LEVEL III

NHRC REPORT FOR 1979

NAVAL HEALTH

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RESEARCH CENTER

NHRC Report for 1979.

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NAVAL HEALTH RESEARCH CENTER

P. O. BOX 85122

SAN DIEGO, CALIFORNIA 92138

NAVAL MEDICAL RESEARCH AND DEVELOPMENT COMMAND

BETHESDA, MARYLAND

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DEPARTMENT OF THE NAVY
NAVAL HEALTH RESEARCH CENTER
P. O. BOX 85122
SAN DIEGO, CALIFORNIA 92138

Report OPNAV 5750-1
31 December 1979

Greetings from the Commanding Officer,

It's my distinct pleasure to introduce our year book for 1979. June marked our 20th year of existence. This U.S. Navy research laboratory, originally titled the U.S. Navy Medical Neuropsychiatric Research Unit, has had an enormous productivity over the last two decades. The breadth and quality of our research are apparent in this report's vicennial bibliography.

Naval Health Research Center (NHRC) is located on Point Loma in San Diego, California. We occupy, in tenant status, six of the Naval Ocean Systems Center's "barracks" buildings. Our administration and library services are in Bldg 306, computer services are located in 309, Environmental Physiology Division in 315; Biological Sciences Division is housed in 331, Stress Medicine Division is located in 346, and Environmental & Social Medicine Division is in Bldg 332. The Center also has space at the Naval Regional Medical Center, the fourth deck of Bldg 36, and at the Naval Training Center, Bldg 272. We, as the other Navy research laboratories around the world, are under the central command of the Naval Medical Research and Development Command in Bethesda, Maryland.

The organization of this year's report is different from that of previous ones. First, we have included a copy of our 20th anniversary program. We were privileged to have some extremely distinguished gests in attendance--including VADM Willard P. Arentzen, MC, USN, The Surgeon General, RADM D. Earl Brown, Jr., MC, USN, CINCPACFLT Medical Officer; and RADM William Cox, Commanding Officer, Naval Regional Medical Center, San Diego. Noted civilian guests included the Honorable Bob Wilson, U.S. Congressman, 41st District, San Diego, Ransom J. Arthur, M.D., Dean, University of Oregon School of Medicine, Portland, and John E. Rasmussen, Ph.D., Director, BATTELLE Human Affairs Research Center, Seattle, Washington. Second, as an example of the many fine presentations given that day we have included the talk given by Captain Paul D. Nelson, MSC, USN, Chief, Medical Service Corps. Dr. Nelson was one of several distinguished alumni of NHRC who attended the celebration. Third, this year we have changed the format of our calendar year's publications. We will use an annotated bibliography for this and future reports. I hope this change will make it easier for the reader to determine which of our several papers he or she would like to pursue in greater depth. Finally, this year's report will contain a longitudinal summary of each of our major research divisions over our 20-year history in place of our usual yearly research summary. This information was also provided in our Vicennial booklet. Some booklets remain and are available upon request.

In reviewing our 20-year bibliography, a steady increase in the number of yearly reports is apparent until 1974. Since that time we've maintained a high output of nearly 60 reports each calendar year, with most reports accepted for publication in prestigious scientific journals. This leveling off of productivity has been exactly parallelled by a leveling of financial and personnel resources. As I mentioned in my talk at the Vicennial celebration, in order to simply maintain our existence over the past few years any previous "fat" has been thoroughly trimmed away. We're now as lean as a championship boxer, ready and eager for substantive new research challenges.

Advancements, academic degrees, honors, awards, and a retirement for 1979 include the following. For the military we had the promotions of HM2 Andre Crisostomo to Petty Officer First Class, HM3s David Kahl and Donald Hammersburg to Petty Officers Second Class, and HNs Dante Yumol and Thomas T. Pate to Petty Officers Third Class. Also, LT Richard L. Hilderbrand, our biochemist in the Biological Sciences Division, was promoted to Lieutenant Commander, Medical Service Corps. The command instituted a Sailor of the Quarter Program in 1979. The first recipient of this honor was HM2 David Kahl from the Stress Medicine Division. On 30 November 1979, Captain Raymond C. Spaulding, MC, USN, retired after serving 27 years of Active Duty, not including his Reserve time, from the Navy. He was a line officer during World War II. His duty stations included Naval Hospital, Bethesda; Bureau of Medicine and Surgery, Washington, DC, Naval Regional Medical Center, San Diego, and NHRC. LT Richard E. Struempler, MSC, USN, was certified on 27 July as a Clinical Chemist by the National Registry in Clinical Chemistry. For our civilian scientists, Ph.D. degrees in Psychology were received by Ross

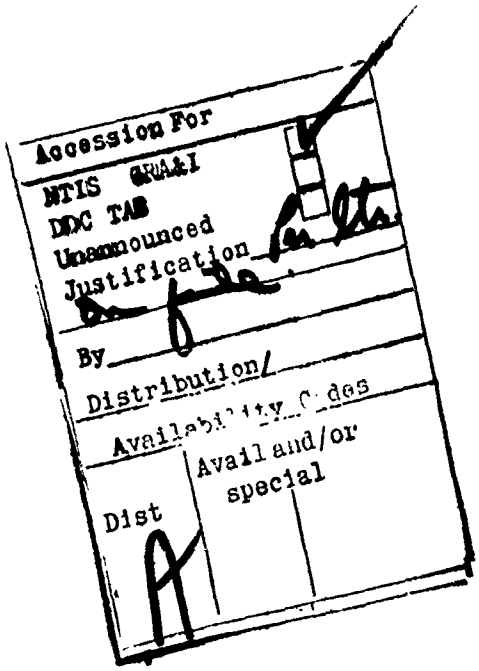
R. Vickers, Jr., on 11 July (University of Michigan, Ann Arbor), Carl Englund on 6 December (United States International University, San Diego), and Barbara McDonald on 21 December (Texas Christian University, Fort Worth). David J. Hord, Ph.D., was voted Faculty Person of the Year by the 1979 Graduating Class of the California School of Professional Psychology, San Diego. Allan P. Jones, Ph.D., in December, was elected Fellow, Inter-University Seminar on Armed Forces and Society. Perhaps our most satisfying award presentation in this calendar year was the naming of NHRC's biomedical library after our retired Scientific Director, Walter L. Wilkins, Ph.D., on 1 October.

Of continuing benefit to the command have been distinguished guests speakers. For example, George F. Solomon, M.D., clinical Professor and Vice Chairman, Department of Psychiatry, University of California at San Francisco, spoke on the topic, "Emotion, Stress and Immunity" at our annual Ardie Lubin Memorial lecture.

Dr. Solomon

The Commanding Officer assumed command on 31 March 1977. NHRC's organization chart, preface, mission, and functions in support of mission have not changed since last year's submission.

RICHARD H. RAHE
Captain MC USN
Commanding Officer



OFFICE OF THE COMMANDING OFFICER

The Office of the Commanding Officer shall consist of the Commanding Officer, the Executive Officer, the Administrative Officer, and other staff and clerical personnel as may be required.

Commanding Officer (Code 01)

1. The Commanding Officer (CO) is charged with the command, organization, and management of the Center. He shall require the timely and economical performance of the functions and operations of the Center in accordance with U.S. Navy Regulations, the Manual of the Medical Department, and other directives issued by those within the recognized chain of authority. He shall be responsible for the overall supervision of the quality and effectiveness of the Center's research and for the safety and well-being of the entire command.

2. The CO shall be responsible for the sound and legal expenditure of funds alloted to the Center for its research and operation. He shall issue instructions concerning the use, expenditure, and conservation of equipment and supplies which shall define the responsibilities of the heads of the administrative divisions and research divisions regarding the correctness of inventories and the transfer of property upon their detachment.

3. The CO may, at his discretion and when not contrary to law or regulations, delegate duties to the Executive Officer, Administrative Officer, and other subordinates, as appropriate, to the maximum extent consistent with the retention of control. Such delegations of authority, however, shall in no way relieve the CO of his continued responsibility for the safety, well-being, and efficiency of his command.

4. The CO also serves in a liaison capacity with other military activities.

Executive Officer (Code 02)

1. The Executive Officer (XO) shall serve as the direct representative of the CO. As such, all orders issued by him shall be regarded as proceeding from the CO and shall govern all persons within the command. While executing the orders of or serving in place of the CO, the XO shall take precedence over all other officers attached to the command. His primary function shall be to assist the CO in the discharge of his responsibility for the overall supervision of the quality and effectiveness of the command's research, in the formulation of professional policies, standards and directives, and in the coordination of all internal administration of the Center dealing with professional research matters.

2. The XO shall direct the Administrative Officer regarding matters of common interest and responsibility.

3. The XO shall coordinate the various scientific research and activities of the Center, under the guidance of the CO, and advise researchers as to the timeliness, naval needs, and requisite support available for the Center's research proposals.

4. The XO coordinates the Center's interactions with other Bureau of Medicine and Surgery and Naval Medical Research and Development Command programs.

Administrative Officer (Code 03)

1. The Administrative Officer (AO) shall be responsible to the XO and the CO for all administrative matters including the coordination of internal administration of the Center as well as management improvement functions. All orders of the AO shall be regarded as proceeding from the CO, whose orders and policies he shall conform to and effect. He shall advise the XO and the CO regarding nonprofessional functions and management of the Center, and shall assist them in the formulation of administrative policies, standards, and directives. He acts independently upon matters which do not require the personal attention of the CO or the XO, and keeps the XO apprised of the action he takes. The AO shall advise the XO regarding matters of common interest and responsibility. He shall exercise due caution to assure that all matters of a professional or research nature which may come to his attention are promptly referred to the XO. The AO shall be an officer of the Medical Service Corps.

2. The AO shall: (a) Establish methods for improving operating procedures, solving administrative problems, and correcting unsatisfactory conditions of an administrative nature. (b) Be responsible for the coordination and efficient operation of the administrative division. (c) Maintain current information regarding laws, regulations, policies, and instructions pertaining to naval administration in general and to management of this Center in particular. (d) Provide for the preparation, promulgation, and maintenance of the directives necessary to meet the operating requirements of the Center. He shall have general orders, orders from higher authority, and all other directives and information which concern or are of interest to personnel of the command posted on conveniently located bulletin boards, or otherwise brought to the attention of the personnel concerned. Copies of the Uniform Code of Military Justice shall be made readily accessible to all personnel. He shall insure that all infractions of law or U.S. Navy Regulations and violations of discipline are promptly reported to the XO and CO. (e) In consultation with the Head, Fiscal and Supply, and other appropriate personnel, formulate fiscal policies for presentation to and approval by the XO and CO. (f) Promulgate directives concerning safety measures and precautions, including procedures for protecting personnel and safeguarding government property. (g) Arrange for the care and safe custody of all Center keys. (h) Insure compliance with the provision of U.S. Navy Regulations pertaining to the security of classified matter. (i) Coordinate the activities of the Officer of the Commanding Officer. (j) Provide for proper military and civilian personnel administration.

ENVIRONMENTAL AND SOCIAL MEDICINE DIVISION (CODE 30)

This division is concerned with the distribution, precipitating factors, and long-term course of major diseases, including psychiatric disorders, in the naval service. Other areas are diagnosis, prognosis, and treatment methods; personality assessment and classification; the effects of environmental hazards and organizational stresses on physical and mental health and performance effectiveness, and factors that affect the quality and cost of health care services.

Branches under this division include:

HEALTH CARE SYSTEMS BRANCH, conducts studies of illness and injury rates in relation to age, occupation, duty station environment, and service history variables, including prospective longitudinal studies of life changes and health patterns in career personnel.

FLEET MEDICINE BRANCH, studies the effects of mission, operational schedules, physical environment, and social and organizational factors on morbidity and performance effectiveness of individuals and groups in ship and shore duty assignments.

PSYCHIATRIC EFFECTIVENESS BRANCH determines incidence, course and outcome for major psychiatric conditions and devises improved diagnostic and prognostic guidelines for effective classification and treatment.

MEDICAL EPIDEMIOLOGY AND FOLLOW-UP BRANCH designs and maintains computer files of medical and service history information for all naval personnel as a basis for epidemiological and longitudinal studies of morbidity and mortality in naval environments.

OCCUPATIONAL HEALTH BRANCH conducts studies of biomedical risks in various naval environments, including determination of morbidity and mortality rates as a function of physical hazards, personnel characteristics, and preventive programs.

STRESS MEDICINE DIVISION (CODE 40)

Psychological, social, and physiological factors associated with stress are studied to determine positive and negative associations between stress, performance, and health. Groups selected for study include Navy populations in high stress occupations (e.g., pilots, divers), in specific high stress situations (e.g., recruit training, captivity). Studies which relate stress in these populations to short-term health effects also search for physiological mechanisms which may connect these stress situations with illness onset.

Branches under this division include:

STRESS PSYCHOLOGY BRANCH emphasizes studies of acute responses to stress situations. Different types of stress are measured along with human's physiological reactions to these stresses. Studies also investigate the effects of psychological and social variables which may increase or decrease human's tolerances for stress.

PROLONGED STRESS BRANCH conducts studies of individuals who have experienced prolonged periods of stress to understand the cumulative effects of this experience. Analysis of physical, environmental, psychological, and interpersonal factors are utilized to predict the positive and negative long-term health and adjustment sequelae of this stress experience. Extended studies permit elucidation of slowly developing effects of stress exposure.

ENVIRONMENTAL PHYSIOLOGY DIVISION (CODE 60)

Conducts research on the effects of various stressors on the response of the human body and, subsequently, on man's performance effectiveness and his health. These stressors include, but are not limited to, factors such as sleep loss, temperature extremes, cold-water immersions, noise, hypo- and hyperbaric conditions, isolation, monotony, and fatigue.

Branches under this division include:

PSYCHOPHYSIOLOGY BRANCH conducts research on psychophysiological aspects of health, and physical and emotional fitness for work performance. The work involves both clinical and nonclinical populations. The clinical tasks include the areas of sleep disorders, selected neurological and psychiatric problems and brain cortex dysrhythmias. In the behavioral area, tasks include areas of sleep patterns, sleep loss, work-rest cycles, biological rhythms, information processing, and computer monitoring of physiological states.

WORK PHYSIOLOGY BRANCH conducts research concerned with physifal fitness, physical standards, work environments, and work load as determined by physiological indices.

BIOLOGICAL SCIENCES DIVISION (CODE 70)

This division investigates the biological and physical aspects of Navy environments in relation to health of naval personnel; initiates and supports studies on the effects of stress on changes in biochemical, immunological, and microbiological parameters which influence health patterns; and develops new methods and techniques for microbial identification.

Branches under this division include:

IMMUNOBIOLOGY BRANCH conducts studies on the immune status of naval personnel. This includes studies on the effect of stress on immunocompetence, using experimental animals as models, investigates the protective role of humoral and cell mediated immune response against microbial agents, and develops rapid methods for identifying bacterial and viral agents, using immunochemical technology and validation through field studies.

BIOCHEMISTRY BRANCH conducts studies into the effects of physiological and psychological stress on biochemical changes in body fluids; develops new techniques for measurement of biochemical constituents; and conducts investigation on the correlation between biochemical changes and illness susceptibility.

MICROBIOLOGY BRANCH conducts studies on rapid diagnostic techniques for infectious diseases. A variety of microbial agents related to Navy-Marine Corps environments and needs are included in the projects. Preventive medicine aspects are emphasized through field studies of methods for early diagnosis leading toward modes for disease treatment and control.

TECHNICAL AND ADMINISTRATIVE SERVICES DIVISION (CODE 80)

Provides overall administrative direction, personnel management, financial management, plant account property control, statistical service, facilities management, and transportation and messenger services through four branches.

PERSONNEL BRANCH develops and administers civilian and military personnel programs for the Center, including recruitment and placement; advises management on personnel philosophy and administration. Provides military personnel support services in coordination with the Personnel Support Detachment. Assists with management and organization analysis, public relations, and coordination of administrative services.

SUPPLY AND FISCAL BRANCH plans, organizes, and coordinates performance of general, financial and budgetary accounting functions and services including payroll, timekeeping, requisitioning, work requests, project orders, and procurement and receipt of materials, supplies and services.

COMPUTER SERVICES BRANCH develops and automates methods of statistical analysis related to the scientific research applications of the Center, and provides consultation to investigators.

TECHNICAL LIBRARY provides for acquisition, receipt, identification and placement of all technical information as required by the scientific staff, furnishes resource materials and references for the investigators, coordinates requests for on-line services with other research centers, cooperates with other Navy, military, and medical libraries for an exchanges of research materials, and provides for the preparation of graphic materials for publication, testing, and visual presentation.

Total library collection for 1979: 6,661 books; 3,069 bound periodicals; 1,331 technical reports, and 39 audio tapes.

TRANSPORTATION BRANCH provides transportation and messenger services. (Additional duties include assembly of scientific reports for mailout on command's mailing list.)

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BOARDS AND COMMITTEES

The *Committee for the Protection of Human Subjects* is appointed by the Commanding Officer under provisions of SECNAVINST 3900.39A on Protection of Human Subjects in Medical Research.

The *Controlled Medicinals Inventory Board* is appointed by the Commanding Officer under the provisions of the Manual of the Medical Department 21-4.

The *Ionization Radiation Control Committee* is appointed by the Commanding Officer under the provisions of NAVMED P-5000, Radiation Health Protection Manual, Chapter 4, Section 4-1.

The *Facility Planning Board* is appointed by the Commanding Officer in accordance with NAVMEDRSCHDEVCOMINST 11000.1 to review and make recommendations to him on facility improvement.

The *Safety Committee* is appointed by the Commanding Officer in accordance with NAVMEDRSCHDEVCOMINST 5100.1.

The *Library Committee* and *Postdoctoral Research Associates Program* are appointed by the Commanding Officer for review and recommendations.

PERSONNEL

(AS OF 31 DECEMBER 1979)

MILITARY PERSONNEL

MEDICAL CORPS

Captains	
Internist (Hematologist)	1
Psychiatrist	1

MEDICAL SERVICE CORPS

Commanders	
Administrative	1
Microbiologist	1
Psychologist	1
Lieutenant Commanders	
Physiologist	1
Psychologist, Aerospace	1
Lieutenants	
Biochemist	1
Psychologist	2
Lieutenants Junior Grade	
Physiologist	1
Psychologist	1
	12

ENLISTED

E-7	HMC	3	
E-6	HM1	2	
E-5	HM2	4	
E-4	HM3	4	
E-3	HN	1	
			14
		TOTAL	26

CIVILIAN PERSONNEL

GRADE	NUMBER
SES	2
GS-14	2
GS-13	5
GS-12	7
GS-11	10
GS-9	11
GS-7	9
GS-6	7
GS-5	9
GS-4	3
WG-5	3
TOTAL	68

In addition, officers with additional duty to NHRC serve on the Committee for Protection of Human Subjects, include:

Commander, Chaplain Corps, USN

Lieutenant Commander, Judge Advocate General Corps, USN

DURING 1979 ....

FORMAL REPORTS of research findings were reported at national, international, and regional meetings of *scientific* and *medical societies:*

AGARD Lecture Series 105: Sleep Wakefulness and Circadian Rhythms, 1-2 October, London, UK; 4-5 October, Paris, France; 9-10 October, Toronto, Canada

"Sleep Disturbances in Humans" (Dr. Johnson)
"Sleep Disturbance and Performance" (Dr. Johnson)

American Occupational Health Conference, 3 May, Anaheim, California

"Life Stress and Illness" (Dr. Rahe)

American Psychological Association, 31 August/1 September, New York, New York

"Cognitive Complexity and Work Environment Perceptions" (Dr. Jones & LT Butler)
"Sleep Logistics" (Dr. Naitoh)

American Psychosomatic Society, 22-25 March, Dallas, Texas

"Serum Group I Pepsinogen is Negative Associated with Occupational Stress in Naval Company Commanders: A Longitudinal Psychobiological Study" (Dr. Ward)
"Antibody Suppression in Mice Experiencing Changes in Social Settings" (Mr. Edwards)

American Society for Microbiology, Annual Meetings; 4-8 May, Los Angeles, California

"Cholera Diagnosis by Coagglutination Test" (CDR Sanborn & Mr. Dutta)
"Rapid Detection of Pneumococcal Antigens in Sputum using a Coagglutination Test" (Mr. Edwards, Drs. Kirkpatrick & Hooper)
"Detection of Group Specific Polysaccharide from Group A Streptococcus by ELISA" (Dr. Hilderbrand, Mr. Edwards, Dr. Henderson)

American Thoracic Society, 13-16 May, Las Vegas, Nevada

"Heart Rate and Exercise in Individuals Engaged in Activities requiring Specific Ventilatory" (Drs. Neuman & Moser)
"Heart Rate, Oxygen Consumption and Minute Ventilation in well Trained Athletes" (Drs. Neuman & Moser)

Association of Military Surgeons of the United States, 86th Annual Meetings; 2-6 Oct, San Diego

"Patterns of Career Development among Health Care Professionals: Organizational Influences" (LT Butler)
"Epidemiologic Models of Value for Management and Clinical Services in Health Care Systems: Some Models and Data from Research" (Dr. Gunderson)
"Hematology as Related to Dentistry" (Dr. Lang)
"Stress Factors in Coronary Artery Disease: Medical and Behavioral" (Dr. Rahe)

California State Psychological Association, 8-11 February, Monterey, California

"Cross-Cultural Adjustment of Military Families Overseas: Some Recommendations" (Arne Beck)
"Multidimensional Locus of Control as a Predictor of Health and Job-related Outcomes" (Ralph Burr & LT Butler)
"Locus of Control and Stress Measures used to Predict Smoking Behavior" (Ralph Burr & Larry Hermansen)
"Outpatient Mental Health Services in the Navy: Referral Patterns, Demographics and Implications" (LCDR Bailey)
"Dimensional Diagnostic Characteristics of the Health Opinion Survey in an Outpatient Psychiatric Setting" (LT Butler, LCDR Bailey, Mr. Thompson & Dr. Jones)
"Stresses Related to Organizationally-induced Family Role Incompatibility" (LT Butler and Dr. Jones)

International Conference on Immunity & Immunization in Cerebrospinal Meningitis, Third; 10-11 October, Marburg, Germany

"A System for Epidemic Meningitis Control in West Africa" (CDR Sanborn)

International Congress of Sleep Research, Third; 30 July, Tokyo, Japan

"Automatic Sleep Analysis" (Dr. Naitoh)

International Diving Symposium, '79; 1-7 February, New Orleans, Louisiana

"Clinical Applications of Neuropsychological Tests in the Diving Industry" (LCDR Hall)

Inter-University Seminar on Armed Forces & Society, Air University, 3-5 June, Maxwell Air Force Base, Montgomery, Alabama

"Women in the Navy: Performance, Health and Motherhood" (Ms Hoiberg)
"The Military Family as a Social Support: Implications for Biosocial Health" (Dr. Nice)

Institute for Social Research, University of Michigan, 13 July, Ann Anbor, Michigan

"Comparison of Three Questionnaires for Measuring Defenses" (Dr. Vickers)

Military Testing Association, 15-19 October, San Diego, California

"Carbohydrate Loading as a Means of Extending Endurance Performance" (LT Hodgdon)

ONR/NIOSH Symposium: Variations in Work-Sleep Schedules: Effects on Health and Performance, 19-23 September, San Diego, California

"On Varying Work/Sleep Schedules: Issues and Perspectives: As Seen by a Sleep Researcher" (Dr. Johnson)
"Altered Sleep Schedules: Circadian Cycle and Restorative Power of Naps" (Dr. Naitoh)

Scandinavian Congress of Physiology & Pharmacology, XVI; 25-28 June, Oulu, Hawaii

"The Effects of L-tryptophan on Waking EEG and daytime Sleep in Normal Healthy Subjects" (Drs. Spinweber, Ursin & Hilderbrand)

Undersea Medical Society, 31 May-2 June, Key Biscayne, Florida

"The Relationship Between Heart Rate and Aerobic Capacity in Individuals Engaged in Underwater Activities" (Drs. Neuman, Moser & Pruett)
"Stress, Fatigue and Work-Rest Cycles Associated with Deep Submersible Operations" (LCDR Hall)

Vicennial Celebration, Naval Health Research Center, "Panel on Future Research Trends at NHRC, 1 October, San Diego, California

"Rapid Diagnosis vs. Immunologic Techniques" (CDR Sanborn)
"Medical and Psychiatric Follow-up of Americans held Prisoner of War in Vietnam" (LCDR Shale)
"Social Systems Research in Field Settings: An Organizational Illustration" (LT Butler)
"Physical Fitness Research in the Navy--An Overview" (LT Hodgdon)
"Sleep Research Causes, Implications and Pharmacological Treatment of Poor Sleep in Military Personnel" (Dr. Spinweber)
"Psychoimmunology: Progress and Perspectives in Stress Research" (Dr. Vickers)

Western Psychological Association, 59th Annual Meeting; 5-8 April, San Diego, California

"Motherhood in the Military: Conflicting Roles for Navy Women" (Ms Hoiberg & J. Ernst)
"Obesity: An Incurable Disorder?" (Ms Hoiberg & S. Berard)
"Alcohol Dosage and Body Fat" (Ms Conway)

World Health Organization (WHO):
Eastern Mediterranean Regional Office, 25 October, Alexandria, Egypt
Headquarters, 31 October, Geneva, Switzerland

"Rapid Diagnostic Systems for Field Use" (CDR Sanborn)

PRESENTATIONS of research findings were made at colloquia and meetings at *universities* and *medical colleges:*

Brigham Young University, Health & Counseling Services, Provo, Utah, 21 March
"A review of Life Changes Scaling and its Association with Illness Onset" (Dr. Rahe)

National University, Mexico City, Mexico, 27 April, "Sleep Disorders" (Dr. Johnson)

Navy Postgraduate School, Monterey, California:
April, Navy Occupational Health Medical Reporting System" (Dr. Gunderson)
July, "Management Seminar Course" (Dr. Jones)

San Diego Community College, San Diego, California, 3 January, "Brain and Behavior" (Dr. Johnson)

San Diego State University, San Diego, California:
20 March, Department of Psychology, "Long and Short Sleepers" (Dr. Spinweber)
21 March, Centennial Colloquium Series, "From Armchair Theorizing to Laboratory Science: The History of the Psychology of Sleep and Dreaming" (Dr. Spinweber)
1 May, Department of Psychology, "On the Meaning of Dreams" (Dr. Spinweber)
30 October, College of Extended Studies (Educational Growth Opportunities) "Sleeping and Dreaming" (Dr. Johnson)
19 December, Department of Psychology Colloquium, "Organizational Research in Military Health Care Systems" (LT Butler w/Dr. Jones), and "Organizational Climate and Health Care (Invited Address) (Dr. Jones)

University of California San Diego Extension, San Diego, California, 24-25 February, Workshop Instructor, "Understanding Sleep Disorders" (Dr. Spinweber)

University of Southern California, Los Angeles, California, 3rd Annual Cardiology Seminar, 25 September, "Emotional and Psychiatric Impact of Myocardial Infarction during Convalescence" (Dr. Rahe)

RESEARCH RESULTS were reported and discussions were led with hospital staff at these *hospitals* and *clinics:*

Centre Muraz, Bobo-Dioulasso, 14 March "Counterimmunoelectrophoresis Techniques" (CDR Sanborn)

Mount Sinai Hospital, Academic Day, Toronto, Canada, 16 November, "New Directions in Life Change and Illness Studies" (Dr. Rahe)

Mount Sinai Hospital, Academic Day, Toronto, Canada, 16 November, "New Directions in Life Change and Illness Studies" (Dr. Rahe)

Psychiatric Hospital, National Neurology, F.B. Alvarez, Mexico City, Mexico, 26 April, "Sleep Disorders" (Dr. Johnson

Naval Regional Medical Center, San Diego, California:
21 February, "Research Findings in Alcohol & Drugs" (Mr. Kolb) (Psychiatry Dept.)
28 February, "Disorders of Sleep" (Dr. Spinweber) (Dept Psychiatry Regional Grand Rounds)
12 March, "The Sleeping Pill" (Dr. Spinweber) " " " " "
13 June, "On Dreams" (Dr. Spinweber) " " " " "
22 October, "A Rapid Spot Test for Pneumonoccal Infections" (Mr. Edwards)

San Diego County Department of Mental Health, San Diego, California, 1 November, "Sleep Disorders" (Dr. Spinweber)

REPORTS READ OR DISCUSSIONS at other *congresses* or *centers:*

Battelle Occupational Health Conference: "Problems & Strategies of Implementing Navy Occupational Health and Safety Programs", Seattle, Washington, 29-30 January:
"Welcome" and "Integration" (Dr. Lang)
"Perspectives on Occupational Health" (Dr. Jones)
"Field Studies" (Chaired by Dr. Gunderson)

Camp LeJeune, North Carolina, Dr. Eli Breger, 9 August, "Research on Attitudes and Performance of Marine Corps Recruits" (Ms Hoiberg)

Egyptian Armed Forces, Headquarters Medical Services, Cairo, Egypt, 12 April, "Rapid Diagnostic Tests and Field Kits" (CDR Sanborn)

Essex Corporation, Alexandria, Virginia, Dr. Alan Boneau, 10 September, "Effectiveness Rates of Navy Enlisted Men Assigned to Academic Remedial Training" (Ms Hoiberg)

Institut Merieux, Lyon, France, 30 October, "Rapid Diagnostic Systems for Field Use" (CDR Sanborn)

Lockheed Space & Undersea Systems, Dr. C.S. Li, "Increased Mission Time with their Deep Submersible Deep Quest" (LCDR Hall)

Marine Corps Recruit Depot, San Diego, California, Dr. Richard Rosenthal, 25 September, "Research on Suicide Attempts and Gestures in the Military" (Ms Hoiberg)

Mexican National Congress of Internal Medicine, II; Magisterial Lecture, Morelia, Mexico, 19 November (Dr. Johnson)

National Institute of Pediatrics, Mexico, City, Mexico, 16 November, "Computer Analysis of Sleep-Waking Rhythms" and "Sleep Disorders" (Dr. Johnson)

Naval Medical Research Unit No. #3, Cairo, Egypt, 27 October, "Rapid Diagnostic Systems for Field Use" (CDR Sanborn)

Naval Personnel Research & Development Center, San Diego, California:
12-13 March, "Aviation Logistics Requirements for the Decade 1985-1995" (Ms Hoiberg, with team members H. Foster, W. Muller & W. Casey) NAVAIR-03 Sponsored Project
28 September, Dr. James Arima, "Military Psychology" (Ms Hoiberg)
3 December, W. Muller & W. Casey (Ms Hoiberg)

Naval Regional Dental Center, Great Lakes, Illinois:
1-2 February, LCDR J. C. Cecil, "Dental Research Project" (Ms Hoiberg)
2 October, Captain Wirthlin & LCDR Cecil, "Dental Research Projects" (Ms Hoiberg)

Office of Naval Research, Washington, DC, 11-12 June, "Future Directions of Research on the Military Family" (Dr. Nice)

Physicians Diving Training Course (NOAA Sponsored), Miami, Florida, 12 November, "Lecture on Decompression Theory" (CDR Berghage)

Radio Stations, San Diego, California:
16 February, KSDO, "Sleep, Dreaming and Sleep Disorders" (Dr. Spinweber)
29 March, KGB, "The Joyful Wisdom Program" and "Sleep and Dreaming" (Dr. Spinweber)
3 June, KBZT Open Line Program, "Sleep Disorders" (Dr. Spinweber)
26 June, KSDO, "Sleep and Dreams" (Dr. Johnson)
9 September, KSON, "Sleep" (Dr. Johnson)
8 November, KSDO, "Sleep" (Dr. Johnson)

Television Station, San Diego, California
Channel 8 "Sun Up Program", 22 February, "Sleep Problems" (Dr. Spinweber)

Undersea Medical Society & Human Underwater Biology, Inc., San Salvador, Bahamas, 3-10 November. AMA Training Course, 3 lectures "Decompression Theory and the Treatment of Decompression Sickness" (CDR Berghage)

University of Southern California, Los Angeles, Dr. Judith Stiehm (Member, Defense Advisory Committee on Women in the Service), 13 September, "Women in the Navy" (Ms Hoiberg)

Veterans Administration (& Yale University), Westhaven, Connecticut, Dr. John W. Mason, 18-20 July 1977, "Measurements of Psychological Defenses of the Research on (1) Neuroendocrine Studies of Grief, (2) Psychoendocinre Studies of Alcoholism" (Dr. Vickers)

Washington National Issues Center (Contracted by ONR), Washington, DC, Gerald Croan, 5 December, "Develop Guidelines for Navy Family Research" (Dr. Nice)

Welcome Research Laboratories, London, England, 8 November, "Rapid Diagnostic Systems for Field Use" (CDR Sanborn)

LINE BRIEFINGS

U. S. Army

Letterman Army Medical Center, San Francisco (COL L. Wamburg), and Dr. Kim, San Diego (Advisor to NIMH & President's Council on the International Year of the Child), San Diego, 16 August "Social Support Agencies for Pacific Island Communities" (Dr. Nice)

U.S. Marine Corps

Marine Corps Recruit Depot, San Diego, California (Gen. Schulze, Gen. McClintock, Col. Abraham & LtCol. Hopkins), 19 February, "Findings of Pilot Study and Progress in Marine Corps Recruits Stress Study" (Drs. Vickers & Ward)

First Marine Corps Recon. Batt., San Diego (Major Kershaw), 19 October, "Physical Fitness Augmentation" (CDR Berghage & LT Hodgdon)

USMC Liaison Officer, Naval Ocean Systems Center, San Diego (LtCol. Whaley), 3 October, "Physical Fitness Augmentation" (CDR Berghage & LT Hodgdon)

U.S. Navy

Bureau of Medicine and Surgery, Washington, DC:
Chief, Medical Service Corps (Captain P. Nelson), May & June, "MSC Study" (LT Butler)
Substance Abuse Section (MED 3122, LT R. Berkley), 24 October, "Fleet Weight Control and Physical Fitness" (CDR Berghage)

CINCPACFLT Submarine Medical Officer (CAPT Nelson), October, San Diego, "Existing and Future Undersea Studies Research Program" (LCDR Hall)

Commanding Officers, USS Denver (LPD 9), USS Cleveland (LPD 7), & St. Louis (LKA 116), San Diego, 9 February, "Family Health Project" (Dr. Nice)

CNET, San Diego (Dr. N. Kerr) and Naval Training Center, San Diego (Dr. L. Graham), 12 June, "Longitudinal Study of Navy Academic Remedial Training Graduates" (Ms Hoiberg)
5 December (Dr. Kerr), "Follow-up" (Ms Hoiberg)

CNO Representative, Washington, DC, November, San Diego Sub Base, "Entire Undersea Studies Research Program with Special Emphasis on Deep Submergence Systems" (LCDR Hall)

Fleet Training Group, Deck Division, San Diego (CDR Williams), November, "Stress Physiology Briefing" (LT Butler)

NAVMAT-1044 (CDRs Furr, Biersner, Bates & LtCol Bowles), Washington, DC, 25 October, "Physical Fitness Augmentation" (CDR Berghage)

Naval Regional Medical Centers:
Camp Pendleton (CDR Thomas, AO; LCDR Rodrigues, Fam/Prac, & Capt Emond, Chief/Nursing) 14 December, "The Outpatient Project" (Dr. Nice)
Camp Pendleton (CDR Thomas & LCDR Rodrigues), December, "Hospital Studies" (LT Butler)
San Diego (CAPT Leisse, Dir., Reg Hlth Car Serv), 30 March, "Organizational Factors Affecting Utilization of Health Care Services" (LT Butler); April, "Setting up Hospital Study" (Dr. Jones)

Naval Regional Medical Clinic, Pearl Harbor, Hawaii (LCDR McCaughey), 23 May, "Effects of Collision at Sea on Long-Term Personnel Reaction" (Ms Hoiberg)

Naval Regional Medical Center Branch Clinics, San Diego, April:
NAS Miramar (LCDR Bazzell, Med AO)
Naval Training Center (LT Hodjer, Med AO)
MCRD (CDR Sherwood, Med AO)
NAS Coronado (Capt Browning, Med AO)
Naval Station (LTjg Glennie, Med AP)
"Setting up and Participation in Hospital/Dispensary Study" (LT Butler & Dr. Jones

Naval School of Health Sciences, Research Department (LCDR P. Bruder), Bethesda, Maryland, November, "Instrument Development, MSC Study" (LT Butler)

Naval Special Warfare Group-One, San Diego (Commodore Schaible), 26 September, "Physical Fitness Augmentation" (CDR Berghage & LT Hodgdon)

Navy Internal Relations Activity, The Broadcast Media Division, Pentagon, Washington, DC, 5 March, Broadcast on Naval Airwaves (the importance of completing a high school education) "There's No Doubt About It, A Diploma Goes A Long Way for Combat Efficiency" (Ms Hoiberg)

NAVSURFPACFLT, Force Medical Officer (CAPT Johnson), Coronado, San Diego, 16 January, "Family Health Project" (Dr. Nice)

NMPC-633 (LTjg Browning), Washington, DC, 24 October, "Fleet Weight Control and Physical Fitness" (CDR Berghage)

OPNAV-150D (Mr. Allison), Washington, DC, 25 October, "Fleet Weight Control and Physical Fitness" (CDR Berghage)

PERS 65/N-6C, Washington, DC, August, "Past Alcohol & Drug Abuse, Research Completed and Projects in Process and Contemplated" (D. Kolb)

PHIBGRUEASTPAC (RADM Paddock), PHIBRON 7 (Commodore Roach), & Chief/Staff (CAPT Connelly), San Diego, 5 February, "Family Health Project" (Dr. Nice)

Submarine Force Medical Officer (CAPT Milroy), June, San Diego, "Existing and Future Undersea Studies Research Program" (LCDR Hall)

Special Warfare Group One (LTjg Steinbaugh), San Diego, October/November/December, "Attrition and Training of Special Warfare Junior Officers" (LT Butler)

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1979 VISITORS

JANUARY	(Name, Activity)	(Division visited)
18	COL Philip Winter, MC USA, Military Asst for Medical & Life Sciences, Office of Under-Secretary Defense for Research & Engineering	(Prolonged Stress Branch)

FEBRUARY

1-2	LCDR J. C. Cecil III, DC USN, Naval Dental Research Institute, Naval Base, Great Lakes,	(Stress Medicine & Environ & Soc Med Divs)
5	CDR Kasner, NOSC and Public Works Center	(CO)
8	Dr. Samuel Berg, Washington, DC	(CO)
12	Postgraduate School, Monterey, California	(Prolonged Stress Br & Environ & Soc Med Div)
13	Dr. Howard Noyes	(Biological Sciences Div)
16	Mr. Nolan Davis, San Diego Union	(Dr. Spinweber, Environ Physiol Div)
9-23	VA Task Force on POWs; as mandated by Congress (P.L. 95-479) [H. Ray Wilburn, Project Manager Studies & Analysis Service; Dr. C.A. Stenger, Dept of Medicine & Surgery; Herbert B. Mars, Dept of Veterans Benefits & B. L. Ziskind, Studies & Analysis Service	(CO & Stress Medicine Div)
23	Capt Peter Flynn, MC USN, DOD	(Stress Medicine Div)
26	Lt Col Djoko Soermartidjo, Indonesian Army	(Dr. Shale, Prolonged Stress Br)
27	Swedish Visitors (from University of California Los Angeles)	(CO)
	Dr. Frank Markland, USC Cancer Hospital	(Environ Physiology Div)
28	Dr. Gloria Patton, ONR Pasadena	(Biological Sciences Div)

MARCH

1	Capt Paul Nelson, MSC USN, Bureau of Medicine & Surgery-71	(Command)
	CDR Ronald E. James, Mr. J Smith & Mr. J.R. Simpson, Office of Naval Research, Arlington, Virginia	(Dr. Jones, Environ & Soc Med Div)
5	Dr. Henderson, Pensacola	(Command)
6	Dr. Gloria Patton, ONR Pasadena	(Biol Sci Div)
	CDR Dick Ilka	(Dr. Richlin, Prolonged Stress Br)
	CDR T. Berghage, NMRI Bethesda	(Command)
9	Dr. Robert Rubin, Harbor General-UCLA Medical Center, Torrance, California	(Command)
12	Dr. Pentti Siltanen & guests, Helsinki, Finland	(CO)
	LCDR Larry Watko, NPMU-5, San Diego	(Biol Sci Div)
5 to 14 September	Alain G. Muzet, Centre d'Etudes, Bioclimatiques du Centre NRS, Strausboug, France	(Environ Physiol Div)
28-30	CDR R. J. Biersner, Naval Medical Research & Development Command, Bethesda	(Command)
30	LTC Larrie D. Wanberg, Letterman Army Hospital, San Francisco	(Major Van Vranken, Prolonged Stress Br)

APRIL

3 LCDR James Socks, MSC USN, UCSD Optometrist, San Diego (Prolonged Stress Br)

13 Dr. Robert T. Rubin & Dr. Judy Peters, Harbor General-UCLA Medical Center, Torrance California (Stress Psychology Br)

18 Dr. Frank Markland, Professor, UCLA, Los Angeles (Biol Sci Div)

19 CDR Dennis Moore, NAS Miramar, RPW, San Diego (Dr. Richlin, Stress Psychol Br)

19-20 Dr. M. W. Radomski & Robert Angues, Defence & Civil Institute of Environmental Medicine, Downsview, Ontario (Dr. Johnson, Environ Physiol Div)

25 Dr. Gerald Greene, Professor, Pediatrics, University of California at Irvine (Biol Sci Div)

26 Ron Crisma.., Iowa (LT Hodgdon, Work Physiol Br)

30-2 May Edward Batschelet, Ph.D., University of Zurich (Dr. Johnson, Environ Physiol Div)

MAY

7 Robert P. Purpura, M.D., The Upjohn Co., Kalamazo, Michigan (Environ Physiol Div)

Warren B. Smith, The Upjohn Co., Newport Beach, California (Environ Physiol Div)

7-9 CDR Paul A Furr, MSC USN, MAT-piT-24D HQ, NAVMATCMD Washington, DC (Admin Div)

14 Dr. Jeannine Majde, ONR Chicaco, & Drs. Eugene Gloy & Gloria Patton, ONR Pasadena (Command)

15-16 Major Robert Blaik, MC USA, Walter Reed Army Institute of Research (Command)

17 Dr. Ransom J. Arthur, Dept of Psychiatry, UCLA School of Medicine, Los Angeles (Command)

CAPT J. S. Cassells, MC USN, Deputy Commanding Officer, NRMC, San Diego (CO)

JUNE

4 CDR Richard Nail, MC USNR, San Diego (12 Days ACDUTRA) (Command)

12 Steve Doehrman, Institute of Social Research, University of Michigan (Dr. Vickers, (Stress Psychol Br)

12-26 Professor James A Horne, Dept of Human Sciences, Loughborough University, Leicestershire, England (Dr. Naitoh, Psychophysiol Br)

13 Dr. Raymond W. Novaco, Assistant Professor (Soc. Ecology), UC Irvine (Dr. Vickers, (Stress Psychol Br)

20 Mr. Charles Miller & Mr. Mel Madero, California American Ex-POW Organization (Prolonged Stress Br)

22 Mr. & Mrs. Ron Cameron, National Welfare Officer & VP of the New Zealand X-POW Group (Prolonged Stress Br)

Drs. Hauri & Horne, Dartmouth Medical School (Environ Physiol Div)

27 Frank Wadleigh, Ph.D., UC San Diego (Psychophysiol Br)

JULY

9 Ulrik Malt, M.D., University Oslo, Psychiatric Institute, Sweden (Command)

10 Reiner W. Kemmler, Dipl. Psych., Flugmedizinisches Institute der Luftwaffe, Furstenfeldbruck, West Germany (Command)

12 Dr. Karson K. Eoyang (& Selected Students, Naval Postgraduate School, Monterey, California (Environ & Soc Med Div)

12-13 Professor W. T. Singleton, Dean, Social Sciences & Humanities, University of Aston, Birmingham, England (Environ Physiol Div)

14 Dr. David Avery, NKMH Postdoctoral Fellow, University of Copenhagen (Environ Physiol Div)

18 Dr. William C. Dement, Stanford Sleep Disorders Clinic (Environ Physiol Div)

25 Mr. Ron David, Federal Bureau of Investigation, San Diego (CO)

26 Mrs. Anny Lubin (for Annual Ardie Lubin Memorial Lecture), San Diego (Command)

Dr. George Solomon, Clinical Professor & Vice Chairman, Department of Psychiatry, UC San Francisco; Director of Medical Education, Fresno Do. Dept Health (Command)

27 Dr. Somers and Mr. Rich, Southern Pacific Transportation Co., San Francisco (CO)

30 Dr. R. Cluydts, Libre University of Bruxelles, Belgium (Environ Physiol Div)

31 Janet DeWeiss, Reporter for *The Reader*, (Dr. Spinweber, Environ Physiol Div)

AUGUST

6 LT James La Rocco, MSC, USN, Naval Reserve Officer Training Center, Ann Arbor, Michigan (Environ & Soc Med Div)

SEPTEMBER

13-14 LTs Lee Mell & Robert Thompson, Naval Medical Research Institure, Bethesda, Maryland (Dr. Vickers, Stress Psychology Br)

24-26 LT Arthur Beare, U.S. Army Research Institute of Environmental Medicine, Natick, Massachusetts (Dr. Naitoh, Psychophysiol Br)

OCTOBER

1 Visitors (past employees. colleagues, associates, friends) to Vicennial Celebration, Argonaut Hall, Submarine Base, San Diego

3 Drs. S. Folkard & P. Colquhoun, Experimental Psychology Lab, University of Sussex, Brighton, Susses, England (Dr. Naitoh, Psychophysiol Br)

9 Brigadier General Garrison Rapmund, MA USA, Commanding, U.S. Army Medical Research & Development Command, Fort Detrick, Frederick, Maryland (CO & Environ & Soc Med Div)

Thomas Pollare, Medical Student, Serafimerlasarettet, Stockholm, Sweden (Command)

16 CAPT B. C. Sharp, DC, USN, Naval Regional Dental Center Branch Dispensary, MCRD, San Diego (Dr. Richlin, Prolonged Stress Br)

Surgeon CDR David R. Leitch, Royal Navy, Senior Specialist Physiology, British Defence Staff, Washington, DC (CDR Berghage, Undersea Br)

29 Sheila Moramarco, Reporter for *Madamoiselle* (Dr. Spinweber, Environ Physiol Div)

30 Michael W. Kalichman, NRC Associate candidate, University of Toronto (Environ Physiol Div)

NOVEMBER

6 LtCol Stackpole, Assistant Chief of Staff, Marine Corps Recruit Depot, San Diego (Dr. Vickers, Stress Psychol Br)

21-23 Dr. Holger Ursin, Professor, University of Bergen, Institute of Psychology, Norway (Stress Psychol Br)

DECEMBER

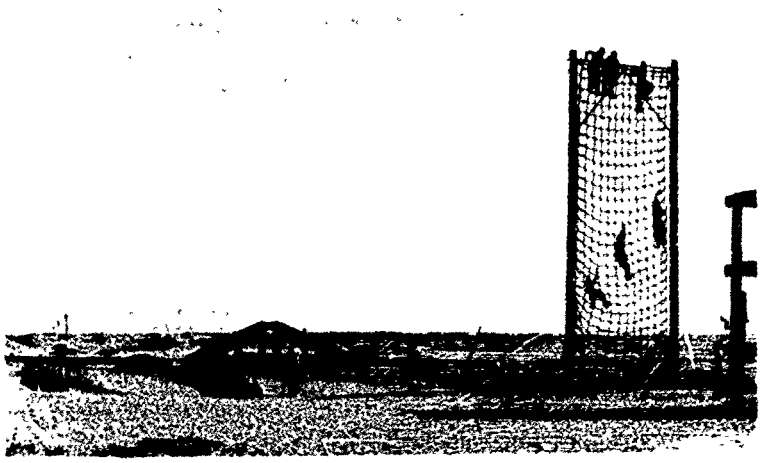
10 Mr. Warren Smith, The Upjohn Co., Newport Beach, California (Dr. Johnson, Environ Physiol Div)

10-13 Dr. Bernard Saltzberg, Head, Info Analysis, Texas Research Institute of Mental Sciences, Houston, Texas (Environ Physiol Div)

Broad jump (LTJG Marcinik + judging distance)

Flexibility testing (LT Hodgdon grading)

Examples of standard physical testing during underwater demolition training.



← Obstacle course for time.

2 mile run for time.

COLLABORATION WITH OTHER RESEARCH FACILITIES

Members of the *Environmental and Social Medicine Division* collaborated with (1) the Naval Dental Research Institute, Great Lakes, Illinois, on follow-up studies of sailors with dental disease. (2) Drs. Elster and Eoyang of the Postgraduate school at Monterey, California, have consulted this Division on research projects and lectures for PG students. (3) Naval Personnel Research & Development Center, San Diego (J. Silverman & J. Borak) on reimbursable work orders to make system improvements on enlisted history data base. (4) Dr. Uddin of Naval Medical Research Institute, Bethesda, Maryland, on follow-up study of black sailors with sickle cell trait. (5) LCDR Larry Dean, Submarine Medical Research Laboratory, Groton, Connecticut, on cold weather medicine research. (6) Military Personnel Command, Human Resources Management Program (CDR McKinley) on reimbursible work orders to conduct evaluation of NASAP alcohol counseling program. And (7) Drs. Rasmussen and Drexler of Battelle Research Programs, Seattle, Washington, with consultations on occupational health research and co-sponsor of occupational health conference.

The *Environmental Physiology Division* collaboration with other research facilities included: (1) Naval Personnel & Research Development Center (NPRDC) and Naval Air Station Miramar on nonauditory effects of noise project. (2) NPRDC and Basic Underwater Demolition Seal Training (BUDS) on comparison of subjective and objective measures of physical effort and abilities in Navy jobs. (3) Studies of sleep disorders and the effects of benzodiazepine for sleep, brain activity, arousal threshold and performance with Naval Regional Medical Center, San Diego, and Naval School of Health Sciences, San Diego. (4) Naval Ocean Systems Center, the development of oxygen toxicity meter and fitness augmentation. (5) Dr. Johnson collaborated with the U.S. Coast Guard as an expert witness on sleep deprivation in a court martial case in October in Yorktown, Virginia. Ray Hilbert of the *Psychophysiology Branch* spent three months developing and sharing bio-medical data acquisition and analysis software at the Institute of Physiology, Department of Clinical Neuro-Psychology, University of Bergen, Norway.

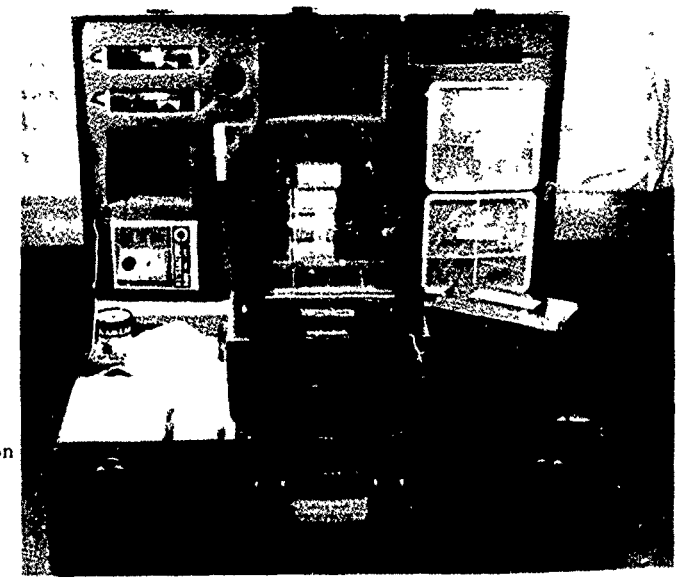
Stress Psychology Branch of the *Stress Medicine Division* collaborated with two foreign scientists, Dr. Holger Ursin, Department of Physiology Psychology, University of Bergen, Norway, and Dr. Austin Darragh, Biological and Medical Research Institute, Dublin, Ireland, on the moderating effects of psychological and behavioral variables on hormonal responses in a fear-inducing situation. They also collaborated with Drs. Robert T. Rubin and Russell Poland of UCLA-Harbor General Hospital, Torrance, California, in determining the correlation between salivary and serum steroids under conditions of stress.

Dr. Richlin of this division's *Prolonged Stress Branch* assisted two doctoral candidates from the California School of Professional Psychology by advising them on a research design related to Vietnam veterans. Collaboration with the Department of Social Work, Letterman Army Hospital to coordinate a continued follow-up of Army Vietnam POWs were also provided by Dr. Richlin, as well as with the Medical Follow-up Agency of the National Research Council advising on a research protocol for follow-up of World War II and Korean prisoners of war.

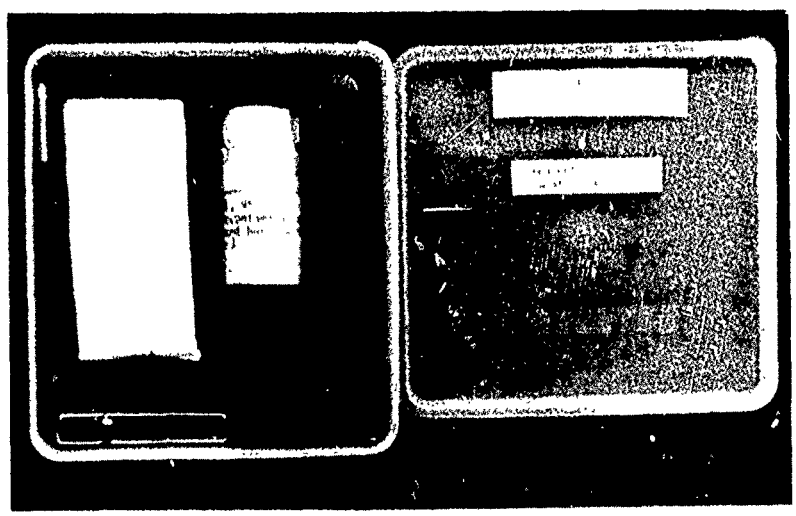
Our Librarian, Mrs. Mary Aldous, a newcomer to the *Technical & Administrative Services Division*, has played an active role this past year in collaboration with different commands. She has worked with the Librarian at Camp Pendleton and two Marine captains on research material for a special Headquarters Marine Corps project on enlisted living conditions and early attrition. Assistance has been provided to a NRMC San Diego Navy Chaplain with materials on Navy/military families. She has provided other research support to local military personnel working on advanced degrees in the field of military families. The Director for Cardiac Rehabilitation & Preventative Medicine Programs at D. N. Sharp Memorial Hospital, San Diego, has used NHRC's library facilities and research materials while working on a study of pilots and heart attacks.

Members of the *Biological Sciences Division* collaborated with (1) the University of California, Irvine, School of Medicine, Department of Pediatrics, on rapid identification of streptococcus Group B infections, and (2) with the University of Kentucky Medical School, Department of Infectious Diseases on a paper concerning coagglutination slide test for pneumococcus infection.

Mr. Edwards and Captain Rahe continue their collaborative work with Dr. James P. Henry, at the University of Southern California School of Medicine, on psychoimmunology.



These two kits were demonstrated by CDR Sanborn and used in collaboration for rapid identification of bacterial infection, with Jennings Center for Zoological Medicine; U.S. Naval Medical Research Units No. 2 and No. 3 (Jakarta Detachment); Headquarters, World Health Organization; Centre Muraz, Bobo-Dioulasso Upper Volta; Association pour la Promotion de la Medecine Preventive, Paris; and Institut Pasteur, Paris.



↑ Portable diagnostic kit showing electrophoresis unit and battery power inverter.

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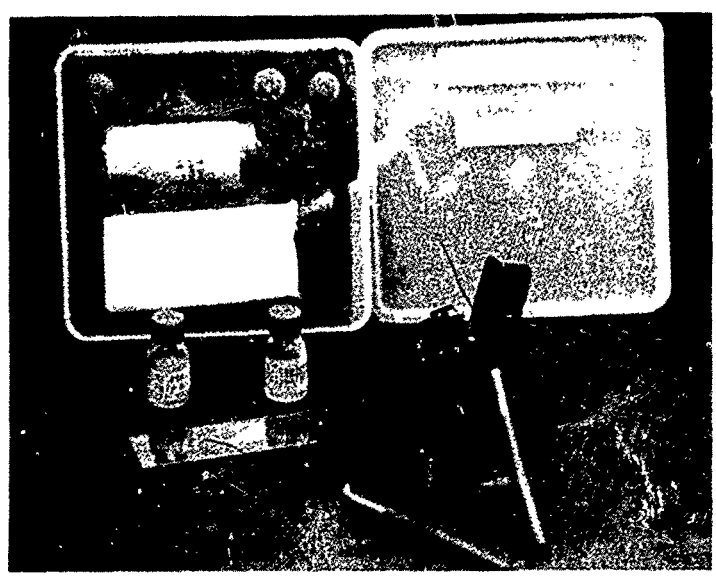
Portable → → Coagglutination Diagnostic Kit

Open and set up for operation. → →



WORK FOR SCIENTIFIC PUBLICATIONS

Editorial input by staff members for 1979, include:

Thomas E. Berghage - *Undersea Biomedical Research* (Reviewer)

Mark C. Butler - Book reviewer for Richard Marek Publications, Inc.

Earl A. Edwards - *Journal of Clinical Microbiology* (Reviewer)

E. K. Eric Gunderson - *Journal of Studies on Alcohol* (Reviewer)
The Journal of Nervous & Mental Disease (Reviewer)

David A. Hall - *Undersea Biomedical Research* (Reviewer)
Sea Grant Proposal for Scripps Institute of Oceanography

Anne Hoiberg - *Armed Forces & Society* (Reviewer)
Psychological Reports (Reviewer)
Perceptual & Motor Skills (Reviewer)
Royal College of Canada (Consulting Reviewer--Monographs published as *MLM Research Reports*)

David J. Hord - *EEG & Clinical Neurophysiology* (Reviewer)

Laverne C. Johnson - *EEG & Clinical Neurophysiology* (Consulting Editor & Reviewer)
Biological Psychology (Reviewer)
Sleep (Reviewer)
Undersea Biomedical Research (Reviewer)
Thesis for Ph.D. Degree (University of Sydney, New South Wales, Aust.)

Allan Jones - *Motivation & Emotion* (Reviewer)
Journal of Applied Psychology (Reviewer)

Paul Naitoh - *Psychophysiology* (Reviewer)
EEG & Clinical Neurophysiology (Reviewer)
Educational & Psychological Measurement (Cooperating Editor)

Richard H. Rahe - *Journal of Human Stress* (Editorial Board)
Psychosomatic Medicine (Editorial Board)
General Hospital Psychiatry (Associate Editor)
Journal of Psychosomatic Research (Advisory Board)
American Journal of Psychiatry (Reviewer)

Warren R. Sanborn - *Asian Journal of Infectious Disease, Singapore* (Editorial Board)

Cheryl Spinweber - *EEG & Clinical Neurophysiology* (Reviewer)

ACADEMIC APPOINTMENTS

Some members of our staff teach, in the evenings, at local colleges. Senior scientists such as Captain Rahe, Dr. Gunderson, and Dr. Johnson hold Adjunct Professorships (honorary) at the University of California medical campuses in Los Angeles and San Diego. These ties with local universities and colleges serve to keep researchers up-to-date with the latest academic advances in their fields. Their appointments also speak for the acceptance of many of our staff and their work by academic appointment committees.

University of California at Los Angeles, Medical School

Captain Rahe, Adjunct Professor, Psychiatry

University of California at San Diego, Medical School

Dr. Gunderson, Clinical Professor (Psychiatry)

Dr. Johnson, Adjunct Professor (Psychiatry & Neurosciences)

Captain Lang, Associate Clinical Professor (Medicine); Attending Hematologist

LCDR Hall, Depts of Pediatrics, Bioengineering, & Physiology/Pharmacology

LCDR Shale, Assistant Clinical Professor (Psychiatry)

Dr. Spinweber, Lecturer (Psychology)

CDR Ward, Assistant Professor III (Psychiatry)

University of California at Irvine, Medical School

Mr. Edwards (Consultant to Dr. G.R. Greene, Dept. of Pediatrics)

San Diego State University

Dr. Johnson, Lecturer (Psychology, Professor Level)

Dr. Jones, Lecturer (Psychology)

Dr. Spinweber, Lecturer (Psychology)

Texas Christian University, Fort Worth

Dr. Jones, Associate Professor (on leave)

The George Washington University School of Medicine & Health Sciences

LT Struempler, Clinical Instructor (Pathology)

Tufts University School of Medicine, Boston

Dr. Spinweber, Assistant Professor (Psychiatry) (on leave)

California School of Professional Psychology

Dr. Hord, Lecturer (Advanced Psychophysiology; Advanced Statistics; Psychology & the Philosophy of Science; Doctoral Dissertation Supervision)

Cincinnati Christian Seminary (Ohio)

LCDR Bailey, Visiting Lecturer & Counselor (Psychology)

Grossmont Community College, El Cajon

LT Butler, Instructor (Dept of Behavioral Sciences)

Mesa College, San Diego

Dr. Englund, Instructor (Psychology)

CONSULTANTS

1 October to 31 December 1979: None

Up to 30 September 1979:

Dr. Ransom J. Arthur, Dean, School of Medicine, University of Oregon, Portland

Dr. Ivan N. Mensh, Professor & Head of Medical Psychology, University of California at Los Angeles

Dr. Robert T. Rubin, Professor of Psychiatry, Harbor General-UCLA Medical Center, Torrance

Dr. Donald O. Walter, Department of Anatomy & Brain Research Institute, School of Medicine, University of California at Los Angeles

* Dr. Walter L. Wilkins, San Diego

Past:

* Francis J. Braceland, M.D.
Norman Q. Brill, M.D.
* Ewald W. Busse, M.D.
William C. Dement, M.D.
Wilfried J. Dixon, Ph.D.
Richard F. Docter, Ph.D.
* Francis M. Forster, M.D.
John R.P. French, Ph.D.
Reuben L. Hill, Ph.D.
* William A. Hunt, Ph.D.
Donald B. Lindsley, Ph.D.
John G. Looney, M.D.
* Kenneth MacCorquodale, Ph.D.
Arnold J. Mandell, M.D.
George A. Mansfield, Jr., Ph.D.
Mrs. Iris R. Powers
* George N. Raines, M.D.
Raloh W. Ritchie, Ph.D.
* John H. Rohrer, Ph.D.
* Howard P. Rome, M.D.
Jon F. Sassin, M.D.
Marc A. Schuckit, M.D.
Saul B. Sells, Ph.D.
Julius Sendroy, Jr., Ph.D.
Ernest S. Tucker, III, M.D.
Thomas L. Trunnell, M.D.
Richard D. Walter, M.D.
* Cecil L. Wittson, M.D.
Leonard M. Zunin, M.D.

* Original panel of Consultants to the Surgeon General appointed 1 June 1959 to advise in research matters and other pertinent general matters of interest in neuropsychiatry.

"PLANK OWNERS"

NMNPRU-NHRC original scientists and staff as of 1 July 1959:

CDR L. K. Cunningham, MC, USN, Officer-in-Charge
Walter L. Wilkins, Ph.D., Scientific Director
LT Frederick L. McGuire, MSC, USN
LT Allen E. McMichael, MSC, USN
HMCS William K. Wright
HM1 James O'Heir
HM2 Jerry G. Irvin
HM3 Jake Westfall
John A. Plag, Ph.D.
Mrs. Dorothy Swett
Ms Josephine Carey

79-1 Wilkins, WL [ZF51.524.002-5020]
Physiological Correlates of Stress and Human Performance. In: EA Fleischman & EA Alluisi (eds), *Stress and Performance Effectiveness, Vol. III*. Hillsdale NJ: Lawrence Erlbaum, in press

Stress at work, as a part of the job demands, exacts a toll in diminished performance, reduced work life, ill health, or other possible effects. Some of the effects can be detected and monitored, often early, through psychological and physiological measures. Reviewed are various autonomic measures, ways on assessing heart, skin, temperature, EEG, and other psychophysiological tests, and oxygen uptake, as measures of the cost of doing work, especially arduous or perilous work.

79-2 Jones, AP & MC Butler [ZF51.524.022-0007]
Cognitive Complexity and the Dimensions Underlying Work Environment Perceptions

The literature on cognitive complexity suggests individual differences in the numbers of dimensions that underly perceptions of the work environment. Other bodies of literature suggest that the underlying dimensions will be generally similar across individuals. Analyses of the work environment perceptions scores of 913 U.S. Navy enlisted men suggested that individuals with varying degrees of cognitive complexity evidenced many similarities of underlying dimensions although persons with higher complexity scores tended to make finer discriminations in their percertions of organizational level characteristics. Results of cross-validation analyses on an independent sample (n = 336) were also reported and were generally consistent with the foregoing analyses.

79-3 McCubbin, HI [ZF51.524.022-0006]
Developing Family Invulnerability to Stress: Coping Patterns and Strategies Wives Employ in Managing Family Separation. In: J Trost (ed), *Proceedings, World Congress of Sociology*. Beverly Hills: Sage Publishing Co., (in press)

The present investigation examines the types of coping patterns and strategies wives employ in managing the stress of family separations. Coping data (Coping with Separation Inventory) were collected on 82 wives of Navy servicemen deployed on an 8-month cruise in the Western Pacific. Using a hierarchical approach to the study of coping behavior, with factor analysis as the statistical methodology, this investigation identified five coping patterns. (I) Maintain Family Integrity; (II) Developing Interpersonal Relationships and Social Support; (III) Managing Psychological Tension and Strain; (IV) Believing in the Value of Spouse's Profession and Maintaining an Optimistic Definition of the Situation; and (V) Developing Self-reliance and Self-esteem. The secondary factor analysis of these coping patterns revealed two basic coping strategies: (I) Maintaining Family and Personal Stability and Develop Social Supports; (II) Develop Self-reliance and Self-esteem. Theoretical implications of these findings are discussed.

79-4 Pugh, WM & EKE Gunderson [ZF51.524.002-5021]
Environmental Factors in the Onset of Illness Aboard Navy Ships

Physical job demands, personnel composition, and work climate were assessed for 188 divisions aboard 18 U.S. Navy destroyer-type ships. These measures were used to predict rates of respiratory illness, dermal disorders, trauma, genitourinary illness, and gastrointestinal disorders during routine overseas deployments. A series of analyses of variance indicated that measures from all three of the variable domains contributed significantly to prediction of one or more types of illness. Because the interaction terms were frequently significant, it was suggested that a systems approach to the prediction of illness would be useful, and a predictive model based upon this perspective was proposed.

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* Interested readers may obtain a copy of any report by addressing a request card to the senior author, Naval Health Research Center, P.O. Box 85122, San Diego, CA 92138. In the case of some of the reports with higher numbers, completed later in the year, there may be some delay because of time needed for journal review, refereeing, process of publication, and procurement of reprints.

79-5 Wilkins, WL
Military Psychology: Is there an evitable double-bind? P Watson (ed), *War on the Mind: The Military Uses and Abuses of Psychology*. New York: Basic Books, 978, pp 524
Armed Forces and Society, 1980, 6(2), 326-337

Review Essay, based on P. Watson's War on the Mind, which is a review of contributions of psychological research to problems of selection, training, organization, morale, and military life.

79-6 Bailey, LW; M Richlin & JD Phelan [MIPR 7801 dtd 1 Oct 78; N0001879WR0007]
Dimensionality and Distinctiveness of the Personality Research Form (Form A)

The purpose of the present study was to determine the factor structure and scale loadings of the 15-scale Form A of the Personality Research Form (PRF-A) Analyses were based upon normative data for males and females. Principle components analyses yielded four comparable dimensions for both groups: Striving, Self-enhancing, Unconstrained, and Socially Involved. The factor structure was found to be less complex than that for 22-scale versions of the PRF, and the components correspond to important aspects of personality functioning. Results indicate the potential usefulness of the four PRF-A components in future research. Precautions regarding interpretation of the results are discussed.

79-7 Bonnett, MH [MR0000.01-6019]
Sleep, Performance, and Mood after the Energy-Expenditure Equivalent of 40 Hours of Sleep Deprivation
Psychophysiology, 1980, 17(1), 56-53

Twelve Marine subjects marched approximately 20 miles to expend as much energy in one 16-hr day as is expended during 40 hrs of relatively inactive sleep deprivation. At the end of the march, performance on addition, vigilance, choice reaction time, tapping, short-term memory, symbol substitution, and three mood scales was decremented significantly. Those decrements closely approximated decrements reported in the literature following 40 hrs of sleep deprivation. However, recovery sleep stages and arousal threshold were essentially unchanged as compared to baseline and were significantly different from that predicted after 40 hrs of sleep loss. It was concluded that while changes in performance were probably linked to total energy consumption, the commonly measured sleep variables were not.

79-8 Rahe, RH [ZF51.524.022-5020]
Life Change Events and Mental Illness: An Overview (DDC #A081-704)
Journal of Human Stress, 1979, 5(3), 2-10

The use of recent life change measurement in the lives of persons developing mental disorders parallels the measurement of risk factors by epidemiologists to understand disease distribution. A significant association between recent life change build-up and illness symptomatology has been documented repeatedly. Proposed mechanisms explaining this association are (1) lowered bodily resistance with resultant precipitation of illness symptomatology, and (2) direct and formative influence of recent life changes on subsequent symptom formation. For schizophrenia (and for most physical illnesses) the precipitation mechanism appears to be the most likely one. For depression and neurotic disorder, both mechanisms may be operative. Future advances in the area of life change and illness awaits the development of reliable and valid measures of persons' stress tolerance characteristics--such as social support systems, psychological defenses, coping capabilities, and illness behavior tendencies.

79-9 Looney, JG; RK Harding, MJ Blotcky & FD Barnhart [M0096-PN.001-3014]
Psychiatrists' Transition from Training to Career: Stress and Mastery
American Journal of Psychiatry, 1980, 137(1), 32-36

Although the development of psychiatric residents has been studied extensively, continuing changes in psychiatrists after graduation from training have not. This report presents results of a survey research study of 263 psychiatrists recently graduated from a wide variety of training programs. The psychiatrists reported alarming symptoms of stress during this period, yet they used effective coping mechanisms and perceived themselves as increasing in growth, mastery, and confidence. Overall contentment with personal and professional life was high. The most effective coping mechanisms were those involving the establishment of support systems with loved ones.

79-10 Pugh, WM [ZF51.524.022-0007]
Documentation of Eleven Programs for the Hewlett-Packard 97 Calculator

Documentation for 11 programs for the Hewlett-Packard 97 Calculator is contained in this report. Nine programs are statistical routines which compute a variety of coefficients including, chi square, t-ratio, F-ratio, multiple correlations, and Chronbach's alpha. The two nonstatistical routines include a data plotting program and a sort program. These programs are not designed to use raw data as input. Instead, they are designed to receive data commonly printed out during data analysis on a large computer system.

Documentation of each program includes a description of the type of analysis performed, program limits, step-by-step instructions for program execution, test data and solutions, formulae, and a program listing. Also included is a list of all the statistical tests and coefficients computed and the page or pages on which they appear.

79-11 Rahe, RH [ZF51.524.002-5020]
Recent Life Change Stress and Psychological Depression
Rhode Island Medical Journals, (In press)

Some of the historical roots of stress concepts were presented as well as information regarding the derivation of a questionnaire which measures recent life change experience as one aspect of recent life stress. Not only can recent life events be inventoried, but some estimation of the magnitudes of these events can be ascertained. Several studies have indicated that recent life change events occur more frequently in subjects' lives who report psychological depression than in normal controls. Although recent life change can serve as an environmental risk factor to identify those at elevated risk to develop psychological depression, far more false positives than true positives will be classified. Therefore, to evaluate persons' recent life stress for its possible influence leading to psychological depression, it is more helpful to trace the effects of recent life changes through the patient's perception, his psychological defenses, his coping skills, and his illness behaviors.

79-12 Pugh, WM [ZF51.524.022-0007]
Instruments, Procedures, and Rationale for Morbidity Forecasting Aboard Deployed Navy Ships

A system designed to assess aspects of shipboard environments that affect illness incidence rates aboard deployed U.S. Navy ships is presented in a step-by-step fashion. Included are all procedures, instruments, and parameter estimates necessary for computing expected incidence rates for respiratory illness, dermal disorders, trauma, gastrointestinal illness, and genitourinary illness. These illness rates are computed for each division (work group) on a ship and are organized in a way which provided an overall ship summary showing (a) the expected monthly incidence of each type of illness for each division, (b) the expected monthly incidence of each type of illness across divisions, and (c) the expected total monthly illness rate for each division. These expected incidence rates are intended to help corpsmen and those in a ship's command anticipate the effects of conditions which adversely affect health so that corrective action can be promptly initiated. In addition the expected incidence rates provide a baseline to which actual illness rates can be compared.

79-13 Hoiberg, A [ZF51.524.022-001]
Military Effectiveness of Navy Men During and After Vietnam
Armed Forces & Society, 1980, 6(2), 232-246

The objective of this study was to (1) identify indices of military effectiveness/noneffectiveness during the Vietnam and post-Vietnam eras, (2) describe the Navy's role in Vietnam, and (3) examine the longitudinal performance of a Navy cohort that began service in 1966 (N=92,203) and determine its rate of effectiveness on several indices during war and peace, 1966-1977. Results showed that these men were highly effective during both the Vietnam and post-Vietnam eras on such indices as overall performance, unauthorized absences, desertions, and physical or psychiatric hospitalizations (including alcoholism and drug-related conditions). When compared with more recent populations, the 1966 cohort had higher percentages of effectiveness on these indices.

79-14 Edwards, EA; RH Rahe, PM Stephens & JP Henry [MR0000.01-6014]
Antibody Response to Bovine Serum Albumin in Mice: The Effects of Psychosocial Environmental Change
Proceedings, Society of Experimental Biology & Medicine, (in press)

The effects of psychosocial environmental change upon circulating antibody response to antigenic challenge was investigated in CBA/USC mice. Mice were reared in isolation and selected groups were subsequently exposed to psychosocial stimulation. Antibody titers of mice that remained in isolation were significantly higher than the titers of mice exposed to psychosocial stimulation. One group of mice exposed to psychosocial stimulation and then returned to isolation showed titers significantly below those of mice exposed to psychosocial stimulation only. These data demonstrated that psychosocial environmental changes are productive of significant suppression of antibody formation in mice.

79-15 Hoiberg, A [ZF51.524.002-5023]
Women in the Navy: Performance, Health, and Motherhood

The purpose of this study was to examine the current status of all Navy women who enlisted during the years 1973 through 1977 by identifying trends in occupational assignments, rates of premature attrition, and reasons for hospitalizations. Results showed that during recent years a significantly higher percentage of women became Aviation mechanics whereas significantly fewer had been assigned to Clerical/Administrative or several other traditional occupations. Premature separations from the Navy tended to have little association with a specific occupation; between 72 and 99% of all separated women had not been assigned to a specific specialty. The most frequent reasons for being separated were either pregnancy/parenthood or unsuitability for service. Other comparisons showed that most hospitalizations occurred because of pregnancy related conditions, respiratory disease, and mental disorders. Pregnancy-related conditions accounted for 10.9% of all separations and 21% of all hospitalizations. Several recommendations were made in an effort to enhance the transition of integrating 20,000 additional enlisted women into the Navy by 1983.

79-16 Hall, DA; RE Townsend & J Knippa [M0099-PN.003-3201]
Stress, Fatigue, and Work-Rest Cycles Associated with Deep Submergence Rescue Vehicle Fly-Away Evolution *(Center Publication)*

To obtain information on stress, fatigue, and work-rest cycles on both submersible operators and surface support crew members during an actual submarine rescue fly-away mission, six operators and seven surface support personnel (SSP) were monitored during the conduct of a six-day trial open-sea submarine rescue evolution using the Deep Submergence Rescue Vehicle (DSRV), Mystic. Operators and crew members lived aboard the mother submarine which carried the DSRV from port to the site of the downed submarine and return. Demographic information, psychological measures, performance measures and environmental data were obtained during pre-deployment, transit-out, at dive site, and transit-in periods. The overall results suggested that a DSRV mission of the present duration and difficulty can be accomplised without exceeding the capabilities of the crew and support personnel. The trend of the changes does, however, suggest that missions of longer duration may require scheduling of regular sleep periods for personnel to maintain performance.

79-17 Sanborn, WR; M Schlumberger & P Stoeckel [M0095-PN.002-5048]
A System for Epidemic Meningitis Control in West Africa

Effective use of specific vaccines to control epidemic cerebrospinal meningitis requires early, exact etiologic diagnosis. Since first cases ofter occur in areas remote from medical laboratories, etiologic diagnosis is seldom made. A portable kit was developed for rapid diagnosis under field conditions, and logistics of administering vaccine have been simplified with jet injection and stabilized meningococcal vaccines. A system employing these components for rapid diagnosis and vaccination was field-tested in Upper Volta, working from a Land Rover and a light plane. The 1979 epidemic was due mainly to Gr. C meningococci, but other etiologic agents were were also found. Thus, Gr. C vaccine was used, and therapy could be consistent with rapid diagrostic test results. This system may be suitable for disease control in other situations.

79-18 Johnson, LC [MR041.01.03-0157]
Sleep Disturbances in Humans
In: *Proceedings AGARD Lecture Series No. 205, Sleep, Wakefulness and Circadian Rhythm.* London: Harford House, ISBN 92-835-024903. Sept 1979. pp 4-1 to 4-16

Disturbed sleep results in feelings of fatigue and usually, impaired performance regardless of whether the distrubed sleep is due to excessive noise or a chronic sleep disorder. In addition to noise, some other environmental factors that disturb sleep are temperature, unscheduled, operational demands that fragment sleep time, rotating shift-work schedules, and operational requirements that result in air travel across several time zones. While appropriate attention to sleep logistics may minimize the environmental causes of disturbed sleep, resolution of the disturbed sleep of those with sleep disorders is more difficult. The focus in sleep disorders must be on the individual. The major sleep complaint is insomnia, not enough sleep, usually due to prolonged sleep latency. A more serious medical problem, however, may be the complaint of excessive daytime sleep or hypersomnia. Most patients with complaints of hypersomnia are usually diagnosed as having narcolepsy or sleep apnea. Relative to narcolepsy, sleep apnea (episodes of respiratory arrest during sleep) has only recently received attention. In addition to a sleep problem, sleep apneic patients may have hypertension and/or cardiac arrhythmia.

79-19 Johnson, LC [MR041.01.03-0157]
Sleep Disturbance and Performance
In: *Proceedings AGARD Lecture Series No. 205, Sleep, Wakefulness and Circadian Rhythm.* London: Harford House, ISBN 92-835-024903. Sept 1979. pp 8-1 to 8-17

While the type of sleep obtained does not appear to be an important factor in performance, the time of day the sleep is obtained and when the performance occurs are very important. Time-of-day effects may be a more crucial factor in performance than the preceding sleep patterns. While the effect of total sleep loss becomes pronounced after 48 to 60 hours, consistent performance decrement following reduced sleep or fragmented sleep has not been found. Feelings of fatigue, however, are a consistent finding in all sleep-loss studies. A significant relation between sleep quality (good vs. poor sleep) and performance is not easily found. The deleterious effect of hypersomnia, especially that due to narcolepsy, has been documented.

79-20 Drexler, JA; AP Jones & CKE Gunderson (Eds.) [ZF51.524.023-2014]
Problems and Strategies of Implementing Navy Occupational Health and Safety Programs.
Seattle: Battelle Human Affairs Research Center, 1979. pp 116

The objectives of this conference on Navy occupational health problems was to consider organizational factors, cost effectiveness, and research and development needs involved in the implementation of occupational health programs. Participants included line managers, safety experts, industrial hygienists, epidemiologists, physicians, and behavioral scientists. Serious problems were noted stemming from two primary sources: (a) the lack of a clearly stated set of occupational health goals and priorities and appropriate resource allocations, and (b) the lack of an appropriate organizational structure to accomplish such goals and objectives. The conference identified many of the Navy's current occupational health problems and proposed various solutions or meaningful approaches to development and conduct of Navy occupational health and safety programs.

79-21 Bailey LW & FA Thompson [MIPR 7801 dtd 1 Oct 78; N0001879WR0007]
Correction of Misinterpreted Data from the Psychiatric Examinations of Repatriated Vietnam Prisoners of War

In a review of literature pertaining to the psychiatric status of Vietnam RPWs during second year follow-up, it was discovered that some of the data had been poorly formulated and erroneously interpreted in published reports. The purpose of the present paper is to delineate the problem and to derive appropriate interpretations of the material. It is concluded that there was notably less pathology among RPWs during this period than had been thought.

79-22 Neuman, TS; RG Spragg, PD Wagner & KM Moser [M0099-PN.002-3121]
Cardiopulmonary Consequences of Decompression Stress

Asymptomatic venous gas emboli (VGE) have been routinely demonstrated in both animals and men undergoing clinically uneventful decompression from hyperbaric environments. The effect of VGE on gas exchange and pulmonary hemodynamics in this setting is unclear. We therefore have studied the cardiopulmonary effects of clinically uneventful decompression on unanesthetized sheep. Sheep were instrumented with a femoral arterial catheter, Swan-Ganz catheter, chronic tracheostomy, and were loosely restrained in the prone position. Following baseline measurements of pulmonary artery pressure (pPA), mean pulmonary artery wedge pressure (pPAw), cardiac output (CO), arterial and mixed venous blood gases, O_2 consumption, CO_2 production, Doppler ultrasonic bubble detection, and V/Q scans using ^{133}Xe, the animals were exposed to: (a) a 15-minute exposure to 6.03 ATA (n=16), (b) a 17.5 minute exposure to 6.03 ATA (n=8) or (c) a 15-minute control period at 1 ATA (n=7). All measured parameters remained unchanged in the control group. VGE were detected in all animals exposed to pressure. In both exposure groups CO fell 20% ($p < .05$) and pulmonary vascular resistance (PVR) rose 60% ($p < .05$) compared to the control group. This rise in PVR was significantly in excess of that predicted for the observed fall in CO. Analysis of pPA and pPAw did not suggest either right or left ventricular failure. No significant abnormalities of gas exchange were detected. V/Q scans remained unchanged in all animals. We conclude CO and PVR are altered by clinically uneventful decompression stress.

79-23 Neuman, TS; K Moser & R Pruett [M0099-PN.001-3125]
Heart Rate and Aerobic Capacity in Individuals Engaged in Underwater Activities

Diving activities have been shown to be dangerous to individuals in poor physical condition. Therefore, to increase diving safety, a simple noninvasive method to predict aerobic capacity would be useful. Among the many methods used to estimate aerobic capacity based upon submaximal exercise testing, the most widely used - the Astrand-Ryhming nomogram - has never been validated in the diving population. Twenty-seven Naval personnel were exercised to their maximal oxygen consumption and this value was compared to the maximal oxygen consumption predicted by the Astrand-Ryhming nomogram. We demonstrated that, in certain groups of U.S. Naval personnel, the Astrand-Ryhming nomogram appears to underestimate the maximal oxygen consumption. As a result, new methodologies to accurately predict aerobic capacity may need to be developed for individuals engaged in underwater activities.

79-24 Neuman, TS & KM Moser [M0099-PN.001-3125]
A Nomogram for Calculation of Oxygen Consumption from Minute Ventilation at Varying Workloads

Oxygen consumption can be difficult and time consuming to measure. At the present time there does not exist an accurate method of estimating oxygen consumption during exercise at varying workloads. This study examined the relationship between minute ventilation and oxygen consumption and from the results generated a nomogram which can be used to accurately estimate oxygen consumption from minute ventilation in normal athletic male subjects. It was also determined that although a positive smoking history did not effect the accuracy of this estimate such a history adversely effects the ability to predict maximal oxygen consumption from heart rate at sub-maximal work rates.

79-25 Ward, HW; RH Rahe, TL Conway, LK Hervig, DH Ryman & RR Vickers [ZF51.524.002-5020]
Navy Company Commanders: Introduction to a Psychobiological Study of Stress and Adaptation

Navy Company Commanders (CC), the senior enlisted men responsible for initial training of recruits, were selected for a longitudinal psychobiological study of occupational stress. These men were not selected for this job by rigid screening; therefore they represented typical men exposed to new, and at times, extreme job stresses. Forty-six CC were followed during a six-month period while they completed schooling for this job and successfully trained their first company of recruits. Of these, 34

volunteered to be studied during their second company as well, thereby providing data pertinent to psychobiological adaptation to stress. The study design included assessments of psychological and physiological variables on two occasions during CC school and on six separate days during each recruit training cycle. Study days were selected to represent a range of job stress. This report describes the study design and the biographical, personality, stress, and strain measures employed. Strains included behavioral and physiological variables which presumably link stress to illness. Analyses confirmed that stress varied significantly and systematically during recruit training cycles. This finding provides the background for future reports on behavioral and physiological strains; adaptation to repeated stress; and life history, social support, and personality variables which buffer or exacerbate the effects of job stress.

79-26 Rahe, RH; TL Conway, RR Vickers, DH Ryman, LK Hervig & HW Ward [ZF51.524.002-5020]
Navy Company Commanders: Serum Uric Acid and Cholesterol Variability with Job Stress

Serum uric acid and serum cholesterol variability were measured in 46 Navy Company Commanders throughout their first experience leading recruits through boot camp. In addition, these serum metabolites were measured in 34 of these men throughout their second recruit company. Analyses provided a systematic investigation of serum uric acid and cholesterol variability in relation to first and second exposures to identical job stress.

Serum uric acid data indicated a significant elevation at an early phase of high job stress for the first recruit company. Serum cholesterol data revealed a significant fall relatively late in the high stress interval, with a slow recovery to baseline in both the first and second recruit companies. These different patterns for serum uric acid and cholesterol in relation to job stress are discussed; the possible significances of adaptation are mentioned.

79-27 Spinweber, CL; R Ursin & RL Hilderbrand [MR0000.01-6018]
L-Tryptophan as a Hypnotic in Daytime Sleep

The effects of daytime administration of L-tryptophan on sleep latency, nap sleep stages, plasma tryptophan levels, and waking electroencephalograms were studied in a group of 20 normal adults. Subjects were assigned to a morning or afternoon group, and data were collected on two occasions, after L-tryptophan (4 grams) and after placebo, assigned in a counter-balanced order. L-tryptophan significantly reduced sleep latency without alteration of sleep stages, elevated plasma free and total tryptophan levels, and increased alpha time and theta time and decreased alpha frequency during waking EEGs. Analysis of subjective reports of sleepiness revealed no post-nap hangover after L-tryptophan. It is concluded that L-tryptophan is a "natural" hypnotic which can facilitate sleep onset at clock times which do not coincide with biological sleep times. The need for future research is discussed.

79-28 Englund, CE [MR041.01.03-0152]
The Diurnal Function of Reading Rate, Comprehension and Efficiency
In: *Proceedings of the XIV International Conference of the International Society for Chronobiology*, Hanover, Germany, 8-12 July 1979, (in press)

The time course of RR and RC, when examined autorhythmometrically, has shown diurnal functions distinctly different from each other. Reading rate appears to be faster in the morning hours, progressively decreasing over the day. Reading comprehension improved from a low morning point to mid-day peaks, falling again late at night much the same way as oral temperature. Reading efficiency is affected by performance in rate and comprehension. The function appears bimodal with a general shape similar to reading comprehension. The circadian rhythms of oral temperature, general activation and memory were found to be synchronous, all peaking mid-afternoon. Attempts to predict the values of either OT, GA, STM or reading performance from knowing the value of the other variable at a particular time were not successful. Holding time-of day constant, thus removing the circadian effect, would only indicate direction of change. The fact that cause-effect relationships between these functions could not be established by this method may indicate that these functions operate somewhat independently.

79-29 Naitoh, P; A Lubin & WP Colquhoun [MR041.01.03-0152]
Comparisons of Monosinusoidal with Bisinusoidal (Two-Wave) Analysis
In: *Proceedings of the XIV International Conference of the International Society for Chronobiology*, Hanover, Germany, 8-12 July 1979, (in press)

Monosinusoidal (one) and bisinusoidal (two) waves were fitted to two sets of data: 1) Kanabrocki-Schevig data consisting of 8 data points over a 2-day period from 13 young soldiers, and 2) Blake-Colquhoun data consisting of 20 data points obtained over a 24-hour period from 73 Royal Navy ratings. Results indicated that the two-wave analysis was preferred to a more widely used one-wave method, as it provided more accurate representation of time-of-peak (TOP) and time-of-trough (TOT) in the data. Temporal sequence of the residuals after the two-wave analysis was found random, revealing its superiority to the one-wave method. Two-wave analysis was observed to have a potential problem in that it could produce "over fitting" where every fluctuation in data, however extraneous, have equal weight in the analysis. This potential problem was illustrated by a much larger confidence ellipse which resulted from the two-wave analysis applied to small scale data. This increased uncertainty in defining TOP and TOT of a group was not seen when a larger data set was used. Two-wave analysis is thus recommended when data basis is sufficiently large, or when a precision determination of individual TOP and TOT is required. When the data basis is limited, use of one wave analysis is suggested as the method of choice.

79-30 Naitoh, P; CE Englund, J Moses & CL Spinweber [MR041.01.03-0152]
Effects of Vigil on Human Circadian Rhythms: Normative Data
In: *Proceedings of the XIV International Conference of the International Society for Chronobiology*, Hanover, Germany, 8-12 July 1979, (in press)

A vigil of up to 45 hours does not destroy circadian cycles in physiological and subjective mood scales, but some rhythms in task performances disappeared with vigil. Vigil does, however, alter some basic parameters of circadian rhythmicity. It tends to reduce strength of rhythmicity and most importantly, to create lengthening of 95% confidence arc for acrophase angles, resulting in appreciably larger 95% confidence ellipse. Thus, major altering effects of vigil of two nights seem to be in a greater scatter of acrophase angles among the individual subjects. Such a greater scatter in time of minimum and maximum due to vigil would result in reduction of amplitude when averages across subjects were plotted along time of day, and also in failure to find a significant cosinor for a group, even though individual subjects might have somewhat reduced but still significant rhythmicity. Relationship between oral temperature and subjective mood and pulse seems to continue undisturbed during the vigil, but correlation between oral temperature and task performance did not survive a process of remaining awake. Findings suggest that more attention must be paid to individual susceptibility to vigil in circadian cycle study.

79-31 Hoiberg, A & J Ernst [ZF51.524.002-5023]
Motherhood in the Military: Conflicting Roles for Navy Women?

The purpose of this study was to determine the effects of pregnancy-related conditons upon the subsequent performance, retention, and hospitalizations of Navy enlisted women who entered the service after 1972 ($\underline{N}$ = 27,503). Results showed that pregnancy-related conditions accounted for approximately 21% of all enlisted women's hospitalizations and about 19% of all days lost from duty for inpatient medical care. The rate of pregnancy/parenthood separations across the 5-year time period was 10.9%, which was second to discharges for unsuitability reasons. Other findings indicated that significantly more active duty than discharged mothers were married; a higher percentage of non-whites also stayed in the Navy. Rates of subsequent hospitalizations for active duty mothers were the lowest among the three selected groups. For those women who remained in the Navy after childbirth, the roles of mother and sailor seemed to be quite compatible which was reflected in part by the relatively high reenlistment rate and low hospitalization rate. Several explanations were suggested to explain the fairly high degree of compatibility between motherhood and the organization.

79-32 Conway, TL; RR Vickers, HW Ward & RH Rahe [ZF51.524.002-5020]
Occupational Stress and Variation in Cigarette, Coffee, and Alcohol Consumption

The impact of occupational stress on self-reported cigarette, coffee, and alcohol consumption was investigated in a longitudinal field study. Stress indicators were perceived work load, subjective stress/stain, and mood. Each variable was measured repeatedly for 34 men performing a job with known systematic variation in stress. On the average, cigarette smoking and coffee drinking were higher while alcohol consumption was lower under high stress. These trends were due primarily to a few individuals who showed pronounced within-person correlations between stress and strain. The significant within-person correlations were limited largely to the stress measures of perceived work load and stress/strain. Between-person correlations based on mean levels of the stress indicators and behavioral strains indicated a more generalized tendency for people who perceived higher stress to show greater strain. These findings indicated that there are important individual differences in response to stress and that within- and between-person study designs may produce different patterns of findings. Future theory and research should take both of these facts into account.

79-33 Butler, MC; JM La Rocco & AP Jones [ZF51.524.022-0007]
Work Group Interdependence and Role Conflict and Ambiguity: Identifying Sources of Job-Related Stress

As the impact of job stressors such as role conflict and role ambiguity becomes more apparent, social scientists have attempted to delineate potential moderating influences that might protect the worker from the stresses of the job. Considerable evidence exists which suggests that the nature of leader-subordinate and workgroup interactions are linked to the influences of stress. The present study postulated that leader practices would be more important in reducing job stress (role conflict and ambiguity) in workgroups involved in highly interdependent and cooperative tasks than for those who are not. Analyses conducted on 952 Navy enlisted personnel supported the hypothesis that stress is more highly related to leader practices for high versus low task interdependent groups.

79-34 Butler, MC & AP Jones [M0106-PN.001-0002]
A General Review of Factors Related to the Health Care Delivery Process: A Working Bibliography

This review represents a cross-section of recent research regarding factors related to the health care delivery process. Over 800 references are included, and were selected because of their relevance to and implications for behavioral science research, theory, and applications. In light of increasing professional opportunities for psychologists in the health care process, the articles included were additionally organized into 10 different major topic areas felt to be relevant to a wide range of behaviorally oriented interests, and should be useful in identifying future efforts.

79-35 Hodgdon, JA; HW Goforth & RL Hilderbrand [M0099-PN.004-8050]
Carbohydrate Loading as a Means of Extending Endurance Performance

A carbohydrate (CHO) loading program was tested in nine Naval Special Warfare personnel to determine whether or not such a program could increase their endurance performance. Participants were divided into two groups. Each participant was given two treatments: a 6-day CHO loading diet-exercise program and a 6-day nonloading program. A counterbalanced design was used with each participant serving as his own control For each treatment, the participants ate a combination of liquid formula diet and solid food providing 3500 cal/day. The loading program consisted of three days of 3% CHO diet, followed by two days of 64% CHO diet, followed by one day of 46% CHO diet. Concurrently, a daily running schedule of 14 miles, 6 miles, 4 miles, 1 mile, 1 mile, and 0 miles was followed for days 1-6 respectively. The noload program consisted of six days of 46% CHO diet and daily runs of four miles for days 1-5 and 0 miles for day six. Endurance performance was determined on day seven with the participants running on a motor-driven treadmill at 0% grade, at the speed necessary to attain approximately 80% of participants'

$\dot{V}O_2$ max. Performance was measured as the period of time a person could run before reaching subjective exhaustion. $\dot{V}O_2$, heart rate, and rectal temperature were monitored during the run. We found that the mean running time was greater by 10.8 minutes following the loading program vs. the nonloading program. This difference represents a 9.0% increase in running time and is significant ($p<0.05$, t-test for planned comparisons). Discussion includes directions for continuing research.

79-36 Edwards, EA & D Coonrod [M0095-PN.002-5045]
A Comparison of Coagglutination and CIE for Detection of Antigens in the Sputum in Pneumococcal Pneumonia
Journal of Clinical Microbiology, (in press)

Coagglutination was compared with counterimmunoelectrophoresis (CIE) for sensitivity and specificity in detection of pneumococcal antigens in sputum. Initial sputum samples from patients with pneumococcal pneumonia (<12 hr antibiotic therapy) were positive for antigen in 37 of 44 cases (84%) by use of either test. There was a decline in the number of positive results with sputums obtained during continuing antibiotic therapy, but the decline was greater for CIE (only 29% of samples positive at three days of therapy) than with coagglutination (61% positive at three days) ($p<0.05$). Sputum of three of eleven patients (27%) with nonpneumococcal pneumonia was positive for pneumococcal antigen by both CIE and coagglutination, indicating the same degree of non-specificity. Coagglutination gave the same results as CIE with sputum from patients with chronic bronchitis without pneumonia; nine of 23 of these patients were positive, and there was a strong association between a positive antigen test and a positive culture of the sputum for pneumococci. Coagglutination was simpler to perform than CIE and required only a fraction (about 1/30) of the antiserum required for CIE. These advantages, plus the greater sensitivity of coagglutination with sputum samples obtained during antibiotic therapy suggests that coagglutination is preferable to CIE.

79-37 Kolb, D; P Coben & N Heckman [P.O. #N0002278F088AFZ; W.U. #M0096-PN.001-1034]
Patterns of Drinking and AA Attendance for Navy Enlisted Men Following Treatment

Follow-up questionnaires were analyzed for 218 younger (≤ 25 years old) and 319 older (≤ 26 years old) Navy enlisted men who were treated in alcohol rehabilitation facilities. While 77% of the younger men and 43% of the older men continued to drink alcohol following treatment, the majority of them reported it had not caused them problems. There was a strong association between not drinking and regular or occasional AA attendance for men in both age groups. Among problem drinkers were men who valued AA but, for reasons not clear from the study, were unable to control their drinking. Both younger and older men rated group therapy and the decision to get help as most helpful of eight treatment elements. Both rated Antabuse therapy as least helpful. Younger men rated AA as next least helpful. Differences in ratings of helpfulness of program elements occurred most often between non-drinkers and men identified as "high" drinkers. The implications of the findings for program modifications are discussed.

79-38 Booth, RF & MS McNally [M0096-PN.001-1031]
The Fate of Disenrollees from Technical Training in the U.S. Navy

Aptitude, background, personality, and interest information was related to the post-training performance effectiveness and occupational advancement of 1,527 enlistees who were disenrolled from Navy health care training. Effectiveness was defined as completion of an obligated term of service with a recommendation for reenlistment, and occupational advancement was defined as moving from a general duty position into an alternative Navy occupation. The rate of effectiveness among disenrollees was 40% as compared with an 81% effectiveness rate among graduates of the training program; when reason for disenrollment was considered, the effectiveness rate of enlistees who were dropped for disciplinary reasons was found to be only 19%. Age, aptitude, education, and Social Conformity and Activity scores on the Comrey Personality Scales were found to discriminate significantly between effective and ineffective disenrollees, and age, aptitude, education, and Navy Vocational Interest Inventory scores were found to discriminate significantly between disenrolees who had moved into different occupational specialty areas, e.g., seamanship, supply, and administration or clerical. Implications of these findings for Navy vocational guidance and placement programs are discussed.

79-39 James, LR & AP Jones [ZF51.524.022-0007]
Perceived Job Characteristics and Job Satisfaction: An Examination of Reciprocal Causation
Personnel Psychology, (in press)

The following four assumptions were tested (a) satisfaction with job/task events and perceptions of job challenge, autonomy, and importance are direct, reciprocal causes of each other; (b) job perceptions are also caused directly by situation attributes, although perceptual distortions resulting for individual dispositions must also be considered; (c) job satisfaction is also cognitively consistent with (i.e., caused by) individual dispositions, although these individual dispositions are generally different from those associated with job perceptions; and (d) individuals rely on job perceptions, and not situational attributes, for information in formulating job satisfaction attitudes. The assumptions were tested on a sample of nonsupervisory subjects (n = 642) from divergent work environments (e.g., production-lines and a computer software department). A nonrecursive, structural equation analysis, combined with tests of logical consistency, supported the assumptions above. The results were employed to recommend changes in current perspectives regarding perceptual/affective dichotomies and unidirectional causal models and moderator models that link job perceptions to job satisfaction.

79-40 Rahe, RH [M0096-PN.001-1035]
Developments in Life Change Measurement: Subjective Life Change Unit Scaling
In: B Dohrenwend & B Dohrenwend (Eds), *Stressful Life Events (in press)*

This chapter first addresses recent life change events within the frame work of a "risk factor" as used in epidemiology. Risk factors are evaluated according to their utility to identify subsets of a population at high risk for development of disease. Useful risk factors inspire considerations of etiology. The etiological significance of recent life change events appears to be their influence upon organismic homeostasis. Disruptions in homeostatis balances, when of sufficient degree or duration, lead to organ system dysfunction and heightened susceptibility to a variety of illnesses. Also, in the instances of depression and neurosis, recent life change events seem to exert an influence in symptom formation.

This chapter will next make methodological comments on the current state of affairs in recent life change sampling and scaling. Though recent life change lists have increased in number over the past decade, item overlap is unexpedctedly high. Conversely, recent life change scaling studies are quite desperate and at times even used in compatible scaling techniques.

Finally, material will be presented from a study of Vietnamese refugees coming from Saigon to California in 1975. This study allowed for the assessment of the utility of the Subjective Life Change Unit technique. Whereas this method improved correlations between recent life change events and illness for female refugees, it did not do so for males. Predominantly physical symptoms were correlated with recent life change events for females while psychological symptoms were correlated with recent life stress for males. In future studies of recent life change stress and illness, separate analyses for women and men appear to be in order.

79-41 Nice, DS & A Beck [ZF51.524.022-0006]
Feelings of Depression in Navy Wives Prior to Family Separation

The mean depression score of 59 wives of naval personnel aboard two ships preparing for an extended overseas deployment was significantly higher than the mean depression score of 29 wives of Navy personnel aboard a ship scheduled to remain in port. Experience derived from previous separations did not significantly affect the depression scores. Preventive and treatment implications of the onset of depressed mood prior to separation are discussed.

79-42 Biersner, RJ & JM La Rocco [MF51.524.002-0511DD5G]
Determinants of Reading Performance and Achievement
Perceptual & Motor Skills (in press)

79-43 Vickers, RR & LK Hervig [M0096-PN.001-1035]
Comparison of Three Psychological Defense Mechanism Questionnaires

Multitrait-multimethod logic was used to compare three questionnaires measuring psychological defenses. The Defense Mechanism Inventory (DMI), the Coping Operations Preference Enquiry (COPE) and scales developed by Joffe and Naditch (J&N scales) were administered to 39 recruits who failed to complete military basic training. Convergent validity was low as scales measuring the same defense in different questionnaires were not highly correlated. Discriminant validity was low for the DMI and J&N scales as substantial correlations occurred between different defenses within these instruments. Allowing for these intercorrelations, the pattern of correlation between defenses was similar within each instrument.

The data imply low validity for the questionnaires, but other interpretations are available. Low convergent validity could be due to sampling different areas of defensiveness in each instrument. Low discriminant validity may be due to inadequate conceptual distinctions between defenses or to the operation of general defensive factors across defenses. While the questionnaires are clearly not interchangeable, one or more may provide valid measures of defenses, particularly in specific situations suited to the content of the questionnaire. The predictive validity of these scales must be compared to help resolve the ambiguities of the present findings.

79-44 Richlin, M; JH Shale & RH Rahe [N0001880WR00005 OM&N FY80]
Five-Year Medical Follow-up of Navy POWs Repatriated from Vietnam: Preliminary Results
In: *Proceedings of World Psychiatric Association, Military Section on "Combat and its Aftermath"*, 26-92 November 1979, Lagos, Nigeria (in press)

Naval aviators who had been prisoners of war (POWs) were matched with a control group of naval aviators who had been flying combat missions in Vietnam but had not been shotdown and captured. Extensive medical examinations of the POW group were conducted at repatriation in 1973, and annually thereafter for five years, and annually since 1976 for the controls. Preliminary results comparing 57 (of 138 possible matched pairs) at the 1978 examinations, showed no significant differences on any of the major organ systems or on psychiatric diagnoses.

79-45 Johnson, LC [MF58.524.004-9026]
On Varying Work/Sleep Schedules: Issues and Perspectives as Seen by a Sleep Researcher
In: *Proceedings, ONR/NIOSH Symptoium, "Variations in Work-Sleep Schedules: Effects on Health and Performance"*, 19-23 September 1979, San Diego, California (in press)

Poor sleep quality, inadequate sleep, and fatigue are major complaints of those on varying work/sleep schedules. In this paper, the relationship of sleep *per se* to the complaints of shift work is explored. Comparison of sleep data from studies of shift workers and from studies of nonshift workers indicated that a decrease in sleep quantity does not appear to be sufficient to cause the extreme feelings of fatigue or the reason for the sleep complaint. The time in the 24-hour cycle that sleep is obtained appears to be a major factor in determining the quality and effectiveness of sleep.

79-46 Hoiberg, A; J Ernst & DE Uddin [M0096-PN.001-1003]
Effects of Sickle Cell Trait and G-6-PD Deficiency on Health and Military Performance in Black Navy Enlistees

The purpose of this longitudinal study was to compare the Navy performance and health status during a 4-year enlistment of four subsamples of Black enlistees who began active service between 14 Feb and 15 Sept 1972 (N=8,725). Based upon results of screening procedures for hemoglobinopathies, the total sample was separated into four subsamples: 599 with sickle cell trait; 1,003 with G-6-PD deficiency; 83 with both trait anomalies; and 7,050 normal enlistees. Results of comparative analyses indicated that the three trait anomalous subsamples did not differ significantly from the normal group on demographic and service-related variables, seven performance

criteria, hospitalization rates, and mortality rates. With a relatively long follow-up period and a large sample size, there was little evidence to show that the trait anomalies studied could be considered anything more than benign under routine conditions of naval service.

79-47 Gunderson, EKE; RE Mitchell & RJ Biersner [ZF51.524.002-5023]
Longitudinal Health Research in the U.S. Navy
In: S. Mednick (ed), *Longitudinal Research in the U.S. (in press)*

Longitudinal health research has important uses in military medicine including estimation of the distribution and relative risks of disease and injury in military populations, discovery of the determinants or causes so that prevention and control can be implemented, and definition of health care needs so that scarce medical resources can be optimally allocated. Three Navy longitudinal research programs are described in some detail and examples of methods and study results are presented. The Thousand Aviator Program, instituted in 1940, was a prospective study designed to determine the etiology of cardiovascular disease among naval aviators. The Submariner/Diver Program was a retrospective study which involved analysis of health effects associated with environmental conditions experienced aboard submarines. The general epidemiological studies under the Active Duty Enlisted Personnel Program are designed to be either prospective or retrospective and to utilize the total archival inpatient medical data files of the U.S. Navy. Some of the limitations of classic epidemiologic methods and the need for more comprehensive morbidity models which incorporate dynamic risk factors are discussed.

79-48 Rahe, RH
Psychological Aspects of Coronary Heart Disease
In: RO Pasnau (ed), *Psychosocial Aspects of Medical Practice, Vol. II.* Menlo Park: Addison-Wesley Publishing Co., Inc. (in press)

For the clinician interested in the psychological management of patients with coronary heart disease (CHD), it is critical to have some grasp of both developmental characteristics of patients prone to this disorder as well as knowledge of the acute precipitating influence of life stress. Confusion abounds regarding these two rather distinct areas. Crucial among the developmental influences upon CHD proneness seem to be occupation-education disparity ("over-achievement"), Type A coronary behavior, and chronic life dissatisfactions. One measure of life stress, recent life changes, appears to exert a marked influence upon clinical onset of CHD.

Optimal treatment of patients with CHD can be achieved with a knowledge of both the physical and the psychological aspects of this disease. In addition to the management of physical risk factors for this disorder, group therapy has proven to be a successful approach in the rehabilitation of patients recovering from acute myocardial infarction. Group therapy is an approach which can combine education regarding heart disease and its management with discussion of relevant developmental and recent life stress issues.

79-49 Rahe, RH; DH Ryman & HW Ward [ZF51.524.002-5020]
Simplified Scaling for Life Change Events

A relatively simple interval scaling method for adjustment to life change events was compared to the original, more difficult, proportionate scaling method. Ranking of life events by both methods was extremely similar. Evidence was also found that today Americans scale several minor life change events as requiring greater adjustment than that estimated for these events a decade earlier.

79-50 Berard, S & A Hoiberg [ZF51.524.022-0001]
The Physical Conditioning Platoon: Two Years Later

This study was designed to assess the two-year effectiveness of Marines who had been assigned to the Physical Conditioning Platoon during recruit training in 1975 (N = 635). Participants were asked to complete: a background information questionnaire, a self-evaluation scale, a Marine Corps opinion questionnaire, and the Comrey Personality Scales. The total sample was divided into a validation and cross-validation subsample using the two-year effectiveness or noneffectiveness criterion as the basis. Results

of Pearson product-moment correlation analyses showed that higher levels of education, fewer expulsions and suspensions from school, favorable attitudes on the Marine Corps Affiliation subscale, and favorable self-perceptions on the three Comrey Personality Scales of Trust vs. Defensiveness, Activity vs. Lack of Energy, and Emotional Stability vs. Neuroticism were significantly associated with effectiveness in both the validation and cross-validation subsamples. Such findings suggest that these variables, particularly those related to affiliation and enjoyment of physical activities, should be considered as possible selection indicators for recruits who are overweight or cannot pass the physical requirements for recruit training.

79-51 Pugh, WM [MF51.524.022-0011]
A Regression Solution to the Problem of Criterion Score Comparability

When the criterion measure in a study is the accumulation of a response or behavior for an individual over time, there may be a problem in obtaining comparable scores if all individuals cannot be observed for the same amount of time. Past solutions to this problem have included prorating the criterion score and deleting individuals lacking a portion of the criterion information. In the present paper the problem of criterion score comparability is viewed as a missing data problem and a solution based upon linear regression is proposed. The regression solution was evaluated by comparing it to the prorating and deletion methods in a Monte Carlo analysis. The population data was an actual data set collected during a study of illness aboard U.S. Navy ships and a series of samples were created by randomly deleting individuals' records and portions of records. Results of the analyses suggested that the regression method would be the preferred solution for the type of criteria evaluated. Application of the regression method and the results obtained no other research settings is discussed.

79-52 Hall, DA; RE Townsend & J Knippa [M0099-PN.003-3201]
The Impact of Remote Fly-Away Submersible operations on Personnel Endurance Capabilities

During open-sea submersible operations, particularly those involving quick reaction rescue missions, the physiological and psychological well-being of the operators and surface support personnel (SSP) becomes of increasing importance in insuring successful completion of the event. The purpose of this study was to obtain information on stress, fatigue, and work-rest cycles of both submersible operators and surface support crew members during an actual submarine rescue fly-away mission. Six operators and seven SSP were monitored during the conduct of a six-day trial open-sea submarine rescue evolution using the Deep Submergence Rescue Vehicle (DSRV), Mystic. Operators and crew members lived aboard the mother submarine which [illegible] the DSRV from port to the site of the downed submarine and return. Demographic information, psychological measures, performance measures and environmental data were obtained during pre-deployment, transit-out, at dive site, and transit-in periods. The overall results suggested that a DSRV mission of the present duration and difficulty can be accomplished without exceeding the capabilities of the crew and support personnel. The trend of the changes, does, however suggest that missions of longer duration may require scheduling of regular sleep periods for personnel to maintain performance. Additionally, it is felt that monitoring and analysis of demographic, operational, and environmental data should aid in the ongoing assessment of the safety of current and future open-sea evolutions, thus providing guidance to operators in the event that deeper, more time-critical missions occur.

79-53 Jones, AP & MC Butler [M0106-PN.001-0002]
Influences of Perceived Superior-Subordinate Communication Patterns on Subordinate Performance

Superior-subordinate communication patterns have been shown to influence subordinate satisfaction and performance. The present study of 184 military and civilian health care support personnel in five outpatient care facilities explored the potential importance of the point of initiation of leader-subordinate communication. Job and individual factors which affected this flow also were explored. A recursive model was

developed to suggest probable causal paths. When tested by path analyses, certain revisions to the model appeared to be necessary. In general, leader-initiated and self-initiated communication appeared to reflect attempts to reduce role ambiguity and to exert only indirect influences on motivation and performance. Individual participation in decision-making, on the other hand, exerted the strongest influence on performance (via motivation) and also reduced ambiguity.

79-54 Pugh, WM [MF58.524.022-0011]
Forecasting Illness Aboard Navy Ships: Methodological Issues

Analyses of data from destroyer-type ships were used to develop a model called the Morbidity Forecast Model (MFM) which was designed to predict specific and total illnesses aboard Navy ships. In the present study, the MFM was applied to a sample of amphibious assault ships to evaluate the instruments, procedures, and validity of illness predictions of the model. Results indicated that the individual predictor instruments were reliable and that five out of six correlated significantly with total illness. However, because of problems encountered when employing a novel method for constructing the prediction equations, the MFM initially performed poorly when applied to prediction of illness on amphibious ships. But, when the equations were reconstituted, the predictions improved considerably. Also, when ship differences were removed to compensate for the lack of power due to the small sample size, the MFM predicted a significant amount of variance in four of five illness categories. Thus, it was concluded that the MFM can be used to predict illness rates from environmental conditions aboard ship. However, it was suggested that, in the future, predictions could be improved by better adjusting for ship-type differences and by taking into account the operational status of each ship throughout a deployment.

79-55 Butler, MC & RG Burr [M0106-PN.001-0002]
The Utility of a Multidimensional Locus of Control Scale in Predicting Health and Job-related Outcomes in Military Environments

This study examined the dimensionality and validity of Levenson's multidimensional locus of control scale in two independent samples of Navy enlisted men. It was hypothesized that internals would report better health, greater general satisfaction, and higher levels of family strain due to separation. Because of the nature of the military environment, it was expected that external scores would be more pronounced for powerful other- rather than chance-oriented expectancies. The results were in general agreement with hypothesized relationships, and are discussed in terms of the utility of a multidimensional locus of control construct approach in measuring generalized expectancies.

79-56 Gunderson, EKE [MF51.524.022-0011]
Forecasting Illness and Injuries Aboard Navy Ships

The initial phases of development of the Morbidity Forecast Model (MFM) for predicting casualty rates aboard deployed ships are described. The objective of this effort was to identify work environments and crew elements at greatest risk of illness or injury during operational deployments. An optically scanned Medical Treatment Report (MTR) has been utilized to provide routine outpatient medical records and research data for investigating the effects of personnel, environmental, and organizational factors on division illness and injury rates. When these factors are combined by multiple regression methods to predict overall division illness rates, multiple correlations of approximately .50 are achieved. The original prediction equations were developed on destroyer-type ships; application to amphibious ships presented problems because of differences in personnel composition, work environments, and organization structures. The present static MFM needs to be expanded to take into account such dynamic factors as operational schedules and port visits and other changes in risk factors during deployment.

79-57 Hoiberg, A & J Ernst [ZF51.524.022-0001]
Cancer Among Navy Personnel: Occupational Comparisons

A large percentage of neoplasms in humans are believed to be caused by environmental factors, and there is increasing evidence that certain occupations are at higher risk for cancer than others. The purpose of this exploratory study was to determine cancer incidence and mortality among Navy occupational groups and to identify occupational groups with an elevated risk of specific types of cancer. Hospitalization records for all male active duty navy personnel admitted for malignant or unspecified neoplasms during the period July 1965 through December 1976 were used for the analysis. Results for 12 major enlisted occupational groups were compared. Construction personnel had the highest malignancy rate (72 per 100,000 per year)--almost double that of men in technical specialties such as electronics, communications, and electrical groups (38 per 100,000 per year for these groups combined). Deck, Aviation, and Hospital Corpsman specialties also had relatively high rates of malignant neoplasms. Both Construction personnel and Hospital Corpsmen are known to be exposed to a number of potentially carcinogenic agents which may explain the observed differences in overall cancer rates. The present preliminary results support the need for detailed longitudinal studies of occupational factors and cancer incidence in the naval population in order to identify causal environmental and occupational influences.

79-58 Kolb, D; P Coben & EKE Gunderson [N0002278P088AFZ]
Comparisons of the Navy Alcohol Safety Action Program and other Alcohol Rehabilitation Programs

The Navy Alcohol Safety Action Program (NASAP) is directed toward the early identification of alcohol abuse among Navy personnel. The objectives of this study were: (1) to compare post-treatment effectiveness for NASAP and alcohol rehabilitation participations, (2) to determine correlates of post-treatment effectiveness for both populations, (3) to estimate the extent of alcoholism among NASAP participants, (4) to compare outcomes among individual NASAP programs, and (5) to determine charges in rates of disciplinary difficulties from pre- to post-treatment for NASAP and rehabilitation participants.

Effectiveness rates were high for both NASAP and rehabilitation participants. Effectiveness in both programs was associated with greater achievement in military service, more favorable preservice histories, and less severe alcohol use and problem histories. Effective NASAP participants presented more favorable profiles than effective rehabilitation participants in terms of preservice, family and social history, military adjustment and achievement, and alcohol use and problem history.

79-59 Nice, DS; AP Jones & A Beck [DSAM 80008]
Screening and Selection of Military Attachés

In recent years the role of the military attaché has assumed increasing levels of importance and complexity. Because of the intense demands of the job, the sensitivity of the mission, and the stresses of adapting to a foreign culture, it is important to select as attachés individuals who have the highest probability of succeeding in this difficult role. The present paper addresses this task by (a) reviewing the major pressures encountered in attempting to adapt to a demanding job in an overseas setting, (b) reviewing briefly the literature that addresses personal characteristics needed to adapt to overseas living, and (c) presenting a research program designed to produce screening and selection that would better match individuals to positions in cross-cultural environments.

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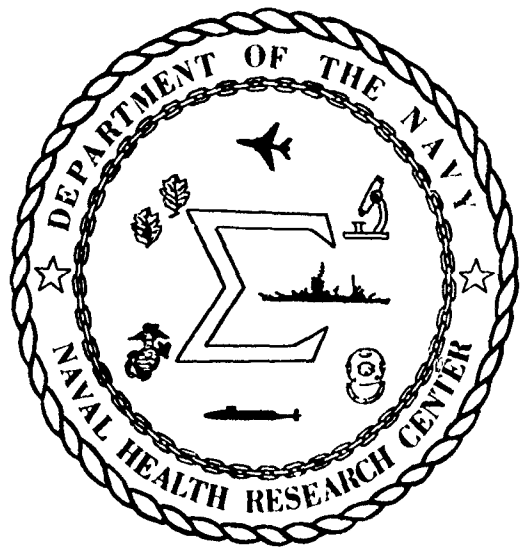
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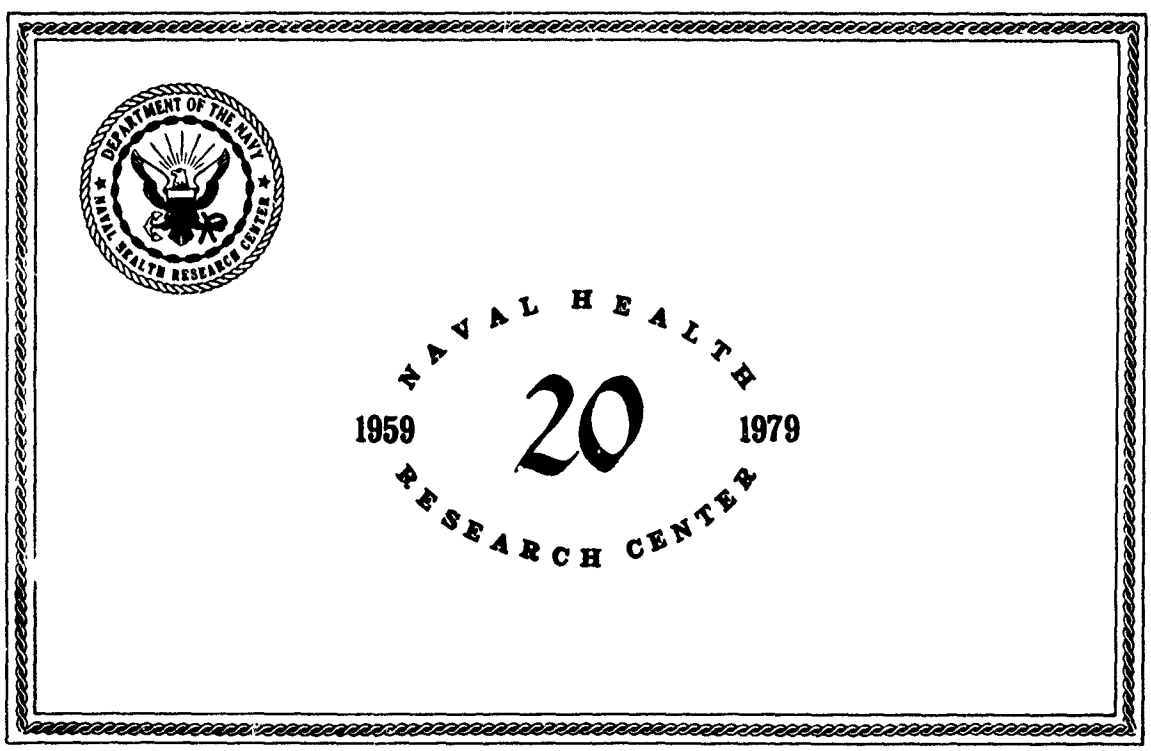
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PROGRAMME

0730	Registration
0800	Welcome: Captain Richard H. Rahe, MC, USN
0810	U.S. Congressman Bob Wilson, 41st District–Medical Research in the Military
0830	VADM W. P. Arentzen, MC, USN–The Navy's Medical Research Mission
0910	Captain J. D. Bloom, MC, USN–Research Objectives of the Naval Medical Research and Development Command
0930	Poster Session and Coffee Break
1000	Captain J. Rasmussen, MSC, USN (Retired)–The Founding of the Navy Medical Neuropsychiatric Research Unit
1030	Captain R. J. Arthur, MC, USN (Retired)–The First Decade
1100	Captain P. D. Nelson, MSC, USN–The Second Ten Years, A Program Manager's View
1130	Captain W. L. Wilkins, MSC, USNR (Retired)–A 20 Year Perspective
1200–1315	Lunch
1315	Panel on Future Research Trends at NHRC

Moderator: Captain Rahe

Panel Members: CDR Warren Sanborn, MSC, USN
LCDR John Shale, MC, USNR
LT Mark Butler, MSC, USNR
LT James Hodgdon, MSC, USNR
Cheryl Spinweber, PhD
Ross Vickers, PhD

1545	Closing Remarks
1600	Proceed to Wine Tasting Social Hour
1730	Adjourn

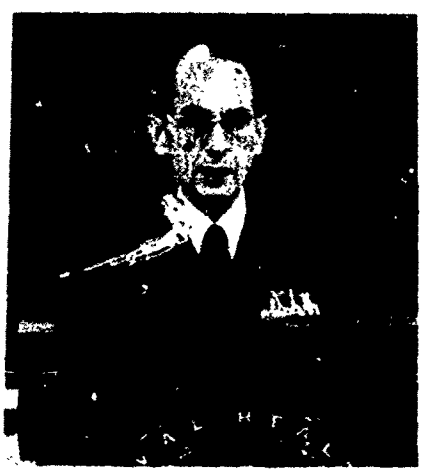
Congressman Wilson, Admirals Arentzen & Brown

Mrs. Bloom & Captain Bloom

Dr. Wilkins, Admiral Cox, Dr. Arthur

CDR Bond Captain Nelson

Congressman Bob Wilson



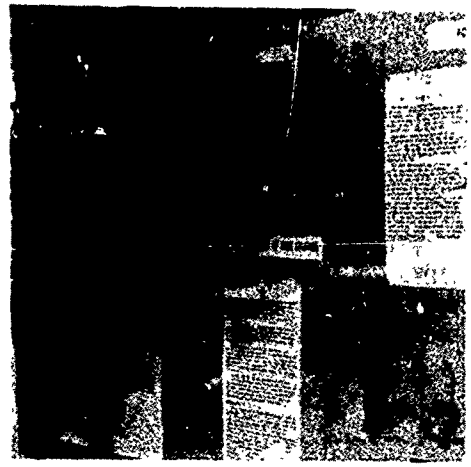
Admiral Arentzen

Captain Nelson

Dr. Arthur

Dr. Rasmussen

Dr. Wilkins



Invited address

THE SECOND TEN YEARS: A PROGRAM MANAGER'S VIEW

Captain Paul D. Nelson, MSC, USN*

It is a singular privilege for me to participate today in observing the twentieth anniversary of the Naval Health Research Center, nee Navy Medical Neuropsychiatric Research Unit. I feel honored for many reasons, of which I will mention but three. First, the early roots of my own professional career and identity took hold at this Unit, long before it was a Center. Secondly, as occurs to each of us through life's various developmental phases, I was greatly influenced and very well taught by my mentors of those and subsequent years, three of the most distinguished of whom immediately precede and follow me on the program this morning. And finally, I am grateful to all of you, most especially those colleagues of nearly twenty years, for your professional support and personal friendship.

Ten years ago, as Captain Rasmussen was soon to retire from active duty, I had just completed what might normally be a three-year tour as Program Manager of the Navy Medical Department Human Performance R&D Program, Research Division, Bureau of Medicine and Surgery. The Navy's neuropsychiatric research program of the 1960's, described by Dr. Arthur, was of course a major area of management responsibility for me, as was the manned system performance research applicable to the environmental and psychological stressors of flight diving, and submarine duty, the mission focus of our sibling laboratories at Pensacola, Bethesda, and Groton. I didn't realize at the time, though I might have suspected, that my tour length as Program Manager was by fate to be ten years, not three or even five; nor did I ever suspect that it would lead me to where I am now (and there are some who "still don't suspect that it will")!

Hence, as I began my second three-year tour as a research program manager, the Navy Medical Neuropsychiatric Research Unit launched its second decade of life. Both of us in a sense had learned if not mastered the mechanics of our tasking and, as I see it now, both of us were to develop in new ways professionally. We were each to be afflicted by the growing pains of adolescence, the problems of identity and direction, but encouraged as well by the joys and price of occasional success, achievement, and of recognition in our new roles. The thoughts which I share this morning, then are about the times and problems we faced, some of the agonies and the ecstasies we shared, during the 1970's, the teenage years of this laboratory. I will do so, as requested, from the perspective of a program manager.

Any organization, as any organism in general, must be able to sense, interpret, and cope with its environment if it is to survive. Its skill in doing so furthermore determines how effectively it will function and grow, given survival. We must acknowledge, therefore, the climate of the times, the issues about us, and the threats if you will to our survival as a laboratory and program during the decade of the '70's.

The post-VietNam era has been one of many moods and issues, to be sure. There was certainly an outspoken sense of social consciousness with, more particularly, an anti-military ring, not unusual following an international conflict so unpopular. Psychologists, and I suppose psychiatrists too, with a penchant and professed vocation for doing good for humanity were caught up in that rally. In 1973, at an American Psychological Association symposium chaired by Professor Herb Kelman and Dr. John Rasmussen, I participated in a public debate of the question: is the military application of psychological knowledge consistent with the promotion of human welfare? Within a few months of that occasion, Dr. Wilkins and others of this laboratory hosted the President of the American Psychological Association in a visit prompted by our involvement in medical follow-up of the returned prisoners-of-war from Southeast Asia. On that encounter, I believe we advanced the professional reputation of this laboratory, possibly that of military psychology, and even the profession of psychology itself.

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Another mood with which we had to contend was that Dr. Arthur on occasion labeled "an anti-intellectual" climate. If there were too many Harvard men in our government of the '60's, as some might contend, there were probably too few during the '70's. Such a mood strikes especially hard on basic science, as upon the arts and humanities. When coupled with inflationary economics and the politics of despair as we have indeed experienced during this decade, the impact of that climate on the defense research laboratory could have been severe. It posed a constant if only potential threat to us; and yet this laboratory continued to grow, not without its budgetary problems, but at a rate at least as good if not better than most of its contemporaries. From the mid '60's to the mid '70's, the R&D budget for this laboratory nearly tripled, as did the Navy's biomedical R&D budget in general. Not all laboratories, or programs, enjoyed that same rate of growth.

Related in part to the economic pressures of the days, plus the frustrations of policy makers and administrators in understanding and coping with the plethora of manpower and personnel problems in the post-VietNam era, and in pursuit of such concepts as the unified service and center-of-excellence, we were studied constantly with the potential consequence of being abolished as a small individual laboratory. We were scrutinzed as often across services as within. The Laboratory Utilization Committee appointed by the Office of the Secretary of the Navy was but one example of the latter, with all Navy personnel and medical research laboratories being the objects of study. "Would it not be better for there to be but one large laboratory?" For those interested in empirical evidence, the data in that instance did not unequivocally support the notion that "bigger is better", by any number of criteria. This laboratory with its unparalleled productivity per resource invested helped of course to make the case for the smaller dedicated unit of research. Though policy makers are not always guided by data, nor are any of us in our daily lives for that matter, we for some reason won that round in defense of smaller laboratories for at least our type of research. We nearly even had our proposal for Military Construction approved soon thereafter, following ten years of frustrating budgetary deferral, only to be kayoed in the final seconds of the fourteenth round at the SECDEF level, the farthest we'd ever gone in the MILCON fight. "Why can't that research be done on contract?" was in essence one of the "bottom liners" at that time, a question we were probably better prepared and more eager to answer than the source of the question was to hear what we had to say. The decision had been made; we lost.

That question, however,--"why can't that research be contracted?"--is one we must never forget. The occasion of the MILCON review was not the first time it had been raised; nor is it likely to be the last. We must always be prepared in professionally responsible ways to be accountable to the public for its investment in our defense in-house R&D laboratories of all types, not just personnel and medical. It is the question which nags me even today in my current position when I must justify having health care administration, clinical and science professionals serve the Navy and Marine Corps as officers of the Medical Service Corps, rather than as civilians. The rationale for the defense laboratory today must be couched as is everything else in terms of its potential contingency role, its unique capabilities to provide critical support in times of conflict--and that might very well be professional support service rather than research. Its contribution to military readiness must be the raison d'être of its life. There is no question that we must be applied research laboratories, a descriptor which connotes a philosophy and style of practice for manager and scientist alike. That the Naval Health Research Center has not only abided but has always taken pride in being so defined in its activities is another reason for its success over these past twenty years.

Lest one might think that thwarting the threats from an unsympathetic environment was my preoccupation and the principal activity of this laboratory during its second ten years of life, let me quickly add that it was not. The point is simply that the laboratory survived in a relatively hostile environment at times, a necessary but insufficient condition for further growth and success. To achieve the latter, an organization must also be proactive in its environment. It must anticipate as well as react; it must risk failure as well as ward off defeat. It must be innovative as well as adaptive, continuously reaching out in search of

truth and new challenge. It must be as capable of change as it is solid in its basic foundation. In no organization is this more essential than one dedicated to research. The Naval Health Research Center met these criteria, each one, during the 1970's.

To a great extent we understand the present by knowing the past. Hence as a Program Manager, I tried to ascertain the historical trace of whatever research was current in our different laboratories, a genealogy of work units or tasks, if you will. For some, that was difficult to do; some were without history. But for most of the work under way at any time in this laboratory, were was indeed a foundation in the past. The trail was theoretical at times, empirical at others. For some work it was a new series of hypotheses; in other instances it was the testing of earlier hypotheses under different conditions. But the trace was usually there. Such systematic, evolving if not planned, programs of research are all too uncommon, unfortunately. Much of the success of this laboratory in my opinion can be attributed to its historical perspective, its attentiveness to the lessons already learned. One can see that from the progression of research conducted here from this laboratory's earliest days. And the scholarly leadership of Drs. Ransom Arthur and Walter Wilkins had a lot to do with that!

Among those threads of continuity which bridged the first two decades of this laboratory's life, the concept of life stress was certainly one of the more predominant. Though even Dr. Rahe will admit to the very modest predictive power of such a psychological scale as the Survey of Recent Experiences based on the concept of life stress, the real utility of the concept lies in its theoretical value. For, in support of the adage afforded us by Kurt Lewin that "there is nothing so practical as a good theory", the concept of life stress with its supporting theoretical constructs enabled a great diversity of questions, hypotheses, and actual projects to be organized in a more powerful way. It influenced the design of countless studies. It facilitated collaborative effort between branches and divisions of this laboratory though not without strain at times; it facilitated interaction between this and other laboratories both inside and outside our country; and between this laboratory and the university or other contract research community as well. An example, of course, is the much more elaborate extension from the 1960's of the early shipboard studies of stress into what has become in the 1970's perhaps the most extensive longitudinal research of life stress, health, and performance in work organizations ever undertaken anywhere.

The longitudinal aspect of this research within an epidemiological framework of methodology, cannot be overemphasized for its importance in any of the research conducted here over the last twenty years. For it has enabled the Naval Health Research Center, as the Navy Medical Neuropsychiatric Research Unit before it, to offer unique data and occasionally new insight into complex personnel issues troubling military managers and commanders--not to exclude those of the Navy Medical Department.

We had the only data for example, in the last battleship to operate in our fleet; we had longitudinal data over the course of a full deployment on a carrier afflicted by outwardly rebellious behavior and racial tension. From those data, in fact, we were able to offer some different perspectives on personnel issues about which the Chief of Naval Operations had to appear before a subcommittee of the Congress. We had been similarly prepared, by virtue of other epidemiological data on naval populations, to be among the first with any empirical evidence of drug abuse problems which, in the early 1970's were cause for considerable alarm, still prevalent today in some circles. Our followup data on neuropsychiatric patients, and then others, returned to duty from hospitalization also provided a means for the earliest program evaluation of the Navy's first alcoholism rehabilitation center. Before "habitability" became a buzz work, this laboratory had already studied and reported on many different aspects of shipboard ecology in relation to the health and performance of sailors. And by the time "environmental psychology" became a household item on the agenda of psychologists at their annual convention, not to mention a popular title for textbooks, this laboratory had already been there for a good number of years. The same is true today, of course, in regard to research on health behavior. But this laboratory was there by virtue of its research program, not the fads of the day. It is significant, and a tribute to Navy

medical research, that of the original task force appointed by the American Psychological Association a few years ago to look at the issues of health research (other than those of mental illness) two members were related to this laboratory and are on the program today--Drs. Rasmussen and Wilkins.

Of even more practical consequence during the 1970's, our shipboard studies of illness and accidents provided the Navy Medical Department its only reliable outpatient statistics from deployed fleet units by which to estimate physician and independent duty Corpsman manning requirements. From that observation came the notion that we develop an acturial forecast model in which parameters of the ship, its crew, and its mission be used to project extent and type of medical care required over a deployment under different conditions of operation wherein the endurance of men is truly tested and absence from the job through illness or injury can impair a mission.

Related to those problems of sustaining performance in continuous operations at sea is the elusive subject of physical and mental fatigue. The pioneering clinical and experimental studies of sleep conducted at this laboratory in the 1960's were, in this past decade, extended to epidemiological research on sleep and other behavioral activity cycles aboard ship, as well as in other environments and continuous military operations. International participation of this laboratory in the Technical Cooperation Program (TTCP) and NATO symposia, as that conducted here two weeks ago on the topics of shifts, work-rest cycles, and biological rhythms, facilitated valuable exchange of information and new field methods for evaluating what Dr. Naitoh calls "sleep logistics", a critical matter of combat units. And, how important is it to be physically fit, as well as mentally alert, when faced with the duress and strain of long hours at sea--or elsewhere, for that matter? This question was pursued from the early UDT training studies to those of deployed carrier pilots on whom we even obtained "hard" performance criteria (no reference to the quality of landing), and upon recruits and their company commanders too, again, before it was mandatory to look at physical fitness.

Another achievement of a most practical value in the 1970's, resulting from the initiative of (then) the Navy Medical Neuropsychiatric Research Unit--most notably, Dr. Arthur --was the support given our returned prisoners-of-war. Based upon a knowing appraisal of history, and a professional assessment of sound medical practice, the use of research to assist in the follow-up health care given our repatriated pilots, sailors and Marines was the first such effort of its kind. When the release of our men came, this laboratory was prepared--though the fiercest of political and budgetary issues were yet to come. Of course the research conducted here in support of health and other services rendered the returned prisoners' families was also the first of its kind. It led, but not without struggle for program support, to further studies of the families of normally deployed pilots and sailors--not just a survey of their complaints, but an in-depth and longitudinal assessment of how they cope as a family with the separation from father or husband. What special health care needs do they have? How do they use the health care and other service agencies available? What might be done to facilitate their adjustment? These issues were the speculative questions of research several years prior to the time by which "family advocacy" became a formal program objective of high priority to Navy budget analysts.

Even on critical matters of research ethics and administration, this laboratory has been in front. The issues of Privacy and Protection of Humans in Research are cases in point. While many point papers and legislative "one-liners" were taking our time in Washington a few years back, the program here never dropped a stitch. The requirements facing research organizations on those issues, after all, had essentially been met some time already through standard professional practice by the Naval Health Research Center staff.

The Naval Health Research Center over its entire life of twenty years has been a shining example of how a defense research laboratory can serve its military organization with every bit the same quality as it conducts the scientific work of its charter. One can note very definite signs of growth in that capacity over the past ten years in particular. A review of this laboratory's abstracts of research in 1969 contrasted with those last published a year ago, 1978, reveals not only a shift in what is being studied, but in what's happening to the research as

well. The length of the report of work in 1969 was eight pages and that of 1978 was fifty-eight. A good bit of the latter was history of the organization and current staff (including pictures) --not a bad idea for public relations. But the variety of scientific and clinical journals in which the laboratory's work is published has increased. And the list of consultations rendered to military managers and commands is greater and more diversified too. The number of scientific consultants is greater; and so is the list of collaborative projects undertaken with other defense laboratories and medical centers. Even the logo on the report cover is bolder and more comprehensive in its reference to the operational naval forces we support--though clearly within the mission of the Medical Department. And the site of today's program is a bit closer to the fleet than was Shelter Island ten years ago.

As much as anything during the life of this laboratory, the value of judicious leadership in an organization has been repeatedly demonstrated. And in that regard, the quality of scientific leadership is every bit as important for a defense research organization as that of the military leadership. Strength in both is required. The mix and quality of staff is critical too, not only the senior scientists but the support staff as well. New young talent is essential, and administration must work well with science. All of this leads to the climate or working atmosphere--representing a composite of many of the behaviors studied at this laboratory--which is absolutely key to productivity in this as in any type of enterprise.

The lessons learned in research management through the experiences of the Naval Health Research Center are as numerous and important to the Navy, I think, as those learned from the substance of the research conducted here. Yes, in search of a new identity more in keeping with new horizons to explore, we even changed our name and mission mid-way through this second decade. After all, as our late and esteemed colleague Ardie Lubin had once said, a research laboratory should be expected to have a productive life of about fifteen years--after which it should be abolished and started again. We weren't abolished; but we paused to take a new lease on life. Now, as we enter the third decade, the Naval Health Research Center is again in the childhood years of the new life. New challenges and opportunities lie ahead. But I expect that with due care and continued cultivation the Naval Health Research Center will have as illustrious a future as it has a past.

My final thought is one again of gratitude. It was always a privilege and personal pleasure--even fun at times--, certainly a professionally rewarding challenge, to work with all of you at the Naval Medical Neuropsychiatric Research Unit and Naval Health Research Center during my ten years as Program Manager. I learned far more than I imparted. Thank you for inviting me to participate and to share in pride with you on this historic occasion.

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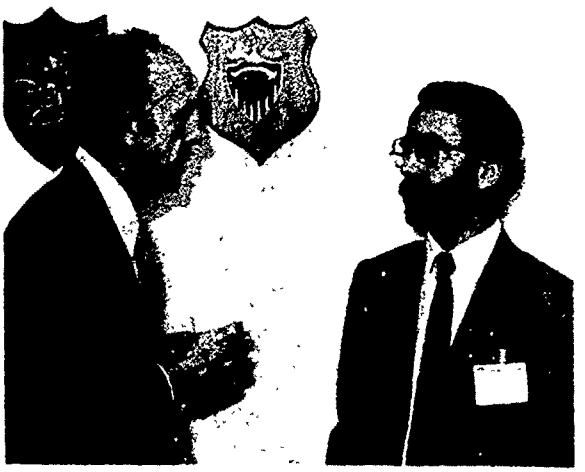

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HISTORICAL SUMMARIES *

OF NHRC'S MAJOR

SCIENTIFIC DIVISIONS

ENVIRONMENTAL PHYSIOLOGY DIVISION

ENVIRONMENTAL & SOCIAL MEDICINE DIVISION

HEALTH OCCUPATIONS RESEARCH DIVISION

STRESS MEDICINE DIVISION

CENTER FOR PRISONER OF WAR STUDIES

BIOLOGICAL SCIENCES DIVISION

* Technical reports cited in the text follow at the end of the summaries and should not be interpreted as being the complete command bibliography.

ENVIRONMENTAL PHYSIOLOGY DIVISION

The Environmental Physiology Division, known originally as the Psychophysiology Division, was established at the Naval Hospital, San Diego, in 1960. The Division was located at the Naval Hospital because initial research projects were concerned with brain activity, seizure discharges, and behavior to determine whether seizure discharges were associated with disruption of performance and changes in activity in somatic and autonomic nervous systems. The results of those studies indicated that the patients were unaware of many seizure discharges, and the seizure discharges resulted in no impairment in behavior functioning and no changes in the autonomic or somatic systems (63-1, 63-10).

During the time period of this study, there were anecdotal reports of helicopter pilots suffering blackouts and, in some instances, a seizure which was attributed to the flicker effect from the helicopter blades interrupting the sun. As we often used flicker as an activating technique in the laboratory with our patients, we were asked to investigate whether photic stimulation should be included in the screening procedure for helicopter pilots and to determine whether flicker was an operational problem for the helicopter pilot. We found that in this highly select and medically well-screened group, flicker was not a problem with respect to seizure discharges or to the production of convulsions. However, we did find that flicker was an operational problem in that it often produced drowsiness or changes in levels of arousal of which the pilot was not aware (62-14).

As an extension of our work with seizure patients and with photic stimulation, we were asked to do a study on the single seizure patient; *i.e.*, the patient who, after one to several years in the Navy, was admitted to the hospital with the diagnosis of probable epilepsy. Patients with this admitting diagnosis were thoroughly worked up by the Clinical Neurology Service and the Psychophysiology Division, and were returned to duty without medication. Seventy-seven patients were admitted to the study, and follow-up data were obtained on all 77 patients. From these data, three variables were found to be useful predictors of a second seizure. They were (a) type of seizure (major motor), (b) EEG classification (spikes with or without slow waves), and (c) postictal confusion and disorientation. If all three signs were present at the time of the first seizure, the odds were extremely high, 96%, that the patient would return and be given a seizure diagnosis (72-21). Personal contacts with some neurologists indicate that these criteria are being applied in the evaluation of single seizures, but probably not by all neurologists.

During our study of seizure patients, all-night recordings were often done to determine whether abnormal seizure patterns during sleep and nocturnal seizures were present (65-16). This laboratory, therefore, was already involved in sleep studies when the study of sleep became a major area of interest in the early 1960s. Since that time, sleep has been a continuing interest in this Division, with studies primarily oriented toward the study of total sleep deprivation (64-21, 68-18, 75-39), of partial sleep deprivation (74-11, 76-43, 76-44), and deprivation of stage REM and stage 4 sleep on behavior and performance (73-22, 74-17). The Division has also contributed significant work to the study of the secretion of the growth hormone during sleep (69-8, 69-17, 70-43), the changes in autonomic and motor activity during sleep (70-31, 72-22, 72-50), the sleep of alcoholics (70-29), and in the use of computers to analyze brain wave patterns during the various stages of sleep (70-35, 71-20, 72-47). As a result of our productivity and work in sleep, and with the change of personnel and interest at the Walter Reed Army Institute of Research, this Division has become DoD's primary sleep research laboratory. As such, we have been asked to participate in operational sleep studies such as those in Sea-Lab 1 and 2 and Tektite I (66-19, 70-36), in a study with the Naval Ocean Systems Center on the effect of continuous sonar signals during a 30-day "mission" (73-33, 75-31), and currently we are completing a joint study with the Army on the effect of continuous operations on the performance of a Fire Detection Center Team.

While sleep has been the major focus of our research, other research interests have been followed. One large study involved a request from the Defense Advanced Research Projects Agency (ARPA) to participate in a multi-laboratory study on self-regulation (*e.g.*, alpha feedback) as a tool to enhance performance. ARPA specifically asked us to join the study because it needed information on whether self-regulation could be effectively utilized by military personnel in military settings. While some of the university laboratories reported encouraging positive results, our findings with an unselected military sample revealed that the positive effects of self-regulation were not present in naive subjects (75-35, 76-25).

Another major area of interest has been that concerned with EEG-evoked potentials (76-31, 77-31). Of potential clinical importance was the evaluation of the brainstem auditory-evoked response (BAER) as an aid in the early diagnosis and prognosis of 17 comatose blunt head injury patients (78-52). Recovery occurred in 12 patients with normal follow-up BAERs, regardless of whether initial BAERs had been abnormal (3 patients) or normal (9 patients). Apparently, initial BAERs (mean 31 hours post-injury) can be abnormal as the result of reversible damage. Follow-up BAERs (3 to 6 days post-injury) did correspond with patient outcome at a time when clinical prognoses were often uncertain. BAERs aided diagnostically in determining the extent of brainstem damage and the effectiveness of treatment.

Currently, major emphasis is in the study of fatigue and performance decrement associated with varied work schedules, work environments, sleep loss, and sleep disorders. The overall goal is to obtain information on the factors that affect sustained optimal performance. Studies being conducted are concerned with (a) sustained performance, (b) work on exercise physiology, (c) undersea studies, (d) the non-auditory effects of noise, and (e) sleep.

(a) *Sustained operations.* In military operations, sustained activity of over 18-36 hours without adequate sleep/rest may be necessary and this intensive sustained operation may recur with a minimal period for recuperation. Operational requirements for high quality task performance in repeated, sustained operations are hard to meet because of predictable adverse changes in human effectiveness and in physiological cost. The objective of work in this area is to see whethe behavioral and physiological adaptation occurs as personnel attempt to cope with heavy workloads in repeated, sustained operations, and to determine the optimal recovery sleep that will ensure adequate recuperation and permit resumption of the sustained operation.

(b) *Work exercise physiology.* Objective measurement of work effort is an important first step in determining personnel qualifications for specific Navy jobs. The level of work effort for various tasks is also important in setting physical fitness standards. The current work in this area compares subjective and objective measures of physical effort and abilities. This work will augment research being done under an ONR contract by the Advanced Research Resources Organization (ARRO) to develop and test subjective measures of the physical effort and abilities required for Navy ratings. In our research, we will (a) determine the validity of the ARRO subjective measure relative to physiological indices of work rate in a variety of laboratory situations; (b) analyze jobs performed by a selected Navy population (deck division personnel) with respect to the physical activities involved, and compare subjective estimates of physical effort and ability using the ARRO scales with field measures of metabolic cost for these physical tasks; and (c) construct laboratory work tasks to simulate Navy work tasks, such simulations to be used in evaluating standards for physical fitness and training programs.

(c) *Undersea research.* As U. S. Navy deep submersibles are retrofitted for greater depth capabilities and longer duration missions, the physiological and psychological well-being of the crew and support personnel becomes of increasing importance in insuring successful completion of the mission. Determination of present stress and fatigue levels in submersible crews and support personnel is important in determining the safety of present operations as well as the reserve capability available in the event of unanticipated demands on performance. Assessment of present submersible operator and crew characteristics, their modes of adaptation to stress, the effects of submersible operations on work-rest schedules, and the extent of stresses encountered are the major

goals of this study.

(d) *Non-auditory effects of noise* There is increasing concern over the influence of environmental factors on the health and performance of Naval personnel. For one of these environmental factors, noise, concern over the auditory effects of noise has resulted in extensive knowledge of effects of noise on hearing, the development of ear protectors, and setting of noise level standards. Less interest has been shown and, subsequently, less is known about the non-auditory effects of noise. There is, however, growing interest in and concern over the non-auditory effects of noise on body tissue, sensory receptors, mood and behavior. Specific to this research, previous work suggests that, in addition to the effects on hearing, there are acute physiological and behavioral changes during maintenance operations on jet aircraft. Physiological dysfunction and behavioral changes attributable to the high intensity stimulation may also appear as chronic degenerative, or suppressed effects. This study will determine the effect of exposure on physiological, behavioral, and subjective responses.

(e) *Sleep.* Sleep problems and the use of hypnotics, especially in operational settings, are often a problem for both medical staff and operational commanders. In addition to the sleep problems induced by operational demands, results from our questionnaire studies indicate that 10-12 percent of Navy personnel report they are chronic poor sleepers. Compared to good sleepers, these poor sleepers describe themselves as more tense, anxious, confused, fatigued, and as having less vigor, and they have been found to perform less effectively.

Insomnia, unsatisfactory sleep, is the major symptom of these poor sleepers, and for most, this symptom is treated with a sleeping pill. The benzodiazepines, and particularly flurazepam (Dalmane), have become the drug of choice for insomnia complaints. For the military, not only is the efficacy of drug important, but equally important is the effect of the hypnotic on waking performance. A study of the effects of flurazepam on the mood and performance showed that visual motor performance was significantly impaired during drug ingestion, and performance continued to deteriorate over the 10-day drug period. Cognitive tests, memory and addition, were not impaired. Although drowsiness was increased, mood was not altered (78-25). Flurazepam thus has severe limitations in operational settings where visual motor skills such as driving, flying, or operating complex machinery are important.

In addition to the performance changes, repeated use of flurazepam caused a decrease in EEG delta amplitude and count, and an increase in sleep spindle rate (78-28). The significance of these changes in brain electrical activity is, at present, unknown.

The sleep research will continue to focus on the identification of an effective hypnotic with minimal electrophysiological and behavioral side effects. Current work includes the use of short-acting benzodiazepine, triazolam (Halcion). Work is also under way on the usefulness of the naturally occurring amino acid (L-tryptophan) as a hypnotic. In an initial study of noncomplaining sleepers, L-tryptophan significantly reduced sleep latency in early morning and early afternoon naps when compared to a placebo (79-27). A study to determine the effectiveness of L-tryptophan for sleep induction in chronic poor sleepers is planned.

With the onset of our studies on the effectiveness of hypnotics in poor sleepers, there has been increased interest in and requests by the clinical services at the Naval Regional Medical Center (NRMC), San Diego, and by the medical staffs at the field commands for assistance in the diagnosis and treatment of sleep disorders. The medical and administrative disposition of patients with sleep disorders poses problems not unlike those of the single-seizure patient. There are no data available as to the incidence of sleep disorders in the naval population, nor are there any accepted standards for diagnosis, treatment, and disposition of these patients. The long-term effectiveness of Ritalin, the usual drug given to narcoleptics, is unknown. To our knowledge, the sleep laboratory of NHRC at NRMC is the only established sleep laboratory in the Defense Department which focuses on sleep problems and also serves as a consultant to the clinical staff on sleep disorders.

Objective work in this area will: (a) determine the incidence of sleep disorders seen in or referred to NRMC; (b) develop techniques for effective diagnostic procedures; (c) explore with the clinical staff treatment alternatives; (d) through follow-up studies, determine the effectiveness of the various treatments and the military effectiveness of active duty personnel with sleep disorders that can be used not only at NRMC but also in other training programs throughout the naval community.

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ENVIRONMENTAL AND SOCIAL MEDICINE DIVISION

The primary research contributions of the Division are in the area of determining the effects of demographic, sociological, psychological, environmental, and organizational factors on health and performance in a variety of naval settings. Research projects have been characterized by long-term involvement with various operational programs or field settings. For example, in 1959, systematic research was initiated on problems of selection and performance in groups of Navy men and scientists wintering at small stations in Antarctica. A consistent program of data collection was maintained from 1964 through 1974. Biographical data, attitude and personality tests, and clinical evaluations by psychologists and psychiatrists were analyzed to determine their usefulness for predicting individual and group adjustment of several stations which were completely isolated from the outside world for 8 or 9 months of the year. Based upon results of this stable 10-year program, the Bureau of Medicine and Surgery issued an instruction in 1975 detailing Antarctic screening procedures to be used on an operational basis. Scientific results of this research were summarized in two volumes: O. G. Edholm and E. K. E. Gunderson (Eds.), *Polar Human Biology*, London: Heinemann Medical Books, 1973; and E. K. E. Gunderson (Ed.), *Human Adaptability to Antarctic Conditions*, Antarctic Research Series Vol. 22, Washington, D. C., National Science Foundation, 1975.

A major research program is concerned with the epidemiology, etiology, course, and outcome of major categories of disease and injury in the naval population. In 1969 and 1970 studies were begun on the epidemiology of psychiatric disorders in the naval service. For this purpose records pertaining to all psychiatric hospitalizations since July 1965 were obtained from the Bureau of Medicine and Surgery, carefully checked for completeness and errors and edited to provide a cumulative, Navy-wide psychiatric inpatient file for research purposes. Earlier studies also utilized records for 27,000 psychiatric cases hospitalized during 1960-62.

Psychiatric disorders represent a major source of manpower loss both in terms of time in the hospital and premature attrition from service. During the 1960-62 peacetime period, almost one million man-days were lost because of psychiatric hospitalizations, and during this time, psychiatric disorders were the leading cause of invaliding (medically discharging) personnel from naval service. There were wide variations in incidence rates among different segments of the Naval population: approximately 250 per 100,000 per year among male Navy and Marine Corps officers; 1,000 per 100,000 among both Navy and Marine Corps enlisted men during peacetime, and 4,000 per 100,000 among Navy and Marine Corps enlisted women. During the Vietnam War the psychiatric incidence rate remained stable for Navy enlisted men at 1,000 per 100,000 per year, but more than doubled for Marine Corps personnel (70-15).

Current research on psychiatric disorders involves longitudinal studies of course and outcome. Studies of 20,000 Navy psychiatric patients hospitalized during 1966 through 1969 have established basic patterns of demographic clinical and outcome characteristics for major diagnostic subtypes (75-80, 76-40, 78-57). More refined diagnostic and prognostic criteria are being developed using additional medical and service history information available on a new sample of 15,000 psychiatric patients hospitalized during 1970-73. Some of our recent work on psychophysiologic disorders (76-69) has been helpful to Dr. Robert Spitzer's American Psychiatric Association Committee revising the psychiatric nomenclature.

During 1975 and 1976, hospitalization data for all categories of disease and injury were added to the research files. In addition to basic demographic and clinical information gathered at the time of discharge from the hospital, data pertaining to Medical Board and Physical Evaluation Board actions have been incorporated in the inpatient file as well as data pertinent

to cause of death. This comprehensive medical data file makes possible comparative studies on incidence rates, course of hospitalization, disposition, recurrence, degree of disability, and death rates for all categories of disease and injury by age, sex, race, occupation, duty station, and other demographic or environmental factors. Morbidity and mortality risks can be determined for any naval environment or segment of the naval population.

Service history data compiled from Bureau of Naval Personnel computer files for all Navy enlisted men and women have been merged with the medical records to provide an integrated medical history/service history file for epidemiological and longitudinal studies. This file gives us the capability of following a sailor throughout his naval career and correlating important changes in occupation or life status with changes in his health (76-26, 77-16). Such a complete data system makes possible measurement of manpower losses and costs from medical causes, evaluation of primary prevention and treatment efforts in various naval settings, and investigation of personal and organizational stresses that impair health or performance effectiveness. Large-scale cohort studies now in progress will provide basic information on inpatient morbidity, days lost, disability, invaliding, and mortality in selected naval subpopulations and work environments (78-1, 78-49, 79-13). Collaborative studies involving long-term follow-up through the Veterans Administration record system, are planned with the National Research Council Medical Follow-up Agency. For example, a preliminary study is in progress to determine the distribution of various forms of cancer in the naval population during the past decade (78-56). Follow-up of survivors is contemplated.

Another major area of research is concerned with the effects of environmental and organizational variables on health and performance aboard ship. Early work in this area was summarized in the volume *Life Stress and Illness,* E. K. E. Gunderson and R. H. Rahe (Eds.), Springfield: C. C. Thomas, 1974.

Shipboard living and working may involve excessive noise, crowding and lack of recreational facilities, boredom, long or irregular working hours with sleep deprivation, arduous routine maintenance, and hazardous duties. The effects of these types of physical stresses upon health, safety, work efficiency, job satisfaction, and career motivation are being systematically investigated (74-47, 74-58, 75-19, 76-10, 76-70, 77-51, 78-46). In addition, the influences of a large array of organizational variables, such as size, structure, climate, leadership, personnel composition, and peer relations, are being studied. A comprehensive theoretical framework for the analysis of individual and group effectiveness in naval organizations has been developed to guide programmatic research efforts in this area (74-26, 76-60, 78-42). Operational definition and measurement have evolved through several cycles of field administration, analysis, and revision. An important strength of this research program has been the long-term commitment of both the sponsor and the investigators. Close liaison with operational fleet units for data collection was necessary over extended periods of time. This research has made important contributions to the Navy's preventive medicine programs by identifying critical environmental and job stresses aboard ship and defining populations at greatest risk for illness or injury.

Current efforts are directed toward development of a morbidity forecast model for predicting casualties during operational overseas deployments which will alert commanding officers and medical personnel to environmental, organizational, and operational conditions that may adversely affect the health and readiness of crew members and thus impair mission effectiveness (79-4, 79-12). The theory and methods which have been developed in the shipboard setting are now being applied to morbidity analysis prediction, and prevention at shore facilities, such as shipyards, insofar as feasible. Finally, research programs are being developed to address problems related to costs and effectiveness of Navy health care services, both inpatient and outpatient, and to assess needs for new occupational and environmental health programs Navy-wide.

HEALTH OCCUPATIONS RESEARCH DIVISION

Research efforts begun at the Center in 1960 in the Preventive Psychiatry Division, later called Health Occupations, are being continued currently by staff of the Environmental and Social Medicine Division. The projects conducted were designed to examine (1) the efficacy of individualized psychiatric interviews as a means to identify entering sailors and Marines most likely to fail to serve successfully in the armed forces, and (2) the incidence of psychiatric illness and/or maladaptation in the serving forces.

The initial research program involving 11,000 sailors and 15,000 Marines was developed with the cooperation of the Chief of Naval Personnel and the Commandant of the Marine Corps. Incoming recruits were assigned to one of three conditions: 1) no routine psychiatric screening at all; 2) standard screening procedures, as previously carried on at the training center or recruit depot; 3) review by psychiatrists or psychologists who were supplied with considerably more information than usual, including peer nomination results early and late in training, standard personality test results, training petty officer ratings, and demographic data. A feature of this study was the identification of inept recruits (in the third condition) who were allowed to finish training and were sent on into service even though various indices indicated the high likelihood that they would fail. At the end of four years, over half of the retained men in the service were identified as successful despite their initially poor tests and performances in recruit training. Overall, it was demonstrated by comparisons of the three conditions that the routine psychiatric screening which had been useful in 1942 because of the wide variety of incoming personnel, was now (following the setting up of the Armed Forces Examining Stations and the exclusion by the Congress of the lowest ten percent of the population) no longer needed and was probably a waste of professional manpower (66-8, 68-23, 69-23, 70-21).

An interesting and extremely useful by-product of this research was the generation of the Odds for Effectiveness Tables. Those factors most easily used and accounting for the largest portion of the variance to predict a successful four-year enlistment were identified, weighted, and combined into a formula and then into simple tables from which a recruiting officer could read the chances that a prospective recruit would be able to complete an enlistment. These tables were incorporated into the recruiters' manuals and used until recently, when the Naval Personnel Research and Development Center was tasked to update the system.

As a part of the Marine Corps segment of this research, an intermediate criterion, labled "Administrative Nuisance," was developed. This phrase aptly identified a set of marginally acceptable but inadequate Marines. This study showed that young men who had shown a reasonably good adjustment to civilian life (as shown by completion of high school, for instance) adapted successfully in the Marine Corps and performed satisfactorily in combat. Those who had difficulty in civilian life tended to continue such patterns of behavior in the Corps and were not considered good combat Marines (77-13).

The comprehensive study of men hospitalized with a psychiatric diagnosis considered how sailors got on the sick list, when and why they were sent back to duty, and how outpatient psychiatric referrals at clinics or hospitals were handled. The personnel and medical tapes allowed ready access to information about successful enlistments. Actuarial odds, based on the same methods as used in the study of incoming recruits, were developed to permit weighting of such variables as diagnosis, length of time on the sick list, and length of time in the service. To assist further in disposition, a supplementary table included the factors of the patient's pay grade, the spouse's attitude toward the man's being in the service, and the presence or absence of disciplinary action on the man (72-1, 72-2).

Because those studies revealed that hospital corpsmen had a higher incidence of psychiatric illness than other Naval ratings, a special study was initiated on a

cohort of medical department enlisted persons (76-24). One surprising outcome of this research was the discovery that strikers, who come to Corps School after a period in the fleet, do better than sailors sent to Corps School right out of recruit training (75-75). Goal and occupational aspirations were shown to be significant predictors of retention among corpsmen as well as seven other occupational groups (74-61, 76-48, 77-58).

Other projects that evolved from those efforts included a study of the health and performance effectiveness of women in the Navy (77-32, 79-15). Background for the women's project was a special issue of *Armed Forces and Society* on women in the military titled, "Women as New 'Manpower'," Hoiberg (ed.), 1978. Another series of research efforts consisted of studies designed to evaluate special programs developed by the Navy such as academic remedial training, weight-reduction, and physical conditioning (74-20, 74-37, 77-11, 78-50).

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STRESS MEDICINE DIVISION

The Stress Medicine Division, which began as the Biochemical Correlates Division in 1968, evolved from a research program designed to study the relationships between social stresses and health. Under the direction of Dr. Rahe, initial work included studies of the personnel complement aboard three heavy cruisers during overseas operations (68-29, 68-30, 68-31). One objective of these studies was the identification of those crew members most likely to report to sick bay during the six- to eight-month period at sea. Significant predictors included the men's reported recent life changes and bodily complaints at the start of the cruise, division assignment, education, job satisfaction, and race. These studies have since been replicated in crews aboard aircraft carriers, amphibious ships, and submarines (73-1). As a result, selected psychosocial characteristics can be used to predict crew members at risk for a significant illness episode during the cruise (two-fold increase over men without these characteristics, 72-31). These early studies on life change and illness were extended to groups of hospitalized patients with an acute myocardial infarction during 1968-69 while Dr. Rahe worked in Stockholm, Sweden on a National Institute of Mental Health Special Fellowship (70-32, 70-33, 70-34, 72-40, 78-10), and later to enlisted sailors in the Norwegian Navy (74-1).

As an outgrowth of these studies, a program was developed in 1970 to study selected physiological responses to life change stress. A biochemical laboratory was started and remained within this division until 1974 when it was transferred to the newly established Biological Sciences Division. Physiological responses studied included serum cortisol, uric acid, cholesterol, lactic and pyruvic acid, urinary cortisol and urinary catecholamines. In a number of shipboard and landbased studies of Navy men undergoing stressful training (*e.g.*, underwater demolition teams, deep sea divers, naval aviators) these physiological variables were studied in addition to psychosocial predictors of illness (68-9, 71-32, 71-11, 72-54, 78-63). These studies have clearly indicated variability among men in their biochemical responses to stress. These responses appear to vary depending upon the individual's perception of the situation and his ability to successfully cope with its demands.

The development of the laboratory and our increased understanding of the biological mechanisms of the responses to stress has been aided by the several physiologists who have worked in the division. For example, in 1975, physical fitness measures were included in the research program (79-25). An exercise physiology laboratory was developed to study physical fitness as a coping capability for life stress. Studies were completed with groups of naval aviators and recruit company commanders. In the past year, the exercise laboratory was transferred to the Environmental Physiology Laboratory; however, there is continued collaboration.

Work on the relationship between life change experiences and health led to studies of factors which may reduce the ill effects of stress (76-14). These have been termed stress tolerance factors and include childhood and developmental experiences, current social support systems, past and present work and life satisfactions, ego defense mechanisms and coping styles. This work has provided the background for designing a longitudinal psychobiological study of adaptation to stress in Navy recruit company commanders (79-25). These men are not highly selected for the job but work in a setting which includes extreme variation in job stress. Important psychosocial, physiological, and stress tolerance factors identified in previous work were included in the design of this study. Serial blood samples were taken for determination of cholesterol, uric acid, pepsinogen, dopamine-beta-hydroxylase, total protein, cortisol, and testosterone. The relationships of the psychosocial and physiological variables to measurements of perceived stress, job performance, and illness are currently being examined.

Further studies of stress tolerance have emphasized ego defense mechanisms and coping. A study was re-

cently carried out with Navy non-swimming recruits during the time they took a mandatory "drown-proofing" test. This study was designed to replicate and extend Dr. Holger Ursin's findings on psychological and biological coping with stress in Norwegian paratrooper trainees. Various measures of psychological defenses and physiological arousal were examined in this investigation.

In 1978, the Center for Prisoner of War Studies and this division merged. The Stress Psychology Branch is continuing prior studies of the Stress Medicine Division, investigating psychological and physiological responses to stress. In response to a request by the Commandant of the Marine Corps, a research program has been developed to study the positive and negative effects of stress in recruit training. Work on instrument development and validation is underway for a future longitudinal study on the process of effective recruit training.

The Prolonged Stress Branch is continuing work on the medical follow-up of the repatriated prisoners of war (RPW) begun by the former Center for Prisoner of War Studies. Most of the Army, Navy, and Marine Corps RPWs have received annual medical exams since Operation Homecoming in 1973. In collaboration with the Naval Aerospace Medical Research Laboratory and Naval Aerospace Medical Institute, the Prolonged Stress Branch will continue studies on the annual medical exams of the Navy and Marine Corps RPWs. Additionally, Navy RPWs are being compared to a match control group for diagnosed medical problems as well as for selected indices of family adjustment. Future studies of these two groups also will be directed toward the possible effects of stress in premature aging in the RPW group. Psychological coping techniques found to be most useful for these men during captivity are being identified as to their utility to stress tolerance training programs—such as the Survival, Evasion, Resistance and Escape (SERE) training (75-74).

Additionally, the Stress Psychology Branch maintains active collaboration with the Immunology Branch of the Biological Sciences Division. In a recent pilot study, the effect of life changes on the immunocompetence of mice was assessed. This study is currently being replicated and extended, with a goal of eventual application with Navy and Marine recruits exposed to the stresses of basic training.

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CENTER FOR PRISONER OF WAR STUDIES

Humanitarian concerns for the eventual welfare of our prisoners of war in Vietnam during the late 1960s, as well as concerns for the immediate and long-term welfare of their families and the families of those men declared missing in action, were the major motivating factors which led to the establishment of the Center for Prisoner of War Studies (CPWS) in early 1972.

In addition to the humanitarian concerns, we foresaw the opportunity of collecting valuable data with respect to such phenomena as the effects of stress upon human performance, the adjustments of families, and particularly of children who endured long periods of father absence, and the opportunity of understanding the etiology and pathogenesis of the excessively high repatriated-prisoner-of-war (RPW) morbidity and mortality of WWII and Korea. Four branches were established within CPWS to accomplish this dual mission: (a) medical specialties, (b) environmental stress, whose data are of the intelligence debriefing variety from Vietnam, (c) family studies, and (d) information processing and archives.

Medical Studies. A major objective of the activities of CPWS during 1972 and prior to the release of the POWs from Vietnam during Operation Homecoming in early 1973 was to prepare a medical examination protocol which was extensive, would not fail to detect pathology, if in fact pathology existed, which was organized in a standard fashion so that comparisons could be made between returned prisoners exposed to varying conditions of imprisonment, and which was organized as a baseline of information for future medical studies. The resulting product (the Initial Medical Evaluation Form) was a 400-page document covering all aspects of the medical, dental, and psychological examinations conducted during Operation Homecoming. In addition, specific plans were made for continued monitoring of the health of the POWs on an annual basis.

As sometimes happens when planning for a crisis, things turn out better than anyone dared to hope. By and large, the recoveries of the RPWs have been outstanding. Much of the pessimistic expectations prevalent during the pre-repatriation days (in 1972) were based upon the high morbidity and mortality which had been seen for individuals who were held prisoners of war in Asia during WWII (by the Japanese) and during the Korean conflict (by the North Koreans and the Chinese). Happily, in comparison, Vietnam RPWs are doing very well indeed. Vietnam RPWs came back not only in better health than previous groups (75-70, 75-82, 76-15, 76-23, 76-42) but have continued to show less disease after return than did RPWs in the previous groups.

Perhaps the most meaningful comparison which can be made for the RPWs is to match each individual with someone from a very similar background in the military whose major difference from the RPW is that he had *not* been held captive in Vietnam. Such a comparison group was selected for Navy RPWs in 1976 (78-22), and the collection of data on this comparison is currently under way. In general, however, we feel safe in saying that there are no dramatic differences between the RPWs and their comparison fellow aviators on any of the major biological systems for which we have sufficient data to at least see a trend.

Captivity Studies. During the course of our analyses of physical, environmental, psychological, and social stresses experienced by prisoners of war during confinement (78-18), we developed a deeper appreciation of the trauma and stress endured by POWs. One of the main findings emanating from these studies was that each POW perceived the captivity experience in his own particular manner. Differences in perception of the captivity experience were a function of personality, previous experiences with stress, and his own particular prison environment.

The supportive effects of command structure were clear. Also, the kinds of coping maneuvers which were most effective during captivity depended on the POW's age, rank, and whether or not he had to deal with the stress of solitary confinement. High intelligence (charac-

teristic of this POW group), maturity, and a strong sense of mission were also of paramount importance in tolerating captivity stresses.

Compared to Korean POW experiences, it appeared that Survival, Evasion, Resistance, and Escape (SERE) training had definite survival value for Vietnam RPWs. Knowing what to expect when captured was an extremely helpful coping mechanism. Training must contain both "universal" aspects of captivity stress (*e.g.*, isolation, physical abuse, time disorientation, etc.) as well as particular knowledge concerning customs and behavior of the potential captors. SERE training should be both maintained and constantly updated. Modification of the SERE School curriculum to incorporate research results pertaining to the role of personality on behavior under duress, or the matching of a student's personality profile with an optimum resistance posture, or the more appropriate selection of personnel for high-risk assignments, or the role of cross-cultural factors in determining a POW's adjustment to captivity are all examples of ways in which our research efforts might have direct payoff for the operational forces.

Family Studies. The Family Studies Branch has been concerned about possible adverse effects of the stress of lengthy husband absence on wives and children, as well as readjustment problems the family may have had upon return of the husband (74-24, 76-65, 78-14, 78-17). Approximately sixty RPW families have participated in a longitudinal study over the past five years. These families agreed to participate with yearly interviews. The physical and social health of these families was compared to a matched comparison group of Naval aviators who (a) flew missions in Vietnam at approximately the same time that the RPW was captured, (b) was approximately the same military rank as the RPW at the time of capture, and (c) matched for number, age, and sex of children to a RPW family.

A remarkable finding has been the ability of most POW husbands, wives, and children to survive their ordeal and show little effect from stress. In fact, for some men and their families, captivity served to strengthen them and build new resources.

As an outgrowth of this work the Family Studies Branch extended its efforts to include MIA and KIA families and families undergoing separation due to routine deployments of their husbands and fathers.

Information Processing and Archives. Since 1972, over sixty technical reports and four books have been prepared by the Center for Prisoner of War staff. Though many reports are for specialized military use only, twenty-six reports have been published in the scientific literature. At present, medical data, family interview data, service record information and correspondence, collected many times over on an annual basis, as well as most of the intelligence debriefing data, form the core of our archives for research and study.

In addition, the Center maintained a collection of historical material about POWs over the history of modern warfare, scientific literature on POWs, and personal accounts of the POW experience.

Where Do We Go From Here? In the evolution of any organization, there exist particular points in time when it becomes necessary to evaluate progress, note accomplishments, and make decisions regarding the future. One such point arrived in November 1978, when it was decided to disband CPWS and transfer its ongoing research programs to the Stress Medicine Division as the Prolonged Stress Branch. These programs continue to seek answers to several major research questions:

(a) Are there differences in the later health and adjustment of former prisoners which are related to length of imprisonment, conditions of captivity, time spent in solitary confinement, one's perception of the stresses of torture, etc.?

(b) Are there significant differences in the later health and adjustment of officer versus enlisted men which might reflect differences in coping abilities during captivity?

(c) Does the stress of captivity have a cumulative effect, or perhaps an accelerating one, so that in future years the RPWs will pay an additional price for the years of incarceration they endured?

(d) Is the KZ Syndrome of Eitinger valid for a RPW sample of individuals who were well above average in physical, mental, and emotional characteristics?

(e) Will there be differential effects of father absence on children depending upon the age and sex of the child and the length of father-absence? Do RPW/MIA children differ in emotional social adjustment from non-RPW/MIA children?

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BIOLOGICAL SCIENCES DIVISION

The Biological Sciences Division was established in July 1974 to provide a center for the study of infectious disease control for the Navy and Marine Corps. The small existing biochemistry laboratory which had been supporting the Stress Medicine Division research for nearly six years was expanded and today the laboratory occupies approximately 5000 square feet and the Division has 14 civilian and military employees working in three branches–Microbiology, Immunobiology and Biochemistry.

The establishment of an infectious disease research laboratory capability on the West Coast was both timely and relevant. Since San Diego is the hub of the Naval fleet, research based here can look directly into a variety of operational medical problems. These problems include incidence of infections, their etiology (75-72, 76-2), methods of prevention, improvement in diagnostic techniques suitable to the limited spaces and personnel of fleet and field forces, and examination of the role that stress and/or poor coping ability have to do with susceptibility to "disease." All of these interrelated research parameters are best coordinated from a single research facility. The location of this facility within the Naval Health Research Center has an added advantage in that a coordinated effort on disease prevention can be made by various disciplines, including psychologists, psychiatrists, biochemists, and microbiologists.

A recent survey of 14 laboratories in Navy dispensaries conducted by the Microbiology Branch indicated the need for improved microbiological laboratory techniques. Intensive investigation is currently being carried out on new technologies and equipment that could be adapted to fleet and ground force requirements. Special attention is being directed toward rapid and simplified diagnostic methods which would increase the reliability of laboratory services and even expand diagnostic services in certain areas of microbiology (78-21). Research pioneered at NHRC resulted in a "break-through" in identifying *Salmonella* infections (75-59), which was field-tested at the NAMRU-2 Jakarta Detachment. These trials showed that the new procedure was both time saving and accurate.

Further development of this approach to technology has resulted in a portable diagnostic kit that can be hand transported to remote areas of field operations. The kit operates off of a 12V battery or 110/220V power source. Collaborative studies with NAMRU-3 and the World Health Organization have demonstrated the usefulness of this portable diagnostic kit for meningitis and pneumococcal disease. This technology is being further refined for broader field trials. Some of these studies will include a cooperative study with the NAMRU-2 Jakarta Detachment because of the large number of enteric infections studied there.

The Immunobiology Branch has been progressively pursuing methods for rapid, specific, and simple procedures for identifying microbial antigens (76-59, 77-39, 77-48). These procedures have the potential for adaption to fleet and Marine Corps needs. The applied technologies being developed draw from innovations in immunochemistry and tumor immunology (75-81). Studies are in progress to increase the sensitivity of a simple spot test so it can be used to identify antigens in biological secretions. Currently, efforts are being directed to identifying group A streptococci antigen directly from throat secretions (78-26). Although there are many technical problems, the benefits to be derived from the development of these techniques are numerous. Recently, a relatively simple slide test has been described to identify pneumococcal antigen in sputum and blood serum (78-45). Current standard technology allows about a 20% chance of detecting pneumococci in pneumococcal pneumonia. Preliminary data indicate that this can be improved to nearly 80% using our new technology. In addition, the results are available to the physician within one hour after the laboratory receives the sample. Extended studies are under way to validate this technology.

The study of more recent innovations in protein

chemistry and immunochemistry leads to the opportunity to covalently link a specific antibody to an immobilizing substance (plastic, beads, etc.) and using the immobilized specific antibody to concentrate antigen in a suspension.

Finally, the Immunobiology Branch is attempting to identify serum protein changes and/or immunoglobulin changes that may occur very early in an infectious process—so early that the changes may occur days prior to any evidence of clinical illness. The potential value of this study is that it would permit early identification of high risk individuals in case of critical military deployment. Such a prospect offers a real opportunity to significantly reduce manpower losses from disease.

A pilot study has been completed in collaboration with the University of Southern California on the effect of stress on antibody response of the mouse (79-14). It was shown that adaptation to environmental changes significantly altered antibody production. An extension of this study is in progress investigating the effect of environmental adaptation to both humoral and cell-mediated immunity.

The Biochemistry Branch supplies critical support to the projects of both the Microbiology and Immunobiology Branches. In addition, the Biochemistry Branch provides consultation services to the other divisions and is engaged in collaborative studies with both the Stress Medicine and the Environmental Physiology Divisions. These studies are investigating a number of biological constituents associated with stress.

Over the span of five years, the Biological Sciences Division has added a new dimension to infectious disease research in the development of new, rapid, and sensitive technologies for identification of microbial agents that could be mission abortive. These technologies have caught the imagination of research institutions and leading medical institutions worldwide, and indeed have helped bring Navy microbiology up to extremely high standards.

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