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**PROGRAM**

**PROGRESS**

**REPORT**

**1st QUARTER**

**FY 1962**



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**OFFICE OF THE SURGEON GENERAL  
DEPARTMENT OF THE ARMY**

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**Record Group: 319  
Accession#: 83-0052  
Box#: 11  
File Name: Annual Reports Army Surgeon General**

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TECHNICAL SERVICES	
Medical	
The Surgeon General .....	69
Class II Hospitals, Medical	
Centers, Depots, and Other .....	44
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ARMY AREAS	
CG, First US Army .....	4
CG, Second US Army .....	3
CG, Third US Army .....	1
CG, Fourth US Army .....	3
CG, Fifth US Army .....	4
CG, Sixth US Army .....	4
CG, MDW US Army .....	3
OVERSEAS COMMANDS	
CINCUSAREUR .....	4
CGUSAREUR (Rear)COMZ .....	4
CINCUSARPAC .....	2
CGUSARCARIB .....	4
CGUSARAL .....	4
CGEUSA .....	4
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TABLE OF CONTENTS

	Page No.
Contents . . . . .	i
Foreword . . . . .	ii
Summary . . . . .	iii

AMEDS PROGRAM

Chapter

2	STAFF AND ADMINISTRATION PROGRAM . . . . .	1
3	COMPTROLLER ACTIVITIES PROGRAM . . . . .	7
4	MANPOWER CONTROL PROGRAM . . . . .	11
5	SPECIAL PLANNING ACTIVITIES PROGRAM . . . . .	21
6	PREVENTIVE MEDICINE PROGRAM . . . . .	29
7	INTELLIGENCE PROGRAM . . . . .	47
8	MILITARY PERSONNEL PROGRAM . . . . .	47
9	CIVILIAN PERSONNEL PROGRAM . . . . .	55
10	PATIENT CARE AND RELATED ACTIVITIES PROGRAM . . . . .	65
11	TRAINING PROGRAM . . . . .	89
12	TACTICAL FORCES PROGRAM . . . . .	89
13	RESERVE COMPONENTS PROGRAM . . . . .	89
14	MEDICAL MATERIEL PROGRAM . . . . .	91
15	INSTALLATIONS AND CONSTRUCTION PROGRAM . . . . .	105
16	RESEARCH AND DEVELOPMENT PROGRAM . . . . .	111
17	PRESERVATION OF ORDER PROGRAM . . . . .	117
19	LOCAL MAINTENANCE AND MANAGEMENT OF FACILITIES PROGRAM . .	119
20	LOCAL LOGISTIC SUPPORT PROGRAM . . . . .	125

Research1. Neuropsychiatry and Stress

Research studies on the basic nature of sleep shows that of all of the body's organs, the brain is the most sensitive to the stresses of sleeplessness. Under prolonged sleep loss the nervous system begins to behave in an intermittent manner, running normally for awhile and then faltering like a motor in need of a tune-up. Effects of sleep deprivation include symptoms such as lapses in attention and fleeting visual illusions which make floors seem to tilt at a dangerous angle or roll like a wave. Tasks which require continuous alertness, but which are boring and monotonous are the most sensitive to sleep loss. Short rests and frequent changes of routine which help to improve performance are suggested.

2. Psychophysiological Studies

Experiments which illustrate the processes of habituation to vestibular stimuli in both man and animal were completed during the quarter. Recommendations were made for clinical evaluation of patients and for the experimental testing of men in rotation devices. A substantial beginning was also achieved in the evaluation of certain pharmacological agents for arresting or facilitating habituation to acceleration. Research in cutaneous discrimination continued with emphasis on the effect of duration and intensity on an observer's ability to discriminate and identify stimuli. The relative efficiency of the cutaneous, auditory, and vibratory stimuli in a task requiring vigilance was studied. Results have shown the acuteness of the several sense modalities compared in the order of auditory, vibratory and electrocutaneous.

3. Biological and Medical Aspects of Ionizing Radiation

a. Progress continues in the development of a chemical compound that will minimize the undesirable effects of ionizing radiation. Investigators have been able to demonstrate in laboratory animals a four-fold reduction in the effects of radiation injury. This advance in protective ability has occurred as a result of the combination of various anti-radiation agents, each having different mechanisms of action. Investigation is continuing on these compounds in conjunction with appropriate studies of their toxicological and pharmacological properties. By biological testing of certain chemicals studied under this program, 13 chemical structural variations have been found which can readily be correlated with undesired biological effects. This knowledge is of vital importance in the synthesizing of new compounds.

b. Initial studies indicate that when human serum gamma globulin is exposed to a source of ionizing radiation, there appears a second electrophoretic peak indicating definite structural changes. These altered molecules may stimulate antibodies specific only for irradiated human serum globulin. Results so far are qualitative and refer only to in vitro systems.

4. Preventive Medicine

a. Malaria prophylaxis and chemotherapy studies using a combination of chloroquine and primaquine in a single tablet has progressed beyond

Research

the large scale field trials. The new combined drug is expected to be in supply channels by December 1961. Research work is continuing on strains of chloroquine-resistant falciparum malaria which has been found in Brazil, Venezuela and Colombia.

b. A group of compounds, which are Keto-aldehyde derivatives of Biphenyl showing promise of effectiveness in humans with certain viral diseases, are being investigated. Special emphasis is being placed on effects on viral hepatitis.

c. A study on immunization against mumps has led to cooperative trial studies with the British Royal Army Medical Corps on Gurkha recruits at the Training Depot in Malaya. To date very encouraging results are appearing with one lot of vaccine. Plans are being made to continue the testing when a new group of recruits arrive in January.

5. Ecology and Control of Disease Vectors and Reservoirs

A new greaseless insect repellent called "deet," for the meta isomer of diethyltoluamide which comprises 75 percent of the new repellent, is now being issued in the field to Army personnel. "Deet" was developed by the Department of Agriculture utilizing US Army Medical Research and Development funds. It was tested extensively by the US Army Environmental Hygiene Agency. Field tests, conducted by the US Army Medical Research and Development Command, found the substance repels most insects including mosquitoes, fleas, chiggers, ticks, deer flies, and biting gnats. Moreover, it was found to be effective under conditions of heavy rainfall and extreme heat. It also gives excellent protection against land leeches that inhabit the jungles of Southeast Asia and against hordes of mosquitoes in mangrove swamps.

6. Oral Diseases

a. Work continued on investigations of the microorganisms of the forefront of deep dentinal caries. Thirty-seven strains of lactobacillus-type organisms have been isolated consistently from 22 carious lesions; no other types or species were found. Twenty-four of the strains seem to belong to known species of either rough or smooth oral lactobacilli, while 13 strains are apparently a new species of anaerobic lactobacillus. The cultural, biochemical and immunological characteristics of the 37 strains of the known lactobacillus-type organisms have been investigated. The chemical composition of the calcified tissues of the teeth of caries-susceptible and caries-insusceptible rats has been investigated in an attempt to establish the mechanism of caries resistance in these animals.

b. Progress has been made in the investigation of the mycotic content of the oral cavity in relation to periodontal disease and dental caries susceptibility or immunity.

7. Army Prosthetics Research

a. A plastic cover for the soldier's I.D. tag has been developed by the Army Prosthetics Research Laboratory. This cover is fabricated from a nontoxic plastic and contains data blanks for permanently recording refraction data with an ordinary ball point pen. The polyvinyl cover provides protection of the skin from cold I.D. tags, stops noise created by the metal tags, and contains a surface which will accommodate the written optical

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## 16 AMEDS RESEARCH AND DEVELOPMENT PROGRAM

### Research

prescription, and other valuable and necessary information such as allergic sensitivities. This information along with the dog tags would be on the soldier's person at all times. These newly developed covers are now being produced and distributed under a US Army Medical Research and Development Testing Program.

b. A voluntary opening hand with finger tip lock which provides a predetermined prehension force, or "finger tip pinch," has been developed for use by amputees who desire a cosmetically suitable inexpensive voluntary type of prosthetic device.

c. A prototype porous suction socket for above knee amputees which develops 3.5 to 4 lb. per square inch negative pressure has been fabricated and successfully tested. This means that an amputee can now be fitted with a type of prosthesis combining the advantages of the porous plastic laminate device which prevents maceration by permitting passage of perspiration, and simultaneously avoiding use of encumbering harnesses and gear. The wearers report that the leg feels more nearly like one's own.

### 8. Nutrition

a. A research team under the direction of two biochemists from the US Army Medical Research and Nutrition Laboratory will conduct a four-month-long nutrition survey and study in Burma. This survey is the first such study to be made at the request of a neutral country. Nutrition deficiencies associated with certain medical problems in the Armed Forces will be analyzed. Military dependents, a portion of the country's civilian population and school children and hospital patients will also be examined. This 10-man team will consist of nutritionists, dentists, doctors and other specialists. The survey will be conducted near Laos and East Pakistan in Burma.

b. Research studies on the irradiation of food continued during this quarter. Plans are being formulated to consider approval of irradiated bacon for military consumption, and a presentation of the data will be made to the Food and Drug Administration.

c. A study is currently being conducted using a night vision device designed to test and identify men who can see well at night. This new device simulates a 20-foot viewing distance under one-quarter moonlight illumination. A tritium-activated light source provides the exact and unvarying illumination needed. In development of this device, night vision was found to be associated almost entirely with two basic functions of brightness-contrast sensitivity and line-resolution discrimination ability. The device has been designed to measure both these faculties. It was found that men who have good contrast sensitivity may spot a well camouflaged object, whereas, a man lacking this ability may not. As a result of these tests, men with a high ability to see in the dark can now be selected for key positions in many critical night operations.

### 9. Environmental Medicine

On 20 September 1961, General Order No. 33 was issued by the Department of the Army establishing the United States Army Research Institute of Environmental Medicine at Natick, Massachusetts. This new Institute was formed from elements of environmental research groups from the US Army Medical Research Laboratory, Fort Knox, Kentucky and the Quartermaster

Research

Research and Engineering Center, Natick, Massachusetts, and will be responsible for the performance of all human environmental studies in the Army. Studies on the acclimatization of combat troops to hot and cold environments will be continued.

10. Neuropsychiatry and Stress

Relationships between the brain and the endocrine systems are being studied. These involve measurements of hormones in blood and urine of monkeys under acute and chronic psychological stress and in humans under a variety of stressful life situations. Through the establishment of several new and improved hormone testing methods considerable new information has been gained on cardiovascular responses to psychological stimuli of schizophrenic patients. This results in physiological changes which appear related to interpersonal involvement in the experimental situation. Progress has been made in the development of these improved methods through collaboration with extra mural investigators. Computer analysis of brain responses and biological potentials upon which studies have been conducted in the past has succeeded in revealing events that hitherto have defied analysis. A minute electro-retinogram has been demonstrated in patients with retina pigmentation and has raised the possibility of useful application of this technique to similar clinical ophthalmological problems. Experiments combining brain shocks with conditional stimuli in an attempt to condition heart rate represent a new series of studies. These will involve the measurement of cerebral blood flow and metabolism during and at intervals following intracranial surgery. These studies will utilize closed system anesthesia with moderate hyperventilation. It is proposed to investigate the fluid balance between blood, cerebral tissues and cerebro-spinal fluid spaces.

11. Contracts

a. A total of 127 contractual procurement actions, valued at over \$4.4 million was accomplished during the first quarter of FY 1962. In addition, 182 actions not involving an expenditure of funds were completed by the U. S. Army Medical Research and Development Command.

b. Grants for basic research increased by 12, during the first quarter, bringing the total number of grants administered by the R&D command to 36, with an estimated value of \$1.3 million.

c. The downward trend in the number of contracts being administered by Research and Development Command continued during the first quarter of FY 1962. As of 30 September 1961, the number of contracts totaled 333, or 3.2 percent less than the previous quarter and 13.9 percent less than the same period a year ago. The distribution by type of contract is shown in the table below:

Type of Contract	Number
Cost Reimbursement	306
Cost-plus-fixed-fee	22
Fixed Price	2
Facilities	5
Total	333

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## 16 AMEDS RESEARCH AND DEVELOPMENT PROGRAM

### Development

#### 12. Development of Medical, Dental and Veterinary Equipment and Supplies

a. In addition to the \$360,000 provided by the three services (\$160,000 by Army) for routine operation of the Medical Equipment Development Laboratory during FY 1962, additional funds in the amount of \$350,000 have been allocated for use in support of limited war development effects. This is the first time that development funds have exceeded the half-million mark. This higher than normal funding will continue in FY 1963 and most likely increase during the next five years.

b. To reduce lead time, equipment in the engineering test phase has been offered for test and evaluation by user activities. Seven prototypes tested in Exercise Swift Strike resulted in significant recommendations which will result in the early adoption of more desirable items. In further efforts to achieve optimum results in less time, contract proposals are being solicited through commercial journals and prepared for implementation on receipt of funds. Preplanning such as this will enable the staff of OTSG to review the exact development approach to be taken and provides information necessary to complete the new format of the QMR (qualitative materiel requirement) now being staffed. Priorities can be determined in advance and long range programs secured.

c. A portable calibrator has been developed which for the first time permits field servicing of audiometers used to give hearing tests at medical treatment facilities. Use of this device will save considerable time and money in that audiometers used at 75 Armed Forces Examining Stations can now be serviced on the spot, eliminating the present practice of sending them to Louisville Medical Depot for repairs.

d. During the first quarter, the following progress and changes were made in AMEDS Research and Development Projects programmed for FY 1962:

Action	Number
<u>Projects</u>	
Initiated	2
Superseded	2
Cancelled	3
Completed	9
<u>Service Tests</u>	
Initiated	12
Completed	13