. (TED NAM EL 52004, Part 6). AD 112 767 UNCLASSIFIED

The need for more adequate warning and caution systems is discussed in terms of the greater probability of physical malfunction inherent in higher performance aircraft, with resulting increase in the probability of human errors. Suggestions for both a Master Warning System and a Master Caution System, incorporating check-off lists, are presented and their advantages over extant systems are expressed in terms of certain basic requirements of an optimal system. In order to evaluate their possible usefulness in light indicator systems, the effectiveness of three types of lights (steady, flashing, and alternating) as attention gainers was studied in a factorially designed experiment. The results of an analysis of variance performed on the data indicate that there are no significant differences in reaction time to the onset of the three types of lights used in this experiment, when these lights are presented peripherally at an angle of from 31° to 45°. This relationship holds despite the fact that the steady light provided a much greater total light flux to the eyes of the subjects than did the other two types of lights. (From the authors' abstract)

6646
Gallup, H. F.,
W. O. Hambacher, and J. R. Dolby
HUMAN ENGINEERING INVESTIGATIONS OF THE INTERIOR LIGHTING OF NAVAL AIRCRAFT: INVESTIGATIONS INTO THE OPTIMAL CHARACTERISTICS OF VISUAL WARNING AND CAUTION SYSTEMS. THE ATTENTION-GETTING VALUE OF A STEADY LIGHT AS A FUNCTION OF BRIGHTNESS, WITH RESPECT TO RAPIDITY AND RELIABILITY. — Naval Air Material Center. Air Crew Equipment Lab., Philadelphia, Pa. (TED NAM EL 52004, Part 9). Report no. NAMC-ACEL-301, Oct. 8, 1956. vii+15 p. AD 112 764 UNCLASSIFIED

One subject sat in a mock-up of the F7U Cutlass cockpit, outside of which was mounted a tracking task. The subject operated the tracking task and pressed a response key as rapidly as possible when a stimulus light appeared. Both day and night conditions were tested using 10 brightness levels in each. On all trials, the onset of the steady light occurred outside the visual field of the subject. After delay of 5 seconds, the tracking task was automatically switched so that the stimulus area was included in the visual field. Each night session was preceded by 15 minutes dark adaptation. The results showed that, in order for a steady light to be as attention-getting as either flashing or alternating lights, its brightness must be increased many times above the brightness of either the flashing or alternating lights. Also, unless the onset of the steady light is detected, it is not seen at all under day conditions, and only occasionally seen under night conditions. (From the authors' abstract)

6647
Gerall, A. A.,
P. B. Sampson, and S. D. S. Spragg
PERFORMANCE ON A TRACKING TASK AS A FUNCTION OF POSITION, RADIUS, AND LOADING OF CONTROL CRANKS. I. STATIONARY TARGETS. — Jour. Psychol., 41 (1): 135-150. Jan. 1956.
DLC (BF1.J67, v. 41)

This study investigated the relationship between the performance of operators on a simple two-hand target acquisition task and two positions of the controls, three sizes of crank radii, and three magnitudes of force requirements. As subjects served 180 recruits with anthropometric data available for 90 of them. The control position which was more natural and continuous with the movement of the target and target follower resulted in a higher and less variable performance level. With this position the approximate ranges for optimal performance suggested with different sizes of crank radii were: (1) 2-in. radius with low torque demand of the system, (2) 4-in. radius with torques between 10 and 40 inch-pounds, and (3) 6-in. radius with torques above 40 inch-pounds. Also

in this control arrangement an increase in coulomb friction causes a decrease in performance for all crank sizes.

6648
Gerall, A. A.,
P. B. Sampson, R. F. Green, and S. D. S. Spragg
PERFORMANCE ON A TRACKING TASK AS A FUNCTION OF POSITION, RADIUS, AND LOADING OF CONTROL CRANKS. II. MOVING TARGETS. — Jour. Psychol., 41 (1): 151-156. Jan. 1956. DLC (BF1.J67, v. 41)

This experiment investigated the influence of two different positions, three sizes of radii, and three magnitudes of loadings of control cranks upon performance of a following tracking task. As subjects served 153 military trainees. The performance of operators of a following tracking task was found not to be systematically related to the variables of position, radius, and loading of the control cranks. It is concluded that the results found for a target acquisition task, as reported previously (item no. 6647), do not apply to a following tracking task.

6649
Graham, N. E.
THE SPEED AND ACCURACY OF READING HORIZONTAL, VERTICAL, AND CIRCULAR SCALES. — Jour. Applied Psychol., 40 (4): 228-232. Aug. 1956. DLC (BF1.J55, v. 40)

The speed and accuracy of reading comparable horizontal, vertical, and circular scales has been studied by means of a film. Pictures of the scales were flashed on a screen at 10-second intervals, the exposure time being 1/2 second. The vertical scale is clearly less easy to read than either of the other two displays, particular difficulty being experienced near its ends. The success of the circular scale may be attributed to the fact that it presents a smaller area to be scanned. The shape of the visual field and the relative ease of moving the eyes from side to side, rather than up and down, are thought to account for the greater accuracy on the horizontal scale. (Author's summary)

6650
Hambacher, W. O.,
and H. F. Gallup
HUMAN ENGINEERING INVESTIGATIONS OF THE INTERIOR LIGHTING OF NAVAL AIRCRAFT: INVESTIGATIONS INTO THE OPTIMAL CHARACTERISTICS OF VISUAL WARNING AND CAUTION SYSTEMS. THE EFFECTS OF VARIATION IN TEMPORAL CHARACTERISTICS OF WARNING LIGHTS ON THEIR ATTENTION-GETTING AND -HOLDING VALUE UNDER DAY AND NIGHT CONDITIONS. — Naval Air Material Center. Air Crew Equipment Lab., Philadelphia, Pa. (Project no. TED NAM EL-52004, Part 7). Report no. NAMC-ACEL-299, Aug. 20, 1956. viii+13 p. AD 112 768 UNCLASSIFIED

Twelve subjects whose attention was focused on a tracking task, were required to respond (under both day and night conditions) as rapidly as possible to both the onset and the offset of a stimulus light. The stimuli were steady, flashing, or alternating lights presented peripherally after one of four delay periods. Reaction times at night were faster than during the day for all kinds of light, onset and offset. Reaction times to onset of lights were faster than to offset for both flashing and alternating lights, but not for steady lights. Reaction times to the onset of steady, flashing, and alternating lights were the same, both under day and night conditions. Steady lights showed superiority only with reaction times to offset of lights.

6651
Hambacher, W. O.,
and H. F. Gallup
HUMAN ENGINEERING INVESTIGATIONS OF THE INTERIOR LIGHTING OF NAVAL AIRCRAFT: INVESTIGATIONS INTO THE OPTIMAL CHARACTERISTICS OF VISUAL WARNING AND CAUTION SYSTEMS. THE EFFECTS OF VARIATION IN TEMPORAL CHARACTERISTICS OF WARNING LIGHTS, PRESENTED AGAINST A HETEROGENEOUS BACKGROUND, WITH THE LIGHT ONSET OCCURRING BOTH WITHIN AND OUTSIDE OF THE VISUAL FIELD. — Naval Air Material Center. Air Crew Equipment Lab., Philadelphia, Pa. (Project no. TED NAM EL-52004, Part 8). Report no. NAMC-ACEL-300, Aug. 27, 1956. ix+11 p. AD 112 765 UNCLASSIFIED

Ten subjects (while engaged in a tracking task) were required to respond (under both day and night conditions) to three visual stimuli (flashing, alternating, and steady lights) which were randomly presented both inside and outside of the visual field against a heterogeneous background. Under night conditions, when the onset of the lights occured within the visual field of the subjects (near condition) reaction times were significantly faster to the alternating lights than to either flashing or steady lights which did not differ. Moreover, on 53% of the trials with the steady light, the subjects failed to make any response. When the onset of the stimuli occurred outside of the visual field (far condition), both flashing and alternating lights resulted in reaction times which were significantly faster than those to steady light; to alternating lights, significantly faster than to a flashing light. Both day and night conditions are included in this relationship. No response was made to the steady lights in 33% of the night trials, in 72% of the day trials.

6652
Hauty, G. T.,
R. B. Payne
FATIGUE AND THE PERCEPTUAL FIELD OF WORK. — Jour. Applied Psychol., 40 (1): 40-46. Feb. 1956. DLC (BF1.J55, v. 40)

Proficiencies in the control of several simulated aircraft instruments were appraised throughout 7 hours of work to determine if the control of marginally located instruments suffered greater progressive impairment than did the control of those instruments located centrally on the instrument panel. Progressive decrement in proficiency occurred for all instruments, but the rates of decline were not found to be significantly different. It is concluded that in a similar work situation, dissociative changes in a field of visual displays are not likely to occur as a function of sustained

and prolonged attendance to this field of work. (Authors' summary)

6653
Hoover, G. W.
LET'S INTEGRATE OUR AIRCRAFT INSTRUMENTS! — SAE Jour., 64 (1): 72-74. Jan. 1956.
DLC (TL1.S5, v. 64)

Since all forms of flight, whether take-off, rendezvous, approach, or landing, are fundamentally the same, any instrument system is adequate for any aircraft or phase of flight. The purpose of the instrument system is to effect an efficient integration of man and machine as a computer system by proper integration and display of information. The present organization of instrument development in subdivisions corresponding to the phases and purposes of flight, which results in duplication of sensors, amplifiers, computers, and displays for each system, must therefore be replaced by a program of integration of the many subsystems into a reliable, light-weight, universal system applicable to any mission.

6654
Jäger, M.
[TECHNOLOGY ON CRUTCHES] Technik an Krücken. — Flug-Revue (Stuttgart), 1956 (11): 6-7. Nov. 24, 1956. In German. DLC (TL503.C524, v. 1956)

The complexity and multitude of dials in cockpit instrumentation is deplored in view of the limited sensory capacity of the pilot for information input. Visual limitations such as dark and light adaptation further obstruct the flow of information. Among suggestions offered from the human engineering view point are: (1) combination of separate controls into systems with a single index, (2) use of colored indices, (3) use of uniform system of measurements, (4) taking the airplane as a reference system for instrumentation, etc.

6655
Katchmar, L. T.,
S. Ross, and T. G. Andrews
DIRECTION AND MAGNITUDE OF RESPONSE ERRORS IN A HORIZONTAL DISPLAY-CONTROL PATTERN. — Jour. Exper. Psychol., 51 (4): 282-286. April 1956. DLC (BF1.J6, v. 51)

This experiment investigated the effects of certain display-control variables on the number of errors and the direction of errors committed in a perceptual-motor task. It is concluded that performance on the task used is significantly affected by the type of response made. The greater number of errors is associated with the motor response. Accuracy for certain signal or response positions differs with the type of response. For verbal responses the positions in the left half of the 9- and 11-light displays were more accurate. For motor responses the positions at the ends of the display showed the greatest accuracy. Directional errors appear to be a function of the type of response made. For verbal responses errors are predominantly to the left, while for motor responses errors are predominantly to the right. Magnitude of directional errors was not found to be significant. Distance between signal positions does not prove to be significant for any but the 11-light display. (Authors' summary, modified)

6656
Kelly, J. J. 1956
THE FLIGHT INSTRUMENT PANEL. — Air Line Pilot, 25 (9): 11-12. Sept. 1956.
DLC (TL501.A5537, v. 25)

The position of flight and power instruments within the cockpit, relative to each other, should be arranged as to require minimum eye travel from one group to the other in making power changes, or in monitoring power settings, and this "scanning" should be in the horizontal plane. The briefest interval of distraction from flight instruments awkardly located in the cockpit may result in the fatal crash of high performance aircraft.

6657
Klemmer, E. T.
TIME SHARING BETWEEN AUDITORY AND VISUAL CHANNELS. — In: Symposium on Air Force human engineering, personnel, and training research, p. 199-203. Air Research and Development Command, Baltimore, Md. ARDC Technical Report 56-8, 1956.
DLC (UG633.A377163, no. 56-8, 1956)

Three subjects were given tests in which they attempted to follow flashing lights and brief tones by pressing appropriate keys. Only one channel was activiated at a time and the rate of alternation between channels was varied systematically between tests. The rate of stimulus presentation in the active channel was 2 per sec. and 3 per sec. in separate tests. The results indicated that forcing a subject to alternate regularly between tasks more rapidly than once every 2 sec. lowers his over-all performance sharply. It also appeared that forced time sharing between tasks of different difficulties leads to a greater decrement in performance on the easier task. The average reaction was close to that for the more difficult channel alone. (Author's summary)

6658
KOLLSMAN HAS INTEGRATED FLIGHT INSTRUMENT SYSTEM. — Skyways, 15 (5): 26. May 1956.

The first integrated flight instrument system has been developed by Kollsman to provide complete and relatively accurate interrelated flight data. The System consists of three pressure instruments, including a sensitive altimeter, a standard indicated airspeed instrument, and a Machmeter; an angle-of-attack sensor; an outside air temperature probe; and a computer. The instruments and computer are interconnected by servo components, so that corrections of data from one instrument are made automatically by reference to data from others.

6659
Kuhn, D.
. . . AND THE COCKPIT OVERFLOWETH. — Air Line Pilot, 25 (7): 10-12. July 1956.
DLC (TL501.A5537, v. 25)

A proposal is made for simplification of cockpit instrumentation, and for modification of cockpit re-

quirements imposed on the pilot. These factors complicate flying operations by presenting work loads exceeding human capabilities.

6660
Kurke, M. I.
EVALUATION OF A DISPLAY INCORPORATING QUANTITATIVE AND CHECK-READING CHARACTERISTICS. — Jour. Applied Psychol., 40 (4): 233-236. Aug. 1956. DLC (BF1.J55, v. 40)

By use of a card-sorting experiment, a comparison of three dial designs was made from the standpoint of accuracy and the speed of check-reading. It was demonstrated that the conventional method of red lining a dial to indicate a deviation from "safe and normal" operation is significantly better than no "redline" indication at all provided the criteria are errors, or reading time isolated from associated motor activity. The experimental dial design principle is significantly more efficient than the other two, regardless of the three measures used in comparison. It is suggested that the experimental dial design is more easily read due to the fact that a simpler form of visual discrimination is required than for the task of reading the other dials. (Author's summary, modified)

6661
Lincoln, R. S.,
and E. Averbach
SPATIAL FACTORS IN CHECK READING OF DIAL GROUPS. — Jour. Applied Psychol., 40 (2): 105-108. April 1956. DLC (BF1.J55, v. 40)

Observers were required to detect deviant pointers within a display panel of 16 circular dials. For each dial the null point was located in the 9 o'clock position. Throughout the experiment the spatial locations of the deviant pointers within a panel were controlled in such a way that it was possible to determine the percentage of deviations detected as a function of quadrant location and position within quadrants. The consistency of these spatial effects was determined over three durations of panel exposure. The results showed that spatial location was an important determinant of the number of detections that were made. The pattern of detections that appeared seems to confirm the idea that the scanning habits which observers use are highly related to previously learned reading habits. (Authors' summary)

6662
Loveless, N. E.
DISPLAY-CONTROL RELATIONSHIPS ON CIRCULAR AND LINEAR SCALES. — Brit. Jour. Psychol., 47 (4): 271-282. Nov. 1956. DLC (BF1.B7, v. 47)

The variation in tracking performance between different quadrants of a circular scale has been shown to be attributable mainly to the ambiguity of display-control relationships on this scale, in that the motion of the pointer may be viewed as either rotary or translatory. The dominant tendency is to view it as rotary, a clockwise control movement being associated with a clockwise pointer movement; but there is a significant secondary tendency to view it as translatory, a clockwise control movement being associated with a displacement of the pointer upwards or to the right, according to the quadrant in which the target lies. The two tendencies conflict when the target is in the lower and right-hand quadrants, where performance is consequently poorer. Performance is also affected by position in the visual field as such. It has been verified that a clockwise control movement is expected to send the pointer to the right on a horizontal linear scale and upward on a vertical linear scale. Performance on the horizontal scale is no better than that obtained on the circular scale under optimal conditions, but the unambiguity of the linear scale renders it preferable, where erroneous reactions are to be avoided. (Author's summary)

6663
Morss, M.
HIGH-PERFORMANCE INSTRUMENTATION: APPROPRIATE EQUIPMENT FOR A MACH 2 FIGHTER: A PILOT'S SUGGESTIONS. — Flight (London), 70 (2496): 811-813. Nov. 23, 1956. DLC (TL501.F5, v. 70)

An instrument panel designed for the probable performance and associated flight attitudes of a Mach 2 fighter would include: (1) a true air speed indicator adapted from the present machmeter; (2) an angle-of-attack meter to replace the stall indication function of the airspeed indicator; (3) a single-pointer altimeter, with large units displayed in numerals in a counter window; and (4) instruments showing pitching plane (pitch and vertical speed) and rolling and yawing planes (bank, radius of turn, yaw, and compass indication), to substitute for the artificial horizon indicator. It is suggested that the compass and associated instruments be arranged in the lower center of the flight panel, and that instruments dealing with flight in the pitching plane be arranged in the top row, with the pitch instrument in the center, the speed instrument on the left, and the vertical speed and altitude indicators to the right.

6664
Naval Air Test Cen.
EVALUATION OF "MOVING AIRPLANE" DISPLAY. — Naval Air Test Center, Patuxent River, Md. (Project TED no. PTR AE-7058.3). Report no. 1 (Final), Nov. 14, 1956. [17] p. AD 116 771 UNCLASSIFIED

A "moving airplane" attitude display was evaluated by the Service Test Division in a TV-2 airplane to determine the suitability for all-weather flight, the compatibility between this display and required maneuvers, and the retraining required to transition experienced interceptor pilots to the display. Five fleet pilots and nine NATC test pilots participated in the evaluation for approximately 40 flight hours. The suitability of the "moving airplane" display, as represented by the Summers Flight Attitude Indicator, was inferior to the standard moving horizon reference in that pilot proficiency was decreased, numerous control reversals were experienced, and the attitude reference during LABS maneuvers was inadequate. It was recommended that the "moving airplane" display, in this configuration, not be accepted as a means of presenting flight attitude information. (Author's abstract)

6665
Noble, N.
HUMAN ENGINEERING INVESTIGATIONS OF AIR-

CRAFT COCKPIT VISUAL DISPLAYS. XIX. DESIGN AND DEVELOPMENT OF AN ELECTRONIC TACHISTOSCOPE. — Naval Air Material Center, Air Crew Equipment Lab., Philadelphia, Pa. Report no. NAMC-ACEL-290, Oct. 29, 1956. [35] p. AD 117 404 UNCLASSIFIED

A tachistoscope for use in short interval visual presentation studies was developed and built for the Air Crew Equipment Laboratory by Swarthmore college. The design details and the calibration procedure along with comments on the utilization of the device are presented. (Author's abstract)

6666
Pollack, I.,
and E. T. Klemmer
INFORMATION TRANSMISSION WITH ELEMENTARY VISUAL DISPLAYS [Abstract]. — Amer. Psychologist, 11 (8): 448. Aug. 1956. DLC (BF1.A55, v. 11)

Elementary visual displays, which varied in terms of the length, direction, and curvature of a line, were presented tachistoscopically to university students. Their task was to identify the display by assignment of numerals. Performance was evaluated in terms of the amount of information transmitted by the display. The main results of the study were: (1) The amount of information transmitted was highest with direction and lowest with curvature. (2) The amount of information transmitted with elementary visual displays increased as the number of display variables increased. (3) Substantial improvement in information transmission is associated by combining display elements into a single compound display. (Quoted in full)

6667
Roth, G. L.
THE FLIGHT CONTROL SYSTEM: PILOT, INSTRUMENTS, CONTROLS. — Aeronaut. Engin. Rev., 15 (9): 66-71. Sept. 1956. DLC (TL 501.A326, v. 15)

The historical progress of aircraft instrumentation and controls parallels the advances in aircraft construction. The current trend is reflected by the 80% reduction in power plant controls, levers, etc. on the instrument panel. Their place is taken by partial control systems which relieve the pilot of many coordination tasks. Transition to fully automatic flight control is envisioned as a future development.

6668
Seaman, E. A.,
H. B. Lutz, and R. R. Cretchley
A TELEMETRY SYSTEM FOR RECORDING BODY TEMPERATURES AND HEART BEATS OF HUMAN SUBJECTS UNDER ARCTIC TEST CONDITIONS. — Defence Research Board (Canada). Defence Research Northern Lab. (Canada). DRNL Report no. 4/56, Jan. 25, 1956. [60] p. AD 100 270 UNCLASSIFIED

Preliminary work on the development of a telemetry system for recording deep body temperatures, twelve skin temperatures and heart beats of mobile test subjects is reported. Temperature and heart beat pick-ups, associated amplifiers, transmitting, receiving and recording systems and power supplies are discussed. Consideration is given to problems of portability of the equipment and low temperature operation. (Authors' abstract)

6669
Spragg, S. D. S.,
and D. B. Devoe
THE ACCURACY OF CONTROL KNOB SETTINGS AS A FUNCTION OF SIZE OF ANGLE TO BE BISECTED, AND TYPE OF END-POINT CUE. — Perceptual and Motor Skills, 6 (1): 25-28. March 1956. DLC (BF311.P36, v. 6)

The accuracy with which subjects could bisect various angular extents by turning a knob was investigated as a function of three different kinds of end-point cue: auditory, visual and tactual-kinesthetic. It was found that relative accuracy was greater for the larger angles bisected, the mean constant error (expressed as a percentage) being taken as the index of performance. No significant differences in accuracy were found among the three cues employed. (Authors' summary)

6670
Taylor, F. V.,
and H. P. Birmingham
SIMPLIFYING THE PILOT'S TASK THROUGH DISPLAY QUICKENING. — Jour. Aviation Med., 27 (1): 27-31. Feb. 1956. DLC (RC1050.A36, v. 27)

In order to test the effectiveness of "display quickening" as exemplified in the Sperry Zero Reader (a device designed to automatically compute for the pilot), a four-coordinate tracking task was employed where the subject manipulated two control sticks in order that two target dots on a two-gun cathod-ray tube were kept in view. The response characteristics in each coordinate were roughly equivalent to those of an airplane being controlled in azimuth. Although the subjects were incapable of controlling more than one coordinate at a time when display quickening was not used, all operators came to be able to control all four coordinates when the quickening device was used. Five of the six subjects achieved perfect scores from the second day on during these tests when quickening was employed. Four of them reached nearly identical standards of perfection in the quickened task, although there were wide variations in their efficiency when they were operating without the quickening device to assist them.

6671
Williams, A. C.,
M. Adelson, and M. L. Ritchie
A PROGRAM OF HUMAN ENGINEERING RESEARCH ON THE DESIGN OF AIRCRAFT INSTRUMENT DISPLAYS AND CONTROLS. — Hughes Aircraft Co., Culver City, Calif., and Univ. of Illinois, Urbana (Contract no. AF 33(616)-3000); issued by Wright Air Development Center, Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 6190, Task no. 71753). WADC Technical Report no. 56-526, Dec. 1956. iv+34 p. AD 110 424 PB 121 896

This report outlines a program for research on the human factors in the design of aircraft instrument displays and controls. The effort is intended

as a source for the Air Force Integrated Display - Integrated Control Program. It consists of three major approaches. One of these concerns the development of a cockpit for a particular airplane or type of airplane. Another consists in the development of principles of man-machine relations applicable to many types of aircraft. The third approach is that of working with formal conceptual systems which may have some promise of general applicability to the cockpit problems. (Authors' abstract)

6672
Wright, L. C.
THE AIR FORCE PROGRAM FOR IMPROVED FLIGHT INSTRUMENTATION. — Wright Air Development Center. Flight Control Lab., Wright-Patterson Air Force Base, Ohio (Project no. 6190). WADC Technical Report no. 56-582, Nov. 1956. [42] p.
AD 110556 PB 121 763

The Air Force program for improved flight instrumentation was set up to resolve performance limitations inherent in the information presented in the cockpit and in the characteristics of the human operator. Five areas described are: (1) technique development and human factor investigation, (2) "whole panel" instrumentation, (3) supporting mathematical and analytical investigations, (4) evaluation, and (5) product improvement. A new approach to cockpit instrumentation is described as eliminating some of the instrument limitations and information deficiencies and more efficiently integrating the pilot into the over-all control loop. (Author's abstract, modified)

d. Simulators and Analogues

6673
(Air Proving Eglin)
FINAL REPORT ON EMPLOYMENT AND SUITABILITY TEST OF THE KC-97G FLIGHT SIMULATOR, TYPE MB-27. — Air Proving Ground Command, Eglin Air Force Base, Fla. (Project no. APG/SAS/1038-A). Sept. 24, 1956. AD 108 048
UNCLASSIFIED

An operational evaluation of the KC-97G Flight Simulator, type MB-27, showed that the simulator is suitable for the training of C-97 and KC-97 flight crews, particularly in the initial phase of transition of crews, in the teaching of emergency procedures, in proficiency flight checks, and in simulation of instrument flight procedures, radio communication and navigation procedures, ground control approach, and instrument landing. The design of the simulator permits problem-free installation, provided exacting housing requirements are met. With properly trained maintenance personnel and an adequate supply system, a very high rate of training utilization may be obtained.

6674
(Air Proving Eglin)
FINAL REPORT ON OPERATIONAL SUITABILITY TEST OF THE B-52B FLIGHT SIMULATOR, TYPE S-9. — Air Proving Ground Command, Eglin Air Force Base, Fla. [Unnumbered Report], June 18, 1956. iv+35 p. (Project no. APG/SAS/165-A-2).
AD 97 633 UNCLASSIFIED

The B-52B Flight Simulator, Type S-9, is an effective ground training device to teach crews (pilot and co-pilot) a part of B-52 flight training in emergency situations, normal preflight and inflight procedures, instrument flying, and flying proficiency. It accurately simulates cockpit configuration, instrument and systems operation, and most of the performance characteristics of the aircraft. Trainer simulation of aircraft flight control and trim forces is marginal. The flight simulator has a creditable in-commission rate. It has been utilized almost 12 hours a day since installation. Maintenance requirements are stringent, and the in-commission rate and fidelity of performance are dependent on the quality of maintenance. (From the author's abstract)

6675
Barr, N. L.,
and R. C. Hackman
INVESTIGATION AND IMPROVEMENT OF SYSTEMS FOR SIMULATING INSTRUMENT CONDITIONS IN AVIATION INSTRUMENT FLIGHT TRAINING (INSTRUMENT FLIGHT SIMULATION). — Naval Medical Research Inst., Bethesda, Md. Research report (Vol. 14, p. 107-172), Jan. 27, 1956. (Project Report no. NM 001 056. 07.04).
AD 98 990 UNCLASSIFIED

An evaluation is presented of the available methods for simulating instrument flight, with special reference to optical and operational requirements, along with a report of two improved methods.

6676
Chernikoff, R., 1956
H. P. Birmingham, and F. V. Taylor
A COMPARISON OF PURSUIT AND COMPENSATORY TRACKING IN A SIMULATED AIRCRAFT CONTROL LOOP. — Jour. Applied Psychol., 40 (1): 47-52, Feb. 1956. DLC (BF1.J55, v. 40)

Two experiments were conducted comparing the effectiveness of pursuit and compensatory tracking display in a simulated one-coordinate aircraft control loop. Four courses, each consisting of a complex of three sine waves, were used. With the slowest course there was no significant difference in error scores between compensatory and pursuit tracking. With the other courses, which contained frequencies three, six, and nine times that of the slowest course, pursuit was significantly more accurate than compensatory. The absolute difference in favor of pursuit increased as the course difficulty level increased. However, the relative difference between the two displays remained constant for all but the easiest course. It is concluded that the superiority of the pursuit mode over the compensatory gives clear evidence that the separate display of target-course input, control-system output, and error are essentially as beneficial in a "loose" control arrangement as in a "tight" but unaided tracking system employing position control. (Authors' summary, modified)

6677
Farr, R. G.,
M. K. Dey, and E. Bloch
THE AIRPLANE CONTROL TEST: A COMPENSA-

TORY PURSUIT TASK. — Perceptual and Motor Skills, 6 (2): 77-80. June 1956.
DLC (BF311.P36, v. 6)

An apparatus for studying the acquisition and retention of a compensatory pursuit skill is described. It consists of a model airplane mounted on a pedestal. This plane is given 3-dimensional movement either by pedal and stick controls which subject uses, or by a motor-cam assembly, or by both. It is the task of subject to counteract the mechanically-induced movement of the plane by use of his controls, while a clock records the amount of time the plane is kept in a straight and level position during 1-min. periods. Acquisition of the skill is rapid, with distributed practice giving superior performance, and there is no appreciable loss of the skill over periods up to one month. (Authors' summary)

6678
Hawkes, R.
HIGH SPEED, ALTITUDE TO ALTER PILOTS RULES. — Aviation Week, 65 (18): 56-58. Oct. 29, 1956. DLC (TL501.A8, v. 65)

Several types of simulators are described as developed by the NACA scientists in laboratory research on anticipated control problems with high-speed, high-altitude aircraft.

6679
Killian, D. C.
SURVEY OF TRAINING CHARACTERISTICS OF THE B-52 FLIGHT SIMULATOR. — Air Force Personnel and Training Research Center, Aircraft Observer Research Lab., Mather Air Force Base, Calif. Development Report no. AFPTRC-TN-56-69, June 1956. v+26 p. (Project no. 7713).
AD 109 180 PB 124 220

Information on the training characteristics and recommendations for improvement of the B-52 Flight Simulator were gathered at Castle Air Force Base from B-52 flight instructors, crews in training, the Officer-in-Charge of the Flight Simulator Section, B-52 SAC aircraft incident reports, and the Boeing Aircraft Company. The survey suggested the desirability of modification of the air refueling, alternator, flap, flight control, fuel, and power plant systems, as well as experimental linkage of the S-9 simulator and T2-A ultrasonic trainer.

6680
McDougall, H.
AIRCRAFT SYSTEMS TRAINERS. — Aircraft (Toronto), 18 (1): 26, 28; 70. Jan. 1956.
DLC (TL501.A56143, v. 18)

A set of aircraft systems trainers are briefly described which are used to instruct students in aircraft operation. The trainers comprise five groups: airframe; aero engine; munitions and weapons; instruments and electrics; and telecommunication. A seat ejection trainer which simulates the action of both the canopy jettison and seat ejection is used to instruct both flight and ground personnel. Consideration is given to the fuel system trainer, engine fuel system trainer, fire extinguisher trainer, and the air system trainer.

6681
Manuel, G.
A SIMULATOR FOR TRAINING G.C.A. CONTROLLERS. — Interavia (Geneva), 11 (7): 526-527. July 1956. DLC (TL500.I555, v. 11)

A complete electronic radar control simulator for the training of air traffic control personnel has been built for the École Nationale de l'Aviation Civile (France). The simulator combines landing and surveillance scopes and requires the same adjustment operations (brightness, centering and calibration, orientation of aerials) as the actual control equipment. The simulator has a training capacity of about twenty-five ground control approach controllers a year.

6682
NEW FLIGHT SIMULATORS FOR MILITARY AND CIVIL CREWS. — Interavia (Geneva), 11 (5): 356-358. May 1956. DLC (TL500.I555, v. 11)

A selection of recently developed flight simulators of French, British, and American design are briefly described. The simulators include simple instrument trainers, a gunnery trainer for fighter pilots, and simulators of jet fighters, helicopters, turboprop airliners, and four-engined commercial transports.

6683
Pinsker, W. J. G.
THE FLIGHT SIMULATOR IN AIRCRAFT CONTROL AND DESIGN. — North Atlantic Treaty Organization. Advisory Group for Aeronautical Research and Development, Paris. Report no. 71, Aug. 1956. iv+31 p. AD 158 804 UNCLASSIFIED

The possibilities of simulating manually controlled flight are discussed and the principal types of flight simulators are described. Particular attention is given to the importance of realistic visual and physical flight impressions. It is shown that useful conclusions on the handling characteristics of an aircraft can be drawn from experiments on relatively simple simulators. This is illustrated by results obtained on the RAE aiming-flight simulators. It is suggested in conclusion that a flight simulator can be a very powerful tool for the design and optimization of aircraft control systems, if sufficiently realistic sensations of flight are simulated. Flight tests will, however, be always necessary as the final check and for the exploration of aerodynamic phenomena, which the simulator cannot predict but only accept as data. (Author's summary)

6684
Townsend, J. C.
EVALUATION OF THE LINK, ME-1, BASIC INSTRUMENT FLIGHT TRAINER. — Air Force Personnel and Training Research Center, Operator Lab. Randolph Air Force Base, Tex. Development Report no. AFPTRC-TN-56-84, June 1956. xii+80 p. AD 113 519 PB 126 219

The Link, ME-1, basic instrument flight trainer is rated average in housing requirements, excellent in instructional facilities, above-average in unloading,

installing and calibrating, excellent in maintenance, below-average in human engineering, average in engineering, excellent in validity and stability of performance curves, excellent in cockpit motion and rough air capability, and excellent in manning requirements. Evaluative opinion by all persons who "flew" the trainer was generally highly favorable.

6685
U. S. A. F. SUPERSONIC AIR RESEARCH TEST TRACK: PROJECT SMART. — Shell Aviation News, no. 221: 12-14. Nov. 1956.
DLC (TL501.S55, no. 221)

The Air Force supersonic military air research track (SMART), 12,000 feet long, across the flat top of Hurricane Mesa, Utah, terminates at the brink of a 1,500 foot escarpment. Test vehicles can be accelerated to supersonic speeds along this track and escape devises such as ejection seats released from them to continue over the cliffs, their descent being checked by the same parachutes used in high performance aircraft. Illustrations are included of the rocket sled, dummy, and ejection seat, and of test ejections.

e. Airplane and Space Cabins and Cabin Equipment

[Protective equipment under 10-b]

6686
AIRCRAFT PASSENGER SEATS: SAFETY WITH ACCELERATION OF 9 G. — Engineering (London), 181 (4693): 19. Jan. 6, 1956.
DLC (TA1.E55, v. 181)

A new type of aircraft passenger seat is described designed to withstand an acceleration of 9 g, facing forward or aft. When forward facing, in an emergency landing, the back of seat, which is padded, will fold forward when struck behind.

6687
Coder, C. H.
CHANGES IN STRUCTURAL REQUIREMENTS ASSOCIATED WITH REVERSING THE DIRECTION OF FACING OF AIRPLANE PASSENGER SEATS. — Appendix to: A. H. Hasbrook, Design of Passenger "tie-down"..., p. 45-50. Aviation Crash Injury Research, Cornell Univ., New York (Contract Nonr-401(21)). Report no. Av-CIR-44-0-66, Sept. 1956.
AD 217 660 UNCLASSIFIED

An engineering analysis is made of the floor reactions to dynamic loads in forward-facing and backward-facing aircraft seat conditions. It is concluded that aft-facing seats (1) require greater resistance of the floor structure and attachment fittings, (2) transmit applied loads to the floor in a different manner than forward-facing seats, and (3) generally impose a weight penalty to maintain structural strength.

6688
Dryden, C. E.,
L. Han, F. A. Hitchock, and R. Zimmerman
ARTIFICIAL CABIN ATMOSPHERE SYSTEMS FOR HIGH ALTITUDE AIRCRAFT. — Ohio State Univ. Research Foundation, Columbus (Contract AF 33(616)-2706); issued by Wright Air Development Center, Equipment Lab., Wright-Patterson Air Force Base, Ohio (Task no. 61192). WADC Technical Report no. 55-353, Nov. 1956. xviii+395 p.
AD 110 490 UNCLASSIFIED

A comprehensive physiological and engineering evaluation is made of systems which might be employed in conditioning the cabin of an aircraft flying above a 70,000-foot altitude at high speeds, including stored systems for gas removal, stored systems for gas supply, and a combined system which uses both stored gases and externally compressed air. It is shown that (1) the combined systems are superior to stored systems with a few exceptions; (2) weight and volume penalty of cabin conditioning systems always increases with cabin leakage, thereby placing the emphasis on low-weight penalty, tightly sealed air frame construction; and (3) the optimum cabin pressure lies between 10,000 and 25,000 feet equivalent altitude. (Authors' abstract, modified)

6689
Grant, L. J.
THE ATMOSPHERE OF A SPACE-SHIP. — Jour. Space Flight, 8 (4): 1-5. April 1956.
DLC (TL780.C413, v. 8)

After a brief discussion of the advantages and disadvantages of using nitrogen-oxygen or helium-oxygen atmospheres in space ships, the author advocates instead an atmosphere with a total barometric pressure of 190 m.m. Hg, composed of pure oxygen (partial pressure, 160 mm.), water vapor (20 mm.), and carbon dioxide (10 mm.). The 75% decrease in pressure is expected to result in considerable weight savings, less danger of leakage, and minimal physiological symptoms in the event of explosive decompression. Dewar flasks or foam-rubber insulated containers may be used to carry liquid oxygen. Other methods of oxygen transport suggested are sodium peroxide and pelletized frozen anhydrous hydrogen peroxide. The disadvantages of a pure oxygen atmosphere are: the high fire hazard, a rapid oxidation of materials, and possible long-term physiological damage. Suggestions are offered for animal and human experiments to explore the latter aspect.

6690
Hambacher, W. O.
HUMAN ENGINEERING INVESTIGATIONS OF THE INTERIOR LIGHTING OF NAVAL AIRCRAFT. V. EXPERIMENTAL EVALUATION OF A PROPOSED THEORY OF WHITENESS CONSTANCY. — Naval Air Material Center. Naval Air Experimental Station, Philadelphia, Pa. (Project TED NAM EL-52004). Report no. NAMC-ACEL-297, Aug. 14, 1956. 21 p.
AD 112 766 UNCLASSIFIED

Using eight subjects, two whiteness constancy experiments were performed under the condition of homogeneous backgrounds of a standard and a variable disc. The results obtained support the hypothesis that subjects, when adjusting the variable

disc to equality with the standard, form equal whiteness ratios; i.e. the variable disc is adjusted so that the ratios of the whiteness of the standard disc to its background and the variable disc to its background are equal. At present this hypothesis is valid only for the condition of homogeneous backgrounds of the standard and variable discs. Further research is planned to integrate the obtained results into lighting requirements for work spaces including aircraft cockpits. (Author's abstract, modified)

6691
Pinkel, I. I.,
and E. G. Rosenberg
SEAT DESIGN FOR CRASH WORTHINESS. — National Advisory Committee for Aeronautics, Washington, D. C. Technical Note 3777, Oct. 1956. 42 p. DLC (TL521.A35)

Data are presented from full-scale laboratory and crash studies on the deceleration loads measured on dummy passengers in seats of standard and novel design. Included are charts for obtaining the maximum deceleration loads experienced by the seat and passenger in response to the crash deceleration pulses. In addition, a method is described for determining the seat strength, spring stiffness, and deformation beyond the elastic limit required to serve in a crash deceleration pulse of a given type.

6692
Rajsić, R.
[PHYSIOLOGICAL PROBLEMS IN PRESSURIZED AIRCRAFT CABINS] Fiziološka problematika avionskih kabina sa natpritiskom. — Vojnosanitetski pregled (Beograd), 13 (11-12): 581-588. Nov.-Dec. 1956. In Serbo-Croatian, with English summary (p. 588). DLC (RC970.V63, v. 13)

Physiological problems arising from the use of pressurized cabins for high-altitude flight are discussed. Brief reviews are given of the following topics (mainly a digest of literature data): hypoxia, low barometric pressure, and explosive decompression. Diagrams illustrate the relation of altitude to the oxygen saturation of the blood; oxyhemoglobin dissociation at various pressures; course of denitrogenation during oxygen breathing; and data concerning the pressure and oxygen content of pressurized cabin atmospheres.

6693
Sandorff, P. E.,
and J. S. Prigge
THERMAL CONTROL IN A SPACE VEHICLE. — Jour Astronautics, 3 (1): 4-8; 26. Spring 1956. DLC

The problem of establishing and maintaining control of the temperature in a vehicle operating in space is treated as an engineering design problem. Use of the "thermos bottle principle" in connection with a Whipple meteor shield is seen as the practical answer to isolation of the vehicle proper from the heating and cooling effects of thermal radiation. Methods by which a variety of requirements may be met are involved. It is concluded that thermal control in a space vehicle is a relatively easy engineering problem, but not without its penalities in the form of design time, cost and weight. (Authors' abstract)

6694
Simons, D. G.,
and D. P. Parks
CLIMATIZATION OF ANIMAL CAPSULES DURING UPPER STRATOSPHERE BALLOON FLIGHTS. — Jet Propulsion, 26 (7, part I): 565-568. July 1956. DLC (TL780.A613, v. 26)

Simple techniques of temperature, carbon dioxide, humidity, and oxygen control were developed for 24-hour balloon flights of small animals at altitudes above 90,000 feet. The almost exclusively radiative nature of heat exchange between the capsule and the atmosphere at these altitudes allowed use of a temperature control system consisting of insulation for retention of body warmth at night, and daytime cooling based on the lower boiling temperature of water at high altitude. Water vapor from expired air and urine was absorbed by a CO_2 soda lime absorber, and precipitated on the cooling system and capsule walls. A constant capsule pressure and 50% O_2 concentration were maintained by replacement of CO_2 with pure O_2.

6695
Strughold, H.
THE U. S. AIR FORCE EXPERIMENTAL SEALED CABIN. — Jour. Aviation Med., 27 (1): 50-52. Feb. 1956. DLC (RC1050.A36, v. 27)

This is a brief discussion of the technical, thermodynamical, and toxicological limitations of the pressurized cabin at altitudes approaching 80,000 feet which is the extreme upper limit of use for such a cabin. Compressing air at this altitude would be technically prohibitive; air at 80,000 feet which was compressed to a physiologically useful range would have a temperature of about 400° F.; ozone would also be a toxic factor in a pressurized cabin above 60,000 feet. For these reasons, a sealed cabin is required at such altitudes and higher. In 1952, a sealed cabin designed by Dr. Fritz Haber was ordered constructed, and the finished prototype was delivered in the summer of 1954. Two main problems connected with the cabin warrant investigation; these are: how and what to degree are the climatic factors of the cabin changed by occupancy, and how can such changes be counteracted by physical, technical, or biological means?

g. Flight and Space Feeding

[Emergency rations under 10-d]

6696
Costilow, R. N.,
A. A. Taylor, and H. C. Dyme
BACTERIOLOGICAL STUDY OF THE FOIL PACK IN-FLIGHT FEEDING SYSTEM. — Wright Air Development Center. Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 7156). WADC Technical Note no. 56-134, March 1956. iv+5 p. AD 94 988 UNCLASSIFIED

Bacteriological data were collected during field tests of the Foil Pack Flight Feeding system for feeding aircrew members. It was found that the total numbers of mesophilic bacteria, coliforms

or gram-positive cocci did not increase significantly in the meat, vegetable, or potato items of the meals during refrigeration between 24 and 72 hours after packaging. It was concluded that Foil Pack Meals to be consumed within 72 hours after packaging were safe from food poisoning if properly refrigerated. (Authors' abstract and conclusions, modified)

6697
Finkelstein, B.,
R. G. Pippitt, and A. A. Taylor
EVALUATION OF IMPROVED COMPACT BOX LUNCH: NUTRITIONAL CHARACTERISTICS, STABILITY, EASE OF FLIGHT KITCHEN PREPARATION, EASE OF HANDLING IN FLIGHT, AND ACCEPTABILITY OF COMPONENTS. — Wright Air Development Center. Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 7156). WADC Technical Report no. 56-363, July 1956. vi+46 p.
AD 97 127 PB 136 174

The compact box lunch feeding system designed for jet bomber aircraft during flights of extended duration is nutritionally adequate, and can be satisfactorily produced by flight kitchens. The size of food items and the compact packaging are principal factors making it the most suitable feeding system yet designed. Foods have adequate stability when used during flights of 10 to 20 hours duration. Preference ratings for components in the lunch indicate high acceptance with the exception of olives, apricots, and salami and Swiss cheese sandwiches. Acceptability can be enhanced by substituting beef cubes for unacceptable sandwiches, and by increasing the amount of beverage in each lunch. Included are revised menues and packaging instructions for the feeding system. (Authors' conclusions, modified)

6698
Mock, R. O.
FEEDING ON A LONG RANGE FIGHTER MISSION (OPERATION FOX PAW). — Wright Air Development Center. Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 7156). WADC Technical Report no. 56-5, Jan. 1956. iii+6 p.
AD 85 534 UNCLASSIFIED

The use of liquid foods was found to be a feasible method of feeding pilots on long-range jet fighter missions. Some solid food was desired, such as sandwiches, to supplement the liquid foods. Juices, especially apricot nectar and tomato juice, were more popular than flavored milk drinks. (Author's abstract, modified)

6699
Mock, R. O.,
and B. Finkelstein
FIELD TEST OF EXPERIMENTAL IN-FLIGHT FOOD PACKET CONTAINING SALMON AND TUNA. — Wright Air Development Center. Aero Medical Lab., Wright-Patterson Air Force Base, Ohio. WADC Technical Note no. 56-15, Jan. 1956. iii+6 p. (Project no. 7156). AD 89 098 UNCLASSIFIED

An experimental in-flight food packet was formulated primarily to determine consumer acceptance of canned salmon and tuna as entree items. Other recently developed items such as canned bread and canned pecan roll were included. Red cherry jam was used as a spread. Mean consumer preference ratings on a nine point like-dislike scale (hedonic scale) indicate a high degree of acceptability for tuna and a fair degree of acceptability for salmon. Canned bread, canned pecan roll and red cherry jam possess high consumer acceptability. (From the authors' abstract)

6700
Mock, R. O.,
and R. G. Pippitt
FIELD TEST OF FOOD TABLETS. — Wright Air Development Center. Aero Medical Lab., Wright-Patterson Air Force Base, Ohio (Project no. 7156). WADC Technical Note no. 56-370, Aug. 1956. iii+5 p.
AD 97 195 UNCLASSIFIED

A field test was conducted to investigate the feasibility of using food tablets for feeding aircrews. Chocolate butter cream food tablets were found to be highly acceptable. Cheese tablets had good acceptability and honey-almond tablets fair acceptability. Milk tablets were unacceptable. In general, the food tablets tested were not well received, primarily because of their dryness. Difficulties were encountered in use of the prototype food tablet dispensing device. The chocolate butter cream food tablet was the only tablet tested that did not crumble during handling, shipping, and removal from the dispenser. (Authors' conclusions, modified)

6701
[Taylor, A. A.]
FLIGHT FEEDING RESEARCH AND DEVELOPMENT. — Office of the Surgeon, Headquarters Air Materiel Command, Wright-Patterson Air Force Base, Ohio. Information Bulletin no. 62: 30-32. Feb. 1, 1956.
DNLM

The development is discussed of a system of feeding for jet fighter aircraft by coordinating the efforts of the flight surgeon, food service officer, nutritionist, and food technologist. Liquid foods currently under consideration depend on their suitability and acceptability in the in-flight situation under conditions of high altitude and oxygen breathing. Available liquid foods are satisfactory, although not of sufficient variety (no main course item has been developed). Liquid foods to take the place of meat and potatoes are still badly needed. Mention is made of the avoidance of gas-forming foods and foods with high fiber content during flight.

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