

# CDC

April · May · June 1949

# BULLETIN



**FEDERAL SECURITY AGENCY**  
**Public Health Service**  
**Communicable Disease Center**  
**Atlanta, Ga.**

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PUBLIC HEALTH SERVICE  
COMMUNICABLE DISEASE CENTER  
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## CONTENTS

CDC TRAINING COURSES . . . . .	i
OVER-ALL FUNCTIONS AND OBJECTIVES OF THE LABORATORY DIVISION . . . . .	1
METHODOLOGY RESEARCH . . . . .	6
REFERENCE DIAGNOSIS SERVICE . . . . .	9
LABORATORY TRAINING AND EXTENSION SERVICE . . . . .	18
CONSULTATION SERVICES . . . . .	24
REPORT OF ACTIVITIES WITH THE ARKANSAS STATE BOARD OF HEALTH . . . . .	28
PICTORIAL REVIEWS: 1. Constructing a Sanitary Pit Privy . . . . .	31
2. The Production and Processing of Oysters . . . . .	32
3. Manson's Blood Fluke . . . . .	33
4. The Epidemiology of Murine Typhus . . . . .	34
IDEA EXCHANGE: A Medium for the Culture of <i>T. cruzi</i> and the Leishmanias (Offutt). . . . .	35
SPECIAL PROJECT: Rickettsialpox Survey in New York City . . . . .	38
BOOK REVIEW: Laboratory Diagnosis of Protozoan Diseases . . . . .	40
DIVISION HIGHLIGHTS:	
Administrative Division . . . . .	41
Engineering Division . . . . .	43
Entomology Division . . . . .	45
Epidemiology Division . . . . .	46
Laboratory Division . . . . .	48
Production Division . . . . .	52
Technical Development Division . . . . .	55
Training Division . . . . .	59
Veterinary Division . . . . .	62
MORBIDITY CHART . . . . .	65

*Material in this bulletin is not for publication.*

## CDC TRAINING COURSES

Listed below are training courses, sponsored by divisions of the Communicable Disease Center, to be held in the near future. Further information on the courses may be obtained from the *Bulletin of Field Training Programs*, issued by the Training Division.

### TRAINING DIVISION

1. **FIELD SURVEY AND EVALUATION METHODS IN HOUSING SANITATION**, July 18 to August 19 and September 19 to October 21, 1949. Five weeks. Atlanta, Ga.
2. **RAT-BORNE DISEASE PREVENTION AND CONTROL**, September 19 to October 14, 1949. Four weeks. Atlanta, Ga.
3. **INSECT AND RODENT CONTROL** (short courses for professional personnel concerned with administration of control programs), June 20 to July 1, July 11 to July 22, July 25 to August 5, August 15 to August 26, 1949. Two weeks. Atlanta, Ga.
4. **ORIENTATION COURSE FOR SANITARY ENGINEERS IN STREAM AND INDUSTRIAL WASTE SURVEY METHODS**, June 20 to September 9, 1949. Twelve weeks. Cincinnati, Ohio.
5. **ADVANCED TRAINING FOR BACTERIOLOGISTS IN CHARGE OF LABORATORIES FOR WATER AND MILK ANALYSES AND FOOD UTENSIL EXAMINATIONS**, October 17 to November 4, 1949. Three weeks. Cincinnati, Ohio.
6. **GENERAL SANITARY ENGINEERING FIELD TRAINING**, June 20 to September 10, 1949. Twelve weeks. Columbus, Ga.
7. **ENVIRONMENTAL SANITATION FIELD TRAINING**, September 17 to December 9, 1949. Twelve weeks. Columbus, Ga.
8. **ENVIRONMENTAL SANITATION FIELD TRAINING**, September 19 to December 9, 1949. Twelve weeks. Troy, N. Y.
9. **ENVIRONMENTAL SANITATION FIELD TRAINING**, August 20 to November 19, 1949. Twelve weeks. Topeka, Kans.
10. **PRACTICAL HEALTH DEPARTMENT RECORDS TRAINING**, August 29 to September 10, 1949. Two weeks. Topeka, Kans.
11. **PUBLIC HEALTH EDUCATION FIELD TRAINING**, June 20 to September 11, 1949. Twelve weeks. Savannah, Ga.

### LABORATORY DIVISION

1. **SEROLOGICAL DIAGNOSIS OF RICKETTSIAL DISEASES**, July 25 to July 30, 1949. One week. Atlanta, Ga.
2. **LABORATORY DIAGNOSIS OF MYCOTIC DISEASES**, August 1 to August 26, 1949. Four weeks. Atlanta, Ga.
3. **LABORATORY DIAGNOSIS OF BACTERIAL DISEASES, TUBERCULOSIS BACTERIOLOGY**, August 29 to September 23, 1949. Four weeks. Atlanta, Ga.
4. **LABORATORY DIAGNOSIS OF PARASITIC DISEASES**, September 12 to October 21, 1949. Six weeks. Atlanta, Ga.
5. **LABORATORY DIAGNOSIS OF BACTERIAL DISEASES, GENERAL BACTERIOLOGY**, September 26 to October 21, 1949. Four weeks. Atlanta, Ga.
6. **LABORATORY DIAGNOSIS OF BACTERIAL DISEASES, ENTERIC BACTERIOLOGY**, October 24 to November 18, 1949. Four weeks. Atlanta, Ga.

### VETERINARY PUBLIC HEALTH DIVISION

1. **LABORATORY DIAGNOSIS OF RABIES**, October 24 to October 28, 1949. One week. Atlanta, Ga.

# Over-all Functions and Objectives of the Laboratory Division

**Dr. S. E. Miller, Chief,  
Laboratory Division**



**Dr. Reider**  
i/c Special Services,  
Laboratory Division



**Dr. Frobisher**  
i/c Bacteriology  
Branch

In 1944, the Committee on Teaching of the American Society of Tropical Medicine sent an urgent request to the Surgeon General of the Public Health Service asking that something be done to improve laboratory diagnosis in the field of parasitology.

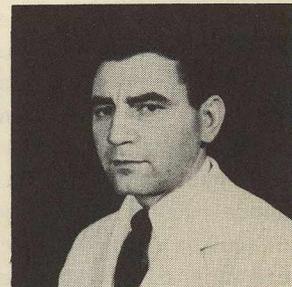
It was decided to start refresher training courses in the laboratory diagnosis of parasitic diseases for persons already employed in diagnostic laboratories, and to establish a national reference diagnostic center to which parasitic disease specimens could be sent for diagnosis.

Accordingly, in 1945 the Parasitology Laboratory was organized and began functioning. At the same time, it was realized that other diagnostic laboratory facilities and services were inadequate in many places throughout the country and that some assistance should be given them.

In 1946, the Virus and Rickettsial Branch Laboratories were set up in



**Dr. Brooke**  
i/c Parasitology  
Branch



**Dr. Schaeffer**  
i/c Virus and  
Rickettsial Branch

Montgomery, Ala. In 1947, the Bacteriology Branch Laboratories were set up in Atlanta. In 1948, a modest start was made toward a Pathology Branch which will include sections in pathology, hematology, and biochemistry. It will perhaps be easier to understand the work of this Division if we discuss first the general functions which apply to all branches.

The first function is to assist the Epidemiology Division of the Communicable Disease Center in field and laboratory investigations of emergency epidemic problems when called upon by any State health officer, and to give whatever laboratory assistance is needed to special epidemiological and control operations of the Communicable Disease Center.

The second function is to undertake methodology research to evaluate the sensitivity and specificity of the various diagnostic techniques now available, to improve these techniques where indicated, and to devise new techniques where there is a deficiency. We are not aiming at establishing "Standard U. S. Public Health Service Techniques," but are trying to evaluate the reliability of the various techniques as an aid to laboratory workers throughout the country in formulating and standardizing their own routines.

The third function of the Laboratory Division is to act as a reference diagnostic center, offering laboratory diagnosis on difficult specimens which local laboratories may not be equipped to handle or on which they wish consultation. Some techniques are demanded so infrequently or are so expensive that many individual laboratories cannot maintain them. This is a need which we are endeavoring to fill.

The fourth function is to offer supplementary training for ALREADY EMPLOYED laboratorians by means of short, intensive refresher courses to improve their performance of techniques now in use and to acquaint them with the newer techniques.

The fifth function is to offer consultation services to State and local public

health laboratories which request them. Assistance is offered in solving technical or administrative problems. When necessary, our personnel go directly to the requesting laboratory to give such aid.

When specifically requested, surveys are made of State and local health department laboratories. These surveys consist of exhaustive program and technical reviews, with specific recommendations for improvement of services. It is hoped that we can thus strengthen the programs of the various State public health laboratories and that they in turn will evaluate and strengthen the performance of all other laboratories within their State. In this way we hope to obtain the greatest increase in efficiency of laboratory diagnosis throughout the country in the shortest possible time.

We want to make clear that we have no desire to offer routine services which can, and should be, provided by the already established laboratories and institutions. Our aim is to render whatever additional help is necessary to improve diagnostic services in this country.

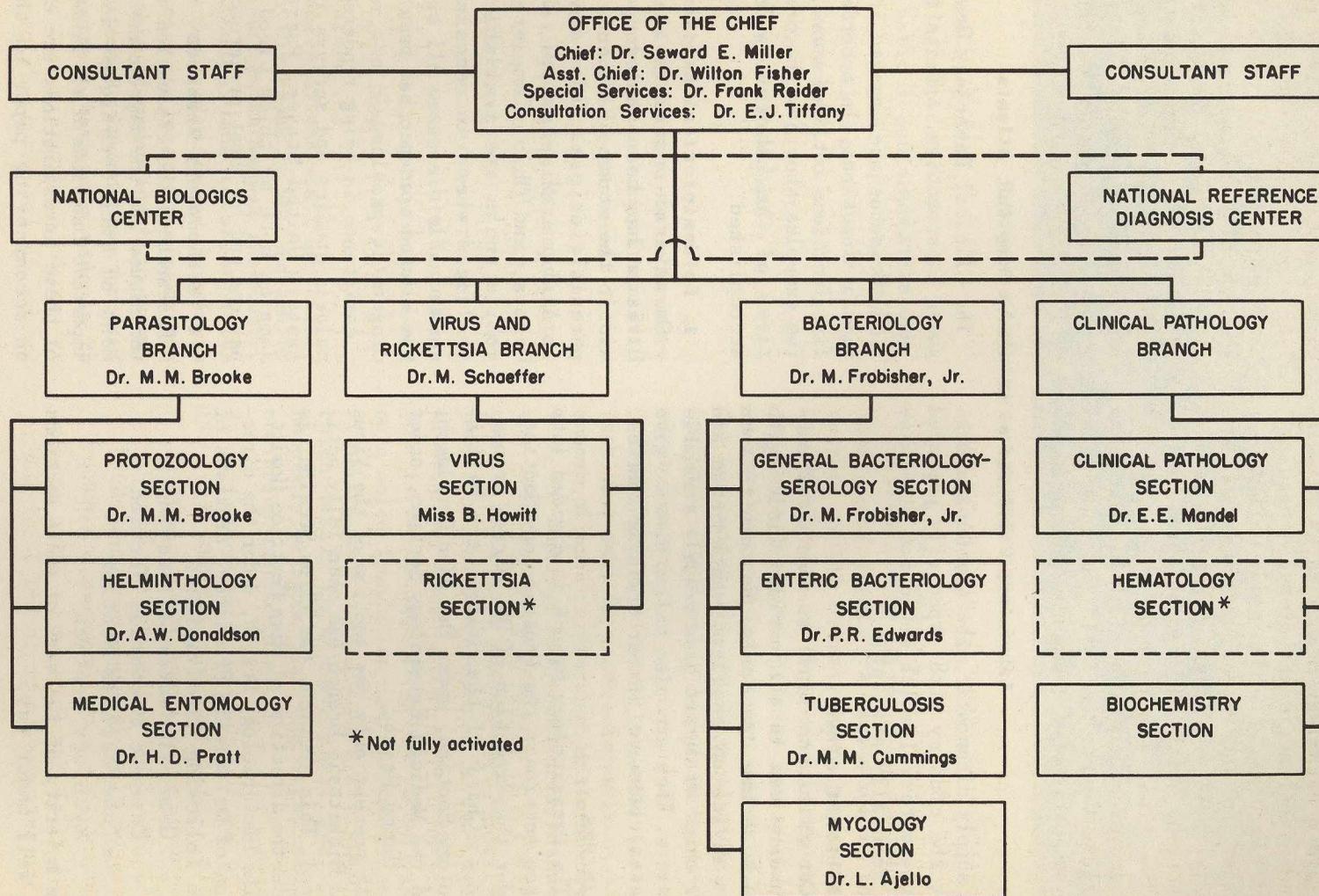
The organization we are creating to render these services (see chart) is as follows:

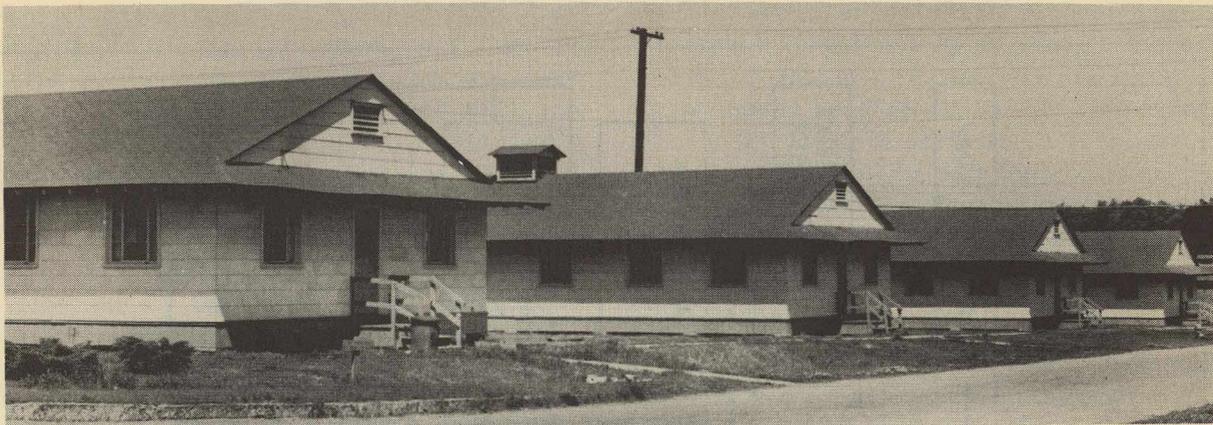
#### OFFICE OF THE CHIEF

The headquarters office is concerned with planning and setting up the programs and organization of the entire Division. All the administrative details of personnel, budget, and supply are handled by this office. Dr. Wilton Fisher, the Assistant Chief of the Laboratory Division, handles all out internal administrative and operational problems.

Dr. Frank Reider maintains our contacts and relationships with the various State and local health departments. Other important functions of this office are the survey of State and city health department laboratories at their request, recruitment of students for the various training courses offered by the Division and the Extension Service. The Extension Service was developed

# LABORATORY DIVISION





Laboratory buildings at Lawson VA Hospital, Atlanta.

to supply diagnostic laboratories throughout the country with especially prepared study material which would not otherwise be generally available.

#### CONSULTANT STAFF

Our consultant staff is made up of outstanding men in the various fields with which we are concerned. We turn to them for advice on problems which arise and for which we do not have readily available answers. They are also called upon to give special lectures in our training courses.

#### BRANCHES

The Parasitology Branch is divided into three sections: the Protozoology Section, under the direction of Dr. Marion Brooke, who is Chief of the Branch; the Helminthology Section, under Dr. Alan Donaldson; and the Medical Entomology Section, under Dr. Harry Pratt.

At present only one section of the Virus and Rickettsia Branch has been fully activated. This section, the Virus Section, is under the direction of Miss Beatrice Howitt.

The Bacteriology Branch, under the direction of Dr. Martin Frobisher, consists of the following subdivisions:

- General Bacterial Section
- Enteric Bacterial Section
- Tuberculosis Section
- Mycology Section

The majority of the work of these sections is well under way.

The Clinical Pathology Branch is still under construction, and its functions are just starting.

All Branches are engaged in essentially similar functions. In accordance with the five functions outlined above, the following examples show how the over-all objectives of the Laboratory Division are accomplished.

#### 1. Epidemiological Assistance

On several occasions the Laboratory Division has been called upon to render aid in the study of enteric diseases of parasitic origin. Units have been sent to Alabama, Mississippi, Texas, North Dakota, and Ohio. Completely equipped mobile units are available to go into the field whenever necessary to study communicable diseases. All too frequently the alleged epidemic has been a laboratory diagnostic problem.

Assistance is being rendered in several malaria studies and surveys in the southeastern United States, Puerto Rico, and Jamaica both by thick blood film examinations and by "host preference" serology.

#### 2. Methodology Research

Research in the evaluation of diagnostic techniques and the improvement and development of such techniques is one of the important functions of all Branches. Details of these investigations are enumerated in an accompanying paper on this subject.



Laboratory buildings at Montgomery.

### 3. Reference Diagnosis

Reference diagnostic services are being rendered to various public health laboratories in this country for the identification of difficult specimens. Also, we receive many arthropods from widely scattered sources for species determinations. An accompanying article adequately describes these services.

### 4. Training

Our objective is to improve laboratory diagnosis. We are not in competition with universities or other educational institutions, since we accept only already employed individuals who have completed their formal education, and merely give them short refresher courses to improve their proficiency on their respective jobs. To keep these students "on their toes," an extension service has been operating for the past 3 years.

### 5. Consultation

Various members of the staff are available to other Divisions of CDC and public health organizations throughout the country for both technical and administrative assistance. Several surveys for State health departments regarding problems in the diagnosis of communicable diseases have been completed. In addition, program reviews or surveys have been made in 23

of the 48 State laboratories.

### 6. Evaluation

The final step in our plan to improve laboratory diagnostic medicine in this country is the evaluation of performance by the 48 State public health laboratories and their branches, with the understanding that they then will assume the responsibility for evaluating all the local clinical and hospital diagnostic laboratories within their States.

This job, of course, is a continuing task that must be repeated yearly. A vast amount of work is involved in the development of improved diagnostic techniques, the training of personnel, and finally the evaluation of performance in all our public health laboratories. No such ambitious plan, despite its great need, can hope to be successful unless it is built on a solid foundation and staffed by outstanding key individuals, all working relentlessly to achieve their goal. We honestly believe that the organization now being assembled will:

1. Render outstanding services to all CDC programs it serves.
2. Make a rapid start toward the goal of improving laboratory diagnostic medicine throughout this country.



**Dr. M. M. Brooke,**  
**i/c Parasitology**  
**Branch**

## *Methodology Research*

**M**ethodology research as engaged in by the Laboratory Division is the first step toward its goal of improving laboratory diagnostic medicine. This methodology research consists of two portions: (1) the evaluation of existing diagnostic procedures, and (2) the development of new techniques when these are needed. Thus the research activities of the Laboratory Division are, for the most part, in the realm of applied research rather than in the field of theoretical or basic research.

A large number of rather varied problems are being investigated by the Bacteriology-Serology, Tuberculosis, Virus, Parasitology, and Entomology Laboratories of the Laboratory Division. A few representative examples will be used to illustrate the scope of methodology research.

One of the research problems of the Bacteriology Laboratories involves several kinds of media used for the isolation of diphtheria bacilli. A comparison of some of the more promising of these media is being carried on by inoculating each throat culture received onto each of several

media under investigation. This investigation will continue for some time, as new diagnostic media are developed by various investigators. The various tellurite plate media containing whole blood vary somewhat, but are, as a group, uniformly much better than the tellurite media containing only serum. Later, it is planned to study these media for initial cultivation directly from the patient's throat in an effort to improve upon the present Loeffler's medium.

Comparative tests are being run by the Serology Laboratories to determine which of several complement fixation techniques will give the optimal sensitivity and specificity. In connection with this study, comparative tests are being performed on commercial complement to determine its status.

The serological diagnosis of brucellosis has inherent limitations, but the technique is widely used and thus is being investigated.

The Tuberculosis Laboratory has undertaken an extensive program of methodology

research concerned with the microscopical diagnosis, cultural diagnosis, animal diagnosis, typing, and virulence testing of tubercle bacilli. These studies are directed toward both the evaluation of existing laboratory procedures and the development of new, more efficient methods. For example: A study to ascertain the efficacy of centrifugalization as a concentration procedure is under way.

A major study has been the comparison of various tuberculosis culture media by inoculation of different media with the same material. The media being tested are modified Lowenstein's, Dubos' (both solid and liquid), Petraganinis', the Trudeau Society's, Sula's, Herrold's egg-yolk agar, and others.

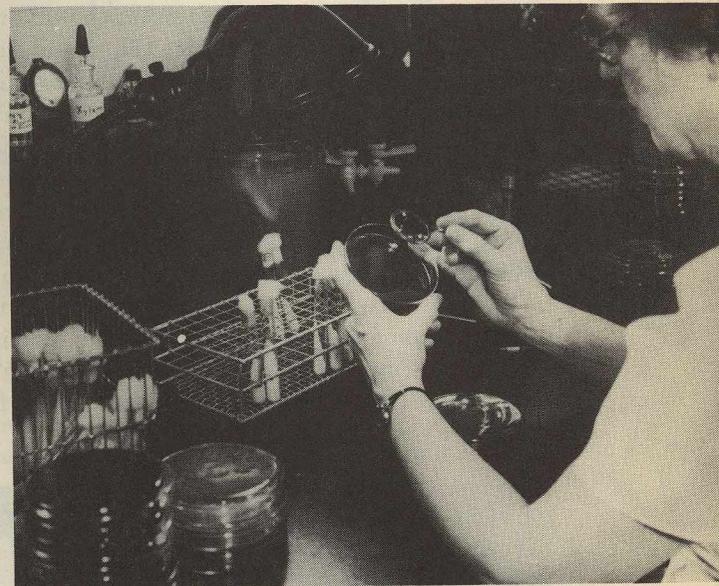
Because of the difficulty of shipping or storing pathological materials over any considerable period of time without having the tubercle bacilli die, studies are being made of various methods of preserving the organisms in a viable state for transportation and storage.

The neurotropic virus diseases are most difficult to diagnose clinically and study epidemiologically. At present, the Virus Laboratory possesses stocks of all the more important viruses. Complement fixation tests for many of the neurotropic virus diseases lack specificity and sensitivity. Studies are being carried on to develop better antigens and to improve the various tests.

It is frequently difficult for physicians to get laboratory assistance in establishing the diagnosis of amebiasis. Shipping the stool to a distant laboratory for diagnosis has been unsatisfactory since the trophozoites are completely disintegrated by the time the specimen is examined. Recently the Parasitological Laboratory has developed a technique that shows promise of markedly improving the diagnosis of this disease. It has been found that by mixing a water-soluble resin, polyvinyl alcohol (PVA), with a fixative, an effective preservative is obtained.

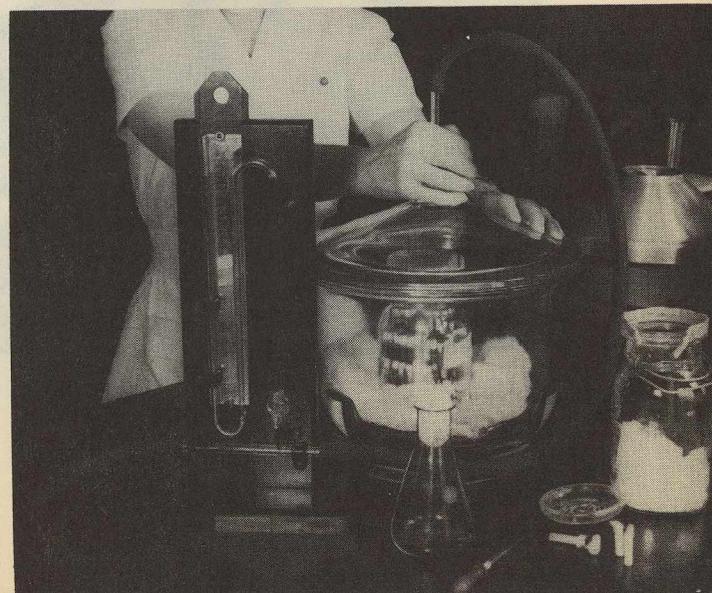


▲ Routine diagnostic serology in virus laboratory.



▲ Checking diptheria cultures.

▼ Equipment used for dessication of bacterial cultures.



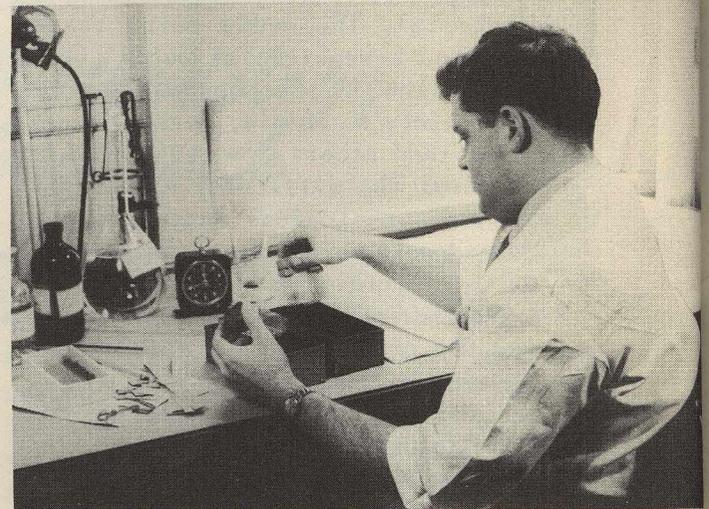
The diagnosis can be made from the preserved specimen immediately or months later. One of the distinct advantages of the PVA-fixative technique is that it makes possible the successful staining of organisms occurring in fluid specimens. To date it has been found that the technique triples the number of positive diagnoses.

The PVA-fixative technique illustrates a phase of methodology research devoted to the development of new techniques where none are available to meet the existing need.

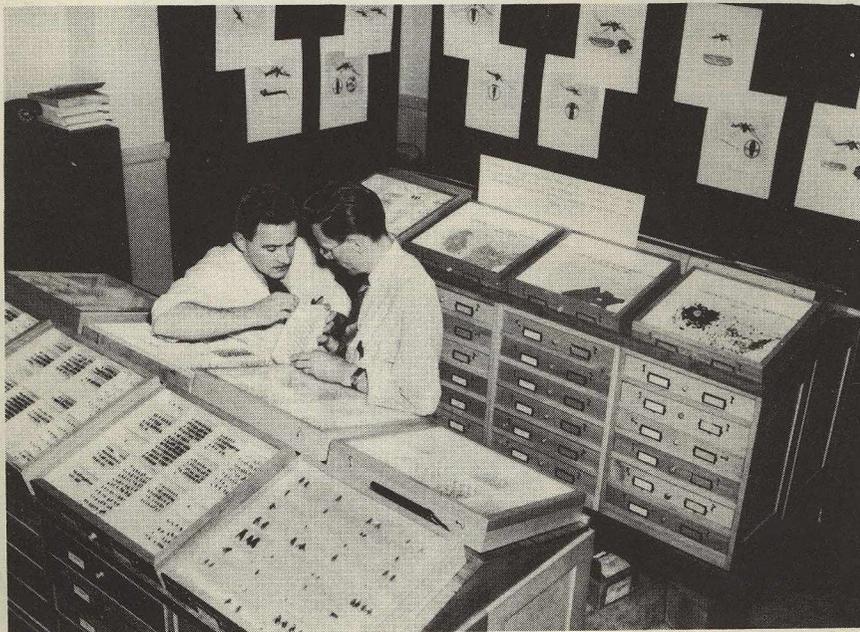
Where large numbers of blood films have to be stained in connection with malaria surveys and other studies, it is a distinct advantage to employ a mass staining procedure. The one formerly used frequently permitted blood to wash off a positive film and to adhere to a normal blood film. If the transferred blood contained malarial parasites, a normal individual might be diagnosed as having malaria. After the discovery of this imperfection it was found that by adding a small quantity of a surface active agent (Triton X-30) all transfer was virtually eliminated.



▲ Staining of fecal smears following preservation by PVA - Fixative technique.



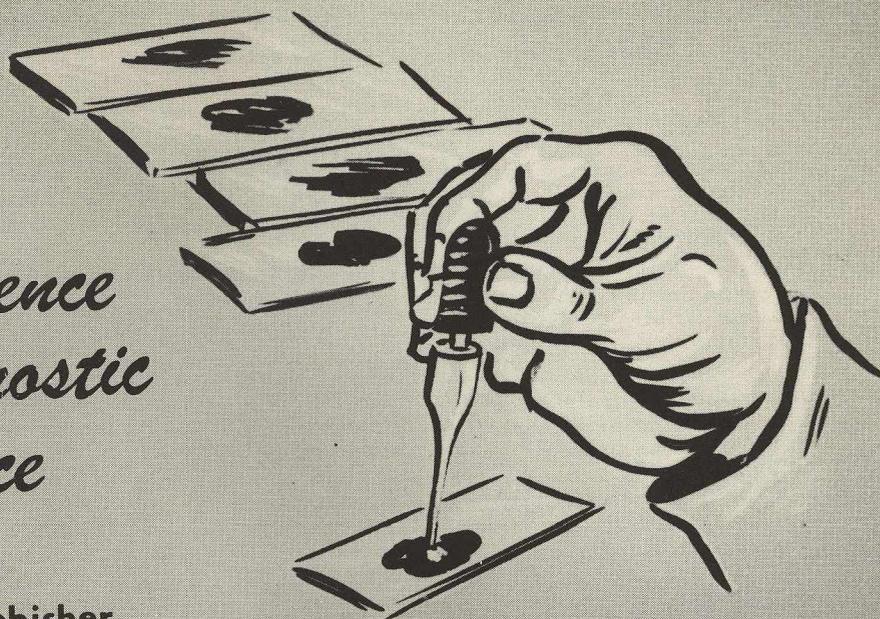
▲ Experimental staining procedures for thick blood film diagnosis of malaria.



◀ Entomologists comparing specimens submitted for identification with museum collection.

## Reference Diagnostic Service

**Dr. M. Frobisher**  
**i/c Bacteriology Branch**



The reference diagnostic service is available to all public health laboratories and all practicing physicians through their health departments with a bona fide diagnostic problem involving a communicable disease or infectious microorganisms. The service deals with rickettsial and viral infections, mycotic diseases, tuberculosis, parasitic infections, diphtheriology, the bacterial enteric infections, leptospiruses, and general bacteriology, including any and all infectious diseases for which laboratory facilities are available.

In the process of organizing the growing reference diagnostic services, occasional relocation of laboratories has taken place, and thus it is sometimes not clear to what address various types of diagnostic specimens should be sent. To clarify this matter and to hasten the transmission of each specimen to its proper destination, a complete list has been prepared by the Office of State Services showing: (a) all

diagnostic services currently available in the Communicable Disease Center; (b) the sort of material most likely to yield a positive result; and (c) method for preparing and shipping it, with EXACT ADDRESS for each sort of material. An abbreviated form of the list is reproduced here for convenience of the reader.

### THE DIAGNOSTIC SERVICES

Some idea of the nature and scope of the reference diagnostic work may be gained from the following outline of the activities of the various laboratories.

### THE VIRUS LABORATORIES

The Virus Laboratory receives from State laboratories, private physicians, and numerous other sources, human blood serum, autopsy specimens, brain material, spinal fluids, feces, nasal washings, etc. Serum neutralization tests have been done against the viruses of Eastern and Western equine encephalomyelitis, St. Louis encephalitis,

**Correct Addresses of Laboratory Division, Communicable Disease Center  
to Insure Prompt Delivery of Specimens Submitted for Reference Diagnostic Services.**

(Copy of letter or other information as to service desired should accompany specimen)

SERVICES AVAILABLE	ADDRESS
<b>BACTERIOLOGY</b>	
Identification of unknown organisms other than those referable to laboratory units listed below.	U. S. Public Health Service Communicable Disease Center General Bacteriology Laboratory Chamblee, Georgia
Examination of throat cultures for isolation of <i>C. diphtheriae</i> . Identification and virulence testing of pure cultures suspected of being <i>C. diphtheriae</i> . Typing of cultures of <i>C. diphtheriae</i> .	U. S. Public Health Service Communicable Disease Center Diphtheria Laboratory Chamblee, Georgia
Cultures or stools for isolation and identification of <i>Salmonella</i> and <i>Shigella</i> . Bacteriophage typing of <i>S. typhi</i> and <i>S. paratyphi B</i> . Grouping of other enteric bacteria by biochemical methods, etc.	U. S. Public Health Service Communicable Disease Center Enteric Bacteriology Laboratory Chamblee, Georgia
Acid fast cultures for typing and determination of virulence. Streptomycin sensitivity testing on cultures. Examination of pathological material for tubercle bacilli (problem cases only: not accepted routinely)	U. S. Public Health Service Communicable Disease Center Tuberculosis Laboratory Chamblee, Georgia
<b>SEROLOGY</b>	
Serological tests for leptospirosis, rickettsioses, lymphogranuloma venereum — psittacosis group of viruses, infectious mononucleosis, brucellosis, etc. Host preference serology. Streptococcus typing.	U. S. Public Health Service Communicable Disease Center Immunology-Serology Laboratory Chamblee, Georgia
<b>MYCOLOGY</b>	
Examination of specimens for fungi. Identification of mycological cultures. Examination of tissue sections for pathological changes due to fungi.	U. S. Public Health Service Communicable Disease Center Mycology Laboratory Chamblee, Georgia
<b>PARASITOLOGY</b>	
Identification of intestinal parasites in amebiasis, hookworm infection, ascariasis, echinococcosis, tape worm infection, etc.	U. S. Public Health Service Communicable Disease Center Intestinal Parasites Laboratory 291 Peachtree Street Atlanta, Georgia
Identification of blood parasites in malaria, filariasis, leishmaniasis, trypanosomiasis, etc.	U. S. Public Health Service Communicable Disease Center Blood Parasites Laboratory 291 Peachtree Street Atlanta, Georgia
<b>MEDICAL ENTOMOLOGY</b>	
Identification of arthropods of medical importance, (mites, ticks, lice, bed bugs, fleas, mosquitoes, cockroaches, flies, etc.)	U. S. Public Health Service Communicable Disease Center Medical Entomology Laboratory 291 Peachtree Street Atlanta, Georgia
<b>VIROLOGY</b>	
Serum neutralization tests, agglutination tests, hemagglutination tests and complement fixation tests for viral diseases. *Examination of body fluids, secretions, excretions, tissues and arthropods for virus. Examination of human and animal tissues for pathological changes due to viral diseases.	U. S. Public Health Service Communicable Disease Center Virus Laboratory Box 436, Rt. 3, Federal Drive Montgomery 5, Alabama

\*Such examinations are also available at the Division of Infectious Diseases, Microbiological Institute, National Institutes of Health, Bethesda, Maryland.



Inoculation of embryonated  
eggs for virus cultivation.

lymphocytic choriomeningitis, herpes, and the Newcastle disease virus of chickens. Complement fixation tests have likewise been done against the three encephalitic viruses, as well as for lymphocytic choriomeningitis and mumps. Fecal specimens and nasal washings have been inoculated into monkeys for isolation of the poliomyelitis virus, using a method developed in this laboratory, which employs a mixture of penicillin and streptomycin for inhibiting bacterial but not viral growth. By this method the percentage of virus isolations has been greatly increased. Human and animal autopsy materials (brain or cord) have been received from various States. Eastern equine encephalomyelitis has most frequently been recovered from such specimens received from Southeastern States.

Diagnostic services for the influenza viruses are designed to detect outbreaks of influenza in the initial stages, and to endeavor to isolate new strains of influenza virus.

Serum neutralization and complement fixation tests have been done on materials collected for various surveys by the Epidemiology Division of the Communicable Disease Center. In this connection, entomological materials (flies, mosquitoes, and other arthropods) have been examined for the presence of viruses. The virus of Eastern equine encephalomyelitis has been recovered on several occasions in such studies.

Occurrences of particular interest in the course of the laboratory studies have been the finding of antibodies for the virus of Newcastle disease of chickens in



the blood of a large number of human cases showing a particular type of neurologic syndrome; and the development of an improved technique for inoculation of bacterially infected fecal material into animals for recovery of the virus of poliomyelitis.

#### THE SEROLOGY-IMMUNOLOGY LABORATORIES

The work of these laboratories has consisted in large part of complement fixation tests on sera from rats trapped in connection with murine typhus control studies. In addition, complement fixation tests are made on sera from persons with undiagnosed febrile diseases, the antigens including Rocky Mountain spotted fever, Q fever, rickettsialpox, and murine typhus. Weil-Felix tests are also done on these sera.

The Serology Laboratories also carry on active studies on the host preference of mosquitoes of medical importance. The purpose is to determine the kind of animal on which disease-bearing mosquitoes prefer to feed. The antisera used in this work are prepared in our own laboratory.

Other services of this laboratory include

complement fixation tests for the lymphogranuloma-psittacosis group of viruses. These are available upon request. The heterophile antibody test for infectious mononucleosis is also performed. The absorption technique for this test has recently been inaugurated in order to yield results of greater specificity.

In the near future, diagnostic complement fixation tests for amebiasis, histoplasmosis, and coccidioidomycosis, will be available. The agglutination tests for leptospirosis and brucellosis are being rendered.

A reference diagnostic service for the grouping and typing of hemolytic streptococci has been completed.

#### THE MYCOLOGY LABORATORIES

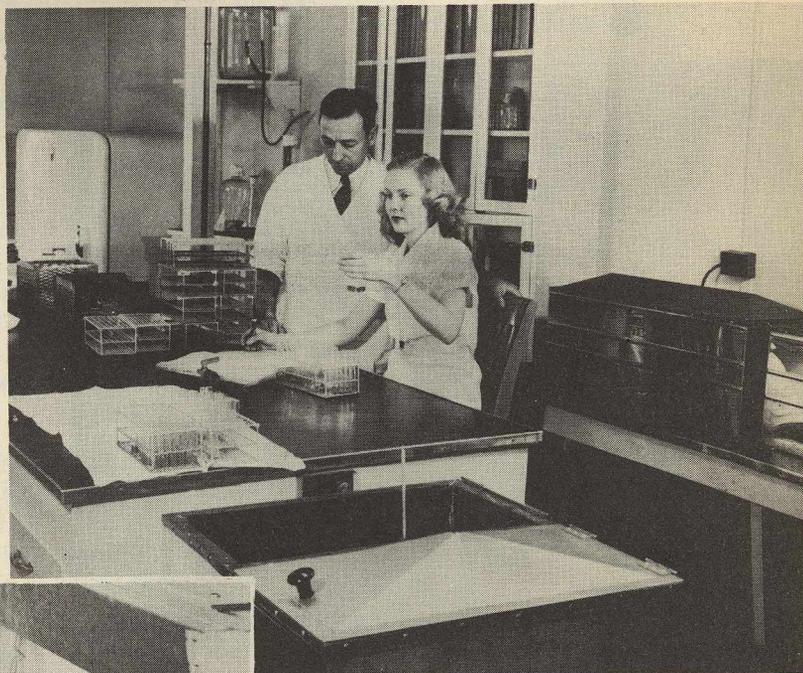
The mycological reference diagnostic service has been widely welcomed because mycological diagnosis is available in only a few laboratories. Three general types of diagnostic services are available; those now carried on are (a) the identification of fungi sent to the laboratory and attempts at isolation of pathogenic fungi from various types of clinical material, such as sputum, spinal fluid, blood, hairs, and nail and skin scrapings; (b) examination of histological slides for pathogenic fungi; (c) skin-testing

antigens for blastomycosis are at present available for distribution and, during the coming year, antigens for histoplasmosis and coccidioidomycosis will be made ready.

#### THE TUBERCULOSIS LABORATORIES

Reference diagnosis in tuberculosis is carried on at the Communicable Disease Center in collaboration with the Tuberculosis Control Division of the Public Health Service. The laboratory handles a large volume of work, the nature of which is shown by the following outline:

- a. Routine microscopic diagnosis is made on specimens of sputum, gastric wash-



▲ Reading results of diagnostic rickettsial serology tests.

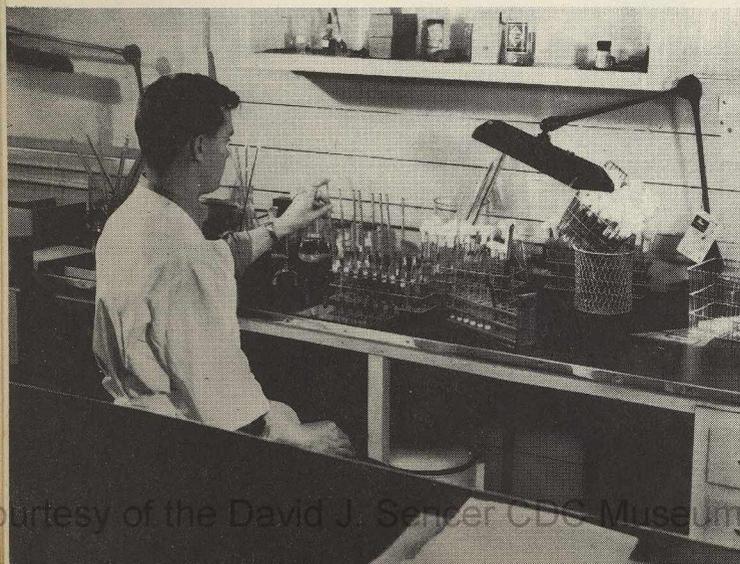
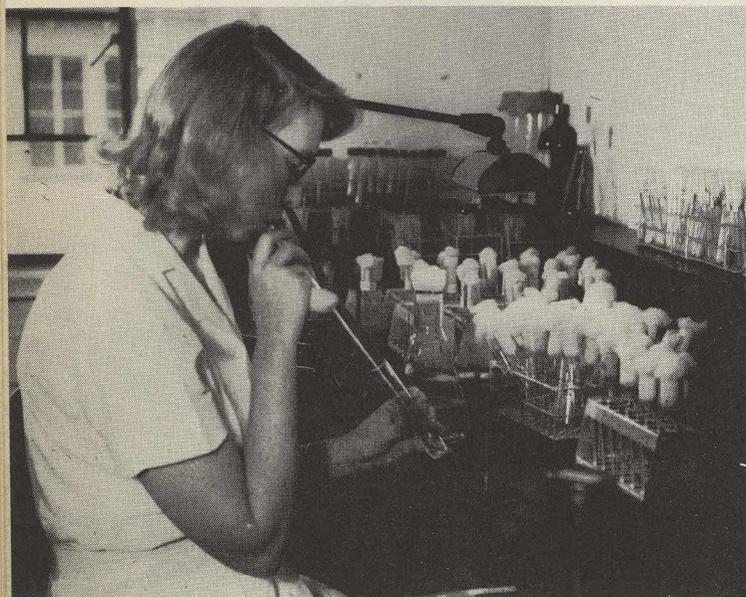
◀ Isolation of pathogenic fungi from clinical material.





▲ Incubator containing cultures from reference diagnostic material.

Testing tuberculosis cultures for streptomycin sensitivity.



ings, and other body fluids. The microscopic diagnoses are supplemented by cultural methods and, when advisable, by animal inoculation.

- b. Reference diagnostic service is rendered on cultures of acidfast bacilli from many sources. These are examined culturally and by animal inoculation when determination of type is requested.
- c. The streptomycin sensitivity (or resistance) of the tubercle bacilli isolated from various patients is being determined. Tubercle bacilli that are not only resistant to, but ABSOLUTELY DEPENDENT on, streptomycin (veritable microbiological drug addicts!) have been found.

The following media have been evaluated with respect to their adaptability to routine streptomycin sensitivity assays: Lowenstein (Jensen-Holm modification), Herrold's egg-yolk agar, Dubos' Tweenalbumen, and Sula's. An evaluation of a simple egg-yolk medium recommended by the American Trudeau Society has also been started, especially in regard to its use in the sensitivity testing of primary cultures. A slide culture technique is also being investigated.

#### THE ENTERIC BACTERIOLOGY LABORATORIES

This important phase of diagnostic bacteriology has developed greatly in volume and degree of complexity. From qualitative biochemical reactions, it has now entered the fields of immunology and serology in their most profound qualitative and quantitative aspects. These facts are evident in the following brief list of reference diagnostic activities of the Enteric Bacteriology Laboratory:

1. Serological typing of *Shigella* and *Salmonella* cultures.
2. Grouping of paracolon bacteria, *Proteus*, etc., by biochemical methods. Certain groups are identified serologically.

◀ Serological typing of *Salmonella* cultures.

### 3. Bacteriophage typing of *S. typhi*.

The Enteric Bacteriology Laboratories are now the U. S. national representatives for the International Committee on Bacteriophage Typing, with headquarters in London.

Not only are these services currently available on an international scale, but it is hoped that in the near future the following services may be added:

1. Distribution of bacteriophages for typing *S. typhi*.
2. Distribution of *Salmonella* typing serums. These materials will be distributed only to laboratories having the personnel and facilities for their proper use.
3. Serological grouping of *Klebsiella* cultures.

Several unusual observations made from reference diagnostic material are:

1. *S. typhi*, phage type E, was recognized among cultures isolated from cloacal swabs from chickens. The organism was isolated in the laboratories of the Dysentery Control Project in New Mexico.
2. Cultures from an outbreak of *S. anatum* infection among restaurant patrons were identified. There were seven cultures from patients, three from cooked turkey (which was the vehicle of infection), and one from a normal carrier who was a food handler in the restaurant. It is not often such a complete chain of evidence revealing the source and vector of the outbreak is compiled.
3. Three new *Salmonella* types were recognized.
  - a. *S. corvallis* — VIII, XX:z4z23 — from turkeys.
  - b. *S. colorado* — VI, VII: 1,w — 1,5 — from man, clinical condition unknown.
  - c. Unnamed type — I, XL: R — 1,6 — from a food handler.
4. A culture isolated from the heart blood of a 5-month-old infant who died of enteric infection, was recognized as an Arizona paracolon, formula 10:1, 2, 10.
5. Cultures of *S. typhi* from several epi-

demics have been typed by bacteriophage. In every instance all the cultures from a given epidemic belonged to the same type. The types most frequently found are A, C, and E.

### THE GENERAL BACTERIOLOGY LABORATORIES

Under this heading are comprised all bacteriological diagnostic problems not referable to the other laboratories discussed in this outline. For the past several months this laboratory has concerned itself largely with problems in the diagnosis of diphtheria. This disease has increased markedly in prevalence and severity during the last few months. Included in the large volume of work already handled has been the isolation of strains of corynebacteria from throat cultures, the determination of their identity, type (*gravis*, *mitis*, *minus*), and virulence. Observations of special interest are the increase in numbers of *gravis*-type strains, and the occurrence of *minus*-type strains and of virulent saccharose-fermenting strains in the southeastern part of the United States.

### THE PARASITOLOGY LABORATORIES

The Parasitology reference diagnostic work has developed to a very large volume with many ramifications.

Some interesting problems in diagnosis not concerning diphtheria were also encountered. For example, a culture of unknown nature from an undiagnosed disease condition turned out to be the glanders organism (*P. mallei*); a supposed diphtheria culture was found to be a species of *Nocardia*; and from the sputum of a patient suspected of having a pulmonary mycosis, another species of *Nocardia* was isolated.

The types of specimens submitted to the Blood Parasite Laboratory are blood smears, thick and thin (thick blood smears to be examined for malarial parasites constitute the bulk of specimens submitted), whole blood, biopsied lymph nodes,



#### PARASITOLOGICAL REFERRAL DIAGNOSIS

Specimens are received in the mail, marked for identification, and microscope slide preparations made in saline, iodine, and Quensel's stain. These preparations are sealed with paraffin and are then ready for diagnostic study under the microscope.

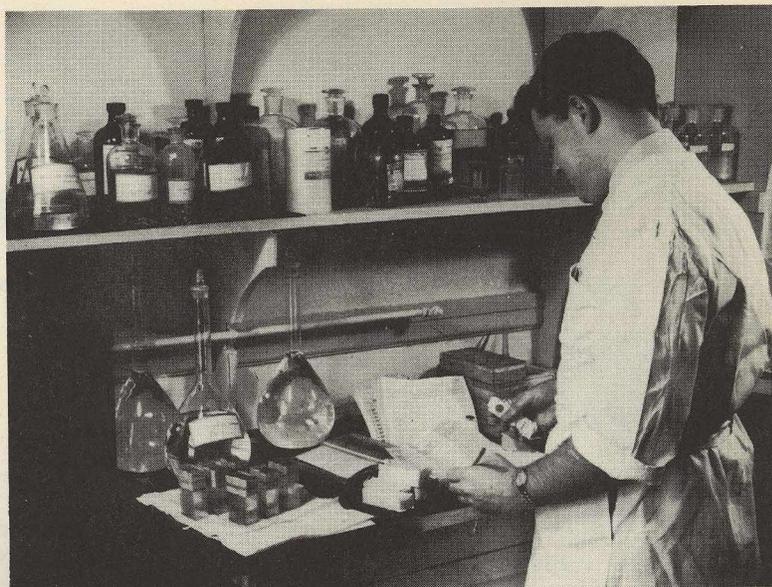


and bone marrow smears. The organisms diagnosed are malaria (*Plasmodium falciparum*, *P. vivax*, and *P. malariae*), *Wuchereria bancrofti*, *Trypanosoma cruzi*, and *Leishmania donovani*.

Specimens submitted to the Intestinal Parasite Laboratory include feces, urine, sputum, pus, adult worms, deer meat, tissue sections, pleural fluid, peritoneal fluid, fish, and cellulose-tape anal swabs. These organisms have been identified: *E. histolytica* and other intestinal protozoa, intestinal nematodes (roundworms), intestinal cestodes (tapeworms), exotic parasites (*Schistosoma haematobium* and *Paragonimus westermani*), hydatid cysts of *Echinococcus*, and *Trichinella*.

The materials for diagnosis come from every State in the Union and from foreign countries.

Reference diagnostic specimens often are the first evidence of unusual incidence of many diseases, as subsequent investigations have shown. Reference diagnostic services have frequently backed up local laboratory diagnoses. However, local laboratory errors have been corrected at times.

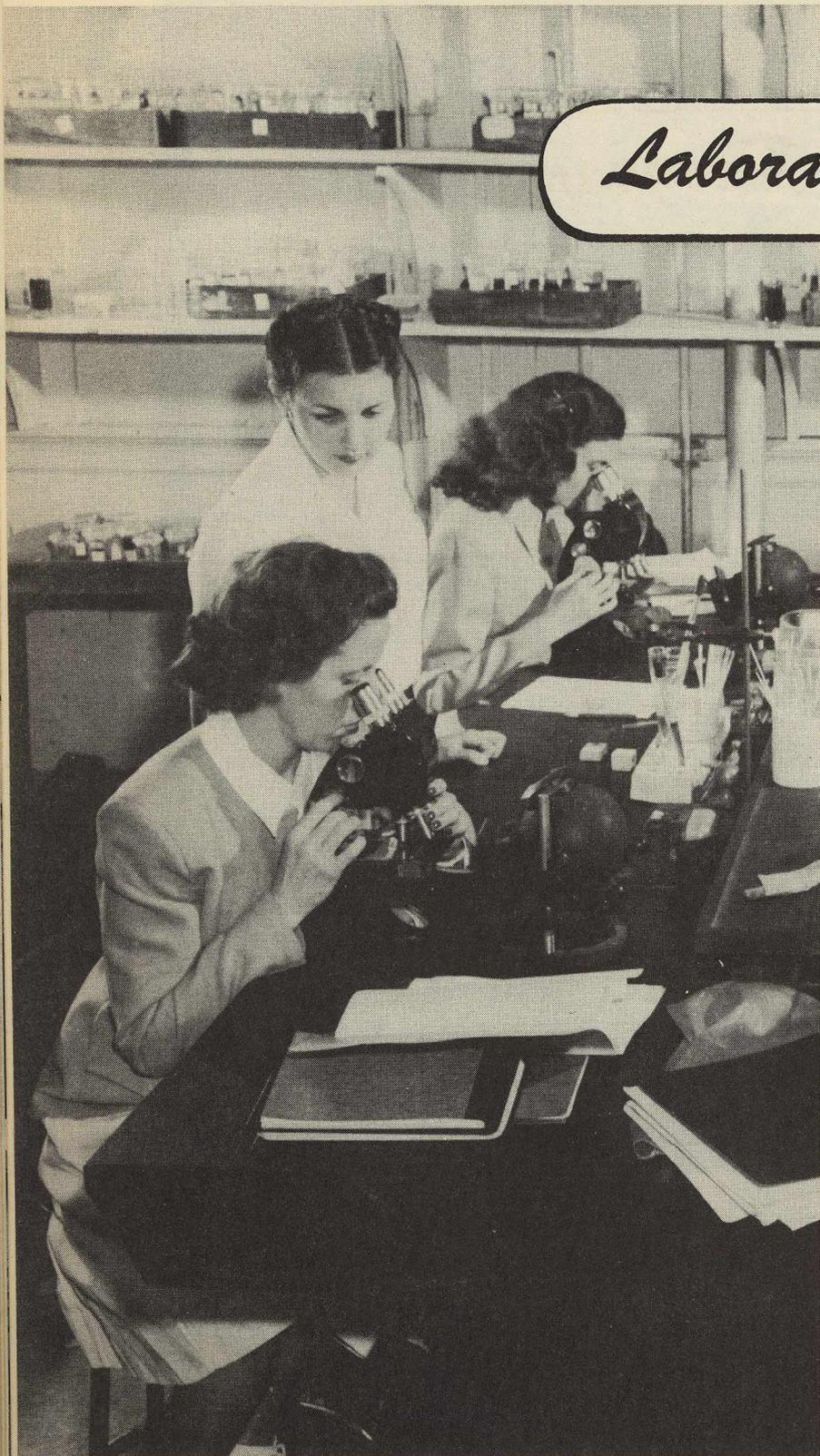


▲ Checking slides preparatory to staining blood smears from malaria survey.

▼ *Ascaris* in specimen submitted for diagnosis.



## Laboratory Training and



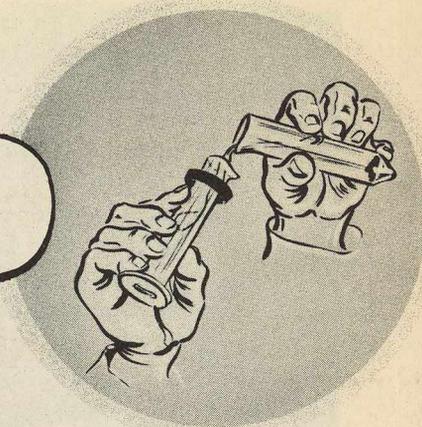
The lack of trained laboratory personnel capable of identifying parasitic organisms was recognized as a serious handicap during World War II. Health authorities were concerned by the many servicemen returning home with both recognized and hidden parasitic infections.

The Communicable Disease Center was charged with the responsibility of providing facilities for training of laboratory personnel to correct this deficiency. Laboratories were built and equipped, a staff was assembled, and the first 6-week course in the "Laboratory Diagnosis of Parasitic Diseases" was given in October 1945.

A policy was established whereby students are selected only from already employed laboratory personnel, first consideration being given to employees of State and local public health laboratories and Federal agencies. This policy is intended to improve proficiency in the performance of daily work and to train students in the use of improved and newly developed techniques, rather than to replace the basic training for laboratory workers which is

## Extension Service Programs

**Dr. Frank Reider, Senior Surgeon  
Office of Chief**



provided in schools and colleges.

A feature of the training offered is the degree of individual instruction made possible by a high instructor-student ratio. Improved proficiency in identification is obtained through repeated examinations of unknown specimens. Both fresh and preserved materials are in plentiful supply, and materials not readily available in this country are imported from tropical regions. A member of the Laboratory Division staff is stationed at the School of Tropical Medicine in Puerto Rico for the purpose of collecting such materials.

Fortunately, the fear that there might be a major extension of imported parasitic infections to the civilian population proved to be unfounded. The great majority of imported parasitic infections are encountered in the Veterans Administration Hospitals at the present time. In 1947 an agreement was made with the Veterans Administration to accept one student from each of the 13 VA districts throughout the country for refresher training in each of the parasitology courses.

Twelve 6-week courses in the "Laboratory Diagnosis of Parasitic Diseases" have been given to date. Refresher training has been provided for approximately 250 laboratory workers from 44 States, 2 Territories, and 5 foreign countries. About 40 percent of the students came from State and local public health laboratories; 40 percent came from Veterans Administration Hospital laboratories; and 20 percent came from general hospital

laboratories, the Public Health Service, and foreign countries.

The success of the training courses in parasitology, in addition to fulfilling the original purpose, led to an opportunity to extend the scope of the program to improve laboratory diagnosis in the other fields of medicine. As the various branches of the Laboratory Division were organized and the methodology research programs developed, training courses were established to provide refresher training in their respective fields. Thus, 4-week courses in the "Laboratory Diagnosis of Tuberculosis" and in the "Laboratory Diagnosis of Mycotic Diseases" were given for the first time in 1948.

The scheduled laboratory training program in 1949 consists of 14 courses in eight subjects as refresher training for laboratory personnel. In addition, two courses of 2 weeks' duration and two courses of 1 week's duration are being given for laboratory directors—courses designed to acquaint them with the material that is taught to their technicians in the longer courses.

A brief description of each of the courses now being offered follows:

1. A 6-week course in the "Laboratory Diagnosis of Parasitic Diseases" includes laboratory diagnosis of diseases due to intestinal parasites, with special emphasis on amebiasis, hookworm disease, echinococcosis and schistosomiasis, and diagnosis of all the blood parasites. Some consideration is given in this course to arthropods of medical

importance.

2. A 2-week course in the "Laboratory Diagnosis of Parasitic Diseases," designed for laboratory directors, senior laboratory staff members, physicians, and others of comparable professional standing, includes the same subject material as that listed in course No. 1 above, but less emphasis is placed on improving performance of techniques and on drilling with unknown specimens.

3. A 4-week course in the "Laboratory Diagnosis of Mycotic Diseases" covers identification of common saprophytic fungi and methods of cultivating and identifying the dermatophytes and the fungi causing subcutaneous and systemic infections, represented by organisms such as *Trichophyton*, *Sporotrichum*, *Coccidioides*, and *Histoplasma*.

4. A 1-week course in the "Laboratory Diagnosis of Mycotic Diseases" for laboratory directors and supervisory personnel, which includes the same subject material as that listed in course No. 3 with less emphasis on improving technical proficiency.

5. A 4-week course in the "Laboratory Diagnosis of Bacterial Diseases (Part I. Tuberculosis Bacteriology)," which covers such topics as preparation of culture media, microscopic techniques, methods for cultivating acidfast organisms from pathological material, and of diagnosis by animal inoculation.

6. A 1-week course in the "Laboratory Diagnosis of Tuberculosis" for laboratory directors and supervisory personnel, covers the subject material of course No. 5, with greater emphasis on discussion groups and demonstrations and less on technical proficiency and unknown specimens.

7. A 4-week course in the "Laboratory Diagnosis of Bacterial Diseases (Part 2. General Bacteriology)," which covers the diagnosis of spirochetel infections, streptococcal and pneumococcal infections (with exercises in serological-type determination) and brucellosis in the first 2 weeks. The last 2 weeks deal especially with accepted methods for the diagnosis of infections due to *Hemophilus* species, the *Neisseria* and the *Corynebacteria*.

8. A 4-week course in the "Laboratory Diagnosis of Bacterial Diseases (Part 3. Enteric Bacteriology)," covers the bacterial infections (salmonellosis and shigellosis), including methods for isolation, biochemical identification, and serological and bacteriophage typing.

9. A 1-week course in the "Serological Diagnosis of Rickettsial Diseases" includes practice in all details of complement fixation and the Weil-Felix test.

10. A 2-week course in the "Laboratory Diagnosis of Bacterial Diseases" for laboratory directors and supervisory personnel, covers the subject material of courses Nos. 7, 8, and 9, with less emphasis placed on improving technical proficiency.

11. A 1-week course in the "Laboratory Diagnosis of Rabies" includes techniques for gross brain dissection, mouse inoculation, smears, and staining.

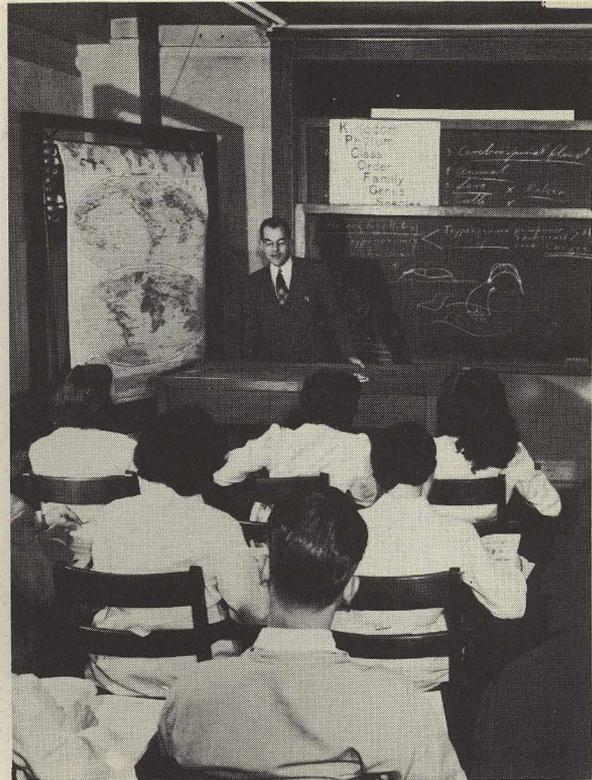
12. A 2-week course in the "Laboratory Diagnosis of Influenza" includes training in techniques of hemagglutination



Discussion session in conference room. Instructor explaining a diagnostic technique.



Part of a Laboratory Section in a course in Diagnosis of Bacterial Diseases.



Lecturing to students attending course in Laboratory Diagnosis of Parasitic Diseases.

tests and virus isolation by fertile egg and animal inoculation.

The preceding courses are scheduled during 1949 as follows:

1. Laboratory Diagnosis of Parasitic Diseases (6 wks.)  
Mar. 14 to Apr. 22  
Sept. 12 to Oct. 21
2. Laboratory Diagnosis of Parasitic Diseases (2 wks.)  
June 20 to July 1
3. Laboratory Diagnosis of Mycotic Diseases (4 wks.)  
Aug. 1 to Aug. 26
4. Laboratory Diagnosis of Mycotic Diseases (1 wk.)  
June 6 to June 10.
5. Laboratory Diagnosis of Bacterial Diseases (Part 1. Tuberculosis Bacteriology) (4 wks.)  
Feb. 28 to Mar. 25
- Aug. 29 to Sept. 23
6. Laboratory Diagnosis of Tuberculosis (1 wk.)  
June 13 to June 17
7. Laboratory Diagnosis of Bacterial Diseases (Part 2. General Bacteriology) (4 wks.)  
Mar. 28 to Apr. 22  
Sept. 26 to Oct. 21
8. Laboratory Diagnosis of Bacterial Diseases (Part 3. Enteric Bacteriology) (4 wks.)  
Apr. 25 to May 20  
Oct. 24 to Nov. 18
9. Serological Diagnosis of Rickettsial Diseases (1 wk.)  
Feb. 21 to Feb. 26  
July 25 to July 30
10. Laboratory Diagnosis of Bacterial Diseases (2 wks.)  
May 23 to June 3

11. Laboratory Diagnosis of Rabies (1 wk.)  
 Apr. 25 to Apr. 29  
 Oct. 24 to Oct. 28
12. Laboratory Diagnosis of Influenza  
 (2 wks.)  
 Mar. 14 to Mar. 25

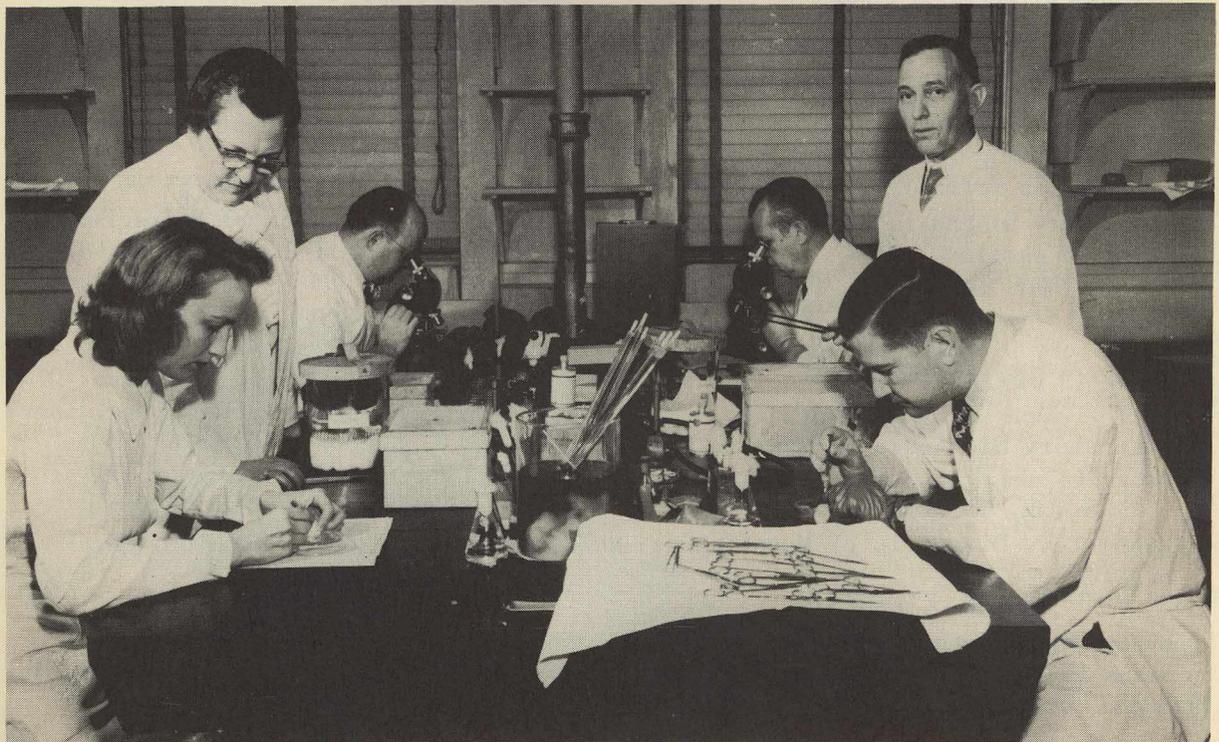
The necessity for restricting the size of classes to 20 students in each of the various training courses, dictated by the number of instructors and available space and materials, limits the number of laboratory personnel who can be trained each year to a small proportion of those who are employed in laboratories. This proportion is further reduced by the loss of trained personnel. It is obviously impossible to provide this training to the great majority of laboratory workers. Selection of students is, therefore, influenced by the education, training, position, and organization in which the applicant is employed. Preference is given to applicants from laboratories located in geographical areas where the subject

matter is of regional importance, or where there is a marked deficiency of such laboratory services available. Preference is also given to persons in positions that will enable them to institute the improved methods in their own laboratories, and to transmit their training to their coworkers and those in neighboring laboratories by means of intrastate training programs.

To assist most advantageously in the selection of trainees, it is required that applicants be nominated by the State health officer and/or the State laboratory director. Certainly, the State health authorities are in the best position to know where the needs are greatest in their State.

An Extension Service was developed in 1945 to supplement the number of laboratory people who could be trained in courses each year, and to provide former students with refresher training. The Extension Service mails two specimens each month,

Inoculating mice for diagnosis of rabies.



consisting of well-prepared stained and unstained slides, preserved and fresh materials, and various arthropods of medical importance. Much of the especially collected and prepared study material would not ordinarily be available to most laboratories in this country. A key is sent with each set of specimens which identifies the specimen and gives pertinent information about the staining, preservation, and stages of organisms present in the material.

The materials remain the property of each laboratory to which they are sent. Thus a valuable collection is being built up to serve a number of purposes. The specimens and instruction keys can be used as refresher material for the former students, and as training material for new laboratory workers. They can also be used to test the diagnostic proficiency of employed workers and as reference material to compare with unusual specimens sent in for reference diagnosis. Finally, they are valuable as demonstration material at meetings and conferences.

The shipments up to the present have consisted of parasitological and entomological specimens, and are sent to more than 310 laboratories located in every State and Territory. It is estimated that more than 2,000 laboratory workers have an opportunity to study this material each month. We are thus able to reach a much larger group than is possible through the training courses themselves.

Plans are now under way to develop similar extension services in the other fields of laboratory diagnosis, and we expect to start shipping mycological, acidfast, rabies, diptheria, *Salmonella*, and *Shigella* specimens this year. It is also planned to send other types of training aids consisting of filmstrips, photographs, charts,



Preparation Laboratory Unit — Preparing specimens for extension service.

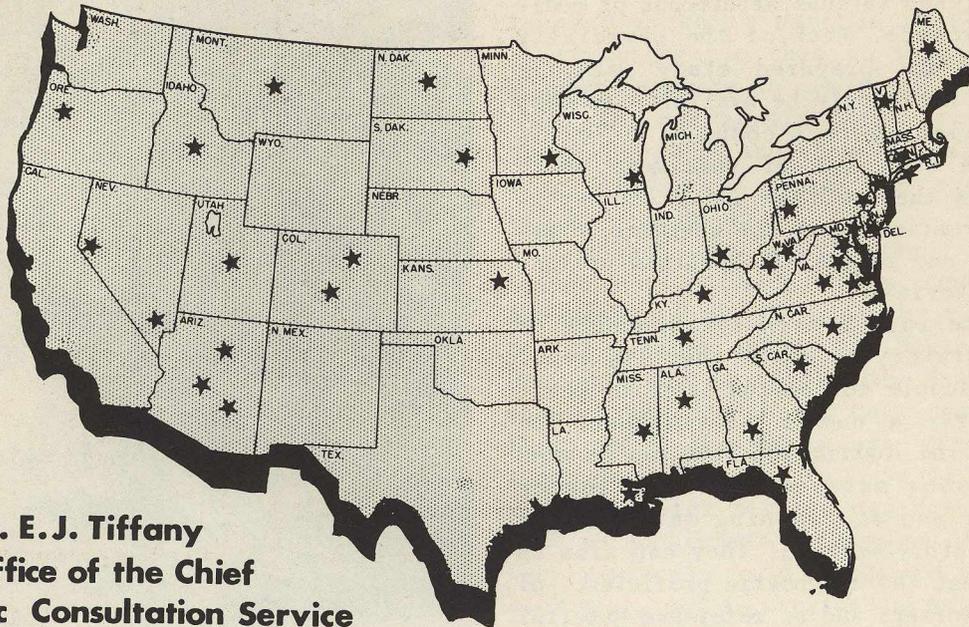
and keys of various kinds.

A small number of special loan sets have been made up to meet particular needs. These are available upon special request for periods of 1 or 2 months, as needed.

Extension Service materials also have been used by State health departments in evaluation programs to determine the proficiency of local laboratories.

The plans for the future are to continue to develop courses and other refresher training aids in the entire field of laboratory diagnostic medicine, so that the best possible laboratory services will be available to the people throughout the entire country.

## Consultation Services



The Laboratory Division is prepared to render consultative services when a problem of laboratory diagnosis arises anywhere in the continental United States or in one of the Territories. The services are available when and where needed, and are rendered only upon request of local agencies for advice or assistance in coping with diagnostic problems which appear to be beyond the reach of their own facilities. Such services have been given on 35 separate occasions since the Laboratory Division was organized.

In some instances, the request for consultation has arisen from an unusually high reported incidence of disease where investigation subsequently showed that the local problem was one of inaccurate diagnosis rather than one of epidemic disease or actual increase in the number of cases. Early last year an unusually large number of cases of amebic dysentery was being reported from areas in two States. On invitation by local authorities, the prob-

lem in these areas was investigated by consultants from the Parasitology Branch of the Communicable Disease Center. In both instances it was found that mistaken laboratory diagnoses resulted from failure to distinguish between the pathogenic *Endamoeba histolytica* and the several species of harmless nondisease-producing amebae which are regularly present in the intestinal tract. Here the problems were educational. The measures adopted for improvement of the situation in these two instances are illustrative. Parasitologists from the Laboratory Division went to one State and gave a short training course in the laboratory diagnosis of amebiasis consisting of lectures, laboratory demonstrations, and laboratory exercises, to a class of 37 technicians from laboratories in that area. In order to encourage still further the maintenance of a high level of accuracy, extension service materials for test diagnoses were sent to these individual technicians at regular intervals.

Since diagnosis of disease can never rest entirely with the laboratory, an evening session on amebiasis was held with the local physicians in order to acquaint them with some of the problems and limitations of laboratory diagnosis and to help correlate the laboratory with the clinical aspects of the problem.

In the other State the situation was somewhat different. Numerous cases of amebiasis were being reported from the vicinity of one of the larger cities by one physician who, with commendable enterprise and energy, was making his own microscopic examinations and diagnoses. However, this physician was, in all good faith, the victim of the same difficulties of recognition. The problem was resolved by extending to that area the regular reference diagnostic service of the Parasitology Branch, and by arranging for a technician from the nearby State branch laboratory to attend the course given in Atlanta by the Laboratory Division on the laboratory diagnosis of the parasitic diseases.

In 1945 and in 1947 there were outbreaks of dysentery in mental institutions in Alabama and in Ohio. These institutional epidemics received intensive on-the-spot study by teams of consultants from the Atlanta laboratories. The investigation of the outbreak in Ohio was joined by the Epidemiology Division, CDC, by the National Institutes of Health, and by the Ohio State Department of Health.

• CONSULTATION SERVICES

"My Day"



In both institutions an unusually high incidence of parasitic infection was discovered among the inmates. A similar field investigation was made in 1946 of a reported epidemic of diarrhea in Mississippi.

During the past year other occasions have arisen calling for consultation in the fields of diphtheria and tuberculosis diagnosis. A consultant from the Bacteriology Branch investigated one outbreak of diphtheria, only to discover that little or no diphtheria actually existed and that local apprehension was based entirely on incorrect laboratory diagnoses and faulty procedures.

Two other State laboratories with active services for the diagnosis of tuberculosis asked for assistance in determining why their laboratory bacteriology findings were not in line with what would normally be expected in regard to colony morphology and incidence of positive specimens. In both instances it was possible for a Laboratory Division consultant to point out the deviations from good technique which were responsible.

In the summer of 1947 there occurred in southwestern Louisiana an extensive outbreak of encephalitis among the horses and mules of that area. There were several instances of human infection, and the situation presented an epidemiological, diagnostic, and public health problem of great importance. The facilities of the Virus Laboratory in Montgomery were used. Consultants from that laboratory and the Epidemiology Division were sent into the epidemic area; there, tissue and serum specimens were taken from diagnosed and suspected cases, as well as from apparently normal individuals and animals. Examinations made in the Montgomery Virus Laboratory showed the causative agent to be the virus of Eastern equine encephalomyelitis.

In April of 1948 a call for assistance was received from a Federal institution in the Midwest for what appeared to be a relatively mild but troublesome enteritis outbreak. The authorities of this institution were apprehensive lest this mild epi-

demio might mean that there was a serious fault in the sanitary regime. Consultants from the Bacteriology Branch, familiar with the laboratory diagnosis of acute enteric disease, were on the way by plane in a few hours carrying a considerable supply of necessary equipment and special culture media. They spent approximately 2 weeks in the hospital laboratory, making some 190 examinations on 137 of the inmates who had been previously involved, who became ill while the investigation was in progress, or who were concerned with the preparation and handling of food.

In July 1948 an important town in the Virgin Islands appeared to be threatened with a serious outbreak of typhoid fever. Nine cases were reported as having been confirmed by laboratory examination, and a telegraphic request was received by CDC for diagnostic assistance. We were asked to send one or more consultants immediately to the area, prepared to set up and operate a temporary laboratory for the identification of the typhoid bacillus or other enteric bacteria and for the proper evaluation of the local water and milk supply.

Within 24 hours, arrangements had been completed, by wire and by telephone, through public health facilities in San Juan, to have equipment and special media sent from Puerto Rico. At the same time, a consultant left Atlanta by air. Within 16 hours he was on the spot, and within 10 days he had completed his investigation. It was found that there was in fact no epidemic of typhoid fever or other enteric infection and that the reports had been based upon the mistaken interpretation of laboratory technical procedures.

Laboratory diagnosis as performed by State or city laboratories is generally at a fairly high level of accuracy, and yet it would seem that people everywhere are equally deserving of accurate public health diagnostic service. We live in an age of scientific medicine. It is difficult, particularly in the field of infectious disease, to make valid diagnoses without laboratory support of one kind or another. The

best physicians have come to rely more and more upon assistance from the laboratory. A State department of health is no stronger than its laboratory division, and yet in some States the laboratory is treated as a stepchild. The quarters may be crowded and antiquated—firetraps in some instances—the equipment out of date, and the staff overworked and underpaid.

In this connection we should speak of a second type of consultation service which the Laboratory Division has made available through the Bureau of State Services and the Public Health Service Regional Offices. This service takes the form of laboratory surveys and program reviews, performed by Laboratory Division consultants for a State or city health department at its own request or as a part of a State health department program review for the Regional Office. A laboratory survey consists of a thorough examination and evaluation of a health department laboratory, both from the point of view of administration and of technical procedures used. A program review is pointed more to administrative, budgetary, and program planning with less emphasis on techniques. However, all aspects of the laboratory organization and service are weighed. What portion of the laboratory funds is supplied by the State and what portion from Federal sources? Is the State bearing a fair share of its own expense or does it lean too heavily on Federal support? What is the salary scale? Is a State Merit System in force governing appointment, tenure, and advancement? Is the State laboratory service well distributed through the agency of branch laboratories? Are branch laboratories needed?

What of the technical procedures? Are they in line with good modern laboratory practice? Are the technical workers well

trained? Have they a good educational foundation and formal training in this work? Does the State laboratory provide for in-service training of its personnel—does it support a program of research? These are examples of the phases of the problem vital to the operation of a good laboratory.

Since 1946 laboratory surveys or program reviews have been completed in 2 cities and in 23 States from Oregon to Florida and from Arizona to Vermont. Additional requests for review have been accepted from 10 other States and 3 cities.



It has been rare indeed to find a State laboratory without administrative and technical problems of one kind or another and which is up-to-date with respect to all procedures. However, almost without exception the directors of the laboratories are good administrators and able bacteriologists, who themselves recognize what should be done. Often an outside observer is able to see aspects of a problem which quite escape those who are constantly working with it. Adequate funds and quarters are frequently lacking and State legislatures are not always well informed as to the vital importance of the State laboratory.

At the conclusion of a survey or program review, a report is made embodying the observations and recommendations for improvement. These consultative services are rendered in the spirit of a cooperative venture. The Laboratory Division shares with all the public health laboratories the common desire to promote and further the quality and variety of diagnostic services available to the public. Whether these services emanate from a public or private laboratory is of little importance. What is important is that every sick individual and every physician in this country have readily available to him adequate diagnostic laboratory services.

# Report of Activities with the Arkansas State Board of Health



The following is a report submitted by Dr. John H. Tuohy, S. A. Surgeon, Public Health Service, of his activities with the Arkansas State Board of Health in malaria investigation from September 1947 through January 1949.

**Purpose:** The object was to attempt investigation of as many of the reported cases of malaria in Arkansas as possible in an effort to evaluate the reporting. An attempt also was made to reconcile the disparity between this and the figure expected, since anopheline indices were well below the calculated level necessary to malaria transmission. In addition, it was necessary to consider that despite the fact that 1,318 cases of malaria with 28 deaths were reported in Arkansas in 1947, the State Hygienic Laboratory consistently failed to find positive films among the large number of specimens submitted.

The following specific projects were undertaken:

With the help of the local malaria con-

Dr. John H. Tuohy, S. A. Surgeon, Public Health Service, Author; Dr. A. M. Washburn, Epidemiologist, Arkansas State Health Department; and Dr. Joseph S. D'Antoni, Professor of Tropical Medicine, Tulane University School of Medicine.

trol supervisors, the unit placed with physicians in areas of heaviest reporting a number (2,000) of packets, each containing two glass slides and a cardboard mailer, for submitting specimens on suspected cases of malaria to the State laboratory. Physicians were requested to submit two thick films, one to be examined in Little Rock, the other to be forwarded to CDC in case of doubt as to findings. Fifty-four different physicians cooperated and, of more than 300 specimens submitted in this fashion, *no positives were recovered*.

**Columbia County:** This county, which had a record of having reported no cases of malaria for the 10-year period through 1946, added 369 cases to the 1947 total. In November 1947 the CDC unit was able to contact only 44 of these patients, due to failure of the physicians to keep adequate records, their reluctance in some cases to make records available, or the unit's inability to locate individuals in the transient population of this oil-

producing area. The lapse of time made it impossible to properly appraise the histories of these 44, but their thick films and those of 540 individuals from the county seat town of Magnolia and the adjacent A. & M. College failed to reveal parasites.

Considerable public interest was aroused by the investigations and, due in part to them, there is now agitation for a full-time health unit in that county where at present there is no organized health work.

In 1948 Columbia County reported 12 cases of malaria.

**Johnson County:** Part of this county lies in the Arkansas River Valley in the west north-central portion of the State. The largest section of terrain is upland with fruit culture and strip-coal mining the principal industries. The county was not included in the 1948 malaria control program, and in the first 6 months of that year, 59 cases were reported as against 96 in the entire year of 1947. To forestall another Columbia County fiasco, conferences were held with the part-time county health officer, the part-time city health officer of Clarksville, the county seat, and the secretary and president of the county medical society, and their challenge to

do a mass blood survey in the county was accepted. Using a mobile laboratory, the CDC officer and a technician from the State laboratory obtained and examined 1,022 thick films in the communities of Clarksville, Coal Hill, Hartman, Lamar, and Spadra. The number represented about 1/16th of the population of the county. *No positive films were found.* Reporting of malaria declined to six cases in the last 6 months of 1948 and the aforementioned physicians now are utilizing the State laboratory more frequently for agglutination tests of various types.

**Lincoln County:** One physician, the part-time county health officer, was relying on his memory to report several cases of malaria weekly. He was encouraged to submit blood to the Hygienic Laboratory and, since doing so, has discontinued his reporting of malaria.

In addition to the above, several other counties were visited with and without the mobile laboratory and, almost without exception, it was noted that such a visit was followed by more frequent use of the facilities of the State laboratory by the local physicians, with a subsequent decrease in the reporting of malaria from those areas.



**Mobile Laboratory:** With the cooperation of John E. Taylor, State Malaria Control Supervisor, and of the director of the State Hygienic Laboratory, a former dental trailer was converted into an acceptable mobile laboratory. This was used in mass blood surveys to enable personnel to stain and examine slides on the spot and give immediate reports to those involved, a

Dr. Marion Brooke accepts questions following the lecture at the seminar.



Dr. G. Robert Coatney of the National Institutes of Health, Mr. Melvin H. Goodwin of the Communicable Disease Center, and Mr. Wilbur V. Henry, i/c Arkansas Malaria Investigations Station, discussing malaria informally during the seminar.

method which, it is found, secures a maximum of cooperation and insures good feeling in the locality. The group was also in a position to obtain, process, and preserve other types of specimens when necessary. This laboratory is now in use at the Malaria Investigations Station, Helena, Ark., where it will be used until the permanent laboratory there is ready.

**Helena Malaria Investigations Station:** The services of the epidemiologist have been offered to the director of this facility to aid him in establishing the epidemiology program in his area of activity. The group has accompanied the nurse on one of her preliminary surveys, and for the future has tentatively arranged with the local county medical society to meet at the station when it is equipped and its operations are established. A program will be prepared to explain the objectives and activities of the project to the physicians, and efforts will be made to enlist their cooperation and support. At a later time the medical societies of adjacent counties will be extended the same invitation.

**Seminar on Amebiasis and Malaria:** In conjunction with the University of Arkansas School of Medicine and the State Medical Society, a seminar was arranged on amebiasis and malaria at the medical school January 20 and 21, 1949. The principal speakers were Dr. Joseph S. D'Antoni, Professor of Tropical Medicine, Tulane University School of Medicine; Dr. G. Robert Coatney, Division of Tropical Diseases, National Institutes of Health; and Drs. Justin Andrews and Marion Brooke from the Communicable Disease Center. The program covered 2 days and was attended by 186 physicians, medical students, nurses, and laboratory technicians. Proceedings were recorded and an effort will be made to transcribe these into a booklet for circularizing the State's physicians.

The reported cases of malaria in Arkansas declined from 1,318 in 1947 to 636 in 1948, deaths decreased from 28 to 16, but these declines were not necessarily due to CDC activities. *More accurate and conscientious preparation of death certificates would have eliminated ALL of these deaths from the malaria records.*

*Environmental Sanitation Series*

# Constructing A Sanitary Pit Privy

## PURPOSE

To aid in teaching: a) Public health values of the sanitary pit privy, b) principles of sanitation involved in its construction, and c) construction procedures.

## AUDIENCE

Sanitary engineers and technicians, local administrative personnel responsible for initiation and operation of sanitation programs; medical personnel concerned with community sanitation problems.

## CONTENTS

1. The unsanitary privy contributes to transmission of intestinal disease.
2. A function of the county sanitarian is to assist local population to solve sanitation problems from planning stage through completion.
3. Various types of sanitary pit privies are based on the same principles of sanitation, differing mainly in materials used.
4. Step-by-step construction of the sanitary pit privy illustrates fundamental principles of sanitation — proper drainage, and complete sealing.
5. The sanitary privy helps to eliminate the menace of diseases originating in poor sanitation, while also providing farm grounds with a creditable-appearing building.

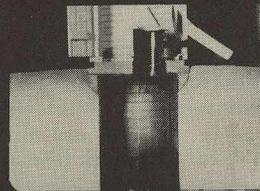
## AVAILABILITY

Thirty day loan upon request to . . . .  
**MEDICAL DIRECTOR IN CHARGE**  
**COMMUNICABLE DISEASE CENTER**  
 605 Volunteer Building, Atlanta 3, Georgia

PRODUCTION NO.  
 CDC 4-083  
 RELEASED 1949

MOTION PICTURE  
 16 mm. Sound  
 Color  
 Length: 536 Feet  
 Time: 15 Minutes

GRAPHIC FORM  
 ● Photography



## COMMENTS

F. S. #5-119  
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*shellfish sanitation series*

# THE PRODUCTION AND PROCESSING OF OYSTERS

## PURPOSE

To depict factors of contamination and to show how sanitation can be maintained throughout oyster production and processing.

## AUDIENCE

Public health personnel responsible for enforcement of shellfish sanitation regulations; and others interested in shellfish sanitation requirements.

## CONTENTS

1. More than half of the oyster harvest is dredged from beds leased by oyster farmers — beds often miles from shore, but always in water tested and approved by State Health Departments.
2. The remainder is tonged from public oyster beds. The harvesting method is different, but the quality of the oysters is still assured by the constant vigilance of those agencies responsible for testing the water.
3. Every shucking and processing plant has the same basic requirements for cleanliness. A schematic diagram of an approved plant is shown in the film.
4. Sanitation, facilitated by plant design and structural materials, is carefully maintained throughout processing procedures.
5. The oysters are packed in tamper-proof containers which must have the packer's certificate number preceded by the State abbreviation permanently recorded on the containers.
6. Housekeeping is one of the most important aspects of oyster production. The film shows clean-up procedures for boats, plant, and equipment.

## AVAILABILITY

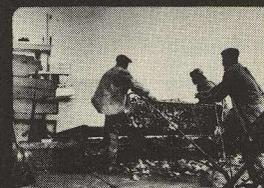
Thirty day loan upon request to . . .  
**MEDICAL DIRECTOR IN CHARGE**  
**COMMUNICABLE DISEASE CENTER**  
 605 Volunteer Building, Atlanta 3, Georgia

PRODUCTION NO.  
 CDC 4-073.0  
 RELEASED 1948

MOTION PICTURE  
 16 mm. Sound  
 Black & White  
 Length: 560 Feet  
 Time: 16 Minutes

## GRAPHIC FORM

- Photography
- Animation



## COMMENTS

Oysters are used to show basic concepts of all shellfish sanitation.

# MANSON'S BLOOD FLUKE

## PURPOSE

To teach the life cycle of the blood fluke, *Schistosoma mansoni*.

## AUDIENCE

Medical students, parasitology students, and workers in the field of tropical diseases.

## CONTENTS

1. The life cycle of the dangerous parasitic blood fluke, *Schistosoma mansoni*, is complex and interesting. Ciliated miracidia hatch from spined eggs and penetrate the skins of certain Planorbis snails.
2. In the snail each miracidium transforms to a primary sporocyst, the germ cells of which rapidly grow into twenty or more secondary sporocysts, each of which in turn produces thousands of cercariae.
3. The cercariae escape from the snail into the water. They penetrate human skins, migrate through the blood vessels to the lungs, and grow to maturity in the portal veins of the liver.
4. The adult worms live in the mesenteric veins of the colon, feed on blood, and lay their eggs, some of which escape through the bowel mucosa into the fecal mass. They reach snail-infested water and perpetuate the life cycle.
5. If eggs are deposited in the submucosal veins, they cause scarring of the bowel wall; if laid in a large portal vein, they may drift to the liver to produce portal cirrhosis; and if laid in the large hemorrhoidal veins they may drift to the lungs to produce pulmonary fibrosis.

## AVAILABILITY

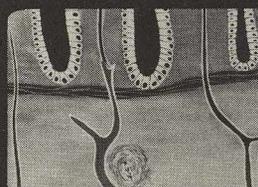
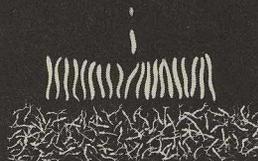
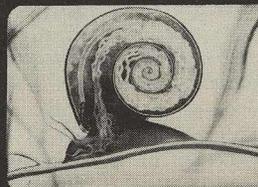
Thirty day loan upon request to . . .  
**MEDICAL DIRECTOR IN CHARGE**  
**COMMUNICABLE DISEASE CENTER**  
 605 Volunteer Building, Atlanta 3, Georgia

PRODUCTION NO.  
 CDC 4-034.0  
 RELEASED 1948

MOTION PICTURE  
 16 mm. Sound  
 Black & White  
 Length: 592 Feet  
 Time: 17 Minutes

## GRAPHIC FORM

- Photography
- Animation
- Photomicrography



## COMMENTS

Related films are nos.  
 4-060, -3, -4, -5, -6, -7,  
 -8. Related Filmstrips  
 are nos. 5-006, -6.1 &  
 5-041.

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# THE EPIDEMIOLOGY OF MURINE TYPHUS

## PURPOSE

To teach basic understanding of epidemiological procedures of murine typhus and their relations to prevention and control.

## AUDIENCE

Public Health Service personnel, physicians, medical students, nurses, laboratory technicians, professional personnel interested in rat borne disease control.

## CONTENTS

1. The three elements of a murine typhus epidemic—animal reservoir (rats) to vector (rat fleas) to man.
2. Human incidence of murine typhus including geographic distribution; age, sex and social status distribution; and seasonal characteristics.
3. Character of rat reservoir of infection including mode of perpetuation and mode of transmission.
4. The relation of the vector to the reservoir and to humans.
5. The role of the doctor in diagnosis, serological confirmation, and reporting of murine typhus.
6. The role of the Public Health Officer in locating foci of infection, instituting continuous control measures, and cooperating with the USPHS in analysis and control of epidemics.
7. The role of PHS epidemiologists in locating infectious rats, confirming by complement-fixation tests, counting and identifying ectoparasites, analyzing data, and instituting control measures.
8. Brief visualization of key control activities: DDT dusting, poisoning rats, and ratproofing buildings.

## AVAILABILITY

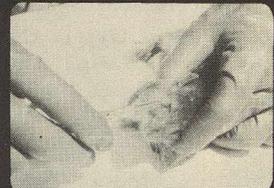
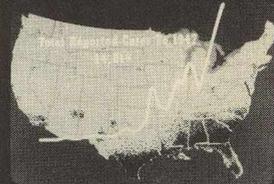
Thirty day loan upon request to . . . .  
MEDICAL DIRECTOR IN CHARGE  
COMMUNICABLE DISEASE CENTER  
605 Volunteer Building, Atlanta 3, Georgia

PRODUCTION NO.  
CDC 4-049  
RELEASED 1948

MOTION PICTURE  
16 mm. Sound  
Black & White  
Length: 665 Feet  
Time: 18 Minutes

## GRAPHIC FORM

- Photography
- Animation



## COMMENTS

First of a series on epidemiology of infectious diseases. Demonstrates the pattern: animal reservoir to vector to man.

A MEDIUM FOR  
THE CULTIVATION OF  
*T. CRUZI* AND THE  
LEISHMANIAS (OFFUTT)



Difco Blood Agar Base is a convenient and satisfactory foundation medium for the cultivation of *T. cruzi* and the Leishmanias from stock cultures and animal sources.

The base is prepared as directed on the bottle and sterilized at 121.6° C. for 15 minutes. It may be stored in the refrigerator for several months until needed. The base is then melted, 5 percent fresh rabbit blood added, the medium tubed in 4 to 5 cc. amounts, and slanted. There will be very little water of condensation formed, so about 1 cc. of sterile normal saline is added to each slant, and the tubes incubated at 37° C. for 24 hours to test for sterility.

This medium may be inoculated with blood, bone marrow, and tissue from spleen and liver. It is essential that aseptic precautions be used in the inoculation and handling of cultures, for none of the blood flagellates will grow in the presence of bacteria or fungi. The cultures are incubated at 22° to 25° C. for at least 2 weeks. Addition of a rubber stopper prevents evaporation of the fluid at the base.

Stock cultures of these organisms grow very well on this medium. Transfers every 14 days give most satisfactory results, but the organisms will remain viable much longer if the proper temperature is maintained.

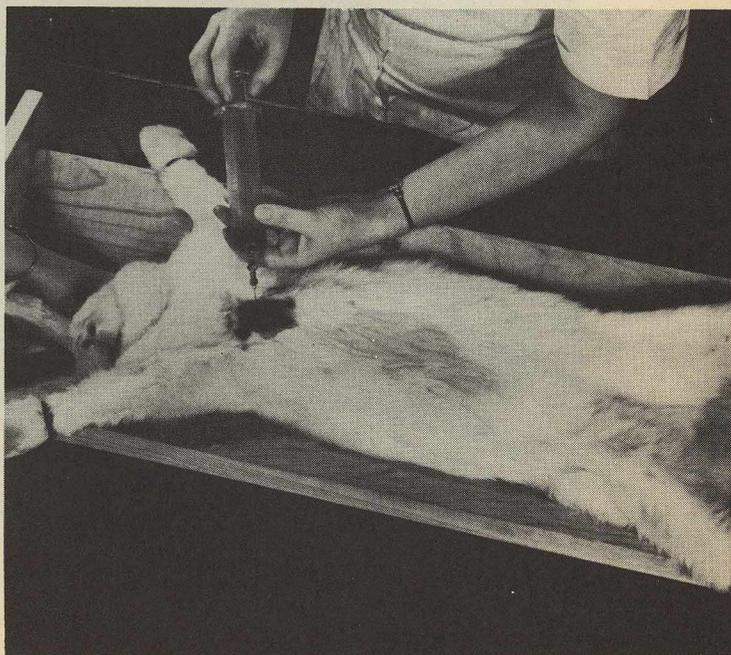
Sterile rabbit blood is obtained by direct heart puncture.

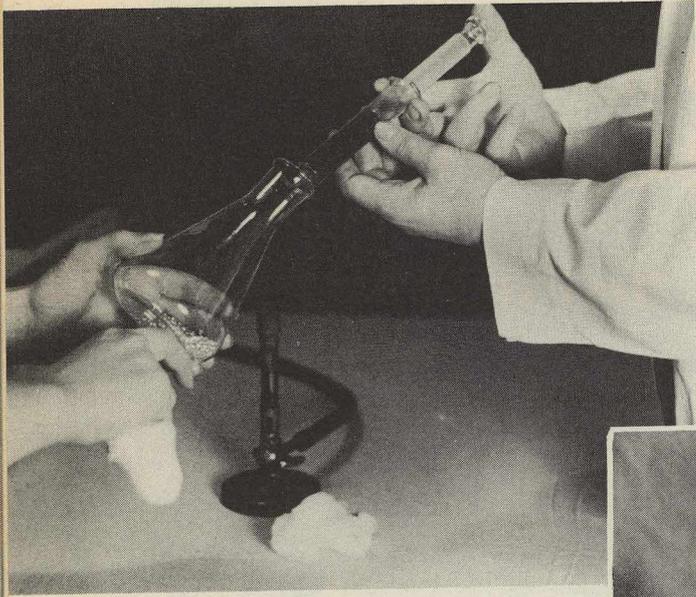
The hair is shaved off an area over the heart and the skin cleaned with alcohol and painted with tincture of iodine. A sterile 10 cc., 20 cc., or 50 cc. syringe may be used, with an 18 or 20 gauge needle, depending on the amount of blood desired.



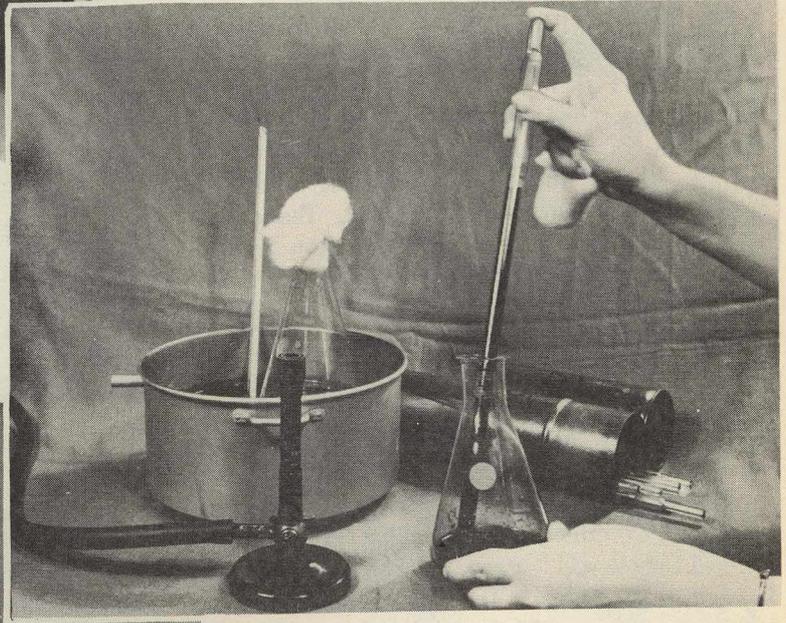
Difco Blood Agar Base is a convenient foundation for the cultivation of *T. cruzi* and the Leishmanias.

Eight grams is suspended in 200 cc. of cold distilled water and dissolved by boiling. It is sterilized at 121.6° C. for 15 minutes and stored in the refrigerator until ready for use.

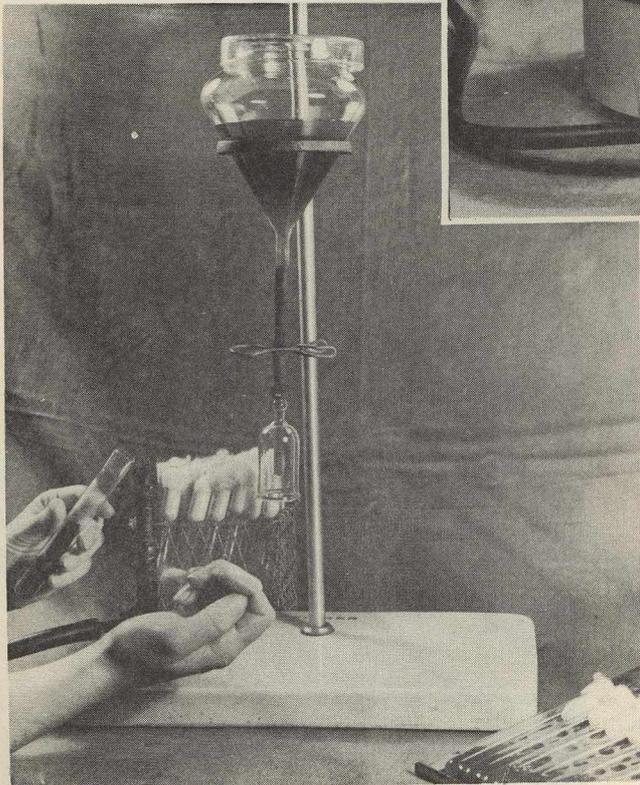




◀ The blood is defibrinated by shaking with glass beads in a sterile flask.

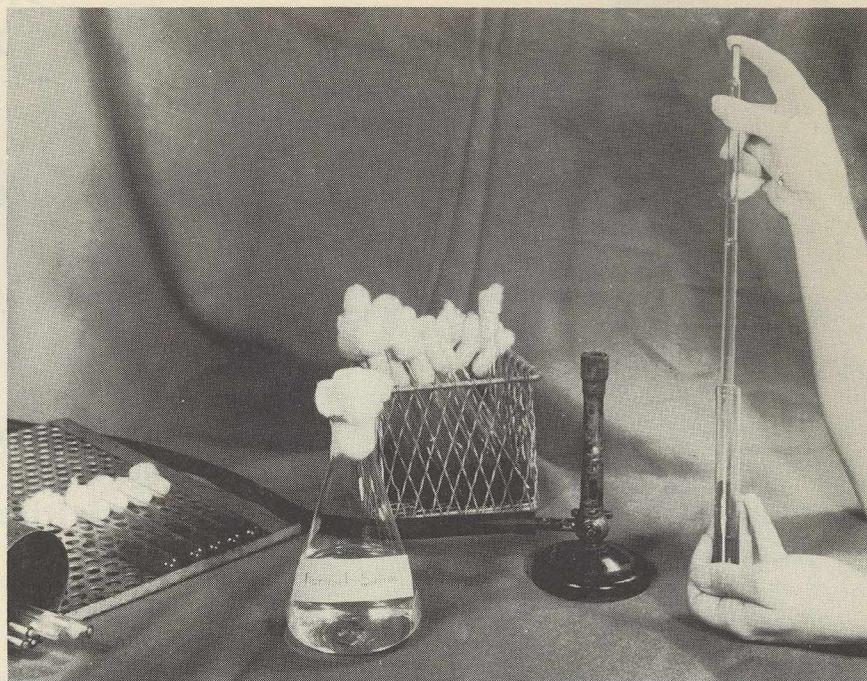


▲ The agar base is melted and cooled to 45°-50° C. and 10 cc. (5 percent) of the defibrinated blood is added to each 200 cc.

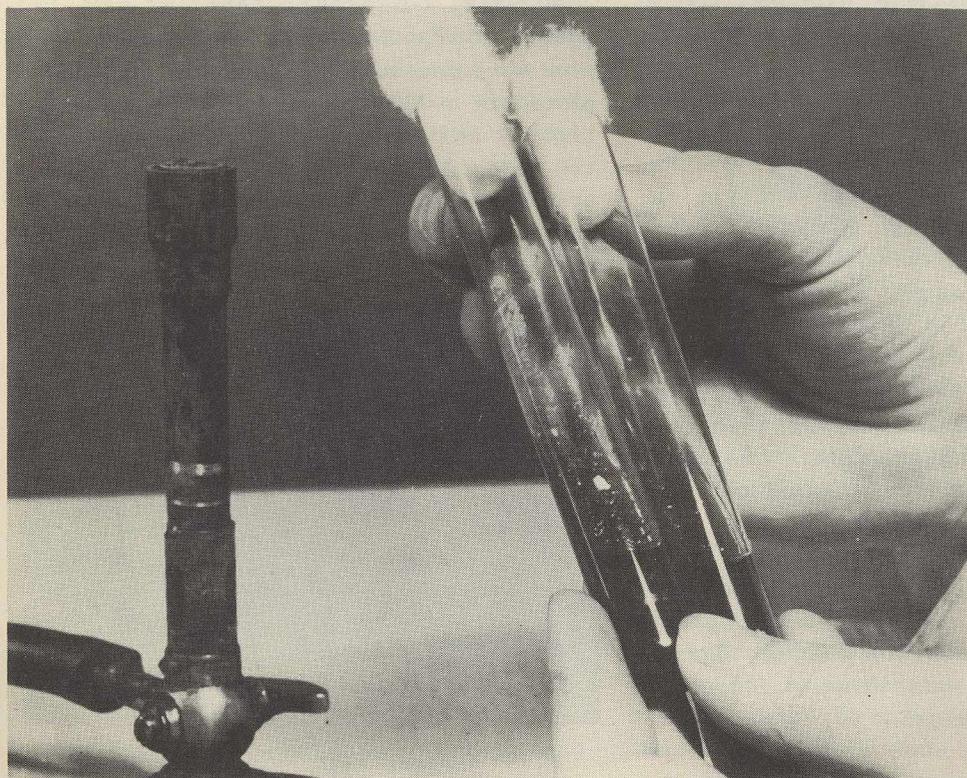


◀ The medium is tubed in 4 - 5 cc. amounts with a dispenser and allowed to solidify in a slanted position.

About 1 cc. of sterile normal saline is added to each slant. ➡



To test the completed medium for sterility, the tubes are incubated for ➡ 24 hours at 37° C. and examined for bacterial contamination.





## : Special Projects

# Rickettsialpox Survey in New York City

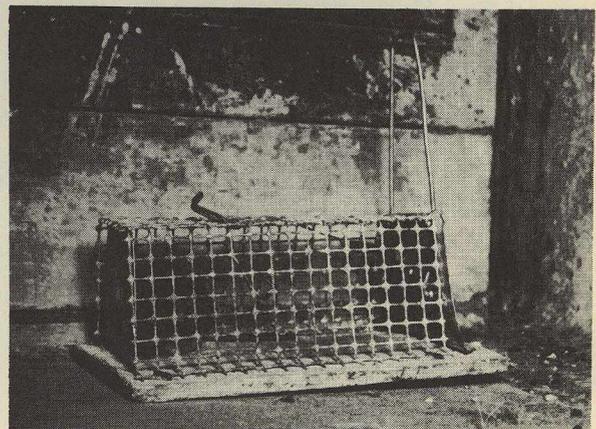
**Miriam B. Horn**  
**Entomologist**  
**CDC Activities, District 1**

In 1946 there occurred in New York City an outbreak of a relatively mild disease of unknown etiology. Upon investigation a new rickettsial organism, named *Rickettsia akari*, was shown to be the causative agent of the disease, and a mouse-borne mite, *Allodermanyssus sanguineus*, the arthropod vector.

The need for further field and laboratory study of rickettsialpox led to a cooperative agreement between personnel of the Communicable Disease Center Activities stationed in U. S. Public Health Service District 1 and the New York City Health Department. The program, designed to run for 1 year, started in July 1947 and proposed to determine the extent of rickettsialpox infection in mice throughout the city. During the course of the investigation additional factors were to be considered: whether other rodents, particularly rats, were involved in the disease, and whether there were other vectors of the disease in addition to the mite, *A. sanguineus*.

In order to achieve these objectives, live mice and rats were trapped all over the city under a variety of conditions. For purposes of this survey, New York City was divided into a series of zones in each

of which a weekly intensive trapping campaign was conducted. Wire-mesh mouse cages were baited with either odorous cheese or sausage, and normally set in the basement of homes, restaurants, commercial establishments, hospitals, zoos, or any suspected or reported mouse habitat. Wherever mice were caught, both trap and mouse were placed in a white paper bag which was tied tightly and marked with a tag indicating the date and specific location of the set trap. Steel-jaw traps were used for trapping rats and sturdy cloth bags were used for



Mouse trapped near established mouse run. Note droppings near wall.

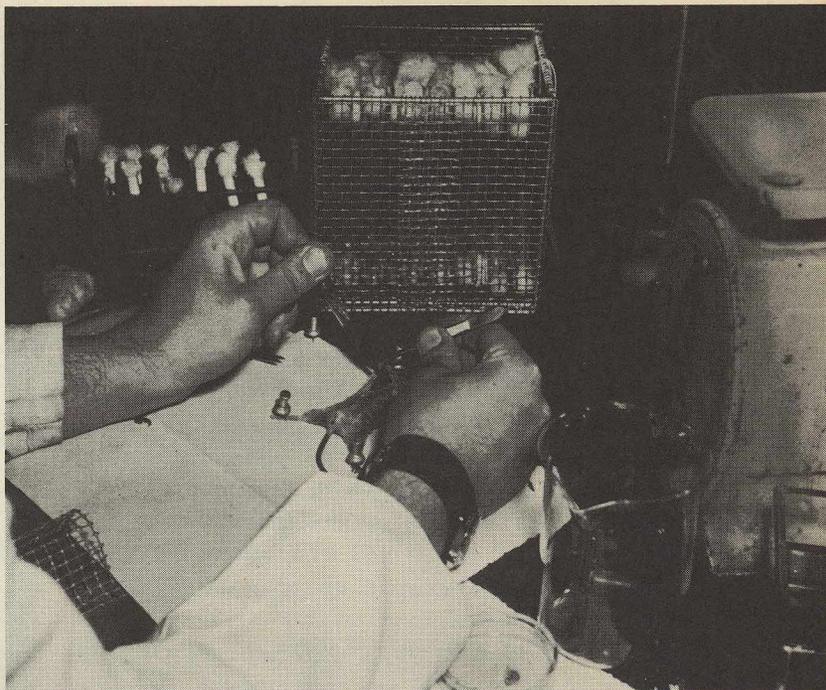
Drawing blood from severed axillary artery of mouse.

transporting them to the laboratory. Wall areas and runways were carefully examined for mites which may have escaped from the rodents. All bags were removed to the laboratory where a thorough scrutiny of the bag followed the removal of the rodent and trap. The mouse cages also were examined for mites. All ectoparasites which were collected were placed in vials of saline solution and later identified.

The mice were placed in battery jars and supplied with food and water for 24 hours in order that a sufficient amount of blood could be taken for a complement fixation test. The method of bleeding the mice consists of cutting away a small section of the skin underneath the right foreleg, opening the right axillary artery and collecting the blood outside of the chest cavity. The blood samples were then tested by complement fixation for rickettsialpox reactions. Small surgical clips were used to fasten the skin before proceeding with the recovery of ectoparasites.

The method of ectoparasite recovery consists of washing rodents with a wetting agent, Aerosol OT, dissolved in water. Butyl cellosolve is added to clear the solution for microscopic examination. The rodent is thoroughly washed in 50 cc. of the solution. Two rinsings of 50 cc. tap water bring the total liquid washing to 150 cc.

Several methods for separating the ectoparasites from the wash water have been tested with varying degrees of success. The use of sedimentation and separation with separatory funnels, filtration through filter paper, and centrifuging of wash water have all been discarded. It is believed that the most satisfactory, and ultimately the most time-saving method



is the complete microscopic examination of the wash liquid.

Thus far the following rodent ectoparasites have been recovered:

*Allodermanyssus sanguineus*  
*Liponyssus bacoti*  
*Myocoptes musculus*  
*Radfordia* spp.  
*Myobia musculi*  
*Cheyletus eruditus*  
*Laelaps nuttali*  
*Xenopsylla cheopis*  
*Nosopsylla fasciatus*  
*Leptopsylla segnis*  
*Ctenocephalides canis*  
*Polyplax spinulosa*

Positive rickettsialpox complement fixation reactions have been reported for several rats as well as many mice. It is hoped that transmission tests will be made to investigate the possibility of the existence of arthropods other than *A. sanguineus* that are vectors of the disease.

## Book Review:

### LABORATORY DIAGNOSIS OF PROTOZOAN DISEASES

by Charles F. Craig, Colonel, U. S. Army, Retired,  
San Antonio. Lea & Febiger, Philadelphia, 1948.

In 1942 Colonel Craig published a book that was welcomed by all persons attempting to diagnose the protozoan diseases of man. It presented detailed descriptions of a wide variety of laboratory diagnostic techniques with evaluations by the author. That exceedingly practical and valuable book has now been brought up to date by this second edition.

Due to the impetus of World War II, a great deal of work was done toward perfecting the parasitological procedures. The author has selected from the newer work those developments that he feels to be the most significant. Only a few of the new additions can be cited in this review. Several new staining methods for the intestinal protozoa have been added. Hakanson's aqueous smears for the diagnosis of *Dientamoeba fragilis* and the destruction of *Blastocystis hominis* have been recommended. Among other cultivation methods, Nelson's alcohol extract medium for *Endamoeba histolytica* and Lourie's, Senekjic's, and Weinman's media for the hemoflagellates are included. The recent work on the successful cultivation of malarial parasites by Ball and his co-workers is discussed, but not in detail since the method is not a practical diagnostic procedure. The J.S.B. method of staining malarial parasites in thin and thick blood films is presented.

The book has been improved not only by the addition of recent developments but also by the inclusion of valuable earlier



Col. Charles F. Craig

work that did not appear in the first edition. For example, the Quensel's method of staining amoebic trophozoites in temporary mounts is now included and recommended.

Except for the addition of newer techniques, the second edition is very similar to the first. A few additional illustrations have been added. Noteworthy of mention are those reprinted from Aimee Wilcox's manual which greatly improve the chapter on the diagnosis of malarial parasites in thick blood films. The list of references has been increased by nearly one hundred articles but should not be considered as complete.

Dr. M. M. Brooke,  
Scientist  
i/c Parasitology Branch  
Laboratory Division

OCT - NOV - DEC  
1948

# DIVISION HIGHLIGHTS



## Administrative

### Field Organizational Changes

Plans were completed during the quarter for the establishment of the CDC Midwest Area Office at Kansas City, Mo. Procedures were developed to provide administrative services for this activity. Adm. Asst. Walter B. Dillon was transferred from Montgomery, Ala., for this purpose.

Administrative procedures in connection with the Epidemic and Disaster Aid Program were devised. An operational and administrative manual is being prepared, together with a disaster-aid "kit" consisting of two steel 2-drawer filing cabinets packed with forms, stationery, and other office supplies ready for immediate dispatch to disaster aid projects.

### TECHNICAL REPORTS BRANCH

#### Editorial Section

#### A. Clearance of manuscripts:

A memorandum entitled "Clearance, Routing, and Submission of Manuscripts for Publication and Presentation," dated December 17, 1948, was issued. The following 39 manuscripts were cleared for presentation and/or publication during the quarter.

- Baker, W. C., Fay, R. W., and Grainger, Mary M.: Laboratory studies on the resistance of *Anopheles quadrimaculatus* to DDT and other insecticides.
- Bradley, G. H. and Goodwin, M. H.: Malaria observations of the Public Health Service
- Bradley, G. H.: Opportunities for entomologists in the Public Health Service
- Brooke, M. M. and Donaldson, A. W.: Effects of various modifications of a mass staining procedure on the transfer of malarial parasites between blood films
- Brooke, M. M., Donaldson, A. W., and Mitchell, R. C.: A method of supplying cellulose tape to physicians for diagnosis of enterobiasis
- Brooke, M. M., and Donaldson, A. W.: Use of a surface active agent to prevent transfer of malarial parasites between blood films during mass staining procedures
- Buck, R. W.: The health department's responsibility in a housing program and survey
- Carroll, L. Dorothy: Rat-borne diseases
- Cummings, Martin M.: The laboratory diagnosis of tuberculosis
- Elias, Hans: A re-examination of the structure of the mammalian liver. I. Intralobular Structure
- Eskey, E. R., and Prince, F. M.: Fleas as vectors of human disease
- Fay, R. W., and Sheppard, Elizabeth H.: *Anopheles quadrimaculatus* activity patterns in the laboratory on untreated and DDT-treated surfaces
- Fay, R. W., and Buckner, Annette J.: The presence of DDT-resistant house flies in the field
- Frohne, W. C., and Hart, John W.: Overwintering of *Anopheles crucians* in South Carolina
- Goldman, Morris, and Brooke, M. M.: Polyvinyl alcohol-fixative as a preservative and adhesive solution for staining protozoa in dysenteric stools and other liquid materials
- Good, Newell E., and Kotcher, Emil: Murine typhus fever in Louisville, Ky.
- Hemphill, F. M.: Trends of diarrheal disease mortality in the United States, 1941 to 1946, inclusive

- Hill, Elmer L., and Morlan, Harvey B.: Evaluation of county-wide DDT dusting operations in the control of murine typhus fever
- Howitt, B. F., Bishop, L. K., Dodge, H. R., and Gorrie, R. H.: Recovery of the virus of eastern equine encephalomyelitis from mosquitoes (*Mansonia perturbans*) collected in Georgia
- Kissling, R. E., Gorrie, R. H., and Benefield, U. R.: Virus and antibody titres in horses experimentally infected with eastern equine encephalomyelitis
- Kruse, C. W.: The airplane application of DDT for the emergency control of common flies in the urban community
- Kruse, C. W., and Quinby, G. E.: Condemnation without trial — plumbago and poliomyelitis
- Link, Vernon B.: Plague among wild rodents in Rio Arriba County, N. Mex.
- Lyman, F. Earle, and Dow, Richard P.: Something about those eye gnats
- Lyman, F. Earle, and Bradley, G. H.: Training of entomologists for public health work
- Markos, Basil G.: Rice field studies in Stanislaus County, Calif., with reference to mosquitoes
- Morlan, Harvey B., and Strandtmann, R. W.: The occurrence of neotropical mites in the United States
- Pratt, Harry D.: Pictorial keys and training films for teaching medical entomology
- Quarterman, Kenneth D.: Field investigations on the effects of a DDT residual-treatment on the resting and feeding habits of several species of mosquitoes
- Quarterman, K. D.: The importance of sanitation in municipal fly control
- Scudder, Harvey I.: Some principles of fly control for the sanitarian
- Spendlove, George A., Cummings, Martin M., and Patnode, Robert A.: The adaptability of mice to the laboratory diagnosis of tuberculosis
- Stierli, H., and Stenburg, R. L.: Some developments in insecticide dispersal equipment
- Stoener, Herbert G., Jenkins, Alton A., and Bramhall, E. H.: Brucellosis studies in Utah
- Sumerford, W. T.: A study of the synthesis and activity of difluorodiphenyl-trichloroethane
- Tarzwel, C. M., Nicholson, H. P., and Cullens, Doris P.: A testing technique suitable for screening candidate acaricides
- Tetzlaff, Frank: Malaria control progress and problems
- Thurman, D. C., Mulrennan, J. A., and Branch, Nina: Description of the male of *Cosmolaelaps gurabensis* fox
- Tisdale, Ellis S.: The functions of a sanitarian in a local health department
2. CDC Bulletin for October-November-December 1948
3. Bulletin of Field Training Programs — January 1 through December 31, 1949
4. Proceedings First Annual Meeting, Biology Section, Southern Branch, American Public Health Association
5. Orientation Course for Commissioned Officers of U. S. Public Health Service, Class III, 1948 December 6-17
6. Film Catalog . . . Utilization Guide

### Library Section

#### New Books Received

- American association for the advancement of science. Directory of members and proceedings, 1948.
- Annual review of microbiology, v.1., 1947.
- Avery, George Sherman, Jr. Hormones and horticulture, 1947.
- Bachman, George William. The issue of compulsory health insurance, 1948.
- Bassett, Jean. Quelques maladies infectieuses . . . , 1946.
- Claessen, Gunnlaugur. Røntgendiagnostik, vejledning for læger og studerende, udgivet med et forord af Gösta Forssell, 1946.
- Drinker, Cecil Kent. Pulmonary edema and inflammation, 1947.
- Emory university quarterly.
- Evans, Ralph Merrill. Introduction to color, 1948.
- Goldberg, Benjamin. Clinical tuberculosis, 1947.
- Hall, David George. The blowflies of North America, 1948.
- Hallock, Grace Taber. Tuberculosis, 1948.
- Harrison, Hal H. American birds in color, 1948.
- Journal of ecology.
- Massachusetts Sanitary Commission. Report of the Sanitary Commission of Massachusetts. 1850, 1948.
- Miller, Malcolm Eugene. Guide to the dissection of the dog, 1948.
- Mitchell, John William. Growth regulators for garden, field, and orchard, 1947.
- Myers, Jay Arthur. The chest and the heart, 1948.
- Rubin, Eli Hyman. Diseases of the chest, 1948.
- Semon, Henry Charles Gustav. Atlas of the commoner skin diseases, 1947.
- Trues, Raymond Carl. Detailed atlas of the head and neck, 1948.
- Vintinner, Frederick J. Hayfever studies in New Hampshire, 1948.
- Welch, Paul Smith. Limmological methods, 1948.

### PERSONNEL BRANCH

Four hundred eighteen interviews were conducted with applicants for positions with the Communicable Disease Center. Recruitment resulted in 13 temporary and 23 competitive appointments in Headquarters.

### B. Reports Completed

The following publications were prepared for reproduction.

1. The Production and Processing of Oysters (Film Guide, Shellfish Sanitation Series)

# Engineering

**Malaria Control.** Practical and desirable specifications for constituent chemicals for residual spraying were worked out during the quarter through consultation with the several Divisions concerned. The specifications agreed upon for solvent are for industrial grade xylene meeting ASTM designation D844-47. The specifications adopted for technical DDT are essentially JAN-D-56A, with slight variations to permit the rejection of materials having appreciable quantities of foreign matter. Emulsifier specifications call for Triton X-100 and Triton X-155, with acceptance based upon a comparison of samples submitted with reference samples of Triton having known emulsification properties.

Estimates of solvent, DDT, and emulsifier

needs of the States for the 1949 season were obtained and submitted to the Procurement Section during the quarter. Contracts for solvent and technical DDT were awarded, and bids for emulsifier were to be opened early in January.

Sampling and testing procedures to be followed during 1949 were discussed in a panel meeting with the Engineering, Administrative, and Technical Development Divisions. It is expected that adequate testing of chemicals will be possible to insure conformance with specifications.

Residual spray operations were under way in six States (Alabama, Arkansas, Florida, Missouri, North Carolina, and Texas) during the quarter. A total of 4,262 house spray applications were made.

**Typhus Control.** In October, arrangements were made with the New Mexico State Health Department for the assignment of an individual to the State office for broad statewide rat control promotion and training work. It is hoped that the assignment of a CDC representative will provide the means

**SUMMARY OF DDT RESIDUAL SPRAY OPERATIONS**  
October 1 — December 31, 1948

State	No. Cos.	No. Houses Sprayed	Lb. DDT	Man-Hours			Lb. DDT per House	M. H. per House	M. H. per Lb. DDT	Total House Spray Applic. 7/1-12/31/48
				CDC	Local	Total				
Alabama	11	2,038	2,489	8,685	1,004	9,689	1.22	4.75	3.89	28,346
Arkansas	47	212	240	19,404	586	19,990	1.13	94.29	83.29	16,269
Florida	2	563	843	192	496	688	1.50	1.22	0.82	12,112
Georgia	15			6,554		6,554				55,906
Kentucky	3			1,760	9,680	11,440				4,334
Louisiana	3			1,440		1,440				1,206
Mississippi	10			5,440		5,440				5,995
Missouri	6	20	25	29		29	1.25	1.45	1.16	6,415
North Carolina	30	106	85	820	120	940	0.80	8.87	11.06	42,745
Oklahoma										10,207
South Carolina	27			11,776		11,776				66,174
Tennessee	4			5,000	152	5,152				2,821
Texas	9	1,323	1,340	6,982	2,048	9,030	1.01	6.83	6.74	37,275
Subtotal Cont. U. S.	167	4,262	5,022	68,082	14,086	82,168	1.18	19.74	16.76	289,805
Puerto Rico & Virgin Islands										178
Grand Total	167	4,262	5,022	68,082	14,086	82,168	1.18	19.74	16.76	289,983

**SUMMARY OF LOCAL PARTICIPATION**  
**Second Quarter F. Y. 1949**

State	Malaria	Typhus	Total
Alabama	\$ 4,775	\$ 18,300	\$ 23,075
Arkansas	7,433	8,624	16,057
California*			
Florida	10,590	14,804	25,394
Georgia	5,000	33,170	38,170
Kentucky	2,323	—	2,323
Louisiana	4,325	21,500	25,825
Mississippi	10,111	7,104	17,215
Missouri	2,754	—	2,754
North Carolina	8,000	36,448	44,448
Oklahoma	620	—	620
South Carolina	6,128	10,350	16,478
Tennessee	1,892	4,335	6,227
Texas	3,012	28,794	31,806
Virginia	—	1,203	1,203
Subtotal	\$66,963	\$184,632	\$251,595
Other (inc. plague, drainage, etc.)			56,105
Total			\$307,700

\*Not yet received

of effectively continuing rodent control measures already begun.

Two rodent-plague technologists were assigned to the Denver area after initial training with the Brownfield, Tex., rodent-plague investigations unit. Investigations to be undertaken in Denver include (1) determination of flea infestation of domestic rodents, (2) collection of nests of hibernating rodents and recovery of fleas and other ectoparasites from them, (3) study of the extent of migration, home habits, association of species of rodents, and abundance of habitats, and (4) study of populations of predatory birds and mammals and the amounts and kinds of prey taken by them in order to evaluate their influence in transporting infected rodents and their ectoparasites.

Residual dusting operations were under way in 10 States in which 52,148 premises were treated. One thousand three hundred and thirty five establishments were rat-proofed. Rat poisoning was done in 63,509 establishments.

**Fly Control.** All five projects of the fly control program conducted full scale entomological inspection and trapping schedules during September and most of October; however, field activities in the more northern projects were curtailed with the approach of cold weather. By the end of October, routine inspections were halted at the Troy (N. Y.), Muskegon (Mich.), and Charleston (W. Va.) projects. Because of the abundance of flies in Topeka, Kans., and the continuation of warm weather in Phoenix, Ariz., regular entomological inspections continued throughout October in Topeka, and until the end of November in Phoenix.

After termination of the regular inspections at Troy, the project entomologist made spot block counts and trap collections, when favorable weather conditions prevailed, to determine when general fly breeding and activity came to a complete halt throughout the city. The fly inspection cards for the season were reviewed and forwarded to Atlanta for machine tabulation and statistical analysis. Data for dysentery-diarrhea and polio case maps were compiled. A start was made on the identification of flies trapped during the season.

Available data show Topeka leading the other investigational areas in fly prevalence. The project entomologist carried on activities similar to those outlined for Troy after the cessation of routine inspections. The project supervisor completed case maps for dysentery-diarrhea and polio for the Topeka area and began preparing reports on garbage handling, water supply, and sewerage.

**Impounded Water Studies.** Six reconnaissance and two final malaria survey reports were completed and forwarded to the Corps of Engineers during the quarter.

Personnel of the Impounded Water Branch participated in a discussion of the clearance of Public Health Service impounded water survey reports with the representatives of Fish and Wildlife Service in October in Kansas City. A Branch

representative also assisted in the field investigations and the preparation of a report on the control of water-hyacinth for the Galveston District of the Corps of Engineers.

## Entomology

### HEADQUARTERS OFFICE

An analysis has been made of entomological data accumulated on the Malaria Eradication Program during the 1948 season. These data show that out of a total of 7,400 sprayed houses inspected for malaria mosquitoes, the percentage free of "quads" in the afternoons in 1948 was 97.2. Comparable percentages for 1947, 1946, and 1945 were 98.8, 99.0, and 97.2, respectively. In approximately 1,000 unsprayed houses inspected in 1948, only 83.3 percent were free of "quads" in the afternoons while in 1947 this percentage was 72.0 and in 1946, 87.3.

Housefly-density data were collected concurrently in both sprayed and unsprayed homes. Results indicate that significantly more fly control was achieved in sprayed houses as compared with unsprayed houses.

### ECTOPARASITE-BORNE DISEASE BRANCH

**Murine Typhus Activities.** Tabulation and analysis were made of the data from examinations of rodents collected during the preceding quarter, July to September 1948. Data were secured from 66 counties distributed over nine States covering ectoparasite identifications from 2,820 rats and of successful tests on rat bloods from 2,253 rats. According to dusting periods the data were divided into the following categories: 45 percent from nondusted areas, 42 percent from areas dusted within 6 months, and 13 percent from areas dusted more than 6 months previous to trapping. All data given are for 10 percent DDT dust, although a few counties used

5 percent DDT dust.

Results of complement fixation tests on rat bloods continue to show a small reduction in the percentage of rats positive for typhus among that group collected from premises 1 day to 6 months after dusting and a smaller reduction among those collected more than 6 months after dusting. The significant fact shown by these figures is that typhus in rats in both dusted and nondusted areas has decreased or been reduced to 15 percent or less. Thus, considering all States for the period July to September 1948, tabulation of the 1,034 rat bloods from nondusted areas shows 16 percent positive for typhus; in 971 rats from areas 1 to 180 days after dusting, 10 percent were positive; and of 248 rats from premises more than 180 days after dusting, 13 percent were positive for typhus.

The percentage of rats infested by ectoparasites showed that DDT dusting reduced *X. cheopis* and all nonsticktight fleas to 36 percent of those in nondusted areas for the first 6 months and to 67 percent after 6 months. Reduction in other species was less pronounced, but still indicated a considerable reduction for dusted areas.

When the effects of DDT dusting are calculated in terms of the average number of ectoparasites per rat, the same general picture is obtained as for percentage of rats infested, but an even greater reduction is shown in *X. cheopis* and other nonsticktight fleas.

**Plague Activities (Utah).** From July 28 through September 1948, 415 mammals were collected in the Salt Lake City area by trapping and shooting. Included among these were several species of rodents. During the period, October 1 through December 1948, a total of 505 mammals was collected. The majority of animals were dead when taken from the traps; however, ectoparasites were collected and identified from all specimens.

### DYSENTERY-VECTOR CONTROL BRANCH

At Thomasville, Ga., three laboratories

are under construction: a bacteriological laboratory for preparing cultures from rectal swabs, stool specimens, and suspected arthropod vectors; a muscoid fly laboratory for conducting studies on the housefly and on common species of blowflies; and an eye gnat laboratory to secure certain basic information on the *Hippelates* spp. These gnats have long been associated with the transmission of infectious conjunctivitis of humans.

#### MISSOURI RIVER BASIN PROJECT

Over-all organizational planning and developing of the CDC Midwest Area Office were continued. An ornithologist and an epidemiologist have been added to the staff.

#### MALARIA INVESTIGATIONS BRANCH

At Manning, S. C., the regular monthly collection of blood films was continued. One positive slide was obtained from a 3-year-old child who had not previously been positive.

During 1948 at the Emory University Field Station, 3,600 blood-engorged female *Anopheles* mosquitoes were collected and prepared for precipitin testing. Similar tests at Manning indicated that most of the films from 3,118 *A. crucians* blood meals were from mule or cow blood, and 16 were from birds.

#### ENCEPHALITIS INVESTIGATIONS, CALIFORNIA

The virus isolated previously from the mosquito *Culex tarsalis* has been definitely identified as Western equine encephalomyelitis.

#### FLY-BORNE DISEASE BRANCH

Some 22,000 fly grill count cards were completed in the field and sent to Atlanta for machine punching and tabulation.

Two entomological keys, "Pictorial Key to Common Domestic Flies in Southern U.S." and "Pictorial Key to Principal Families of Diptera of Public Health Importance," were prepared.

## Epidemiology

#### GENERAL

In December Dr. James A. Doull, of the Leonard Wood Memorial for the Eradication of Leprosy (American Leprosy Foundation) and Dr. Griffith E. Quinby, of this Division, made a 3 weeks' reconnaissance survey of the State of Texas to determine the administrative and epidemiological feasibility of establishing a Hansen's Disease case-finding and treatment program there. On this trip it was learned that there was a tremendous increase in diarrhea in 1948 over 1946 and 1947. This trend has been confirmed in many States.

In November Dr. A. Gale, epidemiologist of the British Ministry of Health, was taken on a tour of inspection of the Typhus Investigation Station at Thomasville, Ga., the Virus Laboratory at Montgomery, Ala., and the Warm Springs (Ga.) Foundation. Although Dr. Gale's interest covered communicable diseases in general, he was especially interested in poliomyelitis in view of the extensive epidemic in Britain in 1947.

#### MALARIA APPRAISAL

The first calendar year's appraisal of malaria morbidity and mortality was completed in December in Alabama, Arkansas, Georgia, Mississippi, and South Carolina (Table 1). Either Texas or South Carolina continues to report more malaria than all the remainder of the nation combined. During this year the extremely small number of "positive" cases confirmed by blood smear indicate the need for restoring the fourth category of a "presumptive" diagnosis to the types of appraisal. Alabama, Mississippi, and Georgia submitted copies of individual case appraisals. Arkansas and South Carolina preferred a more general course relying on contacts with doctors

and dealing with groups of patients rather than individuals.

The extensive success of the program of malaria appraisal is greatly out of proportion to the minimum of trained personnel and funds which were expended on the program.

#### VIRUS BRANCH

Miss Beatrice Howitt, of the Virus Laboratory, reported that from the Georgia specimens, Eastern equine encephalomyelitis virus was isolated from mosquitoes (*Mansonia perturbans*), and positive neutralization for this virus was established in 6 of 15 birds; Western equine encephalomyelitis virus also was neutralized by the serum of four of these birds. These and other results indicate that the wildlife reservoir of Eastern equine encephalomyelitis is extensive. Present knowledge suggests that control of encephalitis through control of wildlife does not appear promising at present.

On December 1, 1948, Dr. Thomas Cockburn, a British subject, was employed as a consultant and detailed to the CDC office at Kansas City, Mo., to assist in planning and executing encephalitis surveys there.

#### LEPROSY

The program of investigation into the epidemiology of leprosy in the United States, of stimulation of early case finding, and of provision for modern treatment continued in Louisiana and Florida. It became increasingly apparent during this period that this program must progress slowly, that socio-economic ramifications of Hansen's Disease are even greater than were those of venereal diseases in 1936 when that social disease program was expanded.

Drs. Doull and Quinby made a 3 weeks' reconnaissance survey of Texas to determine the administrative and practical feasibility of establishing a leprosy program in Texas. This survey led to recommendations that an epidemiologist, fluent in Spanish, should be detailed to Texas. The Leonard Wood Foundation tentatively agreed to furnish the epidemiologist.

Plans were completed during the quarter for training of CDC nurses in leprosy at Carville, La., during January.

#### TYPHUS INVESTIGATIONS

In DDT-dusted Thomas and Brooks Counties,

Table I  
Malaria Appraisal  
in the Important States having Malarial Appraisal Programs  
First and Second Quarters -- Fiscal Year 1949

STATE	Cases Reported 1st Quarter	Cases Appraised	Cases Appraised as			Cases Reported 2nd Quarter	Cases Appraised	Cases Appraised as		
			Positive	Doubtful	Improbable			Positive	Doubtful	Improbable
*Alabama	90	44	30	10	4	35	61	44	13	4
*Arkansas	278	No reports available				102	No reports available			
Florida	56					21				
*Georgia	21	14	9	3	2	27	24 <sup>1/</sup>	24		
Kentucky	17					7				
Louisiana	27					3				
*Mississippi	33	28	22	5	1	28	16	6	6	4
Missouri	1					4				
North Carolina	89					9				
Oklahoma	168					37				
*South Carolina	1802	No reports available				429	413	2	7	404
Tennessee	49					10				
Texas	1240					755				
13 State Total	3871					1467				
U. S. Total	3964					1549				

\*States with Malaria Appraisal Programs  
1/Through October only.

Table II  
Ectoparasite Infestation and Indices  
October, November, December, 1948

COUNTY	DECATUR			GRADY			THOMAS			BROOKS		
	(Rat Poisoning)*			(Untreated)			(DDT Dust)			(DDT Dust)		
	Oct.	Nov.	Dec.	Oct.	Nov.	Dec.	Oct.	Nov.	Dec.	Oct.	Nov.	Dec.
No. rats examined	170	196	202	154	127	140	203	217	273	189	189	183
No. infested with <i>X. cheopis</i>	50	46	47	66	53	63	18	14	15	2	6	3
% infested with <i>X. cheopis</i>	29.4	23.5	23.3	42.9	41.7	45.0	8.9	6.5	5.5	1.1	3.2	1.6
No. <i>X. cheopis</i>	229	148	119	218	196	197	61	52	36	2	10	3
<i>X. cheopis</i> index	1.4	0.8	0.6	1.4	1.5	1.4	0.3	0.2	0.1	0.01	0.1	0.02
No. infested with <i>L. segnis</i>	25	24	51	58	58	78	24	23	33	14	2	5
% infested with <i>L. segnis</i>	14.7	12.2	25.3	37.7	45.7	55.7	11.8	10.6	12.1	7.4	1.1	2.7
No. of <i>L. segnis</i>	99	63	215	241	361	541	57	69	151	52	2	13
<i>L. segnis</i> index	0.6	0.3	1.1	1.6	2.8	3.9	0.3	0.3	0.6	0.3	0.01	0.1
No. infested with <i>L. bacoti</i>	40	71	64	36	37	35	26	20	41	33	13	15
% infested with <i>L. bacoti</i>	23.5	36.2	31.7	23.4	29.1	25.0	12.8	9.2	15.0	17.5	6.9	8.2
No. of <i>L. bacoti</i>	263	1049	531	377	646	499	292	74	666	432	190	240
<i>L. bacoti</i> index	1.6	5.4	2.6	2.5	5.1	3.6	1.4	0.3	2.4	2.3	1.0	1.3
No. infested with <i>P. spinulosa</i>	123	114	110	114	83	101	132	145	184	132	104	127
% infested with <i>P. spinulosa</i>	72.4	58.2	54.4	74.0	65.4	72.1	65.0	66.8	67.4	69.8	55.0	69.4
No. of <i>P. spinulosa</i>	958	572	838	1034	586	786	1183	903	1076	1000	703	878
<i>P. spinulosa</i> index	5.6	2.9	4.2	6.7	4.6	5.6	5.8	4.2	3.9	5.3	3.7	4.8

\* A single county-wide poisoning campaign was completed July 3, 1946.

only one case of human typhus was noted; the percentage of rats positive to typhus complement fixation continued to be suppressed; the percentage of rats infested with ectoparasites remained at a relatively low ebb. In Grady County, which had no typhus control measures, five cases of human typhus had their onset in this period; the percentage of rats positive to typhus complement fixation decreased in November to a new low; and although some fluctuations in ectoparasite populations occurred, they were much higher than in the treated counties and are believed to be within the range of seasonal variations (Table 2).

From the above one can conclude that the beneficial effects of DDT dusting can last as long as 15 months.

## Laboratory

### OFFICE OF THE CHIEF

Program reviews of State Public Health Laboratories were conducted in Montana, North Dakota, and South Dakota. Approximately one-half of the State Laboratories now have been surveyed.

Specimens and cultures received for diagnostic study totaled more than 18,000 items, sent from 46 States, Alaska, Hawaii, Puerto Rico, Canada, the Dominican Republic, Jamaica, and Wales.

The following policy was adopted relative to the awarding of certificates to students taking 4-week training courses: certificates will be awarded only to students graded as "very good" or "excellent," the

grades to be based on proficiency and reliability of the student in the particular diagnostic techniques covered by the course for which the certificate is given. Ordinarily about one-half or less of a class would be expected to qualify for certificates, but this would depend on the subject and the students. Students who make satisfactory progress in the course but fail to receive a certificate will receive a letter of attendance.

**Extension Service.** Regular Extension Service shipments of specimens and keys totaling 886 sets were sent to 304 laboratories in the United States, Canada, Alaska, Hawaii, and Puerto Rico. These slides contained specimens of *Nosopsyllus fasciatus*, *Pediculus humanus*, *Plasmodium falciparum*, *Plasmodium malariae*, *Schistosoma mansoni* eggs, *Hymenolepis nana* eggs, *Giardia* cysts, and hookworm eggs. These materials were seen by more than 2,000 persons each month.

From the loan set collections, five sets were sent out in answer to requests. Special materials, including throat smears, cultures, infected animals, typing serum kits, and mounted insects — totaling 1,026 items — were sent to 110 laboratories to fill particular needs. Eight pictorial keys were sent to seven States. In total, these special services were made available to 38 States, Alaska, Puerto Rico, Australia, Canada, China, Denmark, England, Germany, Mexico, Norway, and Uruguay.

On December 7 the first shipment of streptococcus grouping and typing sera was made in conformance with the present program of supplying these materials to selected laboratories engaged in streptococcus epidemiological studies. Thirty-eight outfits were mailed out to 27 laboratories in these States: California, Delaware, Illinois, Indiana, Kansas, Maryland, Massachusetts, Minnesota, New York, Ohio, Pennsylvania, Texas, West Virginia, Wisconsin, and District of Columbia. One was sent to the Army Epidemiological Board to be forwarded to the Army Laboratory in

Tokyo, Japan.

#### PARASITOLOGY BRANCH

Triton X-30, at a concentration of 0.25 percent to 0.50 percent by volume in diluted Giemsa's stain, is in optimal proportion to prevent transfer of blood cells between slides during mass staining procedures.

The 2-vial method for submitting stool specimens has been used satisfactorily in six States. Equal amounts of fecal material are placed in each of two vials, one of which contains PVA fixative. These may be shipped to a regional laboratory for diagnosis; cysts and ova are diagnosed from the plain vial; trophozoites can be identified from the PVA vial.

The 12th 6-week course in the "Laboratory Diagnosis of Parasitic Diseases" was presented October 11 to November 19 to 23 students from 21 States.

**Referral Diagnosis.** The following parasitological examinations were made for State and local laboratories and clinics as indicated:

Fecal specimens for	
intestinal parasites. . . . .	253
Fecal specimen cultures	
for protozoa. . . . .	30
Slides for pinworm. . . . .	27
Blood film for <i>Trypanosoma cruzi</i> . . .	1
Arthropods for identification .	20,000

**Malaria Surveys.** In addition to slides remaining from the previous quarter, blood smears for examination were received from South Carolina Survey. . . . . 5363  
Arkansas Survey. . . . . 314  
Georgia Survey . . . . . 90  
Of 6,337 blood smears examined for malaria, only 3 were positive.

	SLIDES EXAMINED	NUMBER POSITIVE
South Carolina Survey.	4962	3
Arkansas . . . . .	214	0
Georgia. . . . .	90	0
Mississippi. . . . .	1071	0

#### VIRUS BRANCH

The expansion of functions of the Virus

Laboratories has made it necessary to increase the laboratory space. A new building houses four work rooms. A ferret room has been established, separate from other animal space.

The virus of Encephalomyocarditis (EMC) has been received from the Army Medical School and will remain available for referral diagnosis studies.

The effects of storage and the addition of antibiotics upon antibody content of immune sera were investigated:

1. In horse sera, neutralizing antibodies against Eastern equine encephalomyelitis virus (E.E.E.) diminished 5- to 10-fold during 3½ months of storage.

2. Penicillin and streptomycin were added to normal and to immune sera. When each was mixed with virus and 50-percent endpoint titrations were made, no detectable effect was observed upon either antibody or virus.

Poliomyelitis virus dilutions were tested for titer at intervals up to 5 hours after preparation and storage at 76° to 78° Fahrenheit. Such exposure to room temperature did not appreciably alter the virus titer.

**Referral Diagnosis.** The Complement Fixation Unit tested human sera from seven States against the viruses E.E.E., Western equine encephalomyelitis (W.E.E.), Lymphocytic choriomeningitis (L.C.M.), and mumps. A single specimen from Georgia showed antibodies for W.E.E., one Alabama specimen was positive for mumps.

Human sera from 13 States were tested for neutralizing antibodies against E.E.E., W.E.E., L.C.M., St. Louis encephalitis, and the Venezuelan virus strain. Sera positive against E.E.E. came from Louisiana (2)\* and Virginia (1). A single serum, from Colorado, was positive for W.E.E.

Among the animal sera similarly tested, serum from a white ibis and from a night heron showed antibodies against E.E.E.

Sera from 96 of 163 people in five States contained neutralizing antibodies against Newcastle disease virus. The large pro-

\* Number of positive sera.

portion (60 percent) of positives is noteworthy even for selected material.

No Newcastle disease virus antibodies were detected in the sera of chickens from Birmingham, Ala. (2), Albany, Ga. (15), and Nashville, Tenn. (20).

Specimens from seven States were submitted for poliomyelitis isolation; 8 of the 31 fecal specimens produced paralysis in monkeys, while no poliomyelitis virus was evident in any nasal washings and brain-spinal cord specimens.

#### BACTERIOLOGY BRANCH

The General Bacteriology Section continued studies on diphtheriology, initiated an intensive referral-survey project in diphtheria, and made preparation for its first training course (to be given in 1949).

**Methodology Research.** Acidfast bacilli had been desiccated in vacuo and stored for 17 years. Twenty-seven of these cultures have been reactivated and are being studied for retention of growth characteristics and virulence.

From the various tellurite-containing formulae described as selective plating media for diphtheria bacilli, few are considered worthy of further evaluation. On each of four media 237 throat cultures were inoculated; recovery of diphtheria bacilli and characteristics of growth were compared.

A laboratory outline for the class in "Diagnosis of Bacterial Diseases — Part 2" was completed. Laboratory equipment, sera, and cultures from outside sources for use in the class were secured or ordered.

Preparations were begun for the production of a motion picture showing procedures in the laboratory diagnosis of diphtheria.

At Emory University, three graduate seminars were presented, and at Grady Hospital, a clinico-pathological conference on diphtheria was attended. In Miami, seven lecture and laboratory exercises on diagnostic bacteriology were presented to classes of 50 to 75 persons, under the auspices of the Florida State Health Depart-

ment. Additional lectures were given at Miami University and to the State Health Department nurses. As Lecturer in Bacteriology, Johns Hopkins University, Dr. Martin Frobisher gave three lectures in Baltimore.

Throat cultures for diagnosis of diphtheria were received from the Georgia State Health Department (904) and from various other agencies in Alabama, Florida, Georgia, Indiana, and Washington (38).

Pure cultures received for typing totaled 197, while 14 cultures submitted for identification included *Corynebacterium diphtheriae* (9), diphtherioids (3), *Nocardia* (1), and *Actinomyces* (1).

The Immunology-Serology Section was scheduled to present the first of the new training courses in 1949; reference diagnosis for leptospirosis was begun; the Brucella Unit began full-scale operation, and streptococcus typing sera were distributed.

To determine a routine complement fixation test for diagnosis of the rickettsioses, performance of the Kolmer and the Bengston techniques with two variations were compared in parallel tests. A high percentage of tests showed cross reactions and apparent lack of antigen specificity; the fault was considered to be the use of old, stored positive sera. Only fresh serum is used in the current evaluation tests.

The most widely accepted laboratory diagnosis for brucellosis is that performed by the Bureau of Animal Industry; this technique is to be modified for the detection of human disease, and the final modification will be used as a standard for comparison and evaluation of tests of other types. Production of Bureau of Animal Industry Brucella antigen was brought to full function. Modifications of time, temperature, and antigen concentration in the test proper were studied.

Preparations for the course in "Laboratory Diagnosis of Rickettsial Diseases" were completed. A supply of the necessary sera has been assured.

Diagnostic specimens for rickettsial

serology came from 11 Southeastern States. Of the 145 sera submitted, 42 were considered to be from cases of murine typhus, while 2 were undetermined (reacted with both spotted fever and rickettsialpox antigens). Of the 42 sera positive for murine typhus in the complement fixation test, only 10 showed a positive titer in the Weil-Felix test: 15 additional sera were positive in the Weil-Felix test, but negative in the complement fixation test.

Results from the rodent-survey studies showed 434 of 4,203 (10.3 percent) rat sera positive for murine typhus.

The leptospirosis diagnostic service found 2 positives among 42 human sera submitted for test; 1 of these reacted with *L. icterohemorrhagiae*, the other with *L. canicola*. Animal sera (4 dog, 7 rat, 1 mouse) were negative for all antigens.

#### ENTERIC BACTERIOLOGY SECTION

Twelve hundred milliliters of polyvalent *Salmonella* serum and 5,400 milliliters of *Salmonella* O grouping sera were prepared. Eleven laboratories in 10 States requested such sera; six of these were State health department laboratories, three were university laboratories, and two were Public Health Service laboratories.

During this quarter, 714 cultures were received for identification or study. These were classified roughly as follows: *Salmonella*, 283 (166 human, 102 lower animals, 15 food or food products); *Shigella*, 122 (all human); Paracolon, 255; *Proteus*, 16; *Mimeae*, 35; *Pseudomonas*, 1; *Pasteurella*, 1; and *Alcaligenes*, 1. Two new *Salmonella* types were recognized and their antigenic formulas were determined.

#### TUBERCULOSIS SECTION

A study in conjunction with the New York State Health Department was completed. Designed to evaluate relative efficiency of different laboratory diagnostic procedures, a total of 775 sputum specimens and 106 gastric specimens were involved in the project.

Media evaluation has continued. The

comparison of modified Lowenstein's with Petragani's (McNabb) medium was completed.

Several media have been evaluated for suitability in routine streptomycin sensitivity assays; this study is to be continued. Slide culture techniques for this assay are being developed to a practicable level.

To further characterize a streptomycin-enhanced strain of tubercule bacilli, the response of laboratory animals to injection is being investigated.

A 2-week course was given in October for 20 laboratory directors and staff members. A 4-week training course for technicians was given in November to a class of 20 students.

For routine diagnostic study, 902 specimens were received from Lawson Veterans Administration Hospital and from the Georgia State Department of Health.

Fourteen cultures were submitted for determination of type. These came from Arizona (2), Georgia (3), Idaho (1), and Alaska (8).

From within Georgia 361 cultures were received for streptomycin sensitivity assay.

#### MYCOLOGY SECTION

In attempts to detect nonhuman distribution of *Histoplasma capsulatum*, schedules for rodent collections were arranged and soil collections were made in Tennessee at known endemic centers. From 150 rats and from the soil collections, cultural demonstrations of the fungus has been attempted.

The techniques for soil isolation have been reviewed and those which seemed most useful were used for this study. At the same time studies with experimental soil contamination were begun to develop the more reliable isolation techniques.

A laboratory manual is being written for use in classes to be taught in 1949. Manuscripts have been written for three filmstrips dealing with the diagnosis of mycotic infections. These filmstrips will be designed for classes here as well as for nationwide distribution and use.

From 14 States and Canada, 81 specimens (cultures, sputum, blood, and spinal fluid) were received to be examined for pathogenic fungi. These fungi yielded 11 pathogens: *Candida albicans* (8), *Histoplasma capsulatum* (1), *Trichophyton rubrum* (1), and *Microsporium audouini* (1).

## Production

#### PROJECT DEVELOPMENT BRANCH

The most important development during this quarter was a reconsideration of story development procedures and establishment of predetermined schedules for shooting scripts. The project supervisor has increased responsibilities and freedom in developing and authenticating his story material, but an inflexible deadline is now set for script completion. By putting this scheduling system into effect, it is possible to level out or more evenly distribute the work load in the Production Branch and make the most effective use of all personnel. These improvements are based primarily on the recommendations of Mr. Irving Hartley of Hartley Productions, New York, who spent 2 weeks with the Production Division as a consultant. Mr. Hartley is an outstanding film producer and is recognized as one of the preeminent men in this field.

Mr. Theodore Karp was employed as special consultant to study and organize material on rodent control and to develop a story treatment for production by the Army. The Production Division is developing the story treatment in cooperation with Army consultants. CDC will provide consultants to work with Army personnel during production. As now planned, the result will be a series of films on rodent control that will be equally useful to CDC and the Army.

Mr. Sherrill, Acting Chief, Story Development Branch, was detailed to the

National Institutes of Health at Washington for a 3-week period to study the program of the National Heart Institute and suggest a tentative program of visual education. Preliminary plans were discussed for a cooperative arrangement with CDC for the production of the films needed in the NIH program.

Mr. Sherrill was detailed as Acting Chief of the Production Division.

#### PRODUCTION BRANCH

Several film shorts (for example, "The Climbing Activities of Norway Rats") were processed entirely within the Technical Service Section laboratories. In the particular instance cited, 40 release prints of this film were delivered by the motion picture laboratory, all of which were made by optical reduction printing and all of which were of superior quality compared to the best commercial standards. The physical plant of the Technical Services Section is virtually complete and every effort at this time is being directed toward the maintenance of high production standards, in both quality and quantity.

The Graphics Section completed final art work on the following productions: story boards for "Vivax Malaria — Edition I," "Normal Arteries and Veins," "Foot-and-Mouth Disease," "VD-TB Survey in Georgia," "Portal Cirrhosis," "Constructing a Sanitary Pit Privy," and "The Story of our Lung — Edition I"; color separation drawings for the project, "Page Layout of Production Division to Appear in Films in Medicine (Magazine)." The section completed line drawings for the manual "The Liver — Part I"; page layouts for the "CDC Film Catalog"; reworked story boards on the following productions: "Identification of U. S. Genera of Adult Female Mosquitoes," "In Self Defense," and "Closing In"; completed art work for slide series, "Description of Standard Chlorinators"; reworked and made additional signs for engineering exhibit which has been shipped to California. Preliminary drawings were made for "Lesions of Primary Syphilis," and

work was continued on "Syphilis Horizon Chart." Progress was also made on the animation for "Complement Fixation (for Medical Students)."

In the Motion Picture Section, motion picture photography was completed on "Constructing a Sanitary Pit Privy," "The Collection of Adult Flies," "Fly Density Survey by the Grill Method," "Use of Airplanes for Mosquito Control," and the color version of "Topical Fluorides." Laboratory tables and equipment were in the process of being assembled in the theater building for use on sets of three tuberculosis films.

All motion picture cameras were assigned to individual cameramen for testing and maintenance. A standardized camera test set-up and procedure was initiated so that all cameras may be tested periodically. This assures that cameras will be in the best possible operating condition at all times. Complete sets of the most-often used filters were assigned to each cameraman. With new exposure meters now on order, each cameraman will have an exposure meter for measuring incident light and one for reading reflected light. A 25 mm. lens for Maurer Camera No. 1 was received and a Gyro tripod was acquired.

A camera blimp and a title stand were in the designing and planning stage. The blimp is a soundproof covering for a motion picture camera which allows the camera to move in for close-ups on synchronized sound pictures without the microphone's picking up disturbing camera noises. The title stand is to relieve the Acme animation stand of part of its overload of titles, animation, and film slides. In addition, it is being designed to handle much larger work, such as maps and charts. It will be capable of a number of special-effect features, such as flips, spins, pans, and zooms. To be installed in the theater, it can also be used for extremely accurate zoom effects on small sets where it may be desirable to zoom from a shot of a full test tube to an extreme close-up of the bottom portion.

The Editing Section, now under the Motion Picture Section, was occupied in turning out the seven productions: "The Climbing Activities of Norway Rats," "Diagnosis of TB with an Improved Culture Medium (Spanish Version)," "Excystation and Motility of *Endamoeba histolytica*," "Constructing a Sanitary Pit Privy," "Malaria Control on Impounded Waters," "Concrete Ditching for Malaria Control," and "Pinworm." In various stages of production were: "Topical Fluorides (Color Version)," "Use of Aircraft for Mosquito Control," "Fly Control Series," and "Complement Fixation."

Final phases of installation of all basic equipment for photomicrographic work were completed. Cameras, microscopes, photometer, and lighting sources were tested and calibrated to assure reasonably uniform results. Production was in progress on two films (depicting the life cycles of the fish tapeworm and human hookworms) in the Photomicrographic Laboratory.

#### UTILIZATION BRANCH

Film distribution for October consisted of 169 motion pictures and 266 filmstrips. In November distribution rose to the highest point since the beginning of CDC — 208 motion pictures and 408 filmstrips — a total of 616 for 1 month. The total film distribution for the quarter was 1,443, an increase of about 23 percent over the preceding quarter and the highest distribution in the history of the library.

Several hundred copies of the new 170-page Film Catalog and Utilization Guide were distributed to eligible Divisions and institutions. About 700 copies of Section II and III of the catalog (the Alphabetical and the Classified List of CDC Productions) were mailed in answer to requests for lists of CDC films. Catalog pages describing new CDC films released during the quarter were sent to catalog holders to keep the catalogs up to date. Six hundred copies of the Study Guide for the film, "Production and Processing of Oysters," were sent out.

An exhibit for the Joint Meeting of the California Mosquito Control Association

and the American Mosquito Control Association to be held at Berkeley, Calif., February 6 to 9, 1949, was prepared.

The CDC display for Atlanta Audio-Visual Education Week was completed and set up in the Belle Isle Building together with Army and Navy displays. Various types of projection equipment were also placed in use for the week, and many of the CDC productions were shown repeatedly.

#### PRODUCTION PROGRAM FOR THE VENEREAL DISEASE DIVISION, U.S.P.H.S.

At the end of the quarter, completion of the filmstrip, "Diagnosis of Primary Syphilis," awaited final approval of script by the Venereal Disease Division. Upon receipt of this final approval, the filmstrip will be ready for release in approximately 30 days.

At the end of the quarter, copies of the script of "The Horizons of Syphilis" were in the hands of members of the Medical Review Committee. Upon final approval of script, this filmstrip will be ready for release in 45 days.

#### PRODUCTIONS RELEASED

##### Guides and Manuals

8-010.0 Shellfish Sanitation

##### 2x2-inch Slide Series

9-004.0 Description of Standard Chlorinators

#### PRODUCTIONS 100% COMPLETED, SCHEDULED FOR RELEASE IN FEBRUARY AND MARCH

##### Motion Pictures

4-046.0 Concrete Ditching for Malaria Control  
4-083.0 The Sanitary Pit Privy

##### Filmstrips

5-035.1 The Lung, Second Edition  
5-043.1 Clinical Vivax Malaria (First Revision)  
5-102.0 Foot-and-Mouth Disease — U.S.P.H.S. Significance  
5-119.0 The Sanitary Pit Privy

#### PROJECTS COMPLETED

##### Photographs

1-019.0 18 Photographs — Teaching Program in T.B. Evaluation Laboratory  
1-020.0 Identification Photographs of 17 Students, for Laboratory Division

**Charts and Graphs**

- 2-004.0 Camera Registration Chart and Focusing Signs

**Manuals and Bulletins**

- 8-014.0 Photographs and Prints of T. B. Director's Class for 1949 Training Manual  
8-016.0 Photographs of City of Atlanta, for (Training Division) Illustration in Technical Articles

**2x2-inch Slide Series**

- 9-024.0 Ragweed and Pollen Control, for Engineering Division  
9-025.0 Slides of Textbook and Handbook Illustrations, for Training Division

**Miscellaneous**

- 11-001.0 Assembling of "Pinworm" Film for National Institutes of Health

**RODENTICIDE INVESTIGATIONS**

A bait consisting of thallium sulphate in vegetable oil added to ground fish and yellow corn meal was tested against Norway rats in 10 barracks-type buildings. A dosage of 0.7 percent by weight gave 94.5 percent control of the rats in the buildings and was not exceeded by either 0.5 percent or 1.0 percent dosages.

Regardless of how efficient thallium sulphate may be as a rodenticide, however, it is extremely doubtful whether it should be considered for use in the control of domestic rats and mice except under unusual conditions and except where its use can be strictly controlled. Its lack of warning properties such as odor and taste, the fact that it is accumulative in the body tissues and can be readily absorbed through the unbroken skin, and its relatively high toxicity place it in the same class as rodenticide "1080" insofar as danger to the operator and the general public is concerned.

Laboratory tests on acceptance and mortality indicated variable results with solutions ranging from 9 to 40 gm. thallium

sulphate per gallon of water. Dosages of 12 and 15 gm. were most consistently good, but little choice was noted over the entire dosage range. In tests in rat-infested barracks, best results were obtained with a dosage of 15 gm. per gallon. Three replicate tests made at this dosage gave mortalities varying from 74.6 percent to 84.7 percent and averaging 80.7 percent. This average kill was superior to the kills obtained at dosages of 12, 18, and 24 gm. per gallon.

Tests in the laboratory signified high mortality with dosages of "1080" ranging from 1 to 14 gm. per gallon. There seems to be no reason why the 12-gm. dosage recommended for Norway rats would not be satisfactory for the roof rat as well. None of the dosages tested produced average mortalities as high as 90 percent.

Dosages ranging from 18 to 200 gm. of "1080" per gallon produced high mortalities among Norway rats. In field tests in barracks, 200 gm. per gallon gave satisfactory kills (over 90 percent) of both Norway and roof rats. Thus, even if a permanent protected "1080" dispensing station were neglected long enough to result in maximum concentration of the poison, due to evaporation of water, its effectiveness should not be greatly reduced. Too, it seems likely that any concentration of "1080" in water in a normally tended, permanent "1080" station would be acceptable to rats.

In other tests it was found that, where food for rats is usually readily available both indoors and outdoors in both urban and rural areas, it is doubtful if the Elton feeding station can be used with a high degree of reliability to determine the size of rat populations or the results of applications of rodenticides. Also, it was concluded that the Tigar Rat Guard as now produced cannot be considered an effective barrier against the ship rat, *Rattus rattus*, leaving or entering ships via the lines.

**RATPROOFING STUDIES**

Of four aluminum alloys tested as panels, two have resisted penetration for about 100

\*Abstracted from Technical Development Division Summary of Activities No. 16, Oct., Nov., and Dec., 1948.

nights. When tested as door channels, the various alloys showed greatly increased resistance to penetration by rats—some of the alloys tested being unpenetrated in well over 100 nights, though they had been penetrated in less than 20 nights when tested as panels.

Marine veneers have been much more resistant to penetration by rats when tested flush to the bottom of the cage than when a gnawing edge was exposed.

#### TRANSMISSION OF MURINE TYPHUS

A direct mode of transmission of murine typhus in rats was investigated. Infected white rats were confined with susceptible rats under conditions favoring the maximum direct contact and contamination of food and bedding. In a few tests, rats were found to be infested with lice; but in subsequent tests, lice were eliminated. Of 90 susceptible animals tested before lice were eliminated, 4 proved positive for typhus. Of 152 tested after lice were eliminated, 3 proved positive for typhus. It is concluded that transmission of typhus from rat to rat without the intervention of ectoparasites is possible but occurs at a low rate, and that cannibalism may be involved in the transmission in some cases.

In a study of louse transmission, lice (*Polyplax spinulosa*) removed from rats 8 to 50 days after the latter were infected with murine typhus were used in the inoculation of test animals by various routes. From the 10th to 16th day, positive results were obtained by open culture, intraperitoneal injection, and by abrasion of the skin. No positive results were obtained on the 8th day or after the 16th day, regardless of route. These experiments confirm the findings of other workers who have shown that murine typhus can be transmitted by the rat louse.

#### BIOLOGY OF *LIPONYSSUS BACOTI*

Temperatures of 24° to 26° C. and 47 percent relative humidity were the most suitable of the conditions tested in the laboratory for the development of *Liponyssus bacoti*, though higher humidities

may be more favorable to survival of the egg. The average life of the adult female was 61.9 days, and the average number of eggs per female was 98.8. Most of the mites matured in 11 to 16 days. Egg production and length of life were essentially the same for fertilized and unfertilized females, and the latter produced male offspring capable of reproduction.

#### INSECTICIDAL WORK ON ADULT HOUSEFLIES

Fly eggs were collected from 10 towns which were classified in 3 groups: (1) those where DDT had not been applied, (2) those in which DDT was used from January 1946 to September 1947, and (3) those in which DDT was used from September 1947 to date of collection (September 1948). Flies were raised from these eggs in the Savannah insectary and tested against standard DDT panels. Those flies from towns of the first group showed high mortalities; those from the second group were intermediate, and those from the third group had low mortalities.

A series of towns which has reported apparent failure of DDT to control flies was selected for testing various possible substitute insecticides. Strains of flies from 12 of the towns were tested for resistance; only those from 6 were shown to be resistant. Results of grill counts and visual observations in these six towns indicated that outside applications of 50 mg. BHC (95 percent gamma isomer) or interior applications of 300 mg. methoxychlor per square foot gave satisfactory reductions of the fly populations and warrant further investigation.

Methoxychlor produced good mortality of DDT-resistant flies in laboratory tests but was quite erratic. A combination of 80 mg. methoxychlor and 200 mg. DDT per square foot gave poorer results than a combination of 100 mg. of each toxicant per square foot. Chlordan used in combination with DDT produced high mortalities and was long lasting, but lack of information as to toxic hazards to man prevents

its recommendation for use as an interior residual fly spray.

Laboratory tests of the effectiveness of DDT deposits on leaf surfaces along roadsides which were examined 2 weeks after being sprayed showed that deposits from a water-wettable powder were lost fairly rapidly, but that emulsions containing various adhesives produced longer lasting deposits.

Similar tests with glass panels that had been sprayed and weathered outdoors showed that of a variety of adhesives that might be added to xylene emulsions, 2 percent of water-white rosin showed the greatest promise, maintaining DDT deposits that remained 100 percent effective against *Callitroga macellaria* and *Musca domestica* for over 8 weeks of weathering.

Of 44 chemicals screened, 6 have shown appreciable toxicity for adult houseflies -- 2, 2 bis(p-fluorophenyl)-1,1,1-trichloroethane being the best.

#### INSECTARY PRODUCTION

During 1948 the insectary produced 9 $\frac{3}{4}$  million insects of several different strains of four species of flies (*M. domestica*, *C. macellaria*, *Phaenicia pallescens*, and *P. sericata*) and two species of mosquitoes (*Anopheles quadrimaculatus* and *Aedes aegypti*). The discovery of DDT-resistant house flies in the field has involved the maintenance of approximately 25 different strains of this species during the past year. A lemon-eyed mutation of *C. macellaria* was discovered and produced in numbers for flight dispersion studies in the field.

#### RELATIONSHIP BETWEEN THE PHYSICAL STATE AND INSECTICIDAL ACTION OF DDT ON SOLID AND LIQUID SURFACES (N. I. H. FELLOWSHIP PROJECT)

Solvents of various types, including aliphatic, aromatic, and halogenated hydrocarbons, alcohols, and ketones, were found to produce DDT crystals of various sizes and habits when used in spraying DDT by means of a DeVilbiss atomizer, onto glass panels at the rate of 100 mg. of DDT per

square foot. In all cases, they exhibited a reluctance to crystallize, forming small viscous, gummy droplets that persisted as long as 8 weeks in some cases but crystallized upon mechanical agitation. As crystallization progressed, no consistent effect upon knock-down of exposed houseflies was observed, but higher 24-hour mortalities were produced (using 15-minute exposures).

Some of the solvents referred to in the preceding paragraph were used in applying a deposit of DDT on the surface of the water. The rate of crystallization of DDT varied with different solvents, but no marked differences in size or habit were observed. Biological tests in the laboratory confirm that deposits from fuel oil are more effective a few days after application than they are immediately. Addition of a surface-active agent produced no noticeable effect. Some solvents such as cyclohexanone prolonged the residual effectiveness as compared with fuel-oil solutions.

#### HOUSEFLY LARVICIDE STUDIES

Laboratory tests in which the toxicant was added to cultures containing 250 to 400 fly larvae (3 to 6 days old) indicate that methyl bromide was ineffective at a dosage of 1 cc. per 1,000 gm. of National Association of Insecticide and Disinfectant Manufacturers medium. Dichloropropane-dichloropropene mixture prevented nearly all emergence of adult flies at 0.5 cc. per 1,000 gm. Lower dosages were more erratic.

#### ADULT MOSQUITO CONTROL STUDIES

**Effects of a DDT Residual Treatment.** Small animal-baited houses have been designed to trap mosquitoes by letting them enter openings under the eaves and catching them either in the house or in especially designed window traps. One such house was treated with 200 mg. DDT per square foot, using xylene emulsion, and a second one was left untreated. The treatment appeared to be repellent, for it resulted in at least a 50 percent reduction in the number

of mosquitoes visiting the house as compared with the check house and pretreatment observations. No directional preference was noted as to the side of the house through which mosquitoes attempted to leave.

Of the *A. quadrimaculatus* recovered from the treated building, 59 percent were found dead inside the building, 11 percent were found dead in the outside traps, and 30 percent were recovered alive in the outside traps, including 22 percent that survived over 24 hours after recovery. Of the total catch, 67 percent were engorged, including 15.4 percent which survived for 24 hours. As compared to the untreated houses, this amounted to an 80 percent reduction in the number of females which obtained a blood meal, escaped the house, and survived 24 hours.

Of the *Mansonia perturbans* recovered from the treated building, 60 percent were found dead in the house, 6.6 percent dead in the outside traps, and 28 percent were recovered alive and survived over 24 hours. Of the total, 29 percent were engorged including 6.7 percent which survived 24 hours — a 93 percent reduction as compared to the untreated houses.

Other species of mosquitoes were obtained only in small numbers.

**Evaluation of Varying Degrees of Completeness of Coverage.** The rapidity of knock-down of *A. quadrimaculatus* females in occupied houses tended to be greater in rooms in which the furniture, as well as the walls and ceiling, was treated with DDT spray than in rooms in which the furniture was not treated.

**Effectiveness of DDT Retreatments versus Original Treatments.** Studies with *A. quadrimaculatus* in unoccupied rooms extending over a 3-year period indicate that retreatment of a previously DDT-treated surface restores effectiveness to that of an original treatment and that it remains effective over a somewhat longer period. In this protected situation, an initial deposit of 200 mg. DDT per square foot

was maintained at a reasonably satisfactory level of effectiveness by respraying once with 100 mg. per square foot in the spring of each succeeding year.

In unoccupied rooms, 400 and 800 mg. DDT per square foot maintained a comparatively high level of effectiveness for 2 seasons. In this protected situation, a 200 mg. per square foot residue obtained from a 75-percent-DDT-wettable powder maintained a higher level of effectiveness during its 2nd season than did a comparable residue obtained from a xylene emulsion during its 1st season. Water-wettable powders with a lower DDT content produced slightly less effective deposits.

**Evaluation of DDT Formulations and New Potential Insecticides.** All formulations were sprayed in unoccupied rooms at the rate of 200 mg. of the toxicant per square foot of treated surface. Heptachlor was effective, but it deteriorated rapidly after the first 6 weeks; benzene hexachloride was spectacular at first, but it fell below the effectiveness of DDT at the end of 6 months. Emulsions containing 5 percent DDT were slightly better than those containing 7½ or 10 percent DDT, and the slower rate of application with the lower concentration permits more care in obtaining good coverage.

#### DEVELOPMENT OF NEW SPRAY FORMULATION

For use outdoors only, the period of effectiveness of DDT deposits, as tested against houseflies, may be appreciably prolonged by use of a formula consisting of 105 pounds of technical DDT dissolved in 36 gallons of xylene to which is added 1 gallon of *Triton X-100* or *X-155*, and, after the latter is completely dissolved, 42 pounds of water-white gum rosin. This 50 gallons of 25-percent concentrate can then be diluted with water in the usual manner.

#### ADULT FLY CONTROL STUDIES

In the evaluation of new formulations and new potential insecticides as residual

sprays the same results were obtained with heptachlor, benzene hexachloride, and various DDT formulations when tested against houseflies as reported above against mosquitoes.

During the first part of October approximately 50,000 yellow-eyed blowflies (*C. macellaria*) were released near the geographical center of the residential area of Savannah, Ga. Within 7 hours specimens had been recovered at a distance of 1 mile in every direction and at 1½ miles in one direction from the release point. The results of this test indicate that the fly problem in a city is one of city-wide importance, as heavy fly production in one neighborhood would supply flies to other parts of the city.

#### MOSQUITO LARVICIDE INVESTIGATIONS

Further observations indicated that 3 pounds of DDT per acre as an emulsion provided effective control of both culicine and anopheline mosquito larvae for 8 to 16 weeks. One pound of the gamma isomer of BHC maintained effective control for 8 to 12 weeks. Some of these treatments were very destructive to aquatic wildlife and should not be used where wildlife is a factor.

#### SYNTHESIS OF NEW COMPOUNDS

DFDT (2,2-bis-(p-fluorophenyl)-1,1,1-trichloroethane, the p,p'-fluorine analogue of DDT, was prepared by the condensation of 2 moles of fluorobenzene and 1 mole of chloral with various condensing agents and using derivatives of chloral; optimum temperature was determined.

Concentrated sulfuric acid is an adequate condensing agent. The optimum yields were obtained with a 6- to 8-mole ratio of this agent when used at the temperature of an ice or ice-salt bath. Fluorobenzene condenses with chloral more readily than with its hydrate or its alcoholates from the lower aliphatic alcohols. The crude product was purified by crystallization from a variety of solvents. Steam distillation yielded a small amount of an oily distil-

late. DFDT was superior to DDT in both knock-down and mortality of DDT-resistant houseflies during the first 3 weeks. It ranks high enough in toxicity to the rat mite, *Echinolaelaps echidninus*, to be worthy of further investigations as an acaricide.

#### EQUIPMENT DEVELOPMENT

A precision dispenser has been developed that will release from 0.3 cc. to 1.5 cc. of Freon-12 formulations with an accuracy of 0.001 gm. using standard aerosol formula G-382.

A Westinghouse, type 2-G air compressor ran successfully for a total of 780 hours. This endurance test was conducted over a period of 5 months using simulated field conditions and represents the equivalent of several years of normal use in residual spraying activities. An appropriate 1½-horsepower gasoline engine and truck-mounted air storage tank of 20- to 60-gallon capacity complete a practical and reliable unit for air compression on residual spray programs.

A 15-gpm spur gear pump with Graphitar bearings and monel shafts operated satisfactory for 1,041 hours. A surplus aircraft-type spur gear pump continues satisfactory at 700 hours. Both require less attention than does a piston-type pump when used for circulating a 5-percent-DDT xylene emulsion.

A spray can (knapsack type) of 2 gallons liquid capacity has been constructed of aluminum, designed for 80 to 100 pounds air pressure as an initial charge with sufficient air capacity to empty the liquid tank at a constant pressure of 40 psi.

## Training

#### Field Training

Activities during this quarter were devoted to securing qualified training

personnel and procurement of laboratory equipment for use in training courses scheduled for the last half of the fiscal year 1949. The first of these, "Advanced Training Course for State Bacteriologists Primarily Concerned with Water or Milk Analyses or Food Utensil Examinations," was scheduled to be held March 21 to April 8, and the second, "Orientation Course for Laboratory Personnel in the Examination of Sewage, Polluted Waters, and Industrial Wastes," was to be held April 11 to May 6.

**Columbus, Ga.** The 5th Sanitarians Course was completed during this quarter, with certificates issued to 26 trainees. Guest lecturers from five agencies participated in this course. A trainee from Guatemala City, Central America, attended a 4-week special course in water purification and sewage treatment.

The trainees and instructors from this station attended a 3-day school for sanitarians and sanitary engineers in Atlanta October 13 to 15, 1948.

Clyde F. Herring, S. A. Sanitary Engineer, left this station December 1, 1948, to open the field training station in Denver, Colo. James B. Carey, Sanitary Engineer, reported November 1, 1948, to aid in the training activities.

**Denver, Colo.** The Rocky Mountain Training Center will serve Colorado, Wyoming, Utah, Idaho, and Montana. Staff personnel of the U. S. Public Health Service Regional Office, the Colorado State Health Department, the City and County of Denver Health Department, the Colorado Medical School, and the Tri-County Health Department (which serves three counties adjoining Denver) will be available to participate in training activities. The Regional Office will recruit trainees from all States except Colorado. Recruitment in Colorado will be handled by the State Health Department. It is hoped that the first 11- or 12-week course for sanitation trainees can begin on or about April 4. This will correspond to regular quarter activities of the

medical school.

**Savannah, Ga.** The health education training officer helped plan and direct the work of two new locally employed health educators, and participated in local health programs relative to health education philosophy and techniques at three meetings: with the Savannah Mental Hygiene Society, the local Tuberculosis Association, and at one local hospital with senior nurses as part of a course in public health. She held two conferences with the CDC housing consultant regarding a proposed housing survey in Savannah and participated in three local health department staff conferences.

Preliminary plans were made for field training of health educators during the periods March 21 to May 28 and June 20 to September 11. In this connection, more requests were received for assignment of trainees during the summer by the schools of public health than could be accommodated.

**Topeka, Kans.** A 3-month environmental sanitation training course for sanitarians was held during the period August 30 to November 20, 1948. Seven trainees completed this course.

A 2-week course on eating and drinking establishment sanitation, offered during the period November 29 to December 11, 1948, was attended by 20 trainees.

A conference with State and city officials in Minneapolis, Minn., has been scheduled to develop a program of training for milk sanitarians for this city. The program will be sponsored by city and State officials, U. S. Public Health Service Regional Offices 5 and 7, and the Topeka Field Training Center.

This station is cooperating with the State Board of Health, Division of Local Health Administration; the U. S. Public Health Service Regional Office No. 7; and the Kansas State College, in an endeavor to incorporate public health sanitation subjects into the course of study in "Institutional Management" for undergraduate work. The training center will

supply program material and lecturers. This will be a continuous program requiring approximately 4 lecture hours each school semester.

**Troy, N. Y.** The 3rd 12-week field training course for sanitary inspectors was completed on December 4, 1948, and certificates of satisfactory completion were issued to 12 trainees. Guest lecturers from eight agencies participated in this course.

Several meetings were held with Professor Bradley of the University of Massachusetts and Dr. Gill, District Health Officer of the Massachusetts Department of Public Health, relative to developing plans to present an 8-week course for undergraduate sanitarians of the University of Massachusetts, to be held during the summer of 1949, and a 1-week topical course to be held at the University of Massachusetts for the training of sanitary inspectors in Massachusetts and other New England States.

#### **STATE FIELD TRAINING — COOPERATIVE ENTERPRISES**

Personnel of the Insect and Rodent Control Branch conducted a 5-day insect and rodent control course at the Louisiana Public Health Training Center in New Orleans during the week of November 15. This was the 4th program of this type for sanitarians, which has been presented in cooperation with the Louisiana Training Center. It was attended by 17 sanitarians.

#### **Headquarters Training**

##### **INSECT AND RODENT CONTROL**

The 7th semiannual field training course in "Rat-Borne Disease Prevention and Control" was presented during the period October 11 to November 5, 1948. This course was attended by 17 men from CDC, State health departments, and foreign countries. Four were students from Canada, China, Iraq, and Venezuela. All basic lectures were presented by Training Division personnel, while certain of the more specialized topics were discussed by specialists from

other agencies.

A 1-week course in insect control was presented for eight trainees from South Carolina during the week of November 8, 1948. The course included the biology, identification, and control of mosquitoes, flies, fleas, and certain other insects of public health importance. Field work included demonstrations of DDT mist larviciding and DDT residual spraying.

Personnel of the Insect and Rodent Control Branch assisted in conducting the following decentralized training courses during the quarter: (1) a 2-week rat-control course at Kansas City, November 29 to December 8, attended by 24 men from Midwestern States, and (2) a 3-day rodent-control school at Arlington, Va., December 8 to 10. This school was sponsored by the Arlington County Health Department, the Virginia State Health Department, U.S. Fish and Wildlife Service, and the Communicable Disease Center. Forty persons from Arlington County and the District of Columbia attended.

##### **TRAINING PUBLIC HEALTH PERSONNEL FROM FOREIGN COUNTRIES**

Special observation and training courses, ranging from 1 day to 5 weeks, were arranged for 12 public health personnel from 11 foreign countries who visited the Training Division during the quarter. These visitors were from Bolivia, Brazil, China, England, Guatemala City (Central America), Honduras, India, Mexico, Norway, Scotland, and Uruguay.

Advanced training in rat-borne disease control and related subjects was arranged for a foreign trainee, following his completion of regular courses in rodent and insect control. This work continued from November 15 through December.

##### **HOUSING SANITATION**

Two trainees, one from Minneapolis, Minn., and one from Columbus, Ga., completed regularly scheduled housing sanitation courses during the quarter.

### ORIENTATION

The orientation class for CDC personnel which began on October 12 was completed on November 30. Attendance during the course varied from 22 to 25.

A special 1-week orientation course for nurses was also presented during this quarter at the request of the CDC nursing consultant. Four nurses attended this course, two from Georgia, one from Arkansas, and one from Louisiana.

### Other Headquarters Activities

#### SPECIAL ASSIGNMENTS

The Chief of the Division participated in the American Public Health Association convention activities at Boston, Mass., November 8 to 14. A report was presented to the Public Health Engineering Section dealing with field training of public health department personnel and outlining a plan for a conference of educators in environmental sanitation.

R. J. Hammerstrom, Senior Sanitary Engineer, was transferred in November from the Training Division, CDC, to assume the duties of engineering representative, Division of Commissioned Officers, U. S. Public Health Service, at Washington, D. C.

## Veterinary

The Division inaugurated new programs in Texas and Wisconsin. Dr. Kenneth Young was assigned to the Texas State Health Department to begin a rabies control campaign, study animal diseases communicable to man, and plan a veterinary public health program which the State will operate in the future. His first assignment was to initiate a rabies program in Austin, Tex., obtain material for State regulations, prepare educational materials, and design a sanitary dog shelter. Dr. Young will also assist the State health officials in their investigations of Q fever.

Dr. Dwight L. Lichty reported to the Wisconsin Board of Health to assist in their brucellosis studies and to develop a veterinary public health program. The brucellosis studies are being supported by the State Board of Health, U. S. Children's Bureau, and the University of Wisconsin Veterinary Science Department. The study will be concentrated in the area surrounding Madison, on farms where human brucellosis has been confirmed by isolation of the bacteria from the case. Twenty-eight cases are under study, of which 26 are *Br. abortus*, one *Br. suis*, and one *Br. melitensis*.

During the calendar year 1948 the *Salmonella* Typing Station, Bureau of Laboratories, Michigan Department of Health, serologically identified 25 *Salmonella* types which were isolated from 190 human and animal infections, many of which were brought to attention by the efforts of the veterinary officer. With few exceptions, most of these cases occurred in Michigan during 1948. Most of them occurred sporadically and the source was either obscure or unknown. However, a single Michigan institution accounted for 39 of the cases. A brief description of this institutional outbreak is given below:

#### Institution Outbreak of *Salmonella* Infection Associated with Dried-Egg Powder

Over a period of 8 months, seven different types of *Salmonella* were recovered from stool specimens collected from 39 patients in a hospital in Michigan. With almost all of these patients, gastro-enteritis had prompted the collection of a stool specimen for culture. The average age of the infected patient was between 55 and 65 years. Two of the patients died; the direct cause of death, however, probably was not due to *Salmonella* infection.

The *Salmonella* types isolated in order of frequency were as follows: *S. montevideo* from 19 persons, *S. tennessee* from 3 persons, *S. give* from 4 persons, *S. manhattan* from 4 persons, and *S. softenburg* and *S. newington*, each from 1 person.

Multiple infections with two *Salmonella* types were discovered in four of the above patients. From the stool specimens of two of these pa-

tients with multiple infection, both *S. oranienburg* and *S. montevideo* were isolated. From the stool specimens of another patient both *S. montevideo* and *S. give* were isolated, and from the 4th both *S. tennessee* and *S. manhattan* were isolated.

It was noted that all the types of *Salmonella* isolated from these patients were frequently reported in literature as being isolated from dried-egg powder. Investigation revealed that the hospital was using government surplus dried-egg powder to prepare eggnog for the daily hospital ration. Twelve individual samples of the egg powder in storage at the hospital were collected for culture. Each sample was divided into two parts; one for cultural examination by the hospital laboratory, and the other by the Michigan Department of Health Laboratory. Both laboratories were able to isolate *S. montevideo* from several of these samples.

In view of this limited evidence it was agreed that proper precautions should be taken with further use of the dried-egg powder. It was recommended that the egg powder be used as soon as possible after reconstitution and that any egg powder preparation be sufficiently heated to destroy *Salmonella* organisms.

Q fever studies are continuing at Hamilton, Mont., with Dr. Herbert Stoenner in charge of the veterinary investigations. He will study the pathogenesis of the disease and immunological behavior in the bovine. The studies on the use of aureomycin as udder infusions in cows has not been demonstrated to be of value. During a recent field trip *Brucella abortus* was isolated from sheep's milk by egg (yolk sac) inoculation, according to Dr. Stoenner's report which follows:

"In late September 1948, an attempt was made to isolate *Coxiella burneti* from sheep's milk which had been collected from sheep at Chino, California. The testing of this milk was incidental to an epidemiological investigation of a human case of Q fever presumably contracted on this ranch. Quite accidentally, through chick embryo culture (yolk sac) of the sheep milk, a strain of *Brucella* was isolated. Confirmatory and differential tests proved the organism to be *Brucella abortus*. A search through the literature at this station has revealed no previous isolation of *B. abortus* from sheep in this country. Of interest in this isolation is that *B. abortus* was not isolated from guinea pigs injected with the same lot of milk, yet each of five eggs receiving it yielded a culture of *B. abortus*."

The histoplasmosis study in the midwest has presented evidence that human and bovine re-

actors have a close correlation in eastern Kansas. The incidence of dog infections has not followed any pattern. Late in the quarter canine specimens were received from a veterinarian at Nashville, Tenn., from which histoplasma organisms were recovered. Further inquiry revealed that other dogs in the same kennel had suffered from a similar disease. The Tennessee health authorities are pursuing the investigation in Nashville to determine the source of canine infection.

The Rabies Control Branch gave the first laboratory course for the diagnosis of rabies in the Communicable Disease Center Laboratory, Atlanta, Ga. A full class of 16 students attended. Dr. Tierkel assisted the Florida Board of Health in drafting a rabies control bill for presentation to the next legislature, and extended aid to South Carolina in planning a program.

#### CONSULTATION REQUESTS

Consultation service requests of the Rabies Laboratory were received from many parts of the country, extending from Tennessee to Washington and from Oregon to Maine. The parts of the country which have been free of rabies for any period of time are always interested in having their suspicious cases confirmed as being negative. Maine reported a case of rabies in a fox, the first in a number of years. In cooperation with the Rabies Control Branch, control procedures were immediately put into effect by the Maine health authorities. No further cases have been observed or reported. A number of foxes were trapped, and their brain and salivary glands were sent to the Rabies Laboratory for examination. No evidence of rabies was found.

A diagnosis of pseudorabies (Aujeszky's Disease) was made by mouse inoculation of a dog brain from Florida. Two of the four mice died in 5 and 6 days with symptoms of pruritus and paralysis. No inclusion bodies were found in the brains of the mice. The history of the dog stated it had severe pruritis before death.

A study of additional diagnostic methods indicates that microscopic examination of the ganglion nodosum is a practical procedure in the hands of a pathologist. The advantages are that it is readily acces-

sible and is more resistive to autolysis than the brain. A comparative study of various stains showed that Seller's Stain required less time and equipment, and the working stain is more stable.

Headquarters activities included conferences with the Washington State Health Department on the establishment of a study of animal diseases communicable to man in the Columbia River Basin. Such a project will include a survey of all animal and insect reservoirs to define a base line of disease incidence which can be used as the area is developed and human and animal

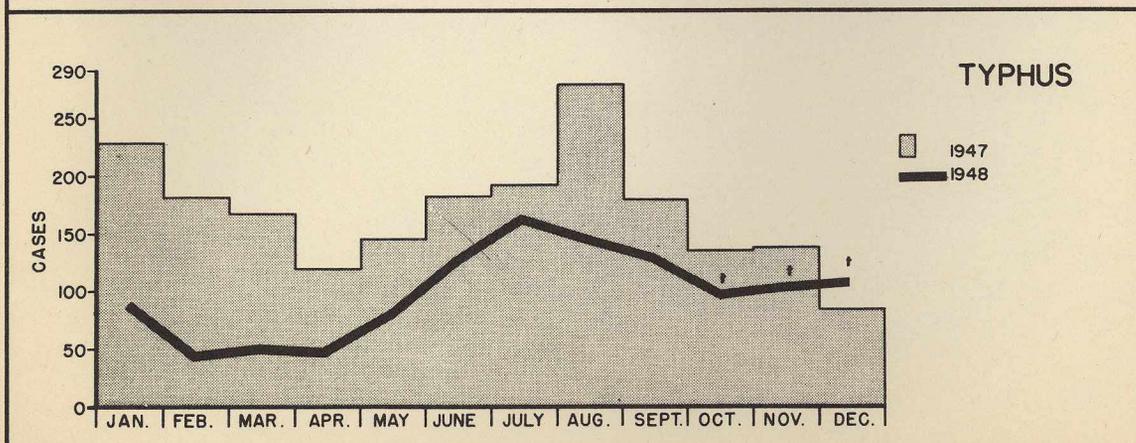
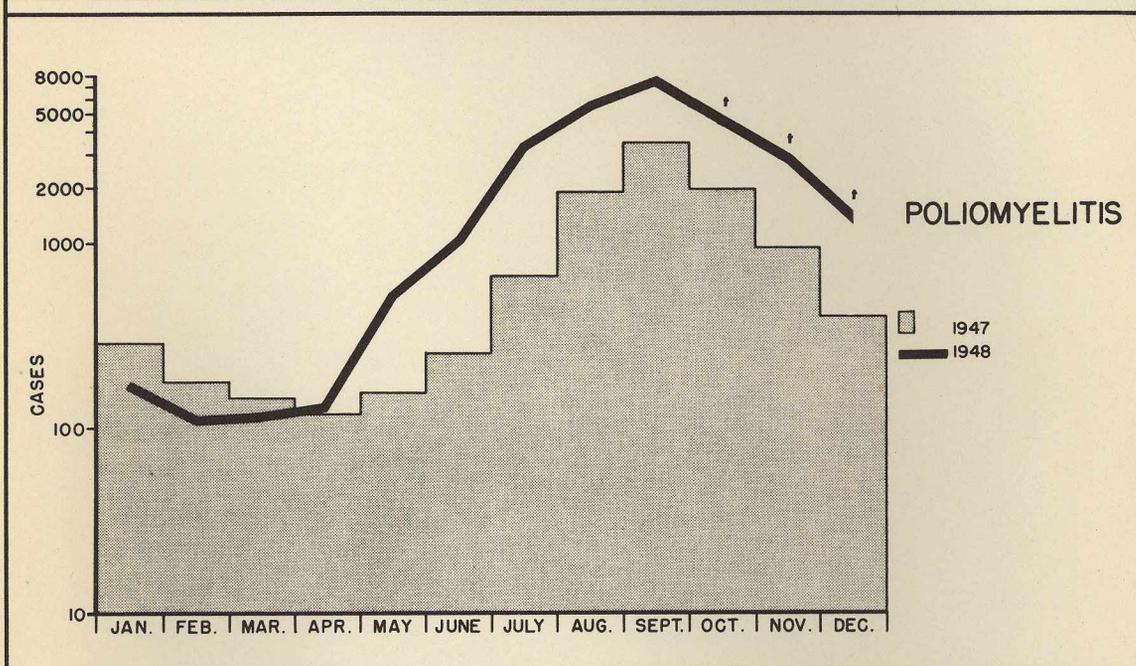
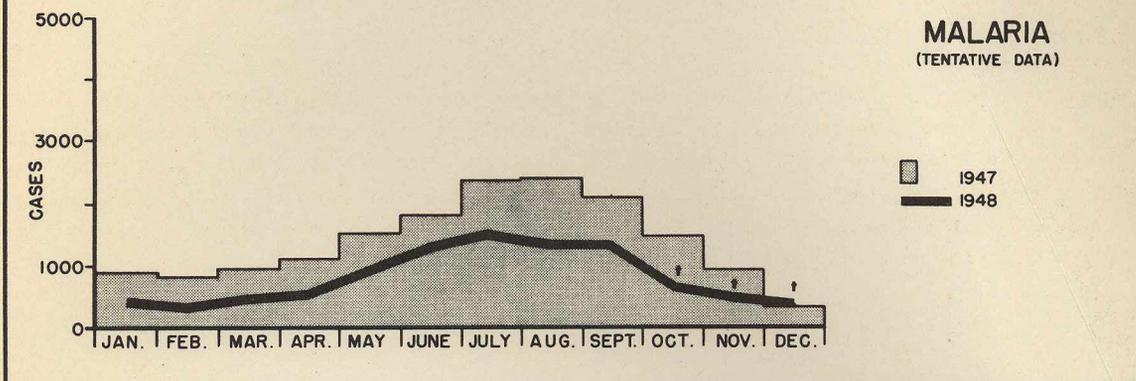
populations increase. At present discussions are being held by all the interested State and Federal agencies in the area. To coordinate the project and assist in its development, a veterinary officer will be assigned to the Washington Health Department in 1949.

The Second Inter-American Congress of Brucellosis was held in Argentina November 17 to 30. Dr. James H. Steele was selected by the State Department to be chief of the American delegation. He presented a discussion of the epidemiology of brucellosis in the United States.



## MORBIDITY TOTALS FOR THE UNITED STATES \* MALARIA, POLIOMYELITIS, TYPHUS

1947 - COMPLETE    1948 - AS REPORTED



FSA PHS-CDC ATLANTA, GEORGIA

\* DATA FROM TABULATIONS BY PUBLIC HEALTH METHODS, USPHS  
† OCT., NOV. & DEC. 1948 DATA ARE TENTATIVE AND INCOMPLETE

