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NAVAL MEDICAL FIELD RESEARCH LABORATORY

FACILITIES AND PROGRAMS

November 1963

CAMP LEJEUNE NORTH CAROLINA

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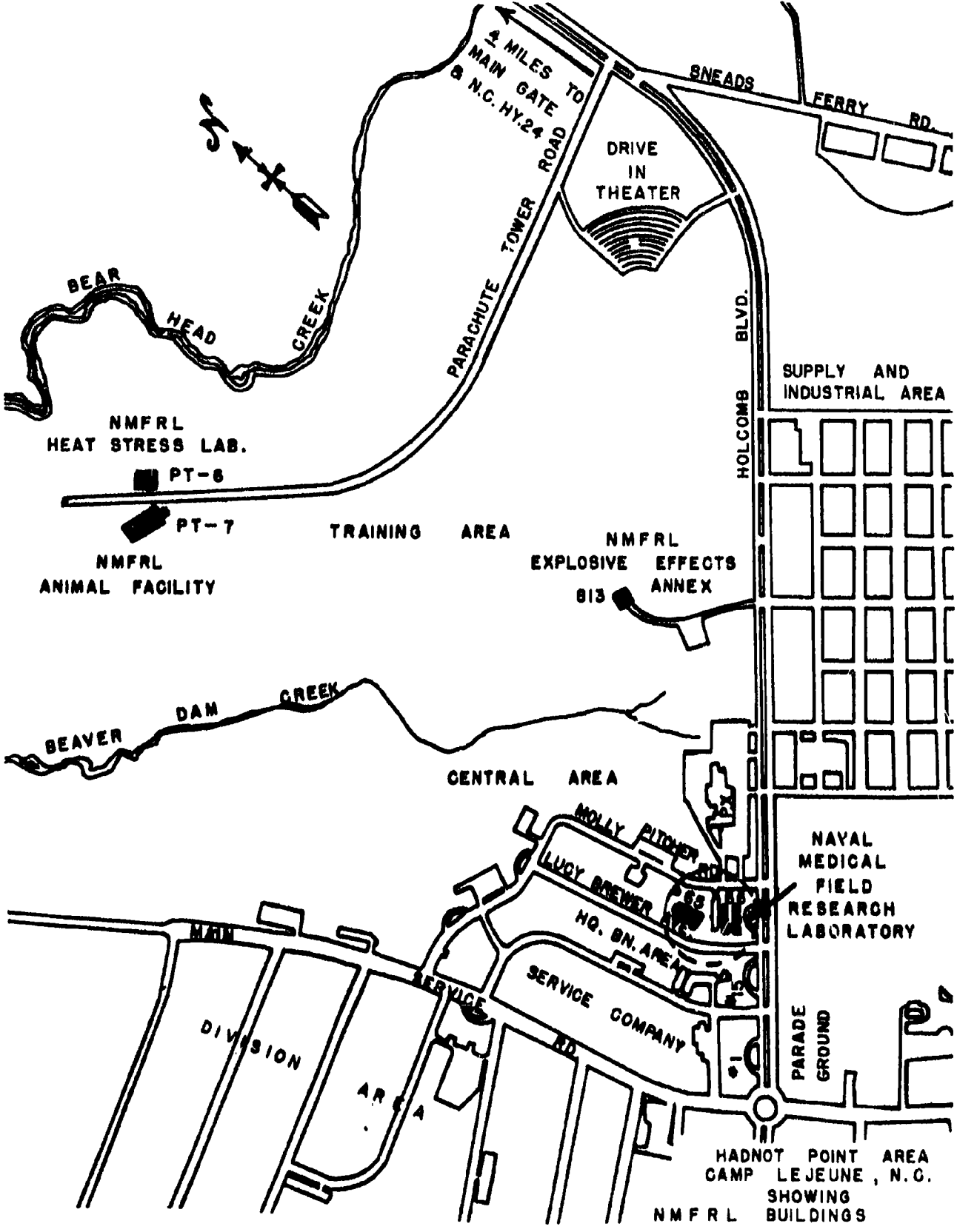
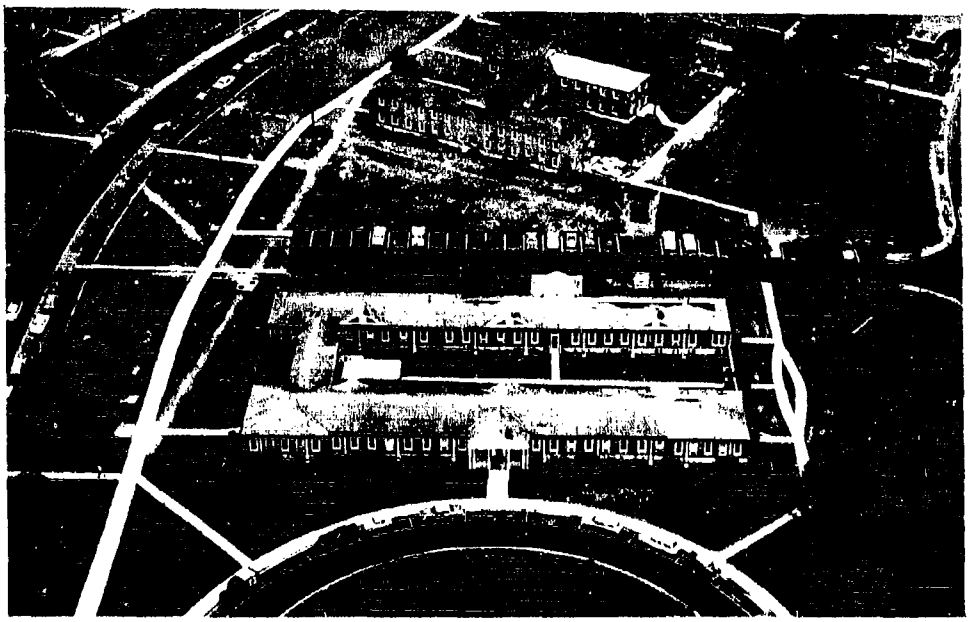
G. L. CALVY, CAPT, MC, USN
Commanding Officer

M. W. BUCKMAN, CDR, MSC, USN
Scientific Coordinator

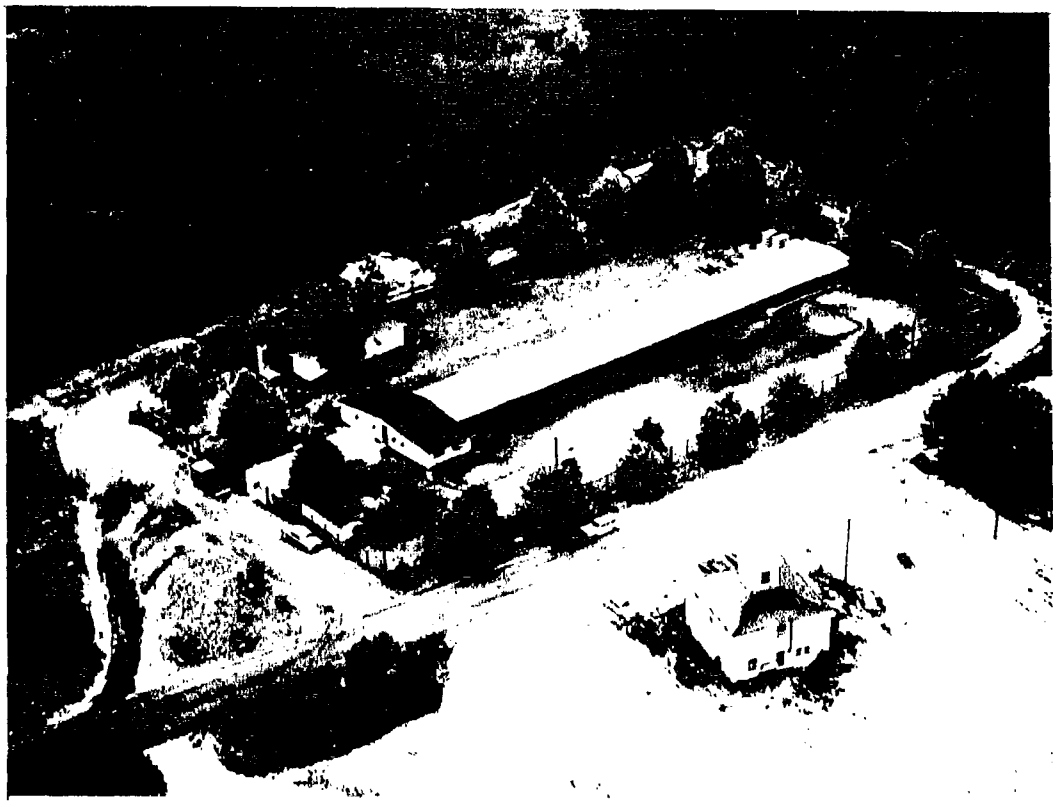

4 MILES TO MAIN GATE & N.C. HY.24
SNEADS FERRY RD.
DRIVE IN THEATER
PARACHUTE TOWER ROAD
HOLCOMB BLVD.
BEAR HEAD CREEK
SUPPLY AND INDUSTRIAL AREA
NMFRL HEAT STRESS LAB.
PT-6
PT-7
NMFRL ANIMAL FACILITY
TRAINING AREA
NMFRL EXPLOSIVE EFFECTS ANNEX
813
BEAVER DAM CREEK
CENTRAL AREA
MOLLY PITCHER RD.
LUCY BREWER
NAVAL MEDICAL FIELD RESEARCH LABORATORY
HQ. BN. AREA
MAIN SERVICE RD.
SERVICE COMPANY
PARADE GROUND
DIVISION AREA
HADNOT POINT AREA
CAMP LEJEUNE, N.C.
SHOWING
NMFRL BUILDINGS



NAVAL MEDICAL FIELD RESEARCH LABORATORY

Administrative building (66) in the foreground houses NMFRL offices, the Scientific Library, the Psychology Division, and the Graphic Arts Section.

Building 65 in the center background houses shops, the Supply Section, and laboratories for the Physiology, Virology, Personnel Protection, Dental and Bacteriology Divisions.



NAVAL MEDICAL FIELD RESEARCH LABORATORY

Building PT-6, right foreground, houses the climatic chamber for work in thermal stress.

Building PT-7, center is NMFRL's animal facility.

HISTORY

The Naval Medical Field Research Laboratory (NMFRL) was established in August 1943 by joint agreement of the Commandant of the Marine Corps, and the Chief, Bureau of Medicine and Surgery. The Laboratory materialized with the realization that many medical problems peculiar to amphibious troop operations were not being investigated in existing research laboratories and deserved special attention.

Camp Lejeune was selected as the logical site for a laboratory to be devoted to field medical problems, particularly in view of the proximity to units of amphibious troops continually training under simulated battle conditions. This offered the opportunity for scientific personnel to obtain firsthand knowledge of conditions at the field level, as well as offering field conditions for the test and evaluation of new medical materiel proposed for Fleet Marine Force use.

In 1947 the Secretary of the Navy designated NMFRL as an activity of the Naval Shore Establishment, in the Fifth Naval District, under the command of a Commanding Officer. Management and technical control were vested in the Bureau of Medicine and Surgery and military command in the Commanding General, Marine Corps Base, Camp Lejeune, North Carolina.

COMPONENT CONTROL

The Naval Medical Field Research Laboratory is under the military control of the Commanding General, Marine Corps Base, Camp Lejeune, North Carolina. For all non-military matters, including conduct of the research program, utilization of assigned personnel, expenditure and accountability of allotted funds, establishment of operating procedures and internal organization, the Commanding Officer is under the management and technical control of the Navy's Bureau of Medicine and Surgery.

LOGISTIC SUPPORT

The Laboratory's research and development projects are funded jointly by the Bureau of Medicine and Surgery and the Commandant of the U. S. Marine Corps.

Buildings and grounds occupied by the Laboratory are the property of the U. S. Marine Corps and are assigned for Laboratory use by the Commanding General, Marine Corps Base. Maintenance of buildings and grounds and minor alterations to buildings are accomplished by the Marine Corps Base. Public utilities are furnished by the Base. Technical laboratory supplies and equipment are procured by the Laboratory through its allotted research and development funds.

The Laboratory is staffed by officers of the Navy, Marine Corps, and Public Health Service, by enlisted technicians of the Navy and Marine Corps, and by civilian investigators and technicians.

MISSION OF THE LABORATORY

The mission of the Naval Medical Field Research Laboratory as prescribed by the Chief of Naval Operations and as stated in the Basic Naval Establishment Plan is to conduct research, development and testing in the medical, dental and allied sciences, with particular emphasis on problems of field and amphibious medicine.

TASKS AND FUNCTIONS

The general responsibilities of naval medical research organizations are outlined in the Manual of the Medical Department, U. S. Navy. The tasks and functions of the NMFRL are detailed in the following paragraphs.

Research and Development:

Conducts research and development projects approved by the Bureau of Medicine and Surgery and the Commandant, Marine Corps, and for which funds have been allocated.

Field Testing:

Conducts field tests, including but not limited to: user tests, acceptability tests and evaluation tests of medical, dental and related materiel at the request of the Field Branch, Bureau of Medicine and Surgery, the Defense Medical Materiel Board, and the Commandant, Marine Corps.

Advisory Committee on FMF Medical and Dental Materiel Allowances:

The Advisory Committee maintains direct communication with the Field Branch, Bureau of Medicine and Surgery. The Committee recommends revisions or modifications of existing materiel allowances and the adoption of new items of medical and dental materiel required by the Marine Corps.

The membership of the Committee includes senior officers of the Navy Medical Department attached to Marine Corps medical support units located in the Camp Lejeune-Cherry Point complex. The Commanding Officer and the Administrative Officer, NMFRL, serve on the Committee as Chairman and Executive Secretary, respectively. The Committee meets at the pleasure of the Chairman. Facilities and secretarial assistance are provided by the NMFRL.

Miscellaneous Tasks:

The specialized services of the staff and the facilities of NMFRL are available to Medical Department units of the Marine Corps Base on a direct request basis. Such services include:

Medical Graphic Arts: Specialized photography, including production of transparencies, microphotography, medical illustrations and other visual aids, for the U. S. Naval Hospital, the Dispensary and the Dental Clinic.

Scientific Library Services: The NMFRL Scientific Library is available for use by all Medical Department personnel in the area, as well as to students at the Camp Lejeune extension of East Carolina College for special reference work.

Consultative Services: Consultation, diagnostic tests and services are performed for the U. S. Naval Hospital and the Dispensary for certain viral diseases and non-gonococcal urethritis.

PHYSICAL FACILITIES

The Naval Medical Field Research Laboratory occupies five buildings in the Hadnot Point area of Camp Lejeune.

Building 66, a permanent, U-shaped, one-story, brick building, faces the main thoroughfare – Holcomb Boulevard. This building houses the Commanding, Executive and Administrative offices, the Psychology Division, and the Scientific Library.

Building 65, to the rear of building 66, is a two-story, permanent, E-shaped, barracks-type, brick building. The ground floor houses the shops, Bacteriology laboratory, Personnel Protection workrooms, Virology laboratories, the Supply offices and equipment storerooms. The top floor houses the Equipment, Testing and Development Division offices and workrooms, additional Virology laboratories, Personnel Protection workrooms, the Physiology laboratories, and the Dental Division.

Building 813, a small, permanent, brick building located in an isolated, wooded area approximately one-half mile distant from the main Laboratory, is the Explosives Effects Annex of the Personnel Protection Division.

Building PT-6, a permanent, two-story, masonry structure, is located approximately two miles north of the main Laboratory in an area formerly utilized for parachute training. This building, at one time the base for a parachute training tower, was assigned to the NMFRL in 1961, and subsequently converted into a heat stress laboratory, an adjunct to the Physiology Division.

Building PT-7, located in proximity to PT-6, is the NMFRL's Animal Facility Annex. The annex is actually comprised of a group of small buildings: a quonset hut houses offices, an operating room, and an animal receiving room; a permanent, brick building is utilized for bulk food storage; wood-frame structures provide quarters for small animals. Dog kennels are constructed so as to provide covered shelter as well as adequate exercise runs. An efficient incinerator is available at the annex.

The BACTERIOLOGY Division is conducting an intensive study of non-gonococcal urethritis among Marine Corps personnel, in an attempt to define the causative agents, to clarify understanding of the epidemiology of the disease, and to develop measures for its control. Non-gonococcal urethritis, responsible for many lost man-hours in infected personnel, has been the subject of concentrated attack by the Bacteriology Division for the past several years. Recent developments at this Laboratory give promise of success in the eventual implication and characterization of the responsible agents, greater insight into the epidemiology of the disease, and methods for its control.

The locale for this type of research program is unique in that periodic rotation of Marine Corps personnel to Camp Lejeune from overseas areas (the Far East, the Mediterranean and Carribean ports, for example, where the incidence of this disease is high) affords ample subject material for research study. Further, a close liaison is maintained with all regimental and other dispensaries in the Camp Lejeune area, and with the U. S. Naval Hospital at Camp Lejeune. Liaison has also been established with an advanced basic training facility at adjacent Camp Geiger, where the 1st Infantry Training Regiment is situated. Marine recruits arrive at this advanced basic training facility at periodic intervals from the basic training area at Parris Island, S. C. All of these various facilities provide an excellent opportunity for conducting research studies on etiology,

Bacteriology Division:
A concentrated study on isolation of the organism causing non-specific urethritis has yielded promising results.

epidemiology and control of infectious diseases affecting Marine Corps and Navy personnel.

The Bacteriology Division is well equipped for the collection, storage and study of clinical specimens. In addition to adequate refrigerator, deep-freeze and incubator facilities, and two ultraviolet-irradiated transfer rooms, the division has other more specialized equipment. This includes a laboratory model Freeze-Dry unit, photomicrographic systems, a fluorescence microscopy unit, and a refrigerated centrifuge.

The DENTAL Division is concerned primarily with evaluation of new dental equipment for possible use in field operations. The division also conducts a continuing survey of the dental equipment allowances in the Fleet Marine Force with a view toward providing the most up-to-date materiel for field dentistry.

The PHYSIOLOGY Division is presently conducting research programs in two main areas:

Thermal Stress: This project seeks to evaluate the effects of heat and humidity as factors influencing performance of U. S. Marine Corps ground combat troops, investigates techniques to pre-acclimatize troops to conditions of high heat and humidity, and assesses the physiological decrement resulting from wearing protective equipment such as body armor and load-carrying systems in hot and humid environments.

The results of these investigations will provide a better understanding of the mechanisms by which heat and humidity limit performance and ultimately will provide criteria for the development of techniques and the design of equipment and clothing which will enhance the capability of the Marine in combat.

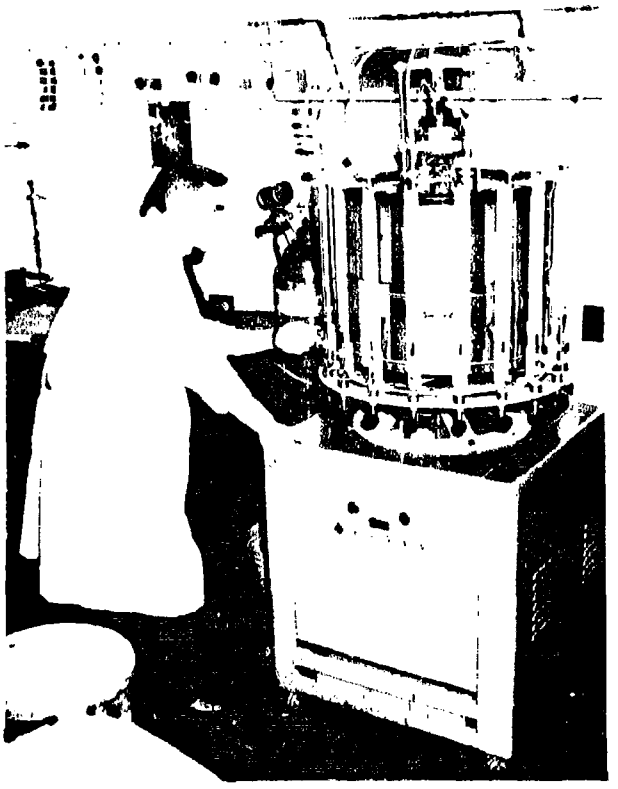
In this project, volunteer subjects perform measured tasks under climatic conditions similar to those which they will be expected to perform in tropical environment. The effect of this environment on performance is determined by selected physiological, biochemical and psychological measurements. Basic measurements are carried out in a climatic chamber which is equipped with two treadmills. A unique Multichannel Temperature and Heart Rate Measurement Programmer and other standard laboratory apparatus are used to record responses of subjects. Equipment and facilities for laboratory measurements of changes in body fluids, such as urine, blood, saliva,

Physiology Division:
Subject (wearing body armor with full pack) walks on a rotating treadmill in a climatic chamber where controlled temperature and humidity are maintained.

and sweat, are also available. The validity of laboratory findings is checked by controlled field studies. Troops are readily available as subjects and excellent field study facilities and conditions exist at Camp Lejeune.

Burn Project: These studies investigate the physiology and pathology of burns and explore new concepts in the treatment of burns, particularly from the standpoint of mass casualties.

Laboratory facilities for burn studies are extensive. The apparatus for burn source consists of fifty-five 750-watt photo-reflector-type lamps arranged on a portion of a hemisphere, and a power source. Included in the construction of the apparatus are timers and meters which make it possible to inflict a standardized reproducible burn on animals. Facilities for animal surgery, multichannel recorders, and apparatus for artificial respiration are among the array of



Physiology Division:
Technician utilizing Warburg apparatus, processing tissue for burn study.

specialized equipment available for this work. The Physiology Division is supported by laboratories for biochemical analyses of specimens, a radioisotope tracer laboratory, and facilities for statistical analyses.

The PSYCHOLOGY Division conducts research related to the measurement of the effect of various factors on the performance of military personnel.

The investigators of this division are interested in measuring the effect on performance of such factors as: emotional stress, fear, anxiety, frustration, feeling of security, heat, carrying loads, etc. They are also interested in evaluating the effectiveness of training methods and the development of improved training techniques. The division is concerned with the selection of the "right combat man for the right combat job" and the most effective methods of training to prepare him for the job.

The division also provides a consulting service in experimental design to the other divisions of research.

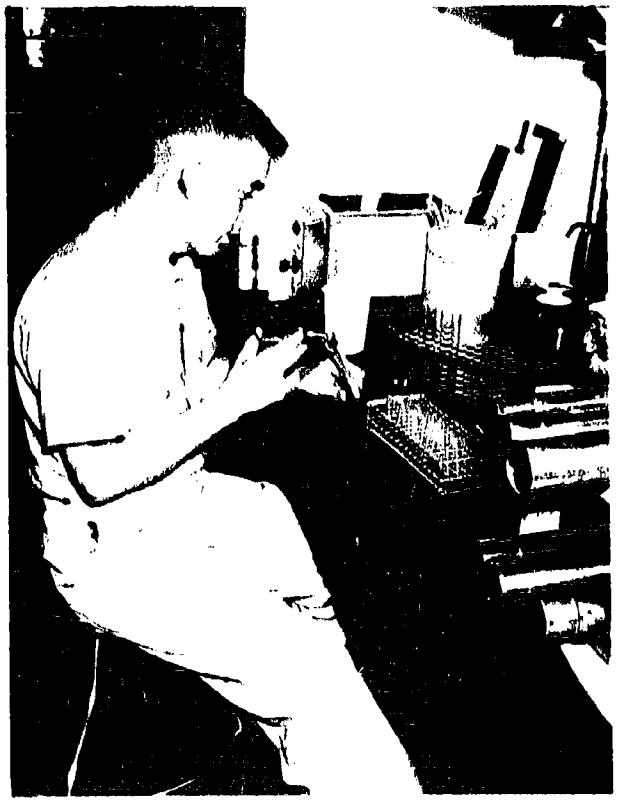
One present research task is an attempt to develop techniques and instruments to discriminate between safe and unsafe automobile drivers. The high accident rate among military personnel with consequent loss of life and man-hours has provided the motivation for this study.

Another study now in progress is directed toward the development of tests to measure the effects of heat stress on rifle marksmanship.

Similar effort is also being made to develop techniques and tests to evaluate the effects of heat stress on personnel mine-lifting ability.

The VIROLOGY Division conducts investigations of the etiology of respiratory disease among Marine Corps personnel and dependent children stationed at Camp Lejeune and at the Marine Corps Recruit Depot, Parris Island, S. C. This project is being pursued through collaboration with the Laboratory of Infectious Diseases of the National Institutes of Health.

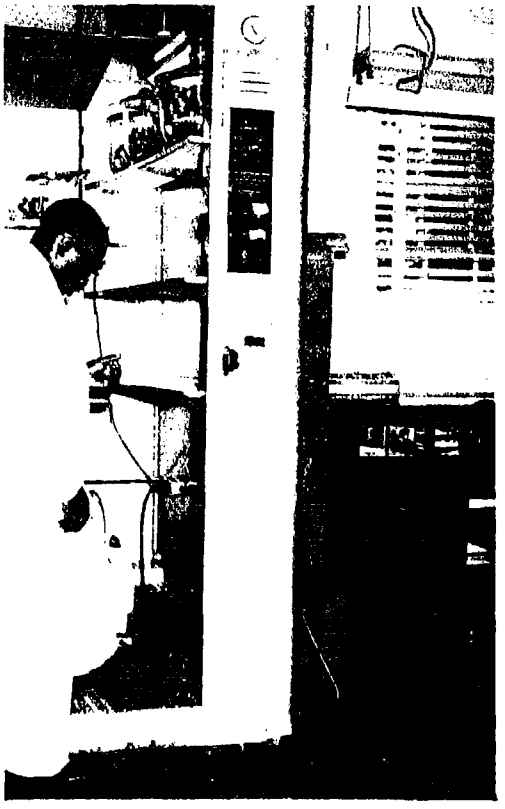
Epidemiologic studies supported by laboratory facilities for virus isolation and identification have provided valuable information on the natural history of several acute respiratory diseases. Recent studies have defined the role of Eaton



Virology Division:

Technician performing Hemagglutination-Inhibition test for identification of viruses.

PPLO in recruit pneumonia, and have provided epidemiologic information on virus infection associated with common cold-like illnesses. Field evaluations of various preventive immunization (vaccines) procedures will be continued.



Virology Division:
The laboratory is equipped with two "walk-in" constant temperature incubators.

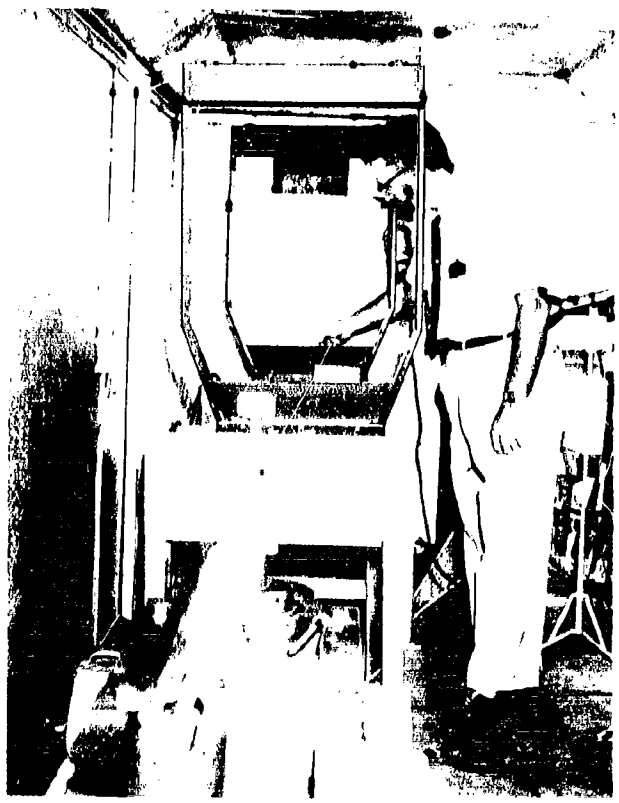
The PERSONNEL PROTECTION Division designs, modifies, and fabricates prototypes and conducts laboratory and field evaluation of protective devices and accouterments for Marine Corps troops. The program has involved such items as body armor, insulated boots, sleeping bags, gloves, helmets, cold weather helmet liners and face masks, canteens, load-carrying systems and armored footgear.

The Personnel Protection Division has made and evaluated many modifications in the basic design of body armor, and the work continues in an effort to produce combat protective devices which afford maximum comfort, balance and freedom of movement, and which are lightweight and compatible with the functions to be performed by troops

in combat. Recent field studies have evaluated the effects of wearing different designs and weights of body armor. The body armor units were fabricated of two standard lightweight armor materials - flexible ballistic nylon cloth and/or in combination with rigid Doron plates. These studies were conducted to determine the compatibility of the body armor with the load-carrying equipment, and the effects upon performance and marksmanship. In addition, work is continuing on the instrumentation for measuring energy absorption and deformation of ballistic protective materials and equipment.

This division maintains close liaison with Headquarters, Marine Corps (AO4D), Washington, D. C. and the Marine Corps Landing Force Development Center, Quantico, Virginia, where final tests and validation of equipment under development are conducted. Continuous contacts are also made with the 2d Marine Division to aid and assist in problems encountered in the field with standard load-carrying devices and body armor.

The Personnel Protection Division contains a workshop for fabrication of many types of materials. An indoor ballistics range, an



Personnel Protection Division:

Indoor ballistics range utilized to determine the effect of fragments on helmets and other protective garments.

electronics shop, machine shop, and an explosives effects laboratory equipped with a Beckman-Whitley high-speed framing camera capable of exposing at the rate of 1,250,000 frames per second are other facilities. Field evaluations are accomplished in collaboration with the 2d Marine Division, Base Rifle Range, and the Infantry Training Regiment at Camp Geiger.

Personnel Protection Division: Fabricating body armor.

The EQUIPMENT TESTING AND DEVELOPMENT Division has a three-fold mission: (1) to develop or adapt equipment for the medical support units of the Fleet Marine Force, (2) to conduct laboratory tests, user tests, field tests and evaluations of medical items developed by other service laboratories or commercial sources for possible use in the Fleet Marine Force, and (3) to design and develop specialized apparatus required by scientific personnel in the Laboratory. Examples of these items may be cited as follows:

Developments: Medical field chests, lightweight litters, portable aid stations, portable X-ray darkroom.

Tests and Evaluations: Mechanical resuscitators, litter beds, protective packaging of injectable drugs.

Laboratory Apparatus: Pressure control apparatus, heat and humidity chamber, high-intensity burn source.

Of prime importance and scope is the test and evaluation program. A constant supply of items are received by this Laboratory for user or service test and evaluation. Three principal sources of supply are:

The Defense Medical Materiel Board – A Department of Defense board which considers medical items for possible common adoption by the services. This board forwards items developed by other service laboratories (the Medical Equipment Research and Development Laboratory, Fort Totten, Long Island, N. Y., for example) to this Laboratory for test and evaluation. Items are evaluated for possible use by mobile field medical units as well as for fixed treatment facilities. Example: Field test and evaluation of a portable field autoclave.

Equipment Testing and Development Division:

The shops are equipped to make prototype and experimental apparatus.

The Chief, Field Branch, Bureau of Medicine and Surgery – Forwards medical materiel developed by commercial manufacturers for evaluation and possible use by the Fleet Marine Force in its field kits and components of medical supply blocks. Example: User test and evaluation of surgical sutures produced by a commercial manufacturer which are dry packed and sterilized in double, disposable containers.

The Commandant, Marine Corps – Upon receipt of suggestions or

recommendations originating in the Fleet Marine Force concerning improvements in medical materiel or procedure, refers these matters to this Laboratory for investigation and recommendation. Example: Investigation of a method to produce quantities of water in the field suitable for use in surgical debridement procedures.

The Equipment Testing and Development Division is equipped with workrooms for design, fabrication and test of materials, including facilities for woodworking, sheet metal and plastic working, a welding shop, machine shop, and paint spray booths. Facilities are also available for limited environmental testing of equipment. The facilities of the U. S. Naval Hospital, the various field medical units, and the Field Medical Service School are all available on a cooperative basis for user tests.

TECHNICAL SUPPORT FACILITIES

Supplemental to the shops previously described, facilities which serve the scientific programs are the Laboratory's Scientific Library, the Graphic Arts Section, the Printing Section, and the Animal Facility.

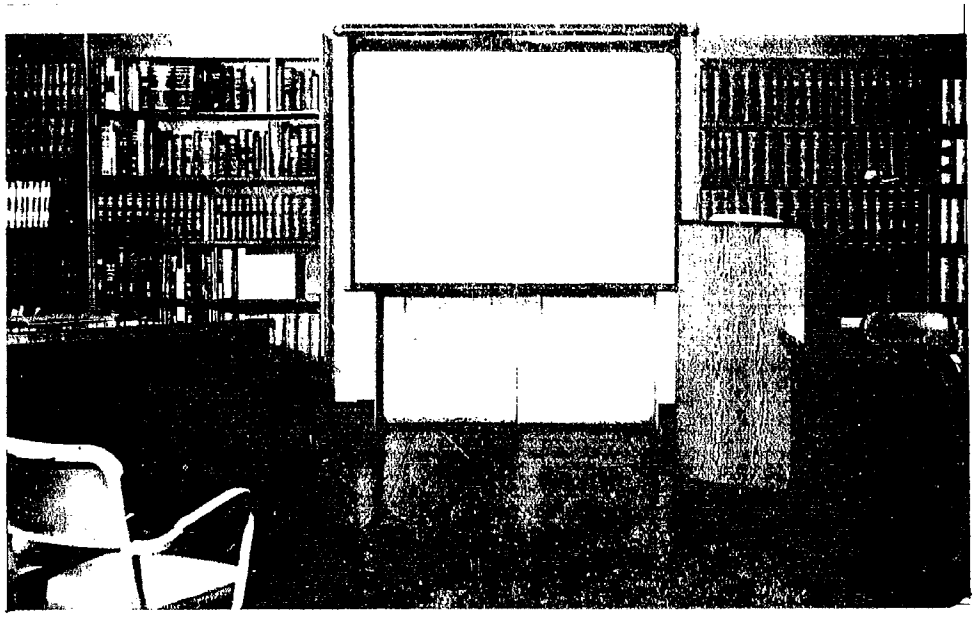
Scientific Library:

The NMFRL library includes textbooks, bound journals, and scientific reports covering the various disciplines represented in the Laboratory's staff and program. The medical librarian and an assistant librarian conduct reference searches and prepare bibliographies for the scientific staff.

In addition to serving the needs of the NMFRL, the library is available to all Medical Department personnel in the Camp Lejeune area.

The resources of the library include approximately 13,000 bound volumes of scientific textbooks and periodicals and approximately 40,000 research reports and technical documents. The library subscribes to 173 current medical and scientific periodicals.

A conference and lecture room equipped with slide and motion picture projection apparatus is available.



Library:
A section of the library conference and reading room.

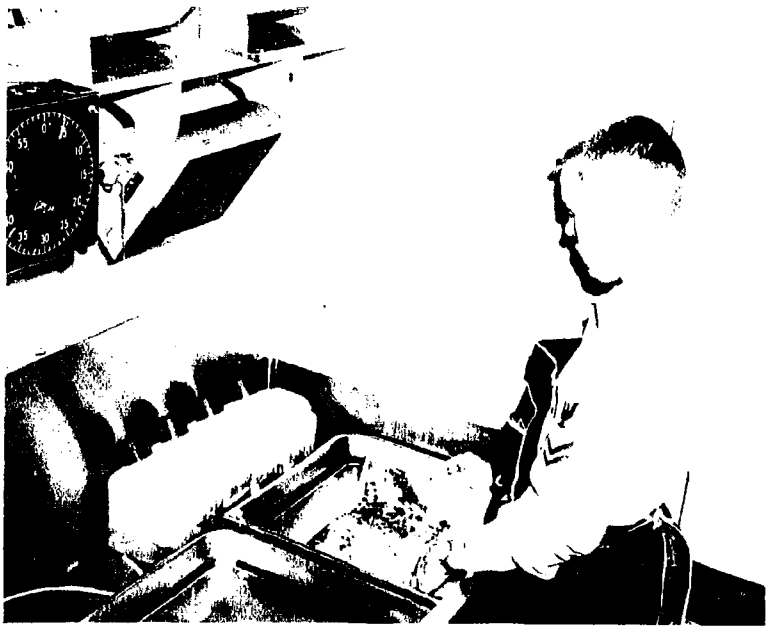
Graphic Arts Section:

This section consists of a photographic laboratory and an art unit.

The photo laboratory, established and authorized as a Class G (experimental) laboratory by the Chief of Naval Operations, is equipped to process photographic material in support of NMFRL programs. Such processing includes production of still and motion picture photography (excluding processing of motion picture footage, which is accomplished by the Naval Photographic Center, Anacostia) in black and white, and color; microphotography; and projection slides.

The art unit prepares tables, graphs and illustrations for manuscripts; prepares mock-ups and displays.

The Laboratory has facilities for producing the majority of its technical reports.



Photographic Section:
NMFRL print being processed by medical photographer.

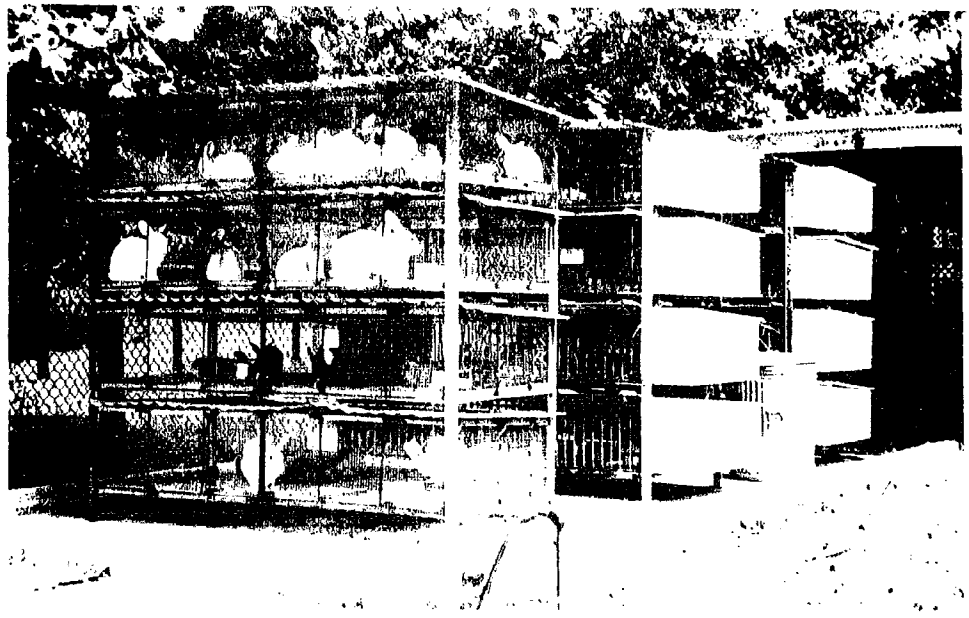
Animal Facility Annex:

A vital adjunct to the NMFRL is the animal facility which breeds and maintains stocks of healthy animals required for controlled experimentation. A fine-bred colony of beagle dogs and colonies of rabbits, guinea pigs, rats and mice are maintained.

Dog kennels are so constructed as to afford excellent shelter as well as exercise areas. Small animals are housed in separate air-conditioned buildings. Isolation facilities are available.

The annex, equipped with receiving, operating and storage rooms, is located in an isolated area two miles distant from the main Laboratory.

The Laboratory is guided by and adheres closely to the principles of Laboratory Animal Care developed and promulgated by the National Society of Medical Research (with representatives from the American Psychological Association, American Medical Association, American Society for Prevention of Cruelty to Animals, and the Federation of American Societies for Experimental Biology) and amended by the American Board of Laboratory Medicine (American Veterinary Association), the Animal Care Panel, and the Institute of Laboratory Animal Resources of the National Academy of Sciences-National Research Council.



Animal Facility Annex:
Breeder rabbit hutches.

Animal Facility Annex:
A portion of the beagle colony weaning kennel.