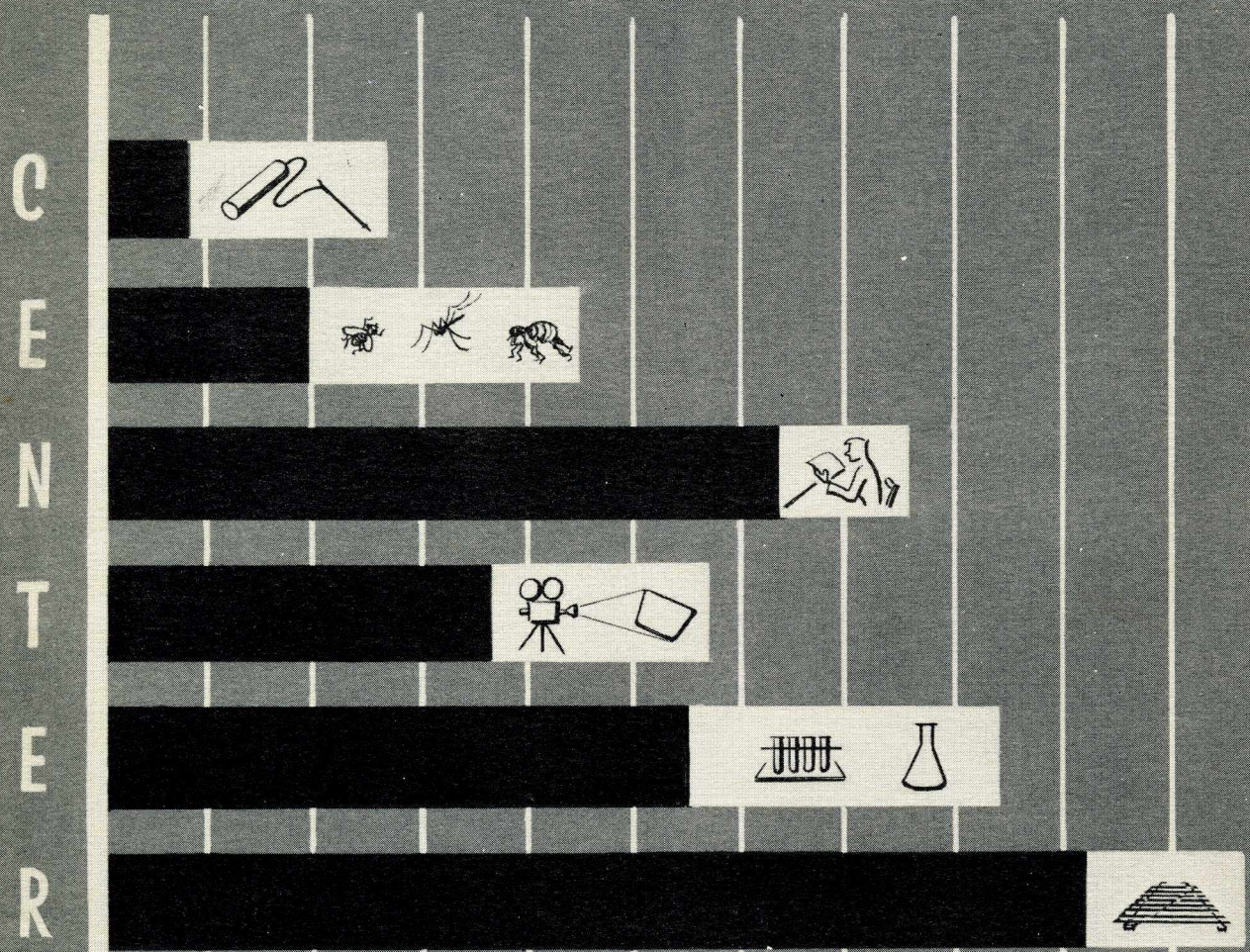
CDC BULLETIN

SEPTEMBER 1951



HIGHLIGHTS

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

CDC BULLETIN
SEPT. 1951
Vol. X, No. 9

CONTENTS

FEDERAL SECURITY AGENCY
Public Health Service
Communicable Disease Center
Atlanta, Georgia

The printing of this publication has been approved by the Director of the Bureau of the Budget, January 19, 1950.

ADMINISTRATIVE SERVICES

MEDICAL—DENTAL CLINIC

Effective June 1, 1951. the Medical—Dental Clinic was placed organizationally under the direction and supervision of Administrative Services. Professional direction and guidance will continue to be the responsibility of the Executive Office. S. A. Surgeon (R) James B. Sidbury, Jr., was appointed Medical Officer in Charge.

FIELD ADMINISTRATIVE SERVICES

Early in May, discussions were begun with the State offices and CDC field stations regarding the necessity for transferring responsibility for administrative services necessary to their operations to the headquarters office because of curtailment of funds for the fiscal year 1952. Plans were made for reduction in the administrative staffs of various offices. By the end of the year, the administrative assistants in the State offices of Alabama, South Carolina, and Louisiana found other positions and administrative work as necessary is performed by the headquarters office, except for routine transactions processed at State offices. Plans are under way for similar adjustments in the Arkansas, Mississippi, and Texas offices.

PERFORMANCE RATING ACT OF 1950

Public Law 873, 81st Congress, approved September 30, 1950, enacted the "Performance Rating Act of 1950." This abolished the Uniform Efficiency Rating System and authorized the establishment of the Agency Performance Rating Plan. In December, instructions were issued to carry out the requirements of the Act, the first rating being due on May 31, 1951.

ENACTMENT OF FICA

Public Law 734, 81st Congress, effective January 1, 1951, made all Civil Service personnel not subject to the Civil Service Retirement Act subject to the Federal Insurance Contributions Act. Approximately 250 CDC employees are subject to this deduction.

JOINT TRAVEL REGULATIONS

Joint Travel Regulations for commissioned officers allowing $9.00 per diem and other expenses incidental to travel became effective April 1, 1951. The original of the joint ruling required the issuance of special travel orders for travel by Government-owned vehicles. Since this regulation was not praticable from the standpoint of CDC operations, a strong request setting forth the difficulties resulted in an amendment so as to permit issuance of F. Y. orders including the use of Government-owned vehicles.

QUARTERLY REPORTS COVERING UTILIZATION OF GOVERNMENT-OWNED VEHICLES

Revisions in the regulations and procedures covering the use of Government-owned vehicles for transportation between the office and domicile make necessary the submission of quarterly reports covering utilization. A deadline of the 15th of the month following the close of the quarter was set for the receipt of these reports in the Central Office where careful screening is made of the reasons for the utilization to assure conformity with regulations and the conditions of the authorization.

SOME CURRENT BOOKS RECENTLY ADDED TO THE LIBRARY

Allen, A. C.: The Kidney, medical and surgical diseases, 1951.

American Pharmaceutical Association: The national formulary, 9th ed., 1950.

American Veterinary Medical Association: Directory, 1950.

American Water Works Association: Water quality and treatment, 1950.

Annales de parasitologie humaine et comparee, 1951.

Atlanta City Directory Company: Atlanta city directory, 1950.

Baer, J. G.: Ecology of animal parasites, 1951.

Baldwin, E. J.: Dynamic aspects of biochemistry, 1949.

Bartlett, John, comp.: Familiar quotations, 12th ed., 1950.

Bell, E. T.: Renal diseases, 2d ed., 1950.

Bray, William E.: Clinical laboratory methods, 4th ed., 1951.

Buros, O. K.: Mental measurements yearbook, 1949.

Carnegie, Dale: Public speaking and influencing men in business, 1949.

Chobot, Robert: Pediatric allergy, 1951.

Color atlas of pathology. Prepared under the auspices of the U. S. Naval Medical School of the National Medical Center, Bethesda, Md., 1950.

Cronbach, L. J.: Essentials of psychological testing, 1949.

Davis, H. L. *et. al.*: Mechanism and evaluation of antiseptics. New York Academy of Sciences. Annals, v.53, art. 1, 1950.

Emerson, Haven, ed.: Administrative medicine, 1951.

Gellhorn, Walter: Security, loyalty and science, 1950.

Gibbs, F. A.: Atlas of electroencephalography, v.1, 1950.

Glasstone, Samuel: Source-book on atomic energy, 1950.

Hanlon, J. J.: Principles of public health, 1950.

Haurwitz, B. *et. al.*: Ocean surface waves. New York Academy of Sciences. Annals, v.51, art. 3, 1949.

Hermann, G. H.: Methods in medicine: the manual of the medical service of George Dock, 1950.

Hopkins, E. S.: The practice of sanitation, 1951.

Irvine, K. N.: BCG vaccination in theory and practice, 1949.

Kauffmann, Fritz: The differentiation of *Escherichia* and *Klebsiella* types, 1951.

Keefer, C. S. *et. al.*: Terramycin. New York Academy of Sciences. Annals, v.53, art. 2, 1950.

Kelly, F. C.: Microbiology, 1949.

Kendall, M. G.: Rank correlation, 1948.

Lardy, Henry A., ed.: Respiratory enzymes, 1949.

MacLeod, C. M., ed.: Evaluation of chemotherapeutic agents, 1949.

Medicinal chemistry; a series of reviews, v.1, 1951.

Mellan, Ibert: Industrial solvents, 2d ed., 1950.

Most, Harry, ed.: Parasitic infections in man, 1951.

Mountin, J. W.: Role of grants-in-aid in financing public health programs, 1949.

National Health Assembly, Washington, D. C., 1948: Planning for health services – a guide for states and communities, 1949.

Nokes, M. C.: Modern glass working and laboratory technique, 1950.

Phelen, V. B.: Care and repair of the house, 1950.

Prosser, C. L.: Comparative animal physiology, 1950.

Public Works Congress: Proceedings, 1949, 1950.

Quick, A. J.: The physiology and pathology of hemostasis, 1951.

Reiss, Frederick *et. al.*: Medical mycology. New York Academy of Sciences. Annals, v.50, art. 10, 1950.

Sherwood, N. P.: Immunology, 3d ed., 1951.

Sigurdsson, Sigurdur: Tuberculosis in Iceland. Public Health Service Technical Monograph No. 2, 1950.

Snygg, Donald: Individual behavior, 1949.

Thorndike, R. L.: Personnel selection, 1949.

Titmuss, R. M.: Problems of social policy, 1950.

Turner, C. E.: Community health educator's compendium of knowledge, 1951.

U. S. Armed Forces Information School, Carlisle Barracks, Pa.: The Army almanac, 1950.

U. S. Armed Services Medical Procurement Agency: Armed services catalog of medical material, 1949.

U. S. Army Medical Library: The pituitary-adrenocortical function: ACTH, cortisone and related compounds, a bibliography, 1950.

U. S. National Security Resources Board. Health Resources Office: U. S. Civil defense health services and special weapons defense, 1950.

U. S. President's Water Resources Policy Commission: Report. 3v., 1950.

U. S. Public Health Service: Medical school grants and finances. pt. 1-3. 1950,1951.

U. S. Public Health Service: Report of Philippine public health rehabilitation program, July 4, 1946-June 30, 1950.

U. S. Public Health Service. Bureau of State Services: Salaries of local public health workers, 1950.

U. S. Public Health Service. Division of Sanitation: Refuse collection and disposal. Bibliography, 1949.

U. S. Public Health Service. Division of Water Pollution Control: Guide to source material on water pollution control, 1950.

Wald, Abraham: Statistical decision functions, 1950.

Witton, C. J.: Microbiology with application to nursing, 1950.

MANUSCRIPTS EDITED, CLEARED

Fifty manuscripts as follows were edited and cleared for presentation and/or publication:

Andrews, J. M.: The biologist in public health.

Andrews, J. M.: A review of malaria in the United States.

Atchley, F. O.: *Leucocytozoon andrewsi* n. sp., from chickens observed in a survey of blood parasites in domestic animals in South Carolina.

Bigham, J. T., Sabrosky, C. W., and Dow, R. P.: Sequel to Bigham's investigations on *Hippelates* in the Southeastern States (Diptera, Chloropidae).

Bradley, G. H., and Hansen, C. A.: CDC programs of interest to mosquito control workers.

Brookman, B., and Reeves, W. C.: New records of Mexican mosquitoes from lower California, with notes and descriptions (Diptera: Culicidae).

Clark, W. H., Lennette, E. H., and Romer, M. S.: Q fever in California. XI. An epidemiologic summary of 350 cases occurring in Northern Calif. during 1948-49.

Clark, W. H., Lennette, E. H., and Romer, M. S.: Q fever in California. IX. An outbreak aboard a ship transporting goats.

Cockburn, T. A.: Encephalitis in the Missouri River States—10. Studies on the role of birds in the ecology of Western equine encephalomyelitis virus.

Edwards, P. R., and Fife, M. A.: A new *Salmonella* type: *Salmonella homosassa.*

Edwards, P. R., and Fife, M. A.: A new *Salmonella* type: *Salmonella milwaukee.*

Edwards, P. R., DeCapito, Thelma, and Fife, M. A.: A new *Salmonella* type: *Salmonella thomasville.*

Ewing, W. H., Hucks, M. C., and Taylor, M. W.: Interrelationship of certain *Shigella* and *Escherichia* cultures with special reference to a new *Shigella boydii* serotype.

Georg, L. K.: Cultural and nutritional studies of *Trichophyton gallinae* (Megnin) N. Comb. and *Trichophyton rosaceum* Sabouraud.

Georg, L. K.: Ringworm of cattle and "favus" or ringworm of chickens transmissible to man.

Georg, L. K., Ajello, L., and Gordon, M. A.: A selective medium for the isolation of *Coccidioides immitis.*

Good, N. E., Schubert, J. H., and Mohr, C. O.: Basic factors determining the incidence of murine typhus infection in domestic rats.

Gordon, M. A.: Lipophilic yeastlike organisms associated with tinea versicolor.

Henderson, J. M.: Remarks on irrigation and mosquito problems.

Hook, J. T., and Parsons, E. I.: The use of human serum in the *in vitro* test for the virulence of *C. diphtheriae.*

Jensen, J. A., and Pearce, G. W.: Synthesis of radioactive iodine analog of DDT.

Keener, G. G., Rowe, J. A., and Smith, G. E.: A study of mosquito breeding on four dry-farm areas along the Republican River, Nebraska and Kansas, 1949.

Kite, J. H., Jr., Patnode, R. A., and Read, T., Jr.: Differentiation of saprophytic from virulent mycobacteria by intracutaneous inoculation of guinea pigs.

Klein, G. C., Maltz, M., Cummings, M. M., and Fish, C. H.: The efficacy of centrifugation as a method of concentrating tubercle bacilli in sputum digested with sodium hydroxide.

Langmuir, A. D.: The importance of respiratory diseases.

Lieux, D. B.: Malaria in Florida.

Lieux, D. B., and Braddock, W. B.: Comparative tests with the Dyna-Fog Jet Generator and Buffalo Turbine for adult mosquito control.

Lindsay, D. R.: Progress in the control of fly-borne disease.

Lyman, F. E., and Bradley, G. H.: Fly control incidental to the residual spray program.

Mandel, E. E.: Renal medullary necrosis—a review.

Menges, R. W.: Canine histoplasmosis.

Menges, R. W., Furcolow, M. L., and Hinton, A.: The effect of humidity and temperature on the growth of *Histoplasma capsulatum* and other pathogenic fungi.

Patnode, R. A., Robinson, J. H., and Fish, C. H.: Rapid estimation of the percentage of viable cells in BCG vaccine.

Pratt, H. D.: *Ficalbia minima* (Theobald) in South Indochina, with a description of the larva and pupa. (Diptera: Culicidae).

Rainey, M. B., Keener, G. G., Smith, G. E., and Rowe, J. A.: A critical study of factors causing mosquito breeding in two irrigated areas in Nebraska in 1950.

Repass, R. P.: A note on the laboratory colonization of *Aedes triseriatus.*

Schoof, H. F., and Ashton, D. F.: The decline and last recorded outbreaks of malaria in North Carolina.

Shields, S. E., Church, J. L., Jr., and Meade, R. H.: The history of residual spraying in Tennessee with notes on operational procedures.

Simmons, O. A., and Parsons, E. I.: The re-use of rabbits for the virulence testing of *C. diphtheriae*.

Siverly, R. E., and Emmet, J.: Human myiasis from the screwworm fly in Arizona.

Smith, G. E., Rowe, J. A., and Shultz, G. R.: Mosquito records from the Missouri River Basin States.

Sommermeyer, L. M.: Laboratory studies on nursing procedures, an essential function of the nursing profession.

Steele, J. H.: Animal diseases of public health significance.

Steele, J. H.: Veterinary Public Health at work.

Stucker, C. L., Galton, M. M., Edwards, P. R., and Fife, M. A.: A new *Salmonella* type: *Salmonella quiniela*.

Thompson, G. A., Howitt, B. F., Gorrie, R., and Cockburn, T. A.: Encephalitis in the Midwest. VI. Western equine encephalomyelitis virus isolated from *Aedes dorsalis* Meigen (Diptera, Culicidae).

Tisdale, E. S.: A national program for training public health personnel.

West, M. G., and Edwards, P. R.: A new *Salmonella* type: *Salmonella albany*.

Wilcomb, M. J., Jr.: Community rodent and fly control.

Winn, J. F., Huebner, R. J., and Elson, B. E.: Q fever studies in Southern California. XIII. Feeding of colostrum containing *C. burnetii* antibodies to newborn calves of two categories.

AUDIO-VISUAL PRODUCTION SERVICES

MAJOR PRODUCTIONS RELEASED DURING THE QUARTER

Motion Pictures

M10a High Temperature Short Time Pasteurization, Part II – Inspection and Testing. 16 mm., sound, black and white, 19 minutes, 742 ft.

M14 Techniques of BCG Vaccination, Part I – Tuberculin Testing and Part II – BCG Vaccination. 16 mm., sound, color, 40 minutes, 1,444 ft.

M42 Chick Embryo Techniques. 16 mm., sound, black and white, 15 minutes, 557 ft.

M57 Infectious Hazards of Bacteriological Techniques. 16 mm., sound, color, 12 minutes, 464 ft.*

M7 Milk and Public Health. 16 mm., sound, black and white, 12 minutes, 400 ft.

Filmstrips

5-170.0 Isolation and Identification of *Salmonella* and *Shigella* Cultures, Part II – Simplified Serologic Identification of *Salmonella* Cultures. 35 mm., sound, color, 6 minutes, 29 frames.

F10a High Temperature Short Time Pasteurization, Part I – Equipment and Controls. 35 mm., sound, black and white, 12 minutes, 95 frames.

F24 A Mycological Slide Culture Technique. 35 mm., sound, color, 4 minutes, 36 frames.

F57a** Infectious Hazards of Bacteriological Techniques, Part I – The Inoculating Needle. 35 mm., sound, color, 10 minutes, 101 frames.*

F57c** Infectious Hazards of Bacteriological

Techniques, Part III – The Hypodermic Syringe. 35 mm., sound, color, 10 minutes, 101 frames.*

F57d** Infectious Hazards of Bacteriological Techniques, Part IV – The Pipette. 35 mm., sound, color, 9 minutes, 75 frames.*

F57g** Infectious Hazards of Bacteriological Techniques, Part VII – The Lyophilizer. 35 mm., sound, color, 7½ minutes, 88 frames.*

F87** An Introduction to Indo-China. 35 mm., sound, color, 13 minutes, 54 frames.

2- by 2-Inch Slide Series

9-034.0** Insects of Importance to Public Health in the United States. Color, 35 slides.

S78** Milk Processing Plant Layouts. Black and White, 13 slides.

S79** Selected Milk Processing Equipment. Black and white, 13 slides.

MAJOR PRODUCTIONS COMPLETED AND AWAITING RELEASE AT END OF THE QUARTER

Motion Pictures

M51a Laboratory Control for Milk Sanitation.

2- by 2-Inch Slide Series (Trials Stage)

S1 Microdissection – Mosquito.

S14 Operating a BCG Clinic.

Exhibits

E77 Fly Control Operations (For Engineering Services)

DIVISION OF CHRONIC DISEASE AND TUBERCULOSIS STATE AID FILM

Work was initiated on a film, "You Can Be Safe From X-Rays." This film will be released as a filmograph, which is a series of still pictures similar to a filmstrip, but released on 16 mm. film with sound on the film, so that it can be projected by a 16 mm. projector. The film, when completed, will teach operators the minimum safety precautions to be taken when operating photofluorography equipment.

*For Biological Department, Army Chemical Corps, Camp Detrick, Md.

**Productions for which prints for general distribution were not available at time of this report because of a power shortage which delayed use of processing and printing equipment.

MICROBIOLOGICAL INSTITUTE, NATIONAL INSTITUTES OF HEALTH FILMSTRIPS

A series of seven filmstrips covering safety precautions in laboratories was planned in collaboration with the Microbiological Institute. While these films are, in a sense, closely related to the series being produced for the Army Chemical Corps, Camp Detrick, the emphasis is upon the physical hazards encountered in the laboratory rather than upon the hazards from micro-organisms. Work was to begin on this series in July.

DEPARTMENT OF STATE, DIVISION OF INTERNATIONAL HEALTH FILMS

A representative of CDC has been requested to serve as Motion Picture Specialist on an audio-visual mission which is a cooperative project of the State Department, the Division of International Health, and the Economic Cooperation Administration. The mission will visit Burma, Thailand, Indonesia, Indo-China, the Philippines, and Formosa to survey local health problems and to determine what audio-visual media will best assist in their solution – whether it will be possible to serve the needs of the different countries by means of the animation type film, or whether separate films on a given subject will be needed for each country. In addition, local production facilities in these countries will be studied to determine the extent to which they may be able to function independently in producing health films, and to recommend what cooperative assistance may be required from CDC or other Government agencies. The mission was to leave for South East Asia the last of July.

VETERINARY PUBLIC HEALTH AT WORK

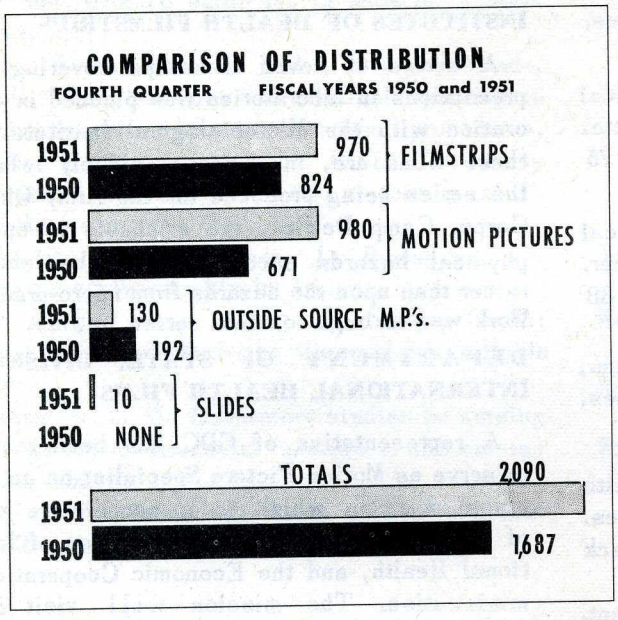
An exhibit on Veterinary Public Health at Work was in process. This exhibit is designed to depict various phases of health work executed by veterinarians, and was to be displayed at the meeting of the American Veterinary Medical Association in August.

UTILIZATION PROGRAM

In the utilization program, chart 1 shows that distribution by the film library for the quarter exceeds that for the corresponding quarter of fiscal year 1950 by 18 percent.

In May, 8 doctors going to Burma, 14 engineers going to Indo-China, and 8 nurses going to Indonesia under ECA auspices were given orientation training in the preparation and use of audio-visual aids. During the quarter, 65 visitors from

Chart 1



the U. S. and 19 from a total of 11 foreign countries were given orientation and/or training.

Thirty-one filmstrips were selected to place with United World Films, Incorporated, for sale of prints. The preprint materials were assembled for these filmstrips and plans were started for making them available to consumers on a purchase basis. This is the first time that any CDC filmstrips have been available for purchase.

A complete tabulation was made of all film loans and evaluation reports since the beginning of the CDC film library in 1947. These data are being used for research on year to year trends in the value and use of CDC production.

Five new utilization guides and a revised price list of all CDC motion pictures for sale were sent to all catalog holders.

The CDC Brucellosis exhibit was sent to the Missouri State Medical Association for display at Kansas City, Mo., April 22.

The National Committee on Films for Safety presented CDC with an Award of Merit for the sound filmstrip "Home Safety and Health Departments."

ENGINEERING SERVICES

WATER RESOURCES DEVELOPMENT

Columbia River Basin. In cooperation with the Pacific Northwest Drainage Basins Engineer in Portland, Oreg., plans were completed for the activation, early in the new fiscal year, of the vector survey work in the Columbia River Basin. CDC participation calls for the assignment of an engineer-entomologist team to the Basin Office to carry out studies in the Washington-Oregon region.

MONOGRAPHS

Two monographs "Observations on Post-Impoundment Clearing" and "Observations on the Biologic Stabilization of Uncleared Areas" are in the process of preparation. The preparation of these monographs is being sponsored jointly by the Tennessee Valley Authority and the Public Health Service.

MALARIA CONTROL ACTIVITIES

Residual Spraying. Because of an unusually late spring season, residual spray activities were under way in only one State at the beginning of the quarter; consequently, the seasonal spray cycle was not completed in several States by the end of the fiscal year. According to data taken from progress reports through June 23, residual spray projects were conducted in 120 counties in the operational States of Alabama, Arkansas, Georgia, Louisiana, Mississippi, South Carolina, and Texas; and in 51 counties in the nonoperational States of Florida, Kentucky, Missouri, North Carolina, Oklahoma, and Tennessee. In the former group of

States, a total of 346,442 residence and nonresidence spray applications was made. In the latter group of States, locally financed accomplishments included 53,594 residence and nonresidence spray applications.

The number of spray applications made during the year decreased approximately 52.52 percent from the preceding year. Local contributions increased from 48 percent of the total cost in 1950 to 56 percent in 1951.

Insecticide formulations and methods of use varied among the program States. Five States used DDT alone for both dwelling and outbuilding treatments, three used a combined DDT-chlordan formulation, two used DDT for dwelling spraying and chlordan for outbuildings, and two States, where only outbuildings were treated, used chlordan exclusively. One State continues to use a DDT-rosin formulation for outside surface treatments.

Defense-connected Activities. Tentative plans for defense area insect vector control were developed. The plans, together with estimates of personnel, equipment, and material needs and costs, were submitted for budgetary consideration. A conference was held with the Air Forces representative relative to the insect vector problem at Moody Field Air Base, Valdosta, Ga. State CDC malaria control personnel made a survey of the area and advised military authorities regarding suitable control measures. Equipment and spray materials were loaned to control the insect problem at this base.

A request was received through the Mississippi State Health Department for advice on insect control programs at two contract Air Force training bases in Mississippi.

The number of cases of malaria reported among veterans who returned from Korea showed a decided increase. This matter was brought to the attention of the program States by letter, and their close cooperation with the military was requested.

Special Studies. In accordance with prearranged plans, the States of Alabama, Georgia, and Mississippi field-tested a chlordan formulation containing kerosene as a solvent and an emulsifier identified an Anatrox A-200. This formulation was used to treat outbuildings and to spot-spray kitchens in one county in each State. Results will be compared with those obtained through the use of a standard chlordan-xylene-Triton formulation in similar areas.

With the increased use of highly toxic insecticides such as chlordan, dieldrin, and others, extra precautions have been taken to protect spray crew members. Leaky shut-off valves have been a hazard of primary concern. Two improved commercial models, laboratory tested by CDC, are being field tested in Alabama, Arkansas, Georgia, Mississippi, South Carolina, and Texas.

A tick-tularemia survey project was approved for the Arkansas program. The project provides for an intensified entomological evaluation of the tick population and behavior, as well as an epidemiological investigation of the incidence of tularemia in selected areas of the State. Ticks collected will be tested for presence of the causative organism.

TYPHUS AND RODENT CONTROL ACTIVITIES

Murine Typhus Control. The reported number of human cases of murine typhus fever and the typhus foci among domestic rats are rapidly declining, but they remain as widespread as ever. Official totals for the period January through March 1951 show 79 reported cases of murine typhus fever as compared to 137 for the same period in 1950.

Through surveys and rat blood sampling, States are endeavoring to locate the remaining foci of infection and to eradicate them through the use of DDT dust and rodenticides. Nonmedical or "lay investigations" of reported cases of typhus fever are being carried out in Georgia. These investigations are made for the purpose of guiding control operations to the foci of infection. The environmental conditions, such as rat and flea infestation, of the patient's home and place of employment, plus the places frequented during a month preceding the illness are checked and control measures applied as indicated. In the past year, 120 reported cases of typhus fever were investigated, and 1,420 premises associated with these cases were treated with DDT dust and rodenticides. In Texas, similar lay investigations of reported cases of typhus fever are being conducted.

In addition to lay investigations, the Georgia biological survey, or rat blood sampling program, is continuing. Since January 1951, 50 or more premises were sampled in 7 counties, between 25 and 50 in 1 county, and under 25 in 4 counties.

While the typhus problem in Georgia is now mainly rural, the reports from Texas indicate that the opposite is true there. Rat blood sampling by typhus control personnel and agricultural vocational students in Texas shows that positive rats

were recovered from 20 percent of the urban sections in one county and from 40 percent in another county. All rural premises sampled harbored negative rats.

In Alabama, county-wide dusting and poisoning programs are demanded by some county officials. In one county, where State personnel attempted to control typhus by spot dusting and poisoning, the program became very popular. However, property owners who were not getting service because the rats on their premises had proved negative to complement fixation tests demanded that the program be made county-wide. It has been demonstrated in Georgia, Alabama, and Mississippi that, after locating the foci of infection in rats, spot dusting and poisoning will control typhus in both humans and rats for about one-third the cost of the county-wide program.

In Mississippi, a reinspection of 157 premises in one county, which had a previous history of heavy rat infestation, revealed that 122 premises were rat free. The degree of infestation in the others was light.

State and local agencies contributed 85 percent of the total man-hours in the typhus control States. Murine typhus activities are recorded in tables 1 and 2. Public Health Service, State and district supervision, entomology and shop man-hours amounted to 9 percent of the total. Twenty-two meetings were held with a total of 421 persons in attendance. Fifty-nine sanitarians and others spent an average of 17 hours each in on-the-job training in rodent control methods. Ten communities had ratproofing projects and 418 establishments were ratproofed. Ninety-two communities had poisoning programs, and 52,477 premises were treated with poisoned bait.

City Rodent Control Activities. The activities of the 19 States participating in cooperative city rodent control consisted of survey work, antirat sanitation, training and education, conferences, poisoning, and defense-connected meetings, as shown in tables 1 and 2.

Ratproofing continued on four projects. A total of 190 establishments was ratproofed, bringing the total for the fiscal year to 1,343. One hundred and twenty-eight man-hours were devoted to maintenance of previously ratproofed buildings on three city projects. There were 7,032 premises treated on 11 poisoning projects.

Antirat sanitation received 22 percent of the total man-hours devoted to rodent control. The local governments contributed 83 percent of the above time. This indicates that programs are organized on a permanent basis and are being included as part of the sanitation programs with all the general sanitarians participating.

Twenty-three percent of the man-hours were devoted to the training and educational programs. Four hundred and ninety-four local health departments and Army and Navy sanitarians were trained in the recognition of domestic rat problems and in the initiation of proper control programs. The sanitarians were given on-the-job training in addition to classroom lectures with an average of 10 man-hours per trainee. One hundred and fifty-six meetings were held with an attendance of 3,645 persons contributing 11,852 man-hours to the meetings.

Thirty percent of the total man-hours were devoted to plague surveillance activities, of which 88 percent were reported from the Hawaiian plague projects. In 18 States, only 12 percent of the total man-hours were devoted to surveillance. Ninety-five percent of the total man-hours were contributed by local governments.

Defense-connected Activities. Training courses were given to personnel from three military establishments, and inspections for rodent infestation were made at three other military establishments. Suggestions were given to the latter three military establishments on the best methods of eliminating the infestations of rats and mice, and demonstrations were given on the use of rodenticides.

FLY CONTROL ACTIVITIES

Activities were largely concentrated on directing the current season's operational programs, and on preparation and distribution of sanitation-educational materials on fly control.

The Fly Control Packet, containing information which outlines a suggested standard procedure for conducting fly control sanitation programs in communities of varying sizes, has been reproduced in limited quantities for distribution as a sample for local reproduction. The Packet has been sent to the fly control projects, to Regional offices, and to interested States and communities.

A set of 41 slides and copies of the talk outline on sanitary landfill operations were sent to each Regional office for their use in introducing and promoting better refuse disposal methods throughout the Region.

A Fly Control Exhibit, depicting fly-borne diseases and fly control methods, was prepared for display at the FSA building in Washington. The exhibit was designed for subsequent display by State and local health departments.

Table 1

TIME AND PERCENTAGE OF WORK DEVOTED TO MURINE TYPHUS AND RODENT CONTROL

April 1 to June 30, 1951

	Murine Typhus Control		Rodent Control	
	Man-hours	Percentage of Total Time	Man-hours	Percentage of Total Time
State and Local	67,722	85	61,449	83
Public Health Service	12,208	15	12,291	17
Total	79,930	100	73,740	100
	Percentage of Total Time		Percentage of Total Time	
State and District Supervision, Shop and Entomological Service (PHS)	9		2	
State and District Supervision (State and Local)	7		3	
Antirat Sanitation Activities	6		22	
Residual DDT Dusting	14		2	
Evaluation Activities	9		30	
Ratproofing and Initial Eradication	15		2	
Maintenance of Ratproofing	2		-	
Rat Reduction (Poisoning or Gassing)	33		8	
Surveys	-		6	
Training and Education	-		23	
Miscellaneous and Leave	5		2	
Total	100		100	

Table 2

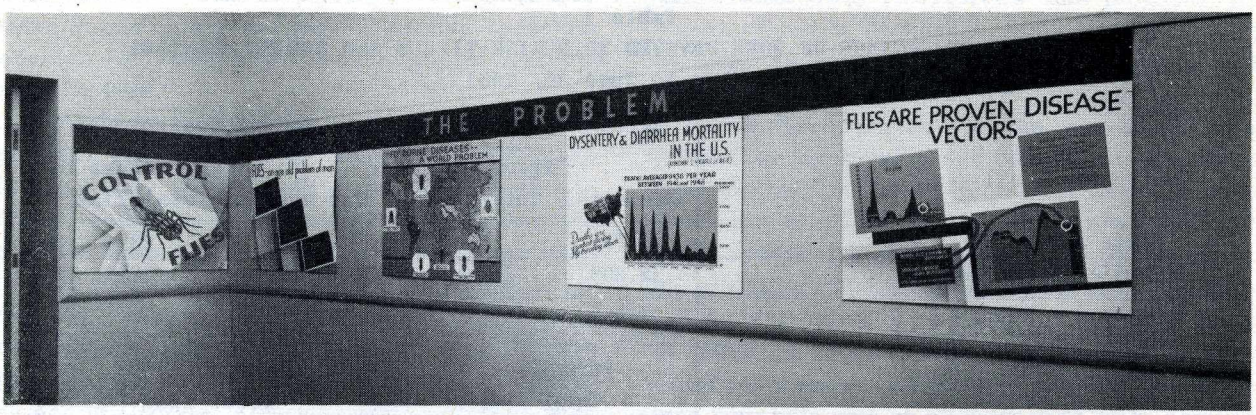
TYPHUS AND RODENT CONTROL ACTIVITIES

April 1 to June 30, 1951

	Murine Typhus Control	Rodent Control
Number of Meetings	22	156
Number in Attendance	421	3,645
Number Persons On-the-job Training	59	494
Average Man-hours per Trainee	17	10
Communities with Ratproofing Projects	10	6
Establishments Ratproofed	418	190
Communities with Poisoning Projects	92	20
Establishments Poisoned	52,477	7,032

Good fly control was maintained at Topeka, Kans. (now a locally directed fly control project). Since the general citizenry is pleased with fly control, the city has proposed the continuance of the control program in calendar year 1952.

Polio-Fly Control Projects. The sanitation program at the Charleston, W. Va., project has featured a drive to eliminate inadequate refuse containers. The drive was explained to the citizens of Charleston through the press and radio. As a by-product of the refuse container drive in Charleston, the City of South Charleston is now contemplating a major change in its refuse storage ordinance in order to regulate refuse storage better. Spraying operations began in early May. Dieldrin was used in the city-wide spraying of



Part of the Fly Control exhibit displayed in the Federal Security Agency building in Washington, D. C. This exhibit is available for loan to local and State health departments.

garbage stations; this will be followed by spot-spraying of trouble areas.

The report on the survey of Charleston's refuse collection system has been completed. The report, together with suggestions for improving the system, will be presented to the City Council.

Privy sampling in Charleston was started in May 1951 to supplement virologic data being obtained from the unsewered Chandler's Branch Section, which represents Epidemiology Study District I. As a result of meetings with a representative of the Yale Polio Study Unit, all phases of study, including epidemiological surveys, fly trapping, and sewage sampling, were intensified in two study districts in the city. The sewage and fly sampling in the remainder of the city were decreased proportionately.

At Phoenix, Ariz., the effectiveness of sanitation activities is clearly demonstrated by the marked reduction of fly-breeding media. The high level of garbage container adequacy has reduced breeding from this source to only a fraction of its former significance. Fly breeding in lettuce culls from the packing houses and in piles of lawn grass clippings raised fly counts during April and May. In a move to solve these problems, the city hired three extra crews to pick up grass clippings and made arrangements to prohibit lettuce cull dumping within a 2-mile radius of the city.

Early in the quarter, spraying operations were started as a supplement to sanitation control in high count blocks. New chemicals, Dilan as a residual, benzene hexachloride (BHC) as a larvicide, and DDT-p-dichlorodiphenyl methylcarbinol (DMC) as a space spray, proved reasonably effective against the "resistant" flies found at Phoenix.

The City Council has approved continuance of the new sanitary landfill as the permanent disposal method for the city's refuse. Operational methods currently used at the landfill, while not yet efficient, are effective in eliminating fly and rodent infestation and odors.

Dysentery-Diarrhea Fly Control Programs.

At Yuma, Ariz., all control efforts were concentrated on sanitation activities because of the high degree of "resistance" which has been encountered in the Yuma flies. Satisfactory progress has been made on privy eliminations, garbage storage facilities have been improved, and animal and fowl pens have been cleaned. However, fly breeding in pit privies and in vegetable and fruit wastes continues to present a serious problem. As a temporary means of disposal, lettuce culls have been disked into the soil or hauled a safe distance from the city and fed to cattle; cantaloupe culls were spread on unused airport runways to dry or were buried in ensilage pits; and citrus wastes were also spread on unused airport runways to dry.

The education-sanitation program in Coolidge-Casa Grande, Ariz., has progressed in presenting the methods and objectives of fly control. A radio talk on animal pens and privies was given, films on insect biology were shown at theaters in both communities, and talks on fly biology and fly control sanitation were given to 1,100 children. A survey of garbage containers in Casa Grande revealed that 90.5 percent of all premises have adequate garbage storage facilities.

Intensive education-sanitation work at the Carlsbad, N. Mex., project has led to a notable increase in garbage wrapping. The city has ordered another packer-type garbage truck to replace the remaining open body truck presently in use. The

program designed to eliminate or flyproof all privies is continuing with very good results in the unsewered portions of the city.

Loving, the check town for the Carlsbad project, has recently installed a sewerage system. Many privies have been eliminated, and several animal pens have been removed. Other sanitation improvements are planned.

The State dysentery and diarrhea Supervisor met with the local fly control committee in Roswell, N. Mex., to help in formulating plans and to furnish informational materials pertaining to the operation of a locally sponsored fly control project in that city.

The Texas State Health Department, local city officials, civic groups, and the citizenry of the project cities in Texas (Seguin, Sinton, and Taft) have shown an increasing interest in the fly control program. Premises clean-up, garbage can, and garbage wrapping drives have made significant contributions to the sanitational phase of the control program. Each of the project cities has definite plans for extending sewers to all areas within its limits, and many privies have been eliminated through this procedure; however, much still remains to be done. Refuse handling methods have improved. Taft has converted its open dump into a modified sanitary landfill and the Seguin sanitary landfill is continuing to operate efficiently. Improvements are being made in garbage pick-up equipment.

The success of the initial fly control projects in Texas has led to the establishment of three new locally financed projects at Atlanta, Olney, and San Marcos, Tex., under the supervision of the State health department. At San Marcos, immediate chemical control measures were initiated following an epidemic outbreak of dysentery and diarrhea (at least 6 deaths and more than 1,000 cases were reported). Fly populations were significantly reduced by these operations.

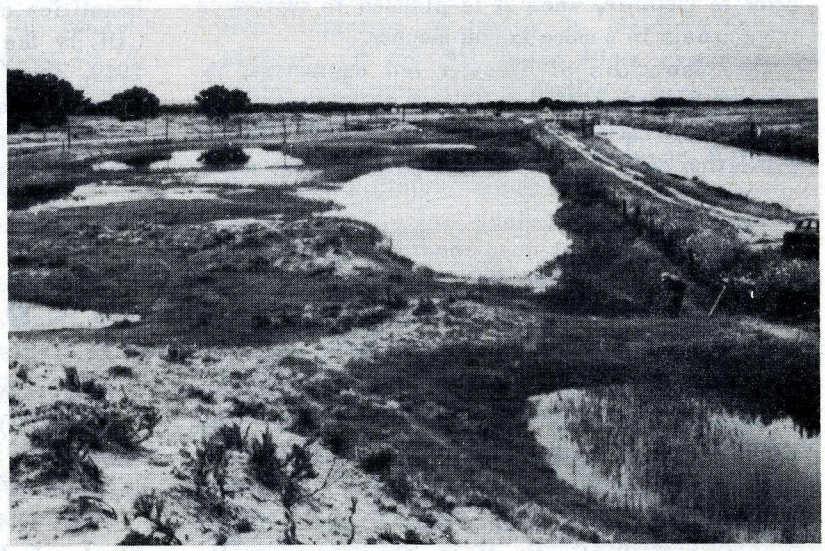
Representatives from 18 municipalities attended the fly control school which is operated at Seguin by the State health department. The training course has been received with much enthusiasm, and the department is now considering running the school on a year-round basis.

Early in May, a city-wide clean-up campaign conducted by the project city of Harlan, Ky., effected an increased civic interest in the citienzry and led to many sanitation improvements. The Harlan County Board of Health, utilizing the findings of the sanitary survey, has sent letters to all owners of insanitary privies requesting that a sanitary means of excreta disposal be provided. A study of Harlan's refuse collection and disposal system has been initiated, with the expectation that the findings of the survey can be used in effecting extensive improvements in current refuse handling practices.

IMPOUNDED WATER STUDIES

Corps of Engineers Impoundments. A mosquito control report was submitted to the Walla Walla District, Corps of Engineers, on the McNary Reservoir, now under construction on the Columbia River in Oregon and Washington. This reservoir will eliminate some important sources of mosquitoes; however, it is predicted that the seepage areas resulting from this project, coupled with possible irrigation, will create an important source of mosquitoes, including *Culex tarsalis*, the common encephalitis mosquito of the West.

Inspections were made of the sites of the Buford Reservoir (under construction in Georgia) and of the proposed Hartwell Reservoir, on the Savannah River in Georgia and South Carolina, for the pur-



Seepage from irrigation systems is a major source of mosquito production in irrigated areas. This is an example of type of problem to be studied by entomologists assigned to State health departments.

pose of securing data on their importance from the standpoint of mosquito control.

An inspection was also made of the clearing operations now being carried on by the Savannah District, Corps of Engineers, on the Clark Hill Reservoir, in Georgia and South Carolina. This work is progressing satisfactorily, and when completed, will result in a completely cleared permanent pool, with a relatively low mosquito potential. This work will do much to increase the usefulness of the reservoir from many standpoints and will reduce the need for, and the cost of, expensive recurrent mosquito control operations.

Military Establishments. At the request of the U. S. Air Force Base, Wilmington, Del., an inspection was made of the extra-cantonment area to determine the need for, and the type of, mosquito control measures. It was found that the mosquito problem in the vicinity of the base involved principally *Aedes*, *Mansonia*, and *Culex* mosquitoes. For the temporary alleviation of the annoyance caused by these insects, the use of an insecticidal fog for killing adult mosquitoes was recommended.

DISASTER AID

Copies of the disaster aid manuals relating to Vector Control – Mosquito Control, Rodent Control, and Fly Control were distributed to CDC personnel concerned with environmental sanitation, State health officers, State sanitary engineers, State epidemiologists, and a few other interested officials. All were requested to review the manuals constructively and to make comments prior to October, when it is planned to reproduce the manuals in a more formal manner.

Demonstrations of disaster aid equipment, including operation of the 100 g.p.m. truck-mounted water purification unit and the setting up and exhibition of a 1,000-gal. collapsible fabric water tank, were conducted for sanitation personnel of CDC in order to familiarize them with the equipment.

For emergency chlorination, a simplified means of controlling the flow of hypochlorite solution from a barrel was developed and tests were inaugurated. This involves the adaptation of a previously devised float-supported orifice with the substitution of a section of capillary tubing for the specially prepared orifice in a T tube.

The disaster aid equipment in Kansas City was inspected and plans were discussed for a program to train operators and to keep the equipment in readiness for emergency operation. Conferences were held with officials of Midwestern CDC Services and Region VII and with the State Sanitary Engineers of Kansas and Missouri regarding demonstration of the equipment before meetings of water and sewerage plant operators and district engineers.

The 100 g.p.m. truck-mounted water purification unit was demonstrated before 50 persons attending the Kansas Water and Sewerage Operators annual meeting at Lawrence, Kans., where the trailer for the unit, a 1,000-gal. collapsible water storage tank, and the trailer-mounted water main sterilizer were exhibited.

During the quarter, 23,000,000 halazone tablets were transferred from 20 drums to quart containers and were distributed equally among five CDC stations in Atlanta, Ga., Boston, Mass., Dallas, Tex., Kansas City, Mo., and San Francisco, Calif. These tablets, used for disinfecting small quantities of water by chlorination, were given to CDC by the New York City Board of Education in 1949. They were originally packed in 1945. Tests of random samples revealed that the strength of the chlorine product was very nearly equal to the content when manufactured.

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Menges, R. W.: The histoplasmin skin test in animals. J. Am. Vet. M. A., 119(892): 69-71 (1951).

Sumerford, W. T., Goette, M. B., Quarterman, K. D., and Schenck, S. L.: The potentiation of DDT against resistant house flies by several structurally related compounds. Science. 114(2949): 6-7 (1951).

Sunderman, F. William: Studies in serum electrolytes. XVII. Some clinical aspects. Am. J. Clin. Path. 21(4): 319-331 (1951).

Steele, J. H.: Veterinary public health activities of the Public Health Service. Mil. Surgeon. 108 (6): 486-490 (1951).

ENTOMOLOGIC SERVICES

MANUAL OF OPERATIONS FOR RIVER BASIN SURVEYS

A Manual of Operations for River Basin Surveys has been prepared as a guide toward attaining the over-all objectives of river basin surveys in a uniform and coordinated manner. Details of planning and timing of the work, together with the exact manner and methods of accomplishing it, have been left largely to the discretion of the individual responsible in each river basin survey. The usual problems which may exist with respect to insects of public health importance in any river basin are defined, and it is suggested that efforts be made to concentrate on diseases, vectors, and pests directly related to water and water use. The over-all objective in each basin study is to determine what influence, if any, water resources developments will have upon increasing or decreasing public health insect problems.

MALARIA INVESTIGATIONS

Routine observations were continued in selected areas for detection of malaria, for measurements of *Anopheles* density, and in connection with studies of other factors that might be causally related to malaria transmission. Except for the Georgia area, where unusual drought conditions continue to prevail, *Anopheles* densities were as high, or higher, than those observed in previous years. No cases of malaria were encountered in any of the experimental areas or among individuals examined in surveys.

Collateral activities were concerned with (1) surveys of animals that might be sources of sporozoites found in *Anopheles*; (2) comparisons of the bionomics and physiology of different "strains" of *Anopheles quadrimaculatus*; (3) attempts to colonize local *A. quadrimaculatus*; and (4) studies of transmission of experimental malaria infections by *Anopheles* and other mosquitoes.

HELENA, ARK., FIELD STATION:

Epidemiological Work. Regular visits were made by the nurse to residents of the intensive study area. Special efforts were made to obtain blood films from all persons moving into the area. Change of residents occurred in 68 percent of the houses and involved 81 percent of the population.

A blood survey of Negro school children was conducted between May 7 and 9, in Chicot County, Ark., a traditionally malarious county. A total of 361 blood films was obtained on the youngest pupils available; over 80 percent of those examined were between 7 and 9 years old. None were positive for malaria parasites, and discussion with physicians in Lake Village indicated that there was no suspicion of malaria at that time and that no clinical malaria had been seen for at least 2 years.

A blood survey was made of 961 male Mexican nationals brought into Phillips County, Ark. These men ranged in age from 17 through 58 years, with the predominant number between ages 21 to 39 years. A total of 24 Mexican states was represented, and questioning of the men revealed that persons from certain of these areas gave positive malarial histories. It is likely that the amount of previous malaria was minimized since the workers were reluctant to testify to previous physical debility. Of the 811 blood films examined, all proved negative. It is a pertinent question, however, whether or not routine blood smears should be taken on all Mexican nationals as they enter the United States, since authentic cases of malaria, and a few deaths due to malaria, have occurred among these people.

Biological Work. With the onset of hot summer weather in the latter part of May, there was a sharp increase in anopheline production that resulted in counts in one adult station which were over six times the number observed during the same period last year. During May and June, an average of 14.1 and 11.1 larval anophelines per dip were taken, respectively; totals of over 8,000 female *quadrimaculatus* were counted in resting places for each of these same 2 months. In contrast to this, the rice field area showed an average of 64.5 anophelines per dip in June, but only 157

quadrimaculatus females were seen. The small numbers of mosquitoes observed were due to the lack of suitable resting places available for inspection. Red boxes and other shelters were being established at the end of the quarter. Toward the latter part of June, the anopheline population dropped to more usual proportions. The best sources for adult *quadrimaculatus* were again in animal quarters and privies; inhabited human dwellings yielded practically no specimens.

In accordance with the major objective of comparing rice field and delta "strains" of *A. quadrimaculatus*, wild specimens of this species are being collected regularly from the rice field and delta areas. Gravid females are brought to the laboratory and allowed to oviposit. The eggs collected are shipped to the malaria laboratory at Columbia, S. C. Adults reared from these eggs will be tested against the NIH strain of *quadrimaculatus* for comparative susceptibility to domestic strains of human malaria.

Additional work in progress includes experiments designed to elucidate the relation of blood from different animals to egg production in the colonized and wild "strains" of *quadrimaculatus*, and an investigation of the biotic potential of these "strains."

MANNING, S. C., FIELD STATION:

Epidemiological Work. Routine monthly blood films were collected from approximately 90 percent of the 1,900 people in the study area. Laboratory findings continue to be negative for all slides submitted from this formerly endemic malarious section. Of 28 known positive smears inserted in the last reported surveys, 26 were diagnosed correctly and upon re-examination the other 2 were found to contain malaria parasites. The check slides are regularly included at the request of the laboratory.

Biological Work. Greater numbers of adults of *A. quadrimaculatus* were present this spring as compared to *Anopheles crucians*. With the possible exception of the month of May, populations of both species were low, but were above the densities of 1 year ago. A prolonged drought in May and the early part of June caused a pronounced decrease in the available breeding areas for mosquitoes, but general rains later changed the situation. Intensive breeding occurred in the observation ponds.

Totals of 1,938 wild-caught *A. crucians*, 3,603 *A. quadrimaculatus*, and 67 *Anopheles punctipennis* were dissected in April, May, and June. One of these female mosquitoes (*crucians*) was found positive with unknown sporozoites in the salivary glands. The entire mosquito was comminuted in citrated chick blood. This resulting suspension, as well as the sporozoites and salivary glands, were injected into a 1-day-old chick. For an ensuing period of 30 days, the blood-film examinations of the chick were negative. Neither animal nor human inoculations with such unidentified sporozoites from this area have ever yielded any positive information.

Culex quinquefasciatus from the laboratory colony has been extremely susceptible to infection when allowed to feed upon a bird harboring *Plasmodium relictum*. By this means, sporozoites of known origin were obtained for study.

Investigations of the techniques employed when handling unknown sporozoites from wild-caught anophelines and when handling the mosquitoes themselves have been proceeding. One study is related to the effect of refrigeration upon sporozoites in stored mosquitoes. From infective females of *C. quinquefasciatus*, held 2 days and 5 days in the refrigerator, sporozoites of *P. relictum* produced infections in canaries. Only negative results were obtained after longer intervals of refrigeration.

Parasitological Work. Young domestic chickens in the experimental area are being examined to detect new infections of *Leucocytozoon andrewsi*. A total of 90 immature fowl was observed this spring. Repeated examinations on some individuals yielded a total of 128 blood films. Recently, the first three young chickens to be found positive were discovered at an anopheline collecting station. Forty-one grown chickens associated with young fowl were also observed periodically. Although developing forms of *L. andrewsi* were rarely noted previously, one mature bird was found with a considerable percentage of small gametocytes. Some possible relationship between this parasite and the unknown sporozoites in anophelines is under consideration.

The survey of wild animals was advanced with the blood-film examinations of 85 specimens. Totals of 35 amphibians, 49 reptiles, and 1 mammal were observed. Haemogregarines and trypanosomes were recorded in some of these same species during the past 3 months or earlier. No *Plasmodium* has been observed in any wild animals except birds in the area.

NEWTON, GA., FIELD STATION:

Epidemiological Work. Regular visits to resi-

dents of the experimental area were continued. No persons with symptoms suggestive of malaria were observed. This period completes the seventh year since a malaria-positive blood film was found in the area.

Biological Work. Regular weekly inspections at established anopheline collecting stations indicated lower larval and adult populations than at any time during the past 9 years. Deficient spring rains in 1951 resulted in less breeding surface available for *Anopheles* mosquitoes than at any time since observations were begun at the station 12 years ago. These meager mosquito populations have also been reflected in light trap collections. One trap collected only 17 mosquitoes (8 *Anopheles*) in 12 nights, normally a very small collection for a single night's operation.

Virtually all experimental information concerning the natural history of *A. quadrimaculatus* is based on observations of a highly domesticated "strain" of the mosquito that has been kept under artificial conditions for many years. It is, therefore, desirable to isolate another "strain" for comparison with the long-established one. To this end, the progeny of wild-collected *A. quadrimaculatus* are being placed in a large outdoor cage 15 ft. high and 10 ft. square. To date 2,407 *A. quadrimaculatus*, 270 *A. crucians*, and 744 *A. punctipennis* have been placed in the cage, but as yet no ova have been obtained.

Previous experiences suggest that conditions, or stimuli, which induce or permit mating have not been simulated. Alterations of the cage were made to permit light changes at the crepuscular period that will approximate more closely conditions found in natural mosquito habitats. Arrangements have also been made to enable artificial adjustments of light within the cage.

In an attempt to secure data on the length of development of the different larval stages of *Anopheles*, and to obtain information on larval abundance for comparison with adult counts, it was desirable to identify all stages of larvae in routine collections. Methods for making these identifications were devised and all larvae from the previous year's collection were identified. Attempts were made to make quantitative comparison of the occurrence of the various stages, but it was apparent that collections at shorter intervals were needed. It is planned to continue this study as soon as data from more frequent collections are accumulated.

Parasitological Work. Attempts were continued to ascertain sources of sporozoites found in *Anopheles*, from areas where human malaria was allegedly absent. This work involves collection of blood films from sylvan vertebrates, limited to birds during the past quarter, and tests of susceptibility of *Anopheles* mosquitoes found in nature.

Plasmodium infections were found in 2 of 45 English Sparrows examined, as well as in 1 Blue Jay. One Parula Warbler examined was infected with *Haemoproteus*. Because of deficient *Anopheles* populations, transmission studies using these species could not be made.

Survey of Plankton Algae. The survey of plankton algae in *Anopheles* breeding places was continued to further available knowledge concerning ecological requirement of *quadrimaculatus* mosquitoes. Quantitative and qualitative samples are being taken regularly from selected ponds. Most ponds showed the normal change from a winter Chrysophycea population to summer populations of Myxophyceae and Chlorophyceae. Qualitatively, 393 species, representing 94 genera, have now been found; 210 species are desmids.

ENCEPHALITIS INVESTIGATIONS (In cooperation with Hooper Foundation, University of California)

Mosquito Biology Studies. Tests to determine the effect of carbon dioxide gas in attracting mosquitoes to stable traps, indicate that the number of mosquitoes captured is roughly proportional to the volume of carbon dioxide released. Since the preliminary trials have been run in an area in which *Culex tarsalis* is overwhelmingly predominant, we do not as yet have adequate figures on carbon dioxide attractiveness to other species of mosquitoes in the area.

Collections of Mosquitoes for Virus Tests. Three areas have been selected for intensive study of virus infection in *C. tarsalis*. These are (1) a typical farm yard, well isolated from other farm yards, from which infected mosquitoes have been taken in the past; (2) an olive grove, 100 acres in extent, in which there is a heavy concentration of wild birds, the majority of which, in past surveys, have shown *Plasmodium* infection; and (3) an area alongside a natural drainage channel which produces enormous numbers of *tarsalis*, and which is isolated from all other mosquito-producing areas by miles of dry hills. In addition, during inspections to determine the efficiency of *Culex* control, an inspector of the Kern Mosquito Abatement District collects a minimum of 250 live *C.*

tarsalis weekly for virus tests. These are pooled, separated into lots of 25 and 50 mosquitoes, and each lot is sealed in a small glass tube and frozen. In the San Francisco Laboratory, variable sizes of pools are tested to determine the "most probable number" of infected mosquitoes. During the quarter, a total of 8,691 *C. tarsalis*, and 955 *C. quinquefasciatus* were frozen for future virus studies.

Experimental Studies With Mosquitoes. Studies were conducted by a representative of the Hooper Foundation in the San Francisco Laboratory to determine the duration of activity of ingested Western equine encephalomyelitis (W.E.E.) neutralizing antibodies in normal female *Aedes nigromaculis*. It was determined experimentally that W.E.E. neutralizing antibodies contained in immune rabbit or human serum, and in human blood, disappear from *A. nigromaculis* within 24 hours after ingestion. Since these antibodies are destroyed considerably in the 24 hours following ingestion, it is probable that they do not prevent virus isolation from infected mosquitoes, because the mosquitoes collected in the field are held approximately 24 hours prior to killing and freezing.

Transmission Studies. Experiments designed to infect a colony of the mite *Fonsecaonyssus* (= *Liponyssus*) *sylviarum* with W.E.E. virus, and to test the capacity of the mites to transmit the virus to young chicks, was started at the end of the quarter. Additional attempts to determine whether *sylviarum* will transmit both W.E.E. and St. Louis encephalitis virus under simulated natural conditions in a colony of mite infested, captive doves are being made. All results to the present time have been negative. The doves normally lay two eggs every 30 days. When the eggs hatch, one of the young is inoculated in each case, one with W.E.E. and the other with St. Louis virus; at intervals, thereafter, samples of mites are frozen for virus tests, and other samples preserved for identification purposes. Also, all birds in the colony are bled at intervals, the serum of uninoculated birds being tested for neutralizing antibodies against both viruses, and that of the inoculated birds for neutralizing antibodies against the reciprocal virus.

During the present quarter, 16 pairs of young doves were inoculated, 43 birds were bled for serologic tests, and 13 pools of mites containing from 150 to 500 mites (a total of 3,645 mites) were frozen. It is hoped that by the end of the present year, we will have obtained sufficient information to determine whether transmission of viruses could have occurred under our experimental conditions.

Ornithological Studies. A total of 114 young and adult wild birds has been captured and bled to determine encephalitis infection rates by means of serologic tests. In addition, blood smears are being made from the same birds. Comparisons will be made between infection rates in nestling and fledgling birds, and in adult birds.

FLY-POLIO INVESTIGATIONS

Poliomyelitis Investigations – Fly Control Program (Phoenix, Ariz.). Operational activities at Phoenix continued in an effort to stem the rising fly populations which began to appear in early April. Even though the combined techniques of sanitation and chemical control were unable to prevent relatively high fly densities in certain areas, over-all control for 1951 showed much improvement over that of 1950.

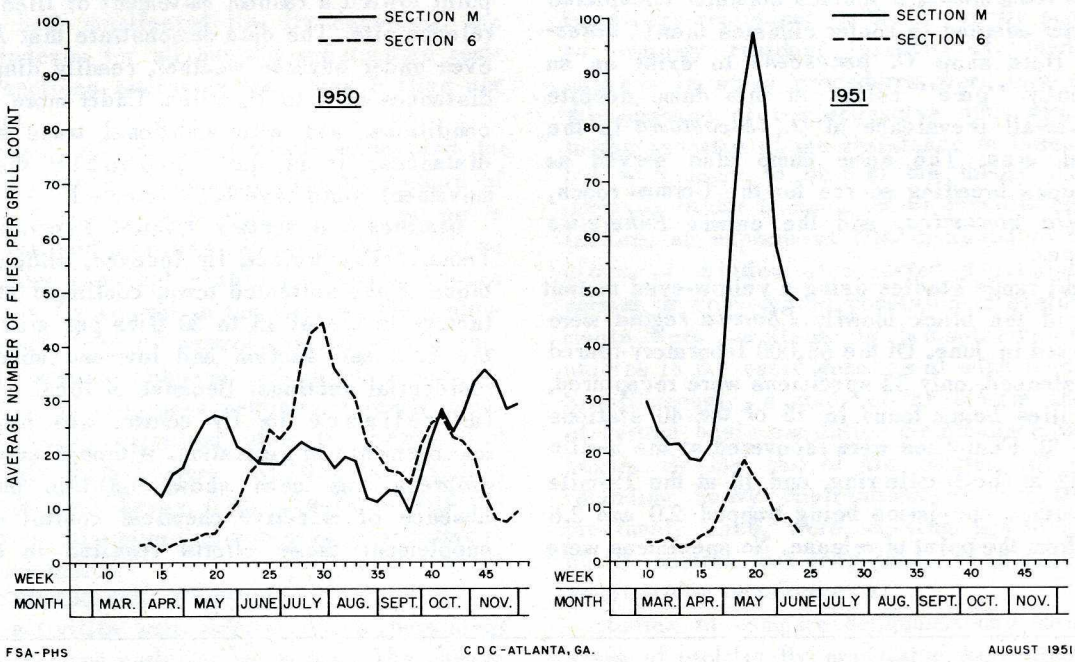
Particularly encouraging was the degree of control in the two low class residential areas where fly indexes declined rapidly, subsequent to Week 19, reaching minimum levels of 5 to 9 flies per grill count on Week 24 (figure 1). These relatively low indexes (as compared to 1949 and 1950) were chiefly the result of sanitational improvement fostered by project personnel. The prinicipal reason for current fly prevalence in these sections is the presence of attrahents such as dishwater and animal excreta, which attract the flies from adjacent county areas.

In the better class residential sections, piles of rye grass clippings in the alleys, and lettuce culls in cattle pastures along the perimeter of the city, were the sources of prodigious fly populations. Soaring counts in certain residential developments were directly traceable to lettuce culls in nearby cattle-feeding pens.

Tests with lindane and Dilan as residual applications showed Dilan to be superior in effectiveness against the dieldrin-, DDT-, and chlordan-resistant flies of Phoenix. When employed as a 2½ percent suspension and applied at the approximate rate of 150-200 mg./sq. ft., Dilan gave 13 weeks effective kill (test still in progress) of wild flies released in a treated washroom at the field office. Complete knockdown without recovery was obtained within 30 minutes after each release. Treatment of horse stables with Dilan at a rate of 125 mg./sq. ft. gave a spectacular reduction of

FIGURE 1

FLY GRILL DENSITIES IN THE TREATED LOW CLASS RESIDENTIAL SECTION 6 OF PHOENIX, ARIZ. AS COMPARED WITH THOSE IN THE UNTREATED LOW CLASS RESIDENTIAL SECTION M OF MESA, ARIZ. BASED ON A 3-WEEK MOVING AVERAGE.



FSA-PHS C D C - ATLANTA, GA. AUGUST 1951

night resting flies for approximately 6 weeks. Limited operational applications of Dilan in problem blocks indicate 5 to 6 weeks of satisfactory control. The principal draw-back to widespread use of Dilan is the present high cost of the chemical ($4.80/lb.).

A xylene emulsion of 5 percent DDT and 0.5 percent dimethyl carbinol, recommended by CDC as a space spray against resistant flies, has given satisfactory results as an operational control measure.

City-wide larval surveys revealed *Musca domestica* to be the predominant species, and one found in a wide range of substrates including cow, horse, human, chicken, and dog excreta; garbage; grass clippings; coffee grounds; and dead animals. *Phaenicia sericata* and *P. pallescens* were recovered chiefly from garbage, while *Sarcophaga* was taken in cow, human, chicken, and dog excreta, and in garbage.

Polio Investigations – Fly Control Programs at Charleston, W. Va. At this project, fly densities in both treated and untreated cities remained at minimum levels. Indexes for Charleston did not rise above 1.0 flies per grill count, and those for Dunbar and St. Albans fell between 1 to 3 flies per grill count.

Completion of the 1950-51 overwintering studies revealed that throughout the November to March period, fly larvae or puparia were detected at each of six observation stations. The latter were found primarily in dump areas which had been prolific sources of fly production the previous summer. The majority of the specimens was recovered from garbage-soaked newspapers, garbage, and soil-garbage mixtures at depths of ½ to 6 in. Relatively few specimens survived and the prevalent-spring-summer flies (*Phaenicia, Phormia, Musca*) were absent or only occasionally represented among the adults reared. The majority of surviving specimens was *Ophyra aenescens* and *Calliphora*, or belonged to minor families such as Sepsidae, Borboridae, and Piophilidae.

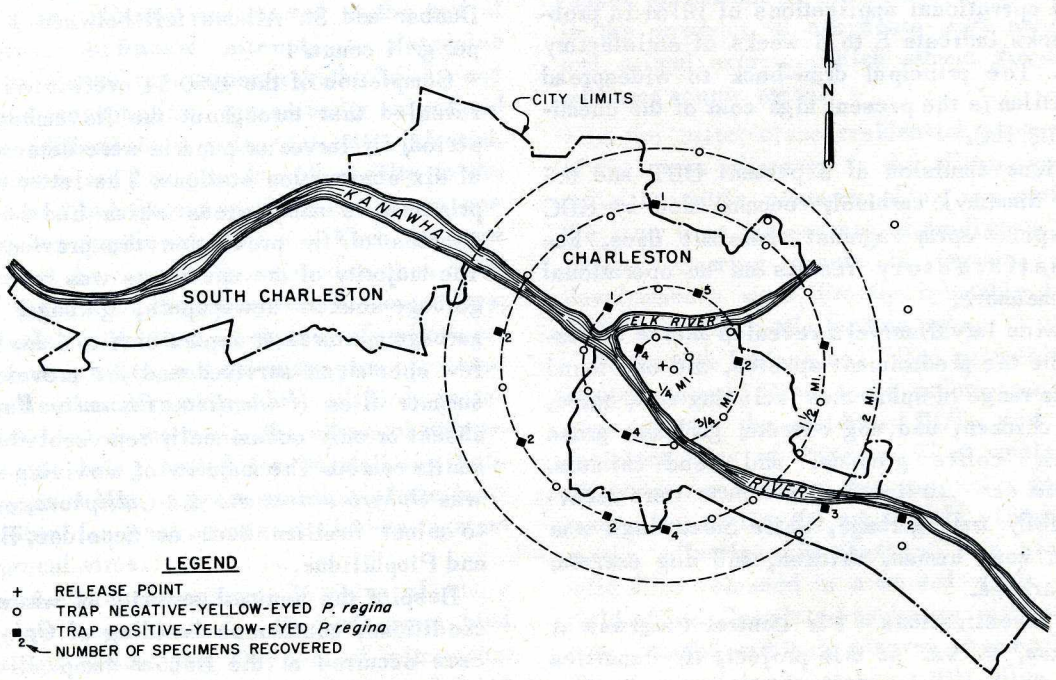
Despite the unusual severity of winter weather conditions, continuous breeding of *Ophyra aenescens* occurred at the Dunbar dump. High habitat temperatures are believed to be the factors underlying this breeding, since dump temperatures fre-

quently were as high as 73° to 95° F. when air temperatures ranged between 16° to 56° F. Of particular interest, and at the same time an enigma, is the infrequent occurrence of *O. aenescens* in summer trap collections as compared to *Ophyra leucostoma*, a species normally considered as better adapted to cooler climates than *O. aenescens*. Data show *O. aenescens* to exist as an apparently "pure" colony at this dump despite the over-all prevalence of *O. leucostoma* in the general area. The same dump also served as continuous breeding source for the German roach, *Blattella germanica*, and the earwig *Enherellia annulipes*.

Flight range studies using a yellow-eyed mutant strain of the black blowfly *Phormia regina* were conducted in June. Of the 65,000 laboratory-reared flies released, only 33 specimens were recaptured, these flies being found in 15 of the 40 stations (figure 2). Four flies were recovered at the ¼-mile ring, 12 at the ¾-mile ring, and 13 at the 1½-mile ring, with 4 specimens being trapped 2.0 and 2.6 miles from the point of release. No specimens were taken the first 5 days after release, possibly a result of the heavy rain and inclement weather which prevailed during that period. Although the small number of flies recovered precludes definite conclusions on the dispersal pattern, indications point toward a random movement of flies from the release site. The data demonstrate that *P. regina*, even under adverse weather, readily disperses to distances of ¾ to 1½ miles. Under more favorable conditions, and with additional traps at greater distances, it is quite probable that further movement could have been detected.

Diarrhea – Dysentery Control Program. At the Yuma, Ariz., project, fly indexes, although below those of the untreated town, continued at unsatisfactory levels of 15 to 30 flies per grill count in the business section and low and middle class residential sections. Because of local conditions, full reliance for fly control was placed upon improvements in sanitation. Although considerable progress has been shown on this phase, the absence of effective chemical control agents to supplement these efforts resulted in sustained

FIGURE 2
FLIGHT RANGE STUDIES
YELLOW-EYED *Phormia regina*
CHARLESTON, W. VA. JUNE 1951



high fly populations. In contrast to Yuma, the Coolidge and Casa Grande projects exhibited relatively good fly control, the city-wide index for Casa Grande remained below 4.6 flies per grill count throughout the quarter.

In New Mexico, the Las Cruces and Carlsbad projects both manifested low fly densities, the weekly indexes for all but the substandard residential sections averaging less than 5 flies per grill count.

In Texas, the Seguin project engineered the city's adoption of a sanitary landfill method of garbage disposal, and promoted an intensive garbage can and premises sanitation drive. These efforts, plus chemical control methods, produced satisfactory fly control in the city. At the Sinton-Taft project, loss of control existed in the substandard areas, although excellent abatement prevailed in the business sections. Locally sponsored programs patterned after the Seguin and Sinton-Taft project were initiated at Atlanta, Olney, and San Marcos, Tex. The latter was the scene of an intensive diarrhea-dysentery outbreak in May and June.

THOMASVILLE, GA., STATION

Field activities were delayed due to persistent low temperatures early in the quarter. The change to warm weather was abrupt and was accompanied by rainfall sufficient to create good fly breeding conditions.

Dysentery Studies. Analysis of data collected into the second quarter of the fiscal year substantially reflected the results of the Hidalgo County, Tex., studies in showing a reduction in *Shigella* prevalence rates corresponding to satisfactory fly control. Loss of fly control, due to house fly resistance to the chemical insecticides employed, resulted in significant increases in *Shigella* infections to a point indistinguishable from check area infections. With these conclusions established, it was possible to terminate the initial phase of the diarrheal studies, which was to determine the effect, if any, of fly control upon human infections with *Shigella* organisms in an area of low to moderate diarrheal disease morbidity. The data with regard to fly control also provided conclusive evidence of the extreme rapidity of acquisition of resistance to certain insecticides in house fly populations, which may occur when field conditions provide an abundance of fly breeding media.

The next predetermined objective, that of establishing economically feasible methods for long range control, was therefore weighted with additional urgency and importance because of this resistance factor. With mounting evidence that heavy treatments with insecticides, at least in areas having long seasons of high fly production potential, are doomed to early failure due to increasing resistance in the house fly population to ordinary residual insecticides, fundamental changes in study procedures were indicated. In the absence of comprehensive data with regard to the genetics of the resistance to insecticides, but with logic to support the theory that such immunity is due to selection of normally recessive factors, an experiment was designed to test the effect of dilution of selected populations with normal or nonselected populations. Field experiments were paralleled by preliminary laboratory studies in the basic genetics of such inheritance. Simultaneously, a study of the effects and costs of certain basic sanitation maintenance was also begun. By the end of the quarter, all methods including heavy applications of insecticide as previously used, were showing positive effects of fly control, but long range comparisons must await further developments.

Studies to compare equipment and methods in areas of prolific fly production were also begun. Investigations in industrial sanitation measures were inaugurated, particularly with reference to meat packing industries.

A reported serious fly breeding problem at the sewage treatment plant in Tallahassee, Fla., was investigated. The superintendent of the plant had been forced to place sludge (which was not completely digested) upon the drying beds, resulting in heavy house fly breeding. This plant is undergoing an expansion, and the construction is seriously hampering the thorough treatment of sewage. When the new plant is completed, the completely treated sewage will no longer present such a problem. However, since the digesters are not scheduled for completion until September, the interim problem is quite severe. The plant superintendent dusted each sludge drying bed with benzene hexachloride (BHC) powder; he performed this coverage daily, until a hard crust formed upon the sewage sludge. Thereafter, he repeated such treatment only after rains which softened the crust of the sludge. Even though the technique used was worthless as a larvicide, since under the crust the maggot activity was very great, the coating of BHC powder apparently was a very effective adulticide against the emerging adult flies. Adequate proof of this

existed in the fact that, although the index of breeding was at an extremely high rate, the plant was remarkably free of adult flies. This adulticide action was assisted by evening fogging operations, during which all surrounding vegetation, as well as the sewage drying beds, were treated.

Typhus Studies. New studies designed to provide information as to the spread and maintenance of murine typhus infections in rats were begun. These studies provide for the capture, marking, combing, bleeding, and release of rats in intensive study areas. It is hoped that departure from previously used sampling techniques, which involved removal of the study rats from the population, will provide valuable information, particularly as to the manner in which reservoirs of infection are maintained. Other experiments with regard to rat ectoparasite ecology were begun late in the quarter. A *Xenopsylla cheopis* colony was started on a cotton rat. This has progressed through the F_1 generation, and pupae are now available for the F_2 generation. It therefore seems reasonably certain that *X. cheopis* can be established and reproduced on the cotton rat without need of domestic rats (*Rattus*) as an intermediate or supplemental host. If this can be continued through several generations of cotton rats, it will indicate a possible reservoir in nature relatively untouched by ordinary rat-run dusting operations.

Epidemiological Studies. No human murine typhus fever cases were confirmed during the period, the 1951 total remaining at one case in Grady County, with none in either Thomas or Brooks Counties. This substantial reduction in cases over the number recognized in the first 6 months of any other calendar year since the institution of this project may indicate an actual decrease in human incidence, or may represent failure of case-finding techniques. Antimicrobial therapeutic agents, now widely used, seem to prevent, inhibit, or retard the formation of antibodies against *Rickettsia mooseri*, so that cases receiving early therapy may now be masked.

Diarrheal disease infection rates for children less than 10 years of age was found to be 1.0 percent for the recognized *Shigella* pathogens and 1.1 percent for *Salmonella*. In an attempt to correlate the high *Salmonella* incidence with food infections, various porcine and bovine food products have been tested bacteriologically, and 29 of 50 specimens were found to harbor *Salmonella* organisms.

An epidemiological investigation of clinical cases of conjunctivitis in the village of Barwick is under way, to determine the incidence of the disease and the relative importance of personal contact as a means of disease transmission. From May 15 through June 30, 15 person-illnesses were reported or observed in the white race, and 24 in the Negro race, with morbidity rates of 6 and 15 percent, respectively.

Conjunctivitis Vector Studies. The laboratory colony of *Hippelates pusio*, which reached a calculated maximum of 652 adults on April 8, suffered a sudden decline during the following 2 weeks. In spite of various efforts to control possible contamination by micro-organisms or insecticides, high mortality of adults continued to occur at intervals of about 6 days, and in consequence the colony studies were discontinued shortly after the hatching of the eggs of the eighth generation. Special studies were made on the hatching of eggs exposed to various physical conditions and from various types of larval media. It is believed that the basic difficulty in maintaining the colony lay in the low fertility rates of the eggs, and the type of larval medium used.

With a modified trap, routine trapping of eye gnats was begun in Pavo and Barwick. The latter town was selected for a special study of gnat prevalence. This test is designed to show whether more consistent prevalence data will be obtained by increasing the number of traps or the frequency of their operation.

NEW ENGLAND-NEW YORK RIVER BASIN STUDIES

A preliminary report on the Pawcatuck River Basin has been prepared and has been submitted for comment and suggestions. It is proposed to organize the material in such a way that it will serve as a pattern for the preparation of reports on other basins in the New England-New York area.

A prespray and postspray tick survey was made on Jamestown Island, R. I., and it was found that there was a marked reduction in ticks as a result of the DDT spraying.

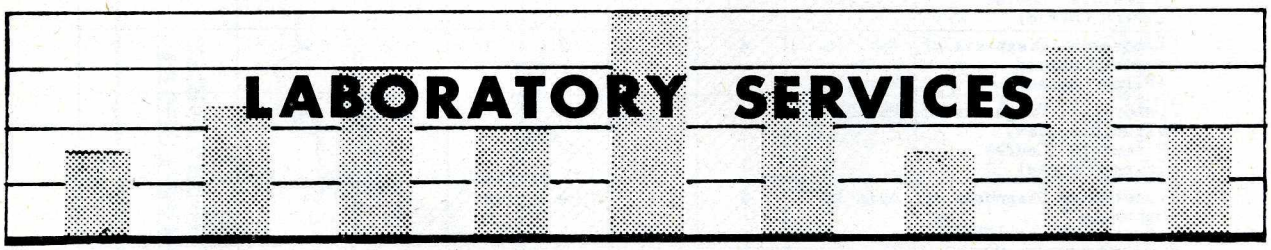
SURVEY AND EVALUATION — ECTOPARASITE STUDIES

Murine Typhus Activities. During the 3-month period from mid-April to mid-July, 1951, records of the examination of approximately 3,350 rats for ectoparasites and/or typhus antibodies were received from 10 Southern States, plus Kansas, Oklahoma, and the border region of Mexico. These

records comprise, for the most part, those relating to rats caught from approximately March 15 to June 15, 1951. A reduction of 47 percent was found in *cheopis* infestation of rats from dusted premises, as compared to undusted premises.

Tick and Tick-borne Disease Survey. The Ohio State Health Department, Federal Security Agency Region V, and CDC Headquarters personnel cooperated in a brief tick and Rocky Mountain spotted fever survey of Ohio during the latter part of June. During the past 10 years, Ohio has reported an average of 8.3 cases per year of spotted fever. Nearly all of them originated in the southern quarter of the State, and the majority can be traced to a few counties. Of nearly a thousand ticks obtained by dragging and by examining dogs and livestock, 98.5 percent proved to be the American dog tick, *Dermacentor variabilis*. All of the 447 ticks collected by dragging were of this species, indicating that it is the only species commonly attacking man in this area. Other species taken on dogs included two specimens of *Amblyomma americanum*, and four of *Ixodes cookei*.

Collected ticks were pooled and tested for natural infection with Rocky Mountain spotted fever and tularemia.



LABORATORY TRAINING SERVICES

A total of 158 students attended 16 scheduled Laboratory Training courses; the agencies represented in each class are shown in table 1.

FIELD TRAINING COURSES

In cooperation with the Veterinary Public Health Services of CDC, a 1-week course in the Laboratory Diagnosis of Rabies was presented at Columbia, Mo., for 14 students from Missouri, Illinois, Kentucky, Iowa, and Nebraska: 10 students came from State (8) or city (2) public health laboratories. This course was presented under the sponsorship of the Missouri Bureau of Laboratories and the University of Missouri.

PARASITOLOGY AND MYCOLOGY LABORATORIES

Activities of the Parasitology and Mycology Laboratories are shown by figure 1.

LABORATORY CONSULTATION SERVICES

Program review of the laboratory facilities, Arkansas State Department of Health, was performed on April 2-4, 1951.

At the request of the Field Director of the American Public Health Association, an extensive survey was made June 4-20 of the public health laboratory facilities of the Department of Health of the City of New York.

INTESTINAL PARASITES

Diagnostic proficiency for the identification of intestinal parasites in a southeastern State clinical laboratory was evaluated. Inspection and discussion will be followed by check-examination of 24 PVA specimens.

MALARIA

The CDC National Depository for Positive Malaria Slides received 27 slides for review; all contained *Plasmodium vivax*. These slides came from persons who acquired malaria outside the United States; many of the patients were Korean war veterans.

From Arkansas, Georgia, and South Carolina, 7,420 Malaria Survey human blood slides were examined; 23 of these, known positive check slides, were found to contain parasites. Malaria blood film slides examined are shown in table 2.

AIR SAMPLING

A contract has been made with the Army Chemical Corps to develop air sampling methods and

Table 1

TRAINING COURSES PRESENTED BY LABORATORY SERVICES

Training Courses	Date 1951	Students							
		State, County, City Health Dept.	U. S. Public Health Service	Other Federal Organizations	Hospitals	Universities	Foreign Students*	Other	Totals
Laboratory Diagnosis of Enteric Diseases Part 2 (Third Course)	Apr. 2-13	6	2	1	2	1	–	–	12
Laboratory Diagnosis of Mycotic Diseases Part 1 (Fourth Course)	Apr. 16-27	1	2	2	6	–	1	–	12
Laboratory Diagnosis of Mycotic Diseases Part 2 (Fourth Course)	Apr. 30 to May 11	1	2	2	4	–	1	–	10
Laboratory Diagnosis of Mycotic Diseases Directors' Course (Third Course)	May 14-18	–	1	7	3	1	1	–	13
Laboratory Diagnosis of Virus Diseases (First Course)	Apr. 16 to May 11	4	–	2	1	–	–	–	7
Laboratory Diagnosis of Virus Diseases Directors' Course (First Course)	May 21-25	4	–	–	–	3	–	–	7
Laboratory Diagnosis of Syphilis** (Seventh Course)	Apr. 16-27	5	–	–	–	–	–	1	6
Laboratory Diagnosis of Syphilis** (Eighth Course)	June 4-15	3	1	1	1	–	1	–	7
Laboratory Diagnosis of Tuberculosis*** (Seventh Course)	Apr. 30 to May 11	10	–	4	3	–	1	–	18
Laboratory Diagnosis of Tuberculosis*** Directors' Course (Fourth Course)	May 14-18	1	1	5	1	–	–	–	8
Laboratory Diagnosis of Venereal Diseases** Directors' Course (First Course)	May 7-11	2	1	–	–	1	–	–	4
Treponema pallidum Immobilization** Directors' Course (First Course)	May 14-18	2	–	–	–	–	–	–	2
Laboratory Diagnosis of Rabies† (Sixth Course)	May 14-18	5	–	–	–	–	7	–	12
Laboratory Diagnosis of Parasitic Diseases Directors' Course (Sixth Course)	May 21-25	2	9	5	–	–	–	–	16
Laboratory Diagnosis of Bacterial Diseases Directors' Course (Third Course)	May 21-25	3	2	6	3	–	2	–	16
Diagnosis of Communicable Diseases (First Course)	May 28-31	–	8	–	–	–	–	–	8

*Foreign Students represented the following countries: Argentina, Brazil, Cuba, Jamaica, Dominican Republic, Palestine, and Puerto Rico.

**Courses given in cooperation with Venereal Disease Research Laboratories, Division of Venereal Disease.

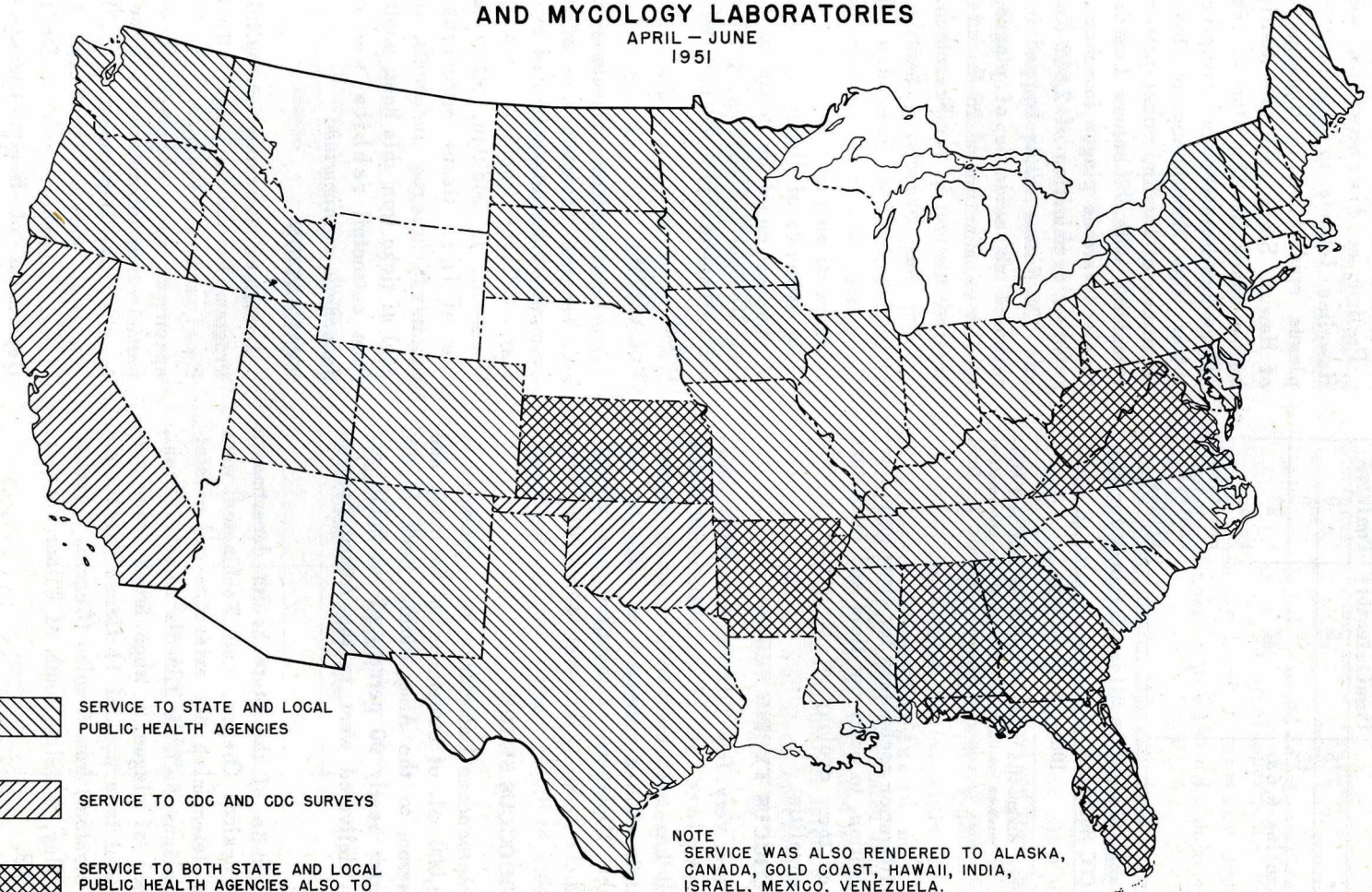
***Courses given in cooperation with Division of Tuberculosis.

†Course given in cooperation with Veterinary Public Health Services, Communicable Disease Center

FIGURE I

SERVICES OF PARASITOLOGY AND MYCOLOGY LABORATORIES

APRIL – JUNE
1951



FSA – PHS – CDC

ATLANTA, GA. AUGUST 1951

Table 2*

MALARIA BLOOD FILM SLIDES EXAMINED

States		Unsatisfactory	Positive
Arkansas	775	5	0
Georgia	15	0	0
South Carolina	6,630	40	23 known positive control slides
Bird Malaria Blood Film Slides Examined for Mid-western CDC Services:			
Kansas	108 – No Positives		

*The reference diagnostic cultures listed in this and other tables are in answer to several requests for information regarding the types of cultures submitted to CDC for final diagnosis.

rapid identification techniques for virus organisms and, in addition, to carry out field and laboratory studies on the ecology of Eastern equine encephalomyelitis.

PNEUMOCOCCUS TYPING SERUMS

There are very few laboratories which maintain a complete set of *Pneumococcus* typing serums. It has been considered wise to prepare and maintain such a collection at CDC; for this reason the Diphtheria Laboratory has already completed 11 serum types, and others are being prepared.

STREPTOCOCCUS SERUM

The Streptococcus Laboratory has contracted to deliver 6,000 ml. of Streptococcus Grouping and Typing serum to the Army during 1952. In the past quarter nearly 90 percent of the 2,118 ml. of serum delivered went to the Armed Forces.

PLAGUE

Survey units of the State health departments of New Mexico, Oregon, and Washington were active in determining the existence and persistence of plague foci. In Lincoln County, Wash., persistence of plague in sage brush voles was demonstrated in a pool of 11 fleas (*Megabothrus clantoni clantoni*) from 8 voles (*Legarus curtatus*) taken in May, 5 miles south of Wilbur on State Highway 4B.

The first proof of wild rodent plague in Santa Fe County, N. Mex., was found in a pool of eight fleas (*Monopsyllus wagneri*) from two white-footed mice (*Peromyscus truei*) taken in April, 14 miles southeast of the Santa Fe city limits on U. S. Highway 85. A human case occurred within 3 miles of this site during July 1950.*

Preliminary discussions were held in the Hawaiian Islands to explore the possibility of plague eradication in Hamakua District, Island of Hawaii. Since 1910 this district has had 112 human cases (in 27 of the 42 years) and rodent plague has been reported every year.

For the Microbiological Institute, National Institutes of Health, mouse protection tests were completed with 93 serums from humans who had received various plague immunogens.

Gross examination of 2,632 *Rattus norvegicus* and 224 *Rattus rattus* trapped in San Francisco revealed no evidence of plague; neither did similar examination of 26 *R. rattus* from vessels entering the port of San Francisco.

From San Francisco, Seattle, and Tacoma collections, 8,794 fleas from 4,021 rats were inoculated into test animals without yielding evidence of plague.

No evidence of plague, tularemia, or rickettsial disease could be found in CDC collections from Georgia (12 rodents, 4 burrows, 316 ticks) and Arkansas (111 rodents, 59 burrows, 4,738 ticks).

TULAREMIA

The first isolation of tularemia from the wood rat *Neotoma albigula* was accomplished while examining materials collected by the New Mexico State "Plague Unit" in Gran Quivera National Monument. In addition, tularemia was found in two of four tissue specimens from cottontail rabbits (*Sylvilagus auduboni*), and in a single pool of ticks from this host; another pool of ticks from cottontail rabbits was found to contain *Salmonella typhimurium*.

EVALUATION

Louisiana Intrastate Parasitology Evaluation Program. For the Louisiana Intrastate Parasitology Evaluation Program, 15 formalin-preserved specimens were examined. Reports from the 14 participating laboratories will be graded at CDC for the State Department of Health Laboratories.

Referee Service for Texas Laboratories. As referee laboratory service for the Texas State Department of Health Bureau of Laboratories, 15 test fecal specimens were examined for parasites.

*See CDC Bulletin. IX(12): 30-31, December 1950.

Laboratory Diagnosis of Tuberculosis. June 1 was established as the deadline for returning all reports from laboratories which participated in the Evaluation of Laboratory Diagnosis of Tuberculosis. Answer sheets have been devised and a scoring system developed.

ENCEPHALITIS

From a special encephalitis study for Midwestern CDC Services, 108 bird blood slides were examined. None were found to be positive. These slides were made to determine how soon nestling birds are bitten by mosquitoes.

From Weld County, Colo., 1,171 bird mites were identified in an encephalitis study.

Ampules of Western equine encephalomyelitis (W.E.E.) in bird blood and in mosquitoes have been prepared at the request of Midwestern CDC Services. Loss of virus or diminution of titer will be studied under conditions of field collection, packing, sealing, storage, shipping, and preparation of virus isolation procedures.

POLIOMYELITIS

There were 5 poliomyelitis isolations from 67 specimens submitted from 10 States as shown in table 3.

Paulding, Ohio. From the Paulding, Ohio, materials, studies on the distribution of poliomyelitis virus among patients, among families with minor illnesses, and among well families residing in that city, during the 1950 epidemic have been completed with the following results: 6 of 10 stool specimens from the 10 "most recent" cases produced poliomyelitis in monkeys; 1 of 10 family-pooled stool specimens from families in which at least 1 member had recorded "suspicious illness" produced poliomyelitis in monkeys; 1 of 19 stool specimens from family pools when at least 1 member had recorded "minor illness" produced poliomyelitis in monkeys.

San Luis, Colo. Material from the San Luis, Colo., Poliomyelitis Investigation was tested for virus in stool specimens from three cases, one family contact pool, and one other individual. Inoculations from the latter and from one "case" produced poliomyelitis in monkeys.

Fort Collins, Colo. From 14 patients involved in the Fort Collins Poliomyelitis Investigation, 7 serum specimens produced no evidence of neurotropic virus when inoculated into 13-day-old mice; 5 stool specimens produced no poliomyelitis in monkeys and no (Lansing) infection in mice.

Charleston, W. Va. Both specimens from two patients at Charleston, W. Va., produced poliomyelitis in monkeys.

MURINE TYPHUS

The results of the complement fixation test for murine typhus antibodies in rat serums are shown in table 4.

Two authors have regarded rodent serum complement fixation titers of 1:8 to 1:64 as false

Table 3

POLIOMYELITIS VIRUS ISOLATIONS ATTEMPTED

Source	Agency	Number Specimens	Number Positives
Alabama	Private	2	-
	VA	2	-
Arizona	CDC	3	-
Arkansas	State	1	-
Colorado	CDC	20	3 poliomyelitis
Florida	Private	1	-
	City	1	-
	State	2	-
Indiana	University	1	-
Louisiana	State	5	-
New York	VA	1	-
	Private	2	-
Ohio	CDC	23	-
West Virginia	CDC	3	2 poliomyelitis

Table 4

SEROLOGY LABORATORIES: COMPLEMENT FIXATION TESTS. RAT SERUMS TESTED AGAINST MURINE TYPHUS ANTIGEN

Source of Specimen	Total No. of Serums	No. Pos. 1:8 or more	Percentage Serums Positive
Alabama	338	74	21.9
Arkansas	150	-	-
Florida	208	3	1.4
Georgia	460	19	4.1
Hawaii	9	-	-
Mississippi	334	12	3.6
North Carolina	253	-	-
South Carolina	136	12	8.8
Tennessee	37	-	-
Virginia	47	-	-
Total	1,972	120	6.1

positives for murine typhus; their serologic techniques differ from the standard practice at CDC. Additional controls have been added to CDC examination of rodent serums to insure the validity of currently used interpretations of test results. Similar controls used in previous years indicated that no infections were overlooked.

REFERENCE DIAGNOSIS

There were 47 cultures of *Salmonella typhi* and 18 cultures of *Salmonella paratyphi B* which were subjected to bacteriophage typing. Some degeneration had occurred in these cultures, probably as a result of prolonged storage before submission to the Center.

Recently it has been noted that some persons returning from Mexico have developed *S. paratyphi A* infection. This pathogen is quite rare in the United States but apparently is still prevalent in Mexico. These infections are similar to those encountered in troops during the Mexican Border campaign prior to World War I.

Three new *Salmonella* types (*S. kingston, S. mendoza, S. stockholm)* were received from other laboratories for confirmation.

The evaluation of *Salmonella* grouping serums prepared by a commercial laboratory for sale to the Armed Forces and to civilian laboratories was completed. It is now felt that reliable diagnostic grouping serums for salmonellae and shigellae will be available.

In the Special Bacteriology Laboratory all serums submitted for detection of *Leptospira* antibodies are tested against *Leptospira icterohemorrhagiae, Leptospira canicola,* and *Leptospira pomona.*

Among the 114 isolates of miscellaneous bacteria submitted to the Special Bacteriology Laboratory for identification (see table 5), 54 percent came from State and local public health agencies, and 22 percent came from Federal agencies.

There were 2,413 serums submitted for the complement fixation tests against amebiasis, trichinosis, or *Echinococcus* antigens; 34 percent of those for amebiasis were positive, 9 percent of those for trichinosis were positive, and 8.5 percent of 82 for hydatid disease were positive (Maryland, 1; New York, 2; Pennsylvania, 2; Alaska, 2).

Complement fixation tests for Q fever antibodies were positive with serums from Rhode Island, Wisconsin, Georgia, and Virginia. Positive tests for Rocky Mountain spotted fever appeared with serums from New Jersey, North Carolina, Florida, Georgia, Kentucky, Ohio, and Virginia.

Excluding serums from Midwestern CDC Services, positive complement fixation tests for histoplasmosis were obtained with serums from Illinois, Maryland, Michigan, Missouri, Ohio, and Tennessee. Submitted from Arizona, serum from one person was positive for coccidioidomycosis.

From 18 States, serums were submitted for detection of *Brucella* antibodies which were present in 12 of 52 specimens; 2 specimens (from Georgia and Massachusetts) among 32 submitted reacted with tularemia antigen.

The Veterinary Laboratory received 50 specimens for virus isolation. One horse brain (Alabama), one fox brain (Maine), two dog brains and one horse brain (Tennessee), one dog brain (Washington), and three mongoose brains from Puerto Rico yielded rabies; a parrot from Ohio and a parakeet from Wisconsin were positive for psittacosis. From Georgia and from Alabama, single human serums were submitted for rabies antibody tests.

From 14 States, 352 *Streptococcus* isolates were sent to the Streptococcus Laboratory for type determination. The total included collections from two rheumatic fever studies. Among 85 cultures from one study, only 20 percent of the

Table 5

SPECIAL BACTERIOLOGY LABORATORY REFERENCE DIAGNOSTIC CULTURES

Alcaligenes	7	*Shigella alkalescens*	1
Brucella abortus	5	*Proteus*	3
Brucella melitensis	1	*Erwinia*	1
Brucella suis	2	*Flavobacterium*	4
Bacteroides	4	*Lactobacillus*	3
Bacillus	2	*Listeria*	1
Corynebacterium	3	*Micrococcus*	2
Corynebacterium acne	3	*Mimeae*	16
Enteric –		*Neisseria* (nonpath)	1
Aerobacter aerogenes	5	*N. meningitidis*	1
Salmonella choleraesuis	1	*Nocardia*	1
Klebsiella	1	*Pasteurella*	
paracolon *Aerogenes*	2	*multocida*	3
paracolon Intermediate	2	*Pseudomonas*	10
paracolon *Escherichia*	1	*Streptococcus*	
paracolon Bethesda	2	Group D	2
paracolon (rough)	1	Unidentified	7
Shigella flexneri	1	Nonviable	4

Group A Streptococci could be typed; from the same study, among 85 cultures submitted in September 1950, 65 percent of the Group A cultures were typed. The current low percentage of isolates which can be typed may reflect antibiotic therapy, prolonged storage before specimens were submitted, or that the predominant type in this series is one for which CDC has no specific serum (60 percent of cultures from a similar study in a second State could be typed at CDC).

The Parasitological Laboratory received 929 specimens from 32 States. Among these were found:

a. *Trichinella* larvae in a muscle biopsy from Maine.

b. *Trichostrongylus* ova in a fecal specimen from Illinois.

c. The following mites which had been taken while feeding on man:

Fonsecaonyssus sylvarium (a bird mite) from West Virginia.

Bdellonyssus bacoti (a rat mite) from Iowa.

From 32 States and Hawaii came 475 cultures and clinical specimens for mycological examination and identification; the 156 isolations from this material are listed in table 6.

The Virus Laboratory received 1,903 specimens for diagnostic study (696 specimens were submitted during the third quarter). These came from 39 States, Puerto Rico, and Japan; 68 percent came from CDC activities, 11 percent from State and local public health agencies, 9 percent from physicians and hospitals. Another 10 percent came from Federal agencies other than CDC.

There were 1,796 complement fixation tests which showed 90 serums reacting with mumps antigen, 2 with lymphocytic choriomeningitis (Georgia, Tennessee), and 4 with Lygranum-psittacosis antigen (Kentucky, Ohio, Oklahoma).

Neutralization tests totalled 669 with 3 positive tests for Coxsackie virus (Georgia), 9 tests positive for Eastern equine encephalomyelitis (Georgia), and 24 tests on CDC survey material positive for St. Louis encephalitis (Colorado, 11; Maryland, 13).

The hemagglutination test for Newcastle disease gave no positives among 6 serums; 17 of the 242 tests for influenza were positive (Arizona, 1; Illinois, 1; Iowa, 1; Missouri, 1; Nevada, 1; North Carolina, 1; Oklahoma, 10).

There were 2 (Georgia, Mississippi) positive cold agglutinin tests among 17 serums from 10 States.

METHODOLOGY RESEARCH

RINGWORM IN CATTLE:

In the Mycology Laboratory, studies of ringworm in cattle and its transmission to man have been

Table 6
MYCOLOGY LABORATORY REFERENCE DIAGNOSTIC CULTURES

Candida albicans	117
Microsporum audouini	9
Geotrichum candidum	6
Trichophyton faviforme	5
Trichophyton rubrum	4
Trichophyton mentagrophytes	3
Coccidioides immitis	3
Microsporum canis	3
Actinomyces bovis	1
Blastomyces dermatitidis	1
Histoplasma capsulatum	1
Nocardia asteroides	1
Phialophora verrucosa	1

continued.

A review of the genus *Trichophyton* has been under way for some time; the definition of two species was completed and other rare or doubtful species are under study. In answer to interest expressed by several dermatologists, work with *Trichophyton tonsurans* will be expanded in the near future.

PLAGUE:

From studies to determine optimal methods for handling materials in which plague is suspected, it was concluded that there is no significant difference between results from subcutaneous and percutaneous injection of material into test animals. Refrigerator retention of suspected tissues in 2 percent saline for up to 30 days has no influence on recovery of bacilli from known positive specimens. It must be emphasized that incidental contamination must be kept to a minimum when tissues are to be submitted for plague detection; sterile equipment and aseptic techniques are very helpful, if not essential when obtaining specimens.

In June the long-term Wild Rodent Plague Ecology study was initiated at Santa Fe, N. Mex. Equipment and supplies have been transferred to establish a laboratory at a known endemic focus, where intensive studies may reveal infection-chain links susceptible to preventive intervention.

TUBERCULOSIS:

Peizer's medium and modified Lowenstein's medium were compared to determine their relative values for the primary isolation of tubercle bacilli from sputum. Lowenstein's yielded more colonies per specimen and enabled more certain differentiation of mycobacterial types, although the appearance of growth on Peizer's medium was earlier, and individual colonies grew much larger.

In an attempt to control "contaminants" in material submitted for isolation of *Mycobacterium tuberculosis*, varying concentrations of penicillin were added to concentrated sputum preparations before they were inoculated to media. It has been noted already that relatively low concentrations of the antibiotic reduce the numbers of viable tubercle bacilli in sputum concentrates.

A study has been made of the effect of cortisone in mice which have been inoculated with virulent or with saprophytic acidfast bacilli. Cortisone enhanced the spread of virulent acidfast bacilli, but did not alter the usual result of saprophyte inoculation.

For the isolation of tubercle bacilli from pathological material, the efficiency of Wallenstein's medium is being compared with that of modified Lowenstein's medium.

It has been claimed that, because they contain increased amounts of free fatty acids, old eggs are unsuitable for the preparation of culture media for tubercle bacilli. With Lowenstein's modified formula as the basis, eggs varying in age from 1 day to 1 year will be used for the preparation of media which will be comparatively tested for diagnostic sensitivity.

The amino acid requirements of various mycobacteria will be studied to develop simpler diagnostic culture media, and to attempt differentiation of virulent and avirulent strains.

The use of screw-capped covers on tubercle bacillus culture media tubes is necessary to preserve the medium during the essential 6 weeks of incubation. Many laboratories use phenol compounds to disinfect tubes and caps before cleaning for subsequent reuse. It has been reported that inhibitory effects result from phenolic residues which remain after the usual cleaning procedures. Investigations of these effects and evaluation of cleaning procedures have begun.

ENTERIC BACTERIOLOGY LABORATORY SPECIMENS:

Specimens submitted to the Enteric Bacteriology Laboratory are shown in table 7.

"KLEBSIELLA" CULTURES:

Among specimens submitted to the Enteric Bacteriology Laboratory, five new *Klebsiella*

Table 7
ENTERIC BACTERIOLOGY LABORATORY REFERENCE DIAGNOSTIC CULTURES

Salmonella	838
Shigella	71
Paracolons:	
Escherichia-like	45
Intermediate	34
Aerobacter-like	41
29911	6
Arizona	25
Bethesda	35
Alkalescens-dispar	49
Escherichia coli	199
Klebsiella	21
Proteus	15
Pseudomonas	2
Cocci	14
Alcaligenes	2
Bacillus	3
Clostridium	1
Corynebacterium	1
Pasteurella	1
Nonviable	6
Broken in transit	1

capsule types were recognized and compared with known types. At present 54 capsule types are known. It has been found that aside from strains isolated from respiratory infections, cultures isolated in the United States usually cannot be typed with serums for capsule types recognized in Europe. For this reason it has been necessary to prepare serums for a number of new types. With serums that are now at hand, it has been possible to type all cultures of biochemically typical, capsulated *Klebsiella* strains which have been received.

"SHIGELLA" TYPES:

Three new *Shigella* types were recognized (*Shigella boydii* 10, 11, and 12), and their serologic and biochemical properties were determined. Later three additional cultures of *S. boydii* 11 were recognized among cultures received from Indo-China.

Capsulated cultures of *S. boydii* 1 and *S. boydii* 2 were found among material received for diagnosis. So far as is known, this observation constitutes the first instance in which capsules were found in *Shigella* cultures. The capsules of *S. boydii* 2 were studied by agglutination, precipitation, and "Quellung" reactions. Antigens of the capsule, which produce "O" inagglutinability, occurred also in other cultures of the type which were "O" inagglutinable but possessed no visible capsules. This observation opens a new field in the study of the serology of *Shigella* cultures.

STREPTOCOCCI CHARACTERISTICS:

Studies were initiated to determine the serologic characteristics of 90 beta hemolytic streptococci submitted from a university veterinary laboratory. It was not possible to assign many of these cultures to any of the presently known 13 groups.

SLIDE AGGLUTINATION TEST:

In studies leading to the development of an adequate slide agglutination test for brucellosis, over 1,000 tests were performed on positive serums titrated against 8 antigens.

WEIL-FELIX TEST:

The Weil-Felix test does not yield a comfortable correlation with rickettsial complement fixation tests for detecting evidence of typhus fever; the presently accepted biological and physical standards for the Weil-Felix test are being evaluated as rapidly as positive human serums become available.

ENCEPHALOMYELITIS:

Eastern equine encephalomyelitis (E.E.E.) studies with bird mite *Dermanyssus gallinae* have been completed* without additional noteworthy findings. *Liponyssus bursa* was similarly tested for vector potentialities in the following manner: mites were fed upon chicks with E.E.E. blood titers of 10^{-8}; virus was recovered from these mites each day through day 5 after the virus meal; subsequent tests through day 35 were negative. It was not possible to demonstrate virus in *L. bursa* protonymphs whose parents had received an E.E.E.-infected blood meal. In a second series, virus was isolated from pools of 250 adults with 750 protonymphs on the 17th day after they were fed on an infected chick.

Aedes aegypti were fed on E.E.E.-infected chicks whose blood showed virus titers of 10^{-5} to 10^{-7}. Mice, 10 days old, were used to test for retention and transmission of virus as follows:

1. *A. aegypti*, when infected, retains virus for life.
2. Transmission of virus is more readily accomp-

*See CDC Bulletin X(6): 33, June 1951.

lished after extrinsic incubation periods of 11 to 23 days than after only 5 days.

3. Many mosquitoes carrying large amounts of virus within their bodies, as determined by trituration and animal inoculation, do not transmit sufficient virus to cause infection in mice on which they feed. (When only 12 percent of one lot of mosquitoes caused death in baby mice by feeding on them, 65 percent of the same mosquitoes had a virus titer of 10^{-3} or greater; in another lot, 25 percent infected mice while 50 percent of the lot had virus titer of at least 10^{-3}.)

4. Transmission by bite may be accomplished although virus level in the vector is 10^{-3} or less.

5. *A. aegypti* may transmit E.E.E. by probing only, i.e. "feeding" without taking visible amounts of blood from the mouse. (By probing only, one mosquito transmitted virus to three of eight baby mice.)

6. After a virus-containing blood meal, a temporary drop in virus titer in the mosquito is demonstrable on the second day. Thereafter virus content rises to a peak during days 8 to 15.

E.E.E.-infected mosquitoes were fed upon 1-day-old, 7-day-old, 14-day-old, and 180-day-old chickens. At 24, 48, and 72 hours subsequently, blood was drawn from each surviving chick and tested for virus. After 3 weeks, each survivor was tested for antibodies by the mouse intracerebral neutralization test. At this time each chick received a "booster" feeding by infected mosquitoes. Identical tests for viremia and antibodies were repeated:

1. Most of the 1-day-old chicks died of E.E.E. within 24 hours. Highest viremias occurred in 1-day-old chicks.

2. E.E.E. runs a milder course in older chickens, and no transmission was detectable in 180-day-old chickens.

3. Antibodies developed only in those chicks which had previously shown viremia; the second infectious feeding did not stimulate antibody production unless viremia resulted.

4. It was possible to show viremia without measurable antibody response.

5. It is probable that at least 24 to 2,400 mouse intracerebral LD_{50} doses of E.E.E. are inoculated by the bite of an infected *A. aegypti*.

The vector potentialities of four other species of mosquitoes are under study.

Colonies of white ibis and of egrets, collected in Louisiana, have been established at Montgomery, Ala. The reservoir potential of these birds for encephalomyelitis virus will be determined.

Ten horses from the vicinity of Montgomery were tested for neutralization test antibodies against E.E.E. and W.E.E. All were negative for E.E.E., but two had significant titers against W.E.E.; no infection or immunization history explained the W.E.E. titers. The eight normal horses will be used for mosquito transmission studies.

It appeared that 2-week-old mice are the most sensitive laboratory animals for isolation of E.E.E. virus.

DIRECT EPIDEMIC AID

Leptospirosis antibody tests were performed on 20 serums from Montrose, Colo.

From New York, 34 serums were examined for evidence of leptospirosis.

From Phoenix, Ariz., 44 paracolon bacteria were received for detailed study.

CORRECTION

CDC Bulletin X (6):34, June 1951

The portion of the table in the left column concerning Western equine encephalomyelitis and St. Louis equine encephalitis should read as follows:

NEUTRALIZATION TESTS	Negative	Positive	Incomplete	Unsatisfactory	Total
Western E. E.	476	11	113	0	600
St. Louis E. E.	380	24	121	4	529

TECHNICAL DEVELOPMENT SERVICES*

(This report presents results of work in progress and the conclusions reached may not be final. For this reason, the contents should not be published or referred to in articles for publication without permission. Reference in this report to any commercial materials or equipment does not in any way constitute a recommendation of such materials or equipment by the U. S. Public Health Service.)

TOXICOLOGY

PHYSIOLOGICAL STUDIES:

Effect of Dieldrin on Liver Cholesterol in Rats. The values for cholesterol, together with those previously reported for total lipid and phospholipid, show that rats mobilize all lipid fractions poorly in the face of acute dieldrin poisoning and the resulting starvation. The three chief lipid fractions maintain a ratio in poisoned animals similar to that in the normal rat.

Effect of Lipotropic Agents on Liver Changes During Dieldrin Poisoning. This completes the study of the effect of vitamin B_{12} as a lipotropic agent on the liver changes seen during dieldrin poisoning in the rat.** It has been determined that the vitamin had no effect in preventing accumulation of fat in the liver during poisoning, nor did it alter the pattern in which the various fractions of fat are accumulated.

Effect of Dieldrin on Weight Loss and Liver Chemistry in the Rat. In the first test of this sort on rats given dieldrin at the rate of 20 mg./kg./day, 5 days a week, the poisoned animals showed an initial weight loss when the poison was first applied but later gained at the same rate as normal controls. The initial loss of weight was identical to that shown by other controls which were not poisoned but were given only the amount of food voluntarily taken by the poisoned rats. Both the experimental and the control rats were sacrificed after 60 days. Livers of the experimental animals were significantly heavier than those of either group of control animals. The total liver lipids, phospholipids, cholesterol, and glycogen were determined.

There was an absolute, but not a relative, increase in the total lipid, phospholipid, and glycogen fractions in the poisoned animals; cholesterol showed a slight relative, as well as absolute, increase. Collectively, the liver constituents analyzed accounted for only 14 percent of the observed increase in liver weight. Studies to identify the remainder are in progress.

Effect of Fat Depletion on Dieldrin Toxicity. Preliminary starvation, which reduced the body weight of rats by 20 percent and deprived them of essentially all adipose tissue, failed to change significantly their susceptibility to dieldrin as measured by the median lethal dose. However, at the upper dosage range the time of survival after poisoning was significantly shortened.

Effect of Subtotal Hepatectomy on Dieldrin Toxicity. Rats from which 70 percent of the liver was removed surgically were treated dermally with dieldrin 48 hours postoperatively. The LD_{50} for these animals was 50 mg./kg. while that for controls was 90 mg./kg. The difference is statistically significant. Laparotomy without hepatectomy had no influence on the LD_{50}.

Effect of Dieldrin Poisoning upon Liver Replacement. Three groups of rats were subjected to 70 percent hepatectomy. One group was treated with dieldrin 48 hours postoperatively at the rate of 50 mg./kg. Two other groups were not poisoned; one was given only the amount of food voluntarily taken by the poisoned animals, and the other was given a full diet. In spite of a reduced food intake, the animals poisoned by a single dermal dose of dieldrin showed approximately the same degree of liver weight restoration as did the paired, unstarved controls that received no poison.

Use of Barbiturates in the Treatment of Dieldrin-poisoned Monkeys. After apparently successful barbiturate treatment of dieldrin poisoning in both

*Abstracted from Technical Development Services Summary of Activities No. 26, April, May, and June 1951.

**See CDC Bulletin X(6):36, June 1951.

monkeys and dogs, an occasional animal has been seen to show signs of poisoning again and to require a second course of the barbiturate antidote. This observation may be explained by the fact that the first course of antidote treatment was not long enough, or by the fact that some unknown stress to which the animal may have been subjected was responsible for the relapse. The latter hypothesis was tested following the apparently complete recovery of two monkeys severely poisoned by dieldrin and subsequently medicated with sodium phenobarbital. Seven days after medication was stopped, one of the monkeys was starved until it lost 10 percent of its body weight. This severe weight reduction did not cause a return of central nervous system symptoms, and the monkey recovered without further medication by phenobarbital.

Effect of Intravenous Administration of Dieldrin Homogenate on Sheep. A sheep which had previously withstood repeated dermal doses as high as 200 mg./kg./day regularly showed symptoms and occasionally convulsions when given 30 doses of dieldrin intravenously at the rate of 2.36 mg./kg./day. This suggests that sheep absorb dieldrin very incompletely from the skin or are able to detoxify the compound very efficiently as it is absorbed.

TOXICITY OF DDT:

Clinical Studies of DDT Storage Levels in Human Fat. Twenty-four additional analyses of DDT in human fat have been made.* A range of 0 to 15 p.p.m. was observed. One case presented a diagnostic problem since the patient thought that his occupational contact with DDT may have aggravated a recurrence of infectious hepatitis. Exclusion of DDT as a contributing cause of illness by failure to demonstrate it in a fat biopsy offered considerable reassurance to the patient.

TOXICITY OF PARATHION:

Study of the Pattern of Cholinesterase Depletion and Recovery Following Repeated Exposure to Parathion. An experiment has been begun to study possible tolerance or sensitization to parathion by following the pattern of cholinesterase decrease and recovery during repeated cycles of poisoning.

Methods of cholinesterase determination are based on measurement of the acetic acid liberated when acetyl choline is hydrolyzed by cholinesterase. The acetic acid set free in this reaction may be measured colorimetrically, manometrically, titrametrically, or electrometrically. The electrometric method appeared to be the procedure of choice and was utilized to follow the blood cholinesterase levels of the experimental animals in the tests.

RODENTICIDE STUDIES:

Field Studies with Warfarin in Bait Used against Norway Rats. The results of tests definitely show the inadequacy of warfarin at a bait concentration of 0.0125 mg./gm. for control of Norway rats in the field although that concentration produced kills of 100 percent within 2 weeks among rats poisoned in the laboratory.

Laboratory Studies of Feeding Reactions in Roof Rats when Fed High Concentrations of Warfarin in Bait. There is no evidence of bait shyness (secondary bait refusal) to warfarin in roof rats. On the other hand, there is evidence of increased avoidance of the poison bait containing an increased concentration of warfarin. This form of avoidance (primary bait refusal) is shown to warfarin by roof rats both on the first day of testing and during the entire testing period. Primary bait refusal is not, however, considered to be of sufficient intensity to be significant in control operations under normal field conditions. The survival time of the rats was not different at the various concentrations now under consideration. Studies reported earlier have, however, emphasized the importance of the over-all resistance and the high degree of the variability in the reaction of the roof rat to warfarin.

Laboratory Studies with Warfarin in Bait against House Mice. The total food intake of mice, if expressed in grams per kilogram per day, is great in comparison to the food intake of rats. The mouse exhibits no secondary bait refusal to warfarin; and if any primary bait refusal is present, it is small in degree and is of no practical significance. Using the criterion of the smallest dosage necessary to kill all of 10 animals, it is evident that wild mice may be more resistant to warfarin than Norway rats, but they are clearly less resistant than roof rats. The mouse shows greater individual variation to warfarin than does the Norway rat though perhaps less than the roof rat.

INSECTICIDE STUDIES

FLY RESISTANCE STUDIES:

Studies on Possible Dieldrin Resistance in "Phaenicia Pallescens." *P. pallescens* were exposed to dieldrin residues through the F_5

*See CDC Bulletin X(6):36, June 1951.

generation. Original survivors for 10 days in colonies with 1 percent coverage with 10 mg. or 25 mg. dieldrin per sq. ft. produced an F_1 generation showing minor resistance. Colonies with 5 percent coverage with 25 mg. dieldrin per sq. ft. did not produce any further resistance through the F_5 generation. With successive selections, low oviposition rates occurred and the F_6 eggs were insufficient for continuing the experiment. Minor resistance to dieldrin residues was also shown in standard exposure chambers.

Cooperative Studies on the Degree of DDT Resistance in Various Laboratory and Field Strains of "Musca domestica." Laboratory and field strains of DDT resistant house flies from various laboratories have been held free from DDT deposits through seven generations. Comparative levels of DDT resistance were determined on alternate generations. In order of decreasing resistance, the strains were as follows: laboratory strains from (1) Urbana, Ill., (2) Orlando, Fla., and (3) Savannah, Ga.; and (4) Pollard field strain, California, (5) Superbell laboratory strain, California, and (6) field strain, Urbana, Ill.

Only the Orlando strain indicated a tendency toward reversion. Previous studies had shown reversion in four of the six strains.

Studies with Dieldrin-Resistant Strains of "M. domestica" from Phoenix, Ariz.* Tests with F_2 and F_3 adults from strains in various parts of Phoenix showed only moderate dieldrin resistance. Considerable resistance to combined deposits of DDT and *P*-dichlorodiphenyl methyl carbinol (DMC) was shown by the female flies of these strains. Various Dilan components tested as residual deposits were ineffective against the various strains in laboratory tests.

Determination of Insecticide Resistance in a "M. domestica" strain from Yuma, Ariz. High dieldrin resistance was found in a house fly strain from Yuma, Ariz. The strain was also resistant to lindane deposits. Topical applications of Dilan components at the high level of 3.25 micrograms per fly produced mortalities greater than 90 percent.

DEVELOPMENT OF FORMULATIONS FOR FLY CONTROL:

Relative Effectiveness of Combinations of Various Halogenated Hydrocarbons with Synergists against Resistant Strains of "M. domestica." Of 1,200 compounds, mixed with DDT, only 5 combinations killed 70 percent or more females of the resistant Roberd strain. Records over a 6-month period indicate that the Roberd strain is becoming more resistant to DDT-DMC deposits.

DDT-DMC Water Wettable Suspension Formulations. DDT and DMC were combined in various proportions, melted together, and added to a standard talc-Triton X-100-water combination with rapid stirring. The resultant suspensions from DDT or DMC alone and in the combination of 10:1 were relatively ineffective as residual deposits. Ratios of DDT-DMC at 200:40 or 200:200 were quite effective. Ratios of DDT-DMC at 100:200 and 200:400 were definitely inferior, indicating a possible masking of DDT by the excess of DMC.

Alteration of pH in DDT and DDT-DMC Combinations. Xylene emulsions of DDT alone and in combination with DMC were prepared with pH values of 3.0, 7.3, and 10. DDT deposits from these emulsions were ineffective against resistant house flies. With the DDT-DMC deposits, those from an emulsion with pH 10 were somewhat less effective than deposits from emulsions at pH 7.3 and 3.0, but not sufficiently so to be of any great significance.

Combinations of Phenyl Mercuric Acetate with DDT.* Combined deposits of DDT and phenyl mercuric acetate at ratios of 200:20, 200:40, and 200:200 mg./sq. ft. gave less than 10 percent mortality of the female adults of resistant house fly strains. These combined deposits in rapid screening tests had shown kills of over 85 percent.

Combinations of 3-Hydroxy-2-Naphthoic Acid with DDT. Combined deposits of DDT and 3-hydroxy-2-naphthoic acid at ratios of 200:20, 200:40, and 200:200 mg./sq. ft. gave less than 20 percent mortality of adult house flies of the DDT-45 and Roberd strains in standard exposure chamber tests.

Combinations of Parachlorophenyl-1, 2-dichloro-2-(parachlorophenyl) Ethyl Ketone with DDT. Preliminary tests with combined deposits of DDT and parachlorophenyl-1,2-dichloro-2-(parachlorophenyl) ethyl ketone in standard test chambers showed promising effectiveness against DDT-resistant flies. The 4-week-old deposits appeared

*See CDC Bulletin X(6):41, June 1951.

to be more effective than the 1-week-old deposits.

Combinations of 1,1-bis(parachlorophenyl)-ethane with DDT. One-week-old combined deposits of DDT and 1,1-bis(parachlorophenyl)ethane in ratios of 200:20, 200:40, and 200:200 mg./sq. ft. were relatively ineffective against adult female house flies of DDT-resistant strains. Progressively greater effectiveness, however, was shown by the 3- and 6-week-old deposits.

Halogenated Nitro Compounds. Residual deposits from Dilan 25-EM at rates of 50 to 400 mg./sq. ft. had essentially no insecticidal value against Roberd strain flies. Tests with individual components of Dilan also showed low mortalities.

Other Synergists Combined with DDT. Combined deposits of DDT and dihydroxanthraquinone and of DDT and bicyclo(2,2,1)-5-heptene-2,2-dicarboxylic anhydrides failed to show marked kill of DDT-resistant house flies in residual evaluations at 1 and 3 weeks after spray application.

Geigy Compounds. Residual deposits of 200 mg./sq. ft. of each of three forms of Geigy compound G-22008 applied from acetone solutions and from xylene emulsions on cardboard failed to give marked kill of normal house flies. Applications on glass panels failed to crystallize during a 6-week period.

PHYSIOLOGICAL AND BIOCHEMICAL INVESTIGATIONS ON HOUSE FLIES:

Absorption and Metabolism of DDT in Resistant House Flies. Investigations were made on DDT-absorption rates and DDE-production rates after topical applications of several DDT-benzene solutions. A constant volume of solution was applied by a micro-loop to the ventral thoracic area of adult females. Flies surviving at 24 hours were killed, washed twice with chloroform, macerated with sand, and subjected to chloroform extraction. Amounts of DDT and dichlorodiphenyldichloro-ethylene (DDE), present externally and internally, were determined. The DDT absorbed was not directly proportional to the dosage applied. Heavy applications probably formed multilayer deposits with only the bottom layer in direct contact with cuticle. At low dosage levels, all of the absorbed DDT was converted to DDE. At higher levels, part of the DDT was found unchanged in tissues; most of it was converted to DDE, but only 65 to 80 percent of the applied dosage was detectable. Absorption and metabolism of DDT at various time intervals after application of a 6.5 microgram dosage showed only 1 percent absorption at the end of the first hour and 6 percent in 2 hours after application. The absorption rate was highest during the first 4 hours and decreased progressively thereafter. Ten to twelve percent was unabsorbed after 5 days. DDE continued to be formed for the first 24 hours and then remained at a constant level.

Laboratory Studies on the Synergistic Effect of DMC with DDT against Resistant House Flies. Dosage-mortality relationships from topical applications for DDT alone and for 7 doses of DMC with various amounts of DDT were determined using the Roberd strain of house flies. Dosage-mortality regressions showed a marked shift to lower amounts of DDT and increasing slopes from addition of 0.065 to 6.5 micrograms DMC per fly and then decreasing slopes with additional DMC. The effective range of dosages over which the synergist could be successfully used was determined. A synergistic index for a given DDT-DMC combination was set up from the ratio of the amount of DDT alone to that of DDT plus DMC necessary to give a certain percentage of mortality. Indexes for the 50 percent and 90 percent mortality levels are given in table 1.

The Mechanism of Synergistic Action of DMC. Adult females of the Roberd strain were treated topically with various DDT-DMC benzene solutions. After 24 hours, adhering residue was removed by a chloroform rinse. The flies were ground and extracted with chloroform. The extract was shaken with concentrated H_2SO_4 several times until the final acid layer remained clear. Schecter-Haller analysis was then made for DDT and metabolites. Increases in the proportion of DMC to DDT up to a 1:1 ratio showed increased amounts of internal unchanged DDT and decreased amounts of internal DDE. Thus inhibition in the conversion of DDT to DDE was demonstrated. DMC has the same absorption spectrum as DDE; however, H_2SO_4 washes of the chloroform extract were found experimentally to esterify the DMC and remove it from the chloroform layer. Absorption of DMC alone showed that a portion of it was rapidly converted in the tissues to an unidentified product. Further experiments show that the DMC and DDT must be applied together in order to obtain maximum activity. DMC applied 24 hours before the DDT showed almost no synergistic effect.

BIO-ASSAY TECHNIQUES:

Residual Microbio-assay Technique Applied in the Evaluation of Dieldrin Deposits. A rapid,

Table 1

RELATIVE AMOUNTS OF DMC AND DDT REQUIRED TO CAUSE 50 PERCENT AND 90 PERCENT MORTALITY OF RESISTANT HOUSE FLIES (ROBERD'S STRAIN)

DMC Micrograms per fly	DDT (Micrograms per Fly)		Synergistic Index	
	Mortality		Mortality	
	50%	90%	50%	90%
0.065	6.5	-	2.7	-
0.325	1.2	4.1	15.0	13.1
0.65	0.64	1.4	28.1	38.5
3.25	0.45	0.73	40.0	74.0
6.50	0.40	0.58	45.0	93.1
16.25	0.49	0.80	36.7	67.5
32.50	0.55	0.84	32.7	64.2

sensitive method for the quantitative determination of dieldrin concentrations in acetone extracts has been developed. Using 30-minute exposure periods, adult female house flies of a normal strain are exposed to carefully prepared dieldrin residual deposits lining shell-vial exposure chambers. Amounts of dieldrin as low as 0.5 to 3.0 micrograms per vial can be detected.

Effect of Tissue Extracts on Micro-loop Delivery Rates. The effect of fatty or other extraneous substances extracted from liver by benzene or chloroform upon the volume of drops delivered from micro-loops has been measured. The largest decrease in volume observed was 3.32 percent less than a straight benzene solution, a change within the experimental error for the loop and not regarded as significant.

DISINSECTIZATION OF AIRCRAFT:

Comparison of Allethrin and Pyrethrins in Combination with Various Synergists in High Pressure Aerosols. Comparisons have been made between high pressure aerosols containing 3 percent DDT, various synergists, and 0.4 percent pyrethrins or allethrin. Allethrin formulations with piperonyl butoxide or with n-propyl isome gave lower kills than did the corresponding pyrethrum formulations. With MGK-264, allethrin formulations were slightly better than pyrethrum formulations.

Comparison between an Allethrin Formulation and Standard G-382 at Various Dosage Rates. An allethrin formulation compared to standard formulation G-382 at dosage levels from 1.5 to 6 gm. per 1,000 cu. ft. showed less effectiveness at dosages of 1.5, 2.5, and 3 gm. per 1,000 cu. ft., but higher effectiveness at dosages from 3.5 to 6 gm. per 1,000 cu. ft. A pyrethrum formulation comparable to the allethrin formulation showed correlation with the G-382 at all dosage levels.

RADIOACTIVE TAGGING STUDIES:

Laboratory Studies on Tagging of "Drosophila melanogaster" with P^{32}. Adult *D. melanogaster* offered 10 gm. of banana-yeast bait containing 20 microcuries of P^{32} showed radioactivity levels of 40-260 counts per minute for males and 240-2,100 c.p.m. for females at 24 hours. Fresh banana-agar paste failed to mark adult flies in exposures of 1-20 hours after preparation but gave good marking during the second 24-hour period, indicating that the fermentive state of the bait was important. With well-fermented baits, 30-minute exposures of adult flies give good levels of radioactivity. Baits containing 2, 5, 10, and 20 microcuries of P^{32}, respectively, were tested for tagging efficiency. Immediately after preparation, only the 20-microcurie bait was adequate. After 36 hours, both the 10- and 20-microcurie baits gave adequate tagging with 2-hour feeding periods. Satisfactory radioactive baits were developed by using an applesauce-vinegar mixture and a stale beer bait.

Studies on Tagging of Adult "M. domestica," "Callitroga macellaria," and "P. pallescens" with Radioactive P^{32}, Ca^{45}, and I^{131}. I^{131}, as NaI^{131}, was added to whole milk at 1.25 and 2.5 microcuries/ml. After 24-hour feeding periods, the levels of radioactivity for adult flies of the three species were distinctly different. *M. domestica* showed 500-1,000 c.p.m., *P. pallescens* 1,000-2,100 c.p.m., and *C. macellaria* 1,000-1,900 c.p.m. Adult females showed higher levels of activity than did the males. *M. domestica* lost radioactivity more rapidly than the other species. *C. macellaria* was unable to dispose of I^{131} to any great extent, and complete male mortality occurred from baits with 2.5 microcuries of I^{131} per ml.

Ca^{45} as $Ca^{45}Cl_2$ was added to whole milk at 0.5, 1.0, and 2.0 microcuries/ml. The $CaCl_2$ apparently made the milk baits somewhat repellent to adult flies. The amount of radioactivity acquired from a 24-hour feeding period was almost entirely lost in the subsequent 24-hour period.

Tests were made to determine possible tagging of flies from feeding on fecal or regurgitation spots

of radioactive flies or from mating with the radioactive flies. With I^{131} baits, no detectable radioactivity was transmitted to flies of either sex from radioactive flies. With P^{32}, however, one-third of the *M. domestica* females which were added to a cage of radioactive males showed marked levels of radioactivity.

CHEMICAL STUDIES

SAMPLING AND ANALYSIS OF AIR FOR PARATHION:

The extensive use of parathion dusts and sprays for the control of agricultural pests has created a health hazard to those applying such materials as well as those in the vicinity of such operations. In order to study distribution of air-borne parathion dusts, a device has been developed which will sample efficiently as much as 2.5 cu. ft. of air per minute. A series of Greenburg-Smith impingers is employed and the air-jet ejector may be used as the source of power.

USE OF THE DAVIDOW METHOD FOR THE ISOLATION OF DDT FROM FATS FOR ANALYSIS:

The Davidow method for DDT separation from fats has been modified so that the rate of flow of eluate may be easily controlled and so that a more nearly homogeneous mixture of the Celite-acid-CCl_4 slurry may be obtained.

EQUIPMENT DEVELOPMENT STUDIES

AIR-BORNE PATHOGENS:

Bacterial Cloud Studies. Studies were made on the dispersal and detection of bacterial clouds, using *Serratia indica* as the test organism. A PT-17 aircraft was used for the dissemination, flying at several altitudes and in various flight patterns. Periodic sampling was carried out before and after dispersion. Results indicated a significant increase in the total culture counts after each cloud dissemination.

Air Flow Meter. A commercially available gas meter was modified to make it suitable for measuring the volume of air samples. Desirable features of this modified meter are its low cost, ruggedness, accuracy, and simplicity of use.

Automotive Engines as Vacuum Pumps. Tests were made with eight different models of car and truck engines to determine if windshield wiper connections from the intake manifolds could be used to provide sources of vacuum power for the operation of air samplers. They were found to be satisfactory for use where the required air flow does not exceed 2.5 to 3.0 cu. ft./minute. Use of automobile engines as a source of vacuum power would be of particular value in a mobile sampling unit or in emergency situations following disaster.

Sieve Samplers. Castings were received for the construction of 100 all-aluminum sieve samplers. Thirty of these were finished and made available to the cooperating air sampling stations. The availability of these samplers will make possible an expansion of the air sampling program in areas where this type of sampler is required.

Electro-mechanical Timer. A timing device was developed which provides repeating momentary electrical contact at preset intervals. It was designed primarily for the control of sampling periods in semiautomatic air sampling equipment; however, its use may be extended to other types of equipment.

EQUIPMENT FOR THE APPLICATION OF MELTED INSECTICIDES:*

Corrosive Properties of Melted DDT Applied as a Spray. Tests were made of the rusting and corrosive properties of molten DDT on samples of plastics, copper, brass, iron, and steel. Test samples were exposed to a direct spray of molten DDT, and to gases in the spray chamber; controls were kept in normal atmosphere. From the results it is concluded that, for the materials tested, corrosion resulting from the application of molten DDT is, if present at all, apparently minor in character. However, additional tests will be conducted before routine use is recommended.

Thermal Behavior of Melted DDT. Further investigation was made of the thermal behavior of melted DDT. Viscosity changes over the 85° to 110° C. range were measured. The temperature differential between solidification and rapid decomposition is comparatively small, indicating that spray equipment for molten DDT must have precise temperature control.

SPRAYING EQUIPMENT:

Materials and Performance Tests. Compressed air insecticide sprayers from three different manufacturers were tested, using 5 percent DDT-xylene emulsion as the spray material. A hand shut-off valve, tested on the automatic testing rack, is a new type valve with the liquid control located in the nozzle.

CONTROL METHODS AND EVALUATION STUDIES

FLY ACTIVITIES:

Fly Resting Habits. Seasonal changes in mini-

*See CDC Bulletin X(6):39, June 1951.

mum daily temperature had little effect on the nocturnal resting habits of house flies on rural unscreened premises. Most of the flies were found resting inside the house at night regardless of temperature. On screened premises, when minimum temperatures ranged form 60° F. downward, most of the observed flies were found resting inside barns or on porches. As the minimum temperatures increased, the flies tended to move out of the barns. As the minimum temperature approached or exceeded 70° F., most of the flies were found in trees at night with few remaining in the barns.

Fly Dispersal Studies in Rural Areas. Radioactive phosphorus, with and without the additional use of dyes, was used to tag wild flies trapped as adults on the premises selected as the release point. The flies dispersed in all directions, apparently at random, for distances up to 8.25 miles, the farthest point at which traps were operated. Approximately 9 percent of the marked house flies were recovered out of an estimated total of 13,500 tagged flies, with about 8 percent being recovered on premises away from the release point. Catches of tagged flies indicated that in some instances, at least 50 percent of the total fly population on the respective premises may have migrated there from the release point over distances ranging up to 2 miles.

Fly Dispersal Tests in Urban Areas. Preliminary data from tests in urban areas showed the random movement of flies in all directions, although there was indication that they tended to concentrate in the more poorly sanitated areas. There was also indication that suburban problem areas where there was heavy fly production contributed substantially to urban fly populations.

PHARR, TEX., STUDIES

ENVIRONMENTAL SANITATION STUDIES:

Relative Fly Populations in Three Sanitation Study Towns. As indicated by 3-week moving averages of the fly population indexes for Mission, Edinburg, and Pharr, Latin sections of the three towns showed a general increase in number of flies from the first of March to the last of May. General heavy rains and high temperatures during May favored this increased fly production. Latin Pharr maintained the highest level throughout the period, but Mission indexes rose more rapidly in May, almost equaling the Pharr index by the end of the month. This increase in the Mission indexes is believed to be due to the higher prevalence of animal pens and to a lapse in sanitation efforts. A decline in Edinburg indexes in late April was probably due to DDT and chlordan fogging operations. Anglo areas in the three towns continued to maintain low fly population levels.

Surveys of Fly Attractants. Monthly sanitation surveys in the three towns showed progressive reductions in frequency of occurrence of attractants and total area of attractants in Latin sections of all three towns. Decreased frequencies of dishwater attractants were particularly apparent. Compared with the previous quarter, there were general but moderate decreases in the frequency of fly attractants for Anglo sections of Pharr and Edinburg, with a substantial reduction in the attractant area in Anglo Mission. All Latin sections showed considerable reduction in total attractant areas, with decreased frequencies of dishwater and miscellaneous attractants. The reduction in attractants is believed due in part to migration of farm-labor families from the area and to the freezing of citrus crops which resulted in decreased fruit wastes.

Evaluation of Sanitation Factors Affecting Fly Populations. Pronounced changes during this period were the reduction of scattered waste water in all Latin sections and increases in scattered and piled rubbish for most sections. There was very little change in the frequency of approved containers in any of the towns, and nonapproved containers increased in Anglo sections.

In comparison with the previous quarter, approved containers have increased in Latin sections of Mission and Edinburg, while nonapproved containers have decreased except in Anglo Mission.

A review of the data on fly attractants and sanitation factors indicates that the Mission sanitation program has become less effective as far as these criteria are concerned.

Survey of Rodent Populations and Related Sanitation Factors. In this initial rodent study, the principal potential harborage type for the Anglo sections was improperly stored goods. The amount of harborage in Mission is as abundant as in the other towns, despite Mission's fly sanitation program.

Garbage was the most predominant rodent food supply in Anglo and Latin sections of all three towns and was more abundant in the Latin sections. Mission shows little improvement over the other towns in this respect.

A detailed survey of burrowing indicated that it was most prevalent in Latin sections. The main locations of burrows were under houses and privies. A significant portion of the burrows were

found in privy pits. Occasional entry into covered garbage and privy pits was noted.

Most of the rodent infestations in both Latin and Anglo sections were classed as light (1-5); however, the frequency of infestation was considerably higher in the Latin sections. Mice were somewhat more abundant in the Anglo sections, whereas Norway rats predominated in the Latin sections; no active roof rat signs were found.

Extensive rat poisoning programs have been carried on in the study towns for several years. Limited contacts indicate that trapping and poisoning are the primary rodent control measures employed by residents. In none of the towns was sanitation being employed as a rodent control measure.

BIONOMIC STUDIES:

Fly Resting Habits. The total number of flies of all species observed in both day and night studies for this period greatly exceeded that of the preceding quarter. The increase in *Drosophila* spp. noted during the previous quarter continued throughout this period. The total number of flies found in daytime observations was approximately the same as the total number found in nighttime observations. Ground surfaces continued to be the principal daytime resting places for house flies and *Phaenicia* spp. Principal nighttime resting places were tree limbs and bushes for house flies, and grasses and weeds for *Phaenicia*. Principal daytime resting surfaces for *Drosophila* were privy pits where 90 percent of the total population was found. Nighttime resting places for this species were more varied with principal locations being privy pits and ceilings and inside of outbuildings.

Investigations on the Dispersal of "Drosophila" from Pit Privies. Three tests, using baits treated with radioactive phosphorus as a marker, were carried out in the Pharr area of Texas to determine the extent to which *Drosophila* might migrate from privy pits into houses. In the first test, treated baits were placed in the pits of 10 privies, and marked flies were subsequently recovered in 8 of the 10 adjacent houses. In the second test, some 3,000 *Drosophila* were trapped, marked, and released in a privy pit; during the following 4 days marked specimens were recovered in houses and privy pits as far as 500 ft. from the release point. In the third test, 1,000 marked *D. melanogaster* were released in one privy pit and 3,000 marked *D. repleta* were released in another privy pit 100 ft. away; both lots were trapped in the same pits in which they were released. Subsequent trapping indicated a rapid dispersal by both species from the release privies to other privies and houses in the nearby area. *D. melanogaster* were recaptured as far as 500 ft. from the release point, and *D. repleta* were found almost 1,000 ft. from the release point. The results of the three tests demonstrate conclusively that there was extensive migration of *Drosophila* from privy pits to houses in the area studied. In fact, it seems likely that a major portion of the *Drosophila* which were found in houses had at one time or another frequented privies.

Comparison of Fly Grill Counts in Three Types of Blocks. Business blocks in Edcouch maintained the highest fly population indexes followed in order by Latin (lower class residential) and Anglo (higher class residential) sections. There were wide differences in indexes for these three types during July, August, and September, and comparatively minor differences during the spring and fall months. This may have been a reflection of extensive *M. domestica* migration from vegetable wastes dumped outside the city during the spring and fall season.

House fly indexes reached peaks in the spring and fall. *Phaenicia* spp. maintained a relatively low and uniform level throughout the period whereas other species (predominantly *Sarcophagula* spp.) reached a peak during midsummer.

CHEMICAL FLY CONTROL INVESTIGATIONS:

Five towns in the Pharr study area were treated in May with dieldrin-rosin residual sprays in order to compare several treatment procedures. The finished spray contained 0.625 percent dieldrin and 0.5 percent rosin and was applied with hand sprayers at the rate of about 25 mg. of dieldrin/sq. ft. of treated surface.

Complete Residual Treatment. The town of Penitas was treated May 9-10 with residuals applied to all potential fly resting surfaces. An immediate reduction in fly populations was effected, but indexes began to rise after a week and in the third week were intermediate between pre- and posttreatment levels. Check town indexes continued to rise during this period.

Complete Treatment of Daytime and Nighttime Resting Places. Principal daytime fly resting places in La Villa were treated on May 14-15. Populations were reduced to an extremely low level after treatment, but assumed an intermediate level 2 weeks after treatment. Principal nighttime fly resting places were treated in Elsa on May 15-

18. Fly populations were reduced immediately and remained at comparatively low levels in the second week after treatment. Indexes in the check town (Edcouch) continued to rise throughout the period.

Selective Treatment by Block Classification. San Juan was treated May 21-23 with applications varying according to pretreatment block classifications. Blocks containing 0-2 attractants were not treated; in blocks containing 3-6 attractants only garbage cans were treated; and in blocks containing more than 7 attractants, complete treatment was made. Fly population indexes indicated that the treatment was initially effective in all block classifications.

Donna was treated May 23-31 with applications being made to principal daytime fly resting places in blocks having 3 or more attractants. Grill indexes indicated initial effectiveness.

Effects of Rainfall. Intensive rainfall and high temperatures led to intense fly breeding in all study areas. Residuals have been subject to washing effects of the rains, and rapid growth of vegetation has substantially reduced the ratio of treated to untreated resting surfaces.

Preparation of Dieldrin-Rosin Concentrates. The employment in field operations of a simplified technique for dissolving rosin in dieldrin-xylene solutions by circulatory displacement has proved successful.

In this method, the rosin is simply suspended in a cheesecloth bag in the upper portion of a dieldrin-xylene solution. The portion of the liquid into which the rosin dissolves displaces the remaining liquid upward as it settles and creates a circulatory movement of the liquid, causing fresh solution to come into contact with the suspended rosin.

To see if the circulatory displacement technique would be applicable in field operations, two 25-gal. batches of 25 percent dieldrin concentrate containing 20 percent rosin in xylene were prepared in connection with May residual treatments.

Materials used were as follows: a large burlap bag, a 35-gal. container, 52.4 lb. technical dieldrin, 41.7 lb. of pine gum rosin (containing lumps up to 3 in. in diameter) and 16.4 gal. of xylene. The dieldrin and xylene were mixed in the container by stirring with a wooden paddle until all the dieldrin had dissolved. The rosin was placed in the bag and suspended in the upper portion of the liquid where it was left overnight. At no time after the addition of rosin was the mixture agitated. By the following morning all the rosin was in solution. Equal success was obtained in making both batches.

TRAINING SERVICES

FIELD TRAINING

Table 1 shows the courses given by field training centers during the quarter.

Bloomington, Ill. The sanitary engineer, Mr. C. D. Spangler, who has been in charge of the Bloomington Field Training Center was transferred to Atlanta, Ga., in June. Mr. Arthur E. Kaye will succeed him as officer in charge of the Center.

Columbus, Ga. During the quarter, 33 Public Health Service officers assigned to ECA reported to this center for field training in various phases of environmental sanitation and engineering problems.

Denver, Colo. The University of Denver was scheduled to begin 4 months of academic instruction in fundamentals of sanitation on July 9 for 500 Air Forces personnel. The University has requested that the two training officers of the Rocky Mountain Field Training Center devote a major portion of their time to this training program.

Pittsburgh, Pa. Under the initial sponsorship of

Table 1

COURSES PRESENTED BY FIELD TRAINING CENTERS

Course	Type of Course	Location of Center	Duration (Weeks)	Dates (1951)	Students	
					Organizations Represented	Total
Environmental Sanitation	Regularly Scheduled	Amherst, Mass.	12	Feb. 26 to May 18	U.S. Air Force, and State and local health departments	17
Sewage Plant Operators' Short Course	Special	Amherst, Mass.	1	Apr. 2-6	State and local health departments, Navy, Public Health Service, and University of Rhode Island	41
Rodent Control*	Special	Amherst, Mass.	1	Apr. 23-27	State and local health departments	34
Fundamentals of Water Bacteriology	Special	Amherst, Mass.	1	June 18-22	Local health departments	16
Environmental Sanitation for Graduate Sanitarians	Regularly Scheduled	Amherst, Mass.	8	June 25 to Aug. 17	University of Massachusetts and Army	14
Environmental Sanitation	Regularly Scheduled	Bloomington, Ill.	12	Feb. 19 to May 11	Local health departments and foreign governments	5 plus 9 part-time
Milk Sanitation	Regularly Scheduled	Bloomington, Ill.	4	June 18 to July 13	Dairies and industry	5
Insect and Rodent Control**	Special	Bloomington, Ill.	3 days	May 21-23	State institutions	25
Environmental Sanitation	Regularly Scheduled	Buffalo, N. Y	12	Apr. 9 to June 30	Local health departments	12 plus 1 part-time
Environmental Sanitation	Regularly Scheduled	Columbus, Ga.	12	Feb. 5 to Apr. 27	Navy, local health departments, and Public Health Service	15 plus 1 part-time
General Sanitary Engineering	Regularly Scheduled	Columbus, Ga.	12	June 18 to Sept. 8	Foreign governments	12
Milk Plant Sanitation	Regularly Scheduled	Columbus, Ga.	1	May 14-18	State and local health departments and dairies	4
Environmental Sanitation	Regularly Scheduled	Denver, Colo.	12	Mar. 19 to June 8	Health departments of Hawaii	10
Environmental Sanitation	Regularly Scheduled	Pittsburgh, Pa.	12	Mar. 19 to June 9	State and local health departments	11
Field Survey and Evaluation Methods in Housing Sanitation	Regularly Scheduled	Syracuse, N. Y.	5	Apr. 16 to May 18	City Planning Board	1
Field Survey and Evaluation Methods in Housing Sanitation	Regularly Scheduled	Syracuse, N. Y.	5	June 11 to July 13	Health Authority and local health department	2
Eating and Drinking Establishment Sanitation	Regularly Scheduled	Topeka, Kans.	2	May 28 to June 9	Army, Air Force, and local health departments	25
Milk Sanitation***	Special	Topeka, Kans.	1	June 25-29	State and local health departments, agricultural departments, dairies, departments of State colleges, and industry	75
Milk Sanitation†	Special	Topeka, Kans.	3 days	Apr. 13-15	State health department	18
Standard Milk Ordinance and Code Seminar††	Special	Topeka, Kans.	3 days	Apr. 24-26	State and local health departments, departments of agriculture, industry, Public Health Service, and University of Wisconsin	33

*Held at Boston, Mass., in cooperation with Training Services, CDC, Public Health Service, and Region I.
**In cooperation with Illinois Department of Public Health.
***Held in conjunction with South Dakota State Department of Health, South Dakota State Department of Agriculture Extension Service, and Federal Security Agency Region VII.
†Held at Bismarck, N. Dak.
††Held at Green Bay, Wisc., in cooperation with University of Wisconsin, Wisconsin State Department of Health, and Federal Security Agency Region V.

the New York Regional Office, the field training center and several local and State health agencies and educational institutions cooperated in the presentation of a 1-day seminar on sanitary landfills. The meeting, which consisted of discussions, films, and demonstrations, was attended by more than 100 representatives from municipalities in western Pennsylvania.

The Department of Dairy Husbandry of the Pennsylvania State College is completing its plans for a 2-week course in dairy sanitation for State dairy farm inspectors; the School of Engineering has indicated its willingness to develop short courses in the sanitary sciences in addition to its present courses for water works and sewage plant operators; and the School of Agriculture is progressing with a curriculum for an undergraduate course in sanitary science. On August 7, a meeting was to be held with the president of the College, the State Secretary of Health, and a representative from the School of Agriculture to develop further cooperation between the college and the State and local health departments in Pennsylvania, which are expected to be reorganized.

STATE FIELD TRAINING (COOPERATIVE ENTERPRISES)

California. In connection with plans to develop a course in vector control in food manufacturing plants, an exhaustive survey was made of the insect and rodent problems encountered by field representatives of the Bureau of Food and Drugs to enable the training staff to devise a course dealing directly with these problems.

A study was made of the reports which are routinely prepared by the Bureau of Sanitary Engineering. Two choices seemed available for designing a training program to help improve report writing in this Bureau. One approach would be to conduct a course on report writing techniques. Another approach would be to incorporate report writing into each course in some technical field, such as water treatment. If, at a later date, an orientation for new employees is developed in the Division of Environmental Sanitation, considerable attention should be paid to the subject of report writing, especially for those who are to be assigned to the Bureau of Sanitary Engineering.

New York. An experiment is being performed with college series examinations. College students in New York State may take one or several of these examinations which are designed to indicate candidate aptitudes in certain subject areas. Papers of those ranking high on generalists, psychology, biology, and economics have been examined. If the examination paper indicates that the individual might be qualified for work in these fields, pertinent data are recorded and an exploratory letter is written to the person. This project has been made possible through the joint efforts of two staff members in the State Health Department Personnel office and the Director of State Civil Service College Series Examinations.

Oklahoma. Arrangements were completed during this quarter whereby an officer of Engineering Services, Mr. Walter L. Dunn, was loaned to Training Services for the purpose of assisting the Oklahoma State Department of Health in organizing and developing their field training program.

The first 12-week course for sanitarians began June 8 with 10 trainees enrolled. Members of the local and State health departments and faculty members of the University of Oklahoma are participating in the program.

South Carolina. A form was developed for the application for trailer park permits. This phase of sanitation work has developed significantly in South Carolina due to the influx of workers in the H-Bomb area. South Carolina has recently developed new laws governing sanitation and health in trailer parks.

HEADQUARTERS TRAINING

Table 2 shows headquarters training courses presented during the quarter.

TRAINING PUBLIC HEALTH PERSONNEL FROM OTHER COUNTRIES:

Special observation and training programs were arranged for 28 public health workers from other countries who visited Training Services during the quarter. A breakdown is as follows: Afghanistan 1, Argentina 2, Austria 2, Brazil 1, Canada 1, Ceylon 1, El Salvador 1, Greece 4, India 3, Indonesia 1, Israel 1, Japan 4, Nigeria 1, Pakistan 1, Philippines 1, Thailand 1, China 1, and Germany 1.

The CDC was asked to assume responsibility for arranging the field training experience of the ECA "Pool" training program. This training followed 6 weeks at the Harvard School of Public Health and included the period April 16 through May 11, with an additional week, May 14, designated as a summary week for the entire group.

Prior to April 16, word was received that five medical officers, three engineers, one parasitologist, and one health educator were expected to receive overseas orders within the very near

Table 2

HEADQUARTERS TRAINING COURSES

Course	Type of Course	Duration (Weeks)	Dates (1951)	Students	
				Organizations Represented	Total
Insect Control	Regularly Scheduled	2	Apr. 2-13	Public Health Service, State and local health departments, Army, ECA (Public health Service), and foreign governments	17 plus 1 part-time
Control of Malaria and Other Insect-Borne Diseases	Special	1	Apr. 23-27	ECA (Public Health Service)	16
Control of Malaria and Other Insect-Borne Diseases	Special	1	May 7-11	ECA (Public Health Service)	12
Rodent Control	Special	4	June 4-29	Public Health Service	6
Insect and Rodent Control	Regularly Scheduled	2	June 11-22	Public Health Service, Military Air Transport Service, and foreign governments	13 plus 6 part-time
Rodent Control*	Special	1	Apr. 16-20	District of Columbia health department and Public Health Service	24
Rodent Control**	Special	1	Apr. 23-27	State and local health departments	34
Insect and Rodent Control***	Special	1	Apr. 30 to May 4	State and local health departments, industry, and foreign governments	15
Insect and Rodent Control†	Special	1	May 21-25	Tulane University	8
Insect and Rodent Control††	Special	1	May 22-25	Army, Air Force, and Navy	75
Insect and Rodent Control†††	Special	1	June 4-8	State and local health departments	18
Rodent Control+	Special	1	June 11-15	City of New York Department of Parks, Marine and Aviation, Rodent Control Coordination Unit, City Hospital, Department of Sanitation, Public Works, Housing, Department of Health, and Board of Education	26
Housing Sanitation	Regularly Scheduled	5	Mar. 19 to Apr. 21	Housing Survey Project	1
Housing Sanitation	Special	1 day	June 5	Trainees of Rodent Control Course	6
Home Accident and Housing Training++	Special	1 day	Apr. 9	Local health departments	67
Home Accident and Housing Training+++	Special	1 day	Apr. 10	Local health departments	53

*Held at Washington, D. C.
**Held at Boston, Mass., in cooperation with New England Field Training Center and Federal Security Agency Region I.
***In cooperation with Bloomington Field Training Center.
†Held at New Orleans, La.
††Held at Ft. Jackson, S. C., in cooperation with Third Army.
†††Held at Chapel Hill, N. C.
+Held at New York, N. Y.
++Held at Charleston, S. C.
+++Held at Lancaster, S. C.

future, and arrangements were made for these officers to begin their field training on April 2 instead of April 16. There were 39 officers who received training. Of this group, there were 20 medical officers, 10 engineers, 6 nurses, 1 health educator, 1 malariologist, and 1 medical missionary.

OTHER HEADQUARTERS ACTIVITIES

EXPANSION OF SERVICES:

Arrangements were completed with the Washington State Health Department for assigning a training officer, at present assigned to the New York State Health Department, at the State level to develop regional facilities for field training to serve the entire Northwest Pacific area. He will be stationed at the State Health Department headquarters in Seattle, Wash., and will work closely with the Division of Environmental Sanitation with offices in the Smith Tower.

Plans are being formulated to train Indian sanitation leaders at the Rosebud Indian Reservation in South Dakota. They will, in turn, train other groups of Indians.

The sanitary engineer, Mr. C. D. Spangler, who has been in charge of the Bloomington Field Training Center, was transferred in June to Atlanta where he will head the consultant service to the Division of International Health on the development of field training centers in other countries. His first assignment will be to Brazil to develop, at the request of the Institute of Inter-American Affairs, field training facilities to serve graduates from the School of Public Health at Sao Paulo. Later in the year he may serve several other countries in the Southeast Asia territory where ECA is assigning public health personnel on technical missions.

A new Section on Training Methods and Aids has been set up in Training Services.

TRAINING MATERIALS:

A series of pictorial instruction sheets on the use of various rodenticides is currently being developed.

EVALUATION:

The experimental form of the achievement test for the environmental sanitation field training program was administered as a pretest to 33 trainees and as a posttest to 46. A total of 217 trainees has been pretested and 148 trainees posttested. Due to a change in the program of one of the environmental sanitation courses, the experimental period will continue through September instead of August.

VETERINARY PUBLIC HEALTH SERVICES

SALMONELLOSIS STUDIES

As previously reported,* studies during the summer of 1950 on dogs cultured at rabies clinics in Florida provided more adequate information concerning the prevalence of *Salmonella* in normal dogs than any other source. Thus it seemed desirable to obtain additional data on normal dogs at rabies clinics. During the quarter it was possible to obtain cultures on approximately 400 dogs. The percentage of *Salmonella* isolations from these animals has varied from 6 to 22 percent. This is in agreement with previous observations.

The number of rectal swab cultures taken on hogs has been cut to a minimum in recent months in an effort to divert more time to post-mortem cultures of swine tissues. A satisfactory technique has been devised for obtaining these tissue specimens free of contamination in the field. Recently these activities have, of necessity, been curtailed, due to a lowered Government quota of hogs in abattoirs.

Epidemiological surveys of materials in Florida

*See CDC Bulletin X(3):41-42, March 1951.

packing houses have been continued in two places showing a low percentage of *Salmonella* isolations with similar findings in both locations. In another slaughterhouse, which previously yielded a very high percentage of *Salmonella*, further surveys showed a marked decrease. Between the first and last surveys, this particular establishment had been visited by an inspector from the State Livestock Sanitary Board who made recommendations for improvement of sanitary conditions.

A dilution technique for the examination of ground meats for *Salmonella* organisms has been devised. Comparative data is now being accumulated on a large number of specimens cultured by the direct method and by the dilution technique.

Through the cooperation of local veterinarians and dairy owners, cultures have been obtained on more than 500 dairy cows. As expected, these cultures have yielded few positives. In one instance, an owner requested that cultures be taken on a group of 26 calves, some of which had recently recovered from diarrhea. *Salmonella* were isolated from seven of these calves.

Bacteriological examination of poultry at two large local processing plants commenced the latter part of April. Through the cooperation of the owners it has been possible to obtain cultures from the organs and muscle tissues of these birds without contamination. Thus far no *Salmonella* organisms have been isolated.

Early in June the Bureau of Entomology arranged to trap rats in the restaurants in Jacksonville, Fla. These rats have been examined for presence of *Salmonella*. It is of interest that 6.8 percent of the first 60 rats cultured were positive for *Salmonella*.

Of 30 hens and young chicks received from veterinarians and poultry raisers for examination for *Salmonella*, 2 hens yielded *Salmonella pullorum*. From one group of 3-week-old chicks, an anaerogenic paracolon *Escherichia* containing *Salmonella flexneri* antigens was isolated. Mortality in this group of chicks was high.

Q FEVER

Pasteurization Project. Investigation has been conducted to determine the effect of holding the Henzerling strain of *Coxiella burnetii* at 145° F. and 144° F. for 30 minutes when suspended in skim milk in concentrations of between 1 million and 10 million infectious guinea pig doses. The organisms did not survive holding for 30 minutes at temperatures of 145° F. The experiments at 144° F. have not yet been concluded. It is also interesting to note that skim milk containing between 1 and 10 million infectious guinea pig doses of *C. burnetii*, when held for 30 minutes at 146° F. or 145° F. and subsequently inoculated into guinea pigs, has shown no evidence of stimulating the formation of specific complement-fixing antibodies in this host.

Epizootiological Project. Field studies devised to develop the epizoology of naturally occurring Q fever among dairy cattle have been continued. Sampling of two herds which have been under study for over 3 years was continued and records were brought up to date. Preliminary analysis of the infection pattern occurring within the herds was performed. Data were collected on a native dairy to test the hypothesis, suggested by previous data, that young-matured dairy animals, exposed to infection throughout their early life, might be more resistant to infection than adult dairy cattle exposed for the first time. Further data are needed to test the hypothesis.

Beef cows were found to possess serologic evidence of infection for the first time. Previously, several hundred such animals sampled in slaughterhouses had failed to indicate infection. The recently found infected animals were bred or pregnant Hereford females as breeding stock were maintained with dairy animals on infected premises. A few unbred dairy heifers were found with serologic evidence of infection. This constitutes the first time such animals have been found infected. The age at which infection does occur is not well defined as yet. The constant finding of animals infected at a younger age is of epizootiological importance and such efforts are being continued.

Dairy cows included in a previous vaccine study were resurveyed about 2 years after the study was started. Of 25 previously negative animals, only 1 had developed subsequent evidence of infection and this was in a nonvaccinated control cow. Placental material was collected from an immigrant herd included in the vaccination study in an effort to determine the importance of placental expulsion as a route of shedding *C. burnetii* by infected cows. The afterbirths from recently arrived cows and from cows resident on the dairy for various lengths of time were obtained. Tests of such material are incomplete, but they will have an important bearing on the conduct of future vaccine studies.

A slaughterhouse collection of tissue specimens

from dairy calves is under way. These calves drink infectious material before they are slaughtered. It is hoped that tests will determine whether or not the calves actually become infected with a localization of the infectious agent within the tissue and its possible persistence within such tissue. Establishing this fact is epizootiologically important as well as being of interest, as there is a considerable movement of dairy calves from the area by shipment to other parts of the United States.

Air-borne Infection Studies. The study of the infection of cattle by inhalation of *C. burnetii* is being continued. Two additional cows were exposed. Cow 34, one which had become infected by inhalation of *C. burnetti*, was re-exposed to 10,000 minimal infectious guinea pig (MIGP) doses during a period when her serum contained no complement-fixing antibodies. A slight stimulation of antibodies resulted, but no other evidence of infection was obtained. Cow 57, in her latter half of gestation, was exposed to 1,000 MIGP doses. Complement-fixing antibodies against *C. burnetii* have appeared in her serum. She will be observed through her next lactation period to ascertain whether or not Q fever rickettsiae will be shed in her milk.

Intradermal Inoculation Studies. Calves previously vaccinated by intradermal inoculation with living rickettsiae (Nine Mile) still possess antibodies 8 months after exposure. Urine and feces of these calves, which have been tested at monthly intervals, have been consistently free of *C. burnetii.*

Ingestion Infection Studies. As discussed in previous reports, five cows were exposed by ingestion of 2 x 10^9 MIGP doses of *C. burnetii.* Feces of these cows were infectious for guinea pigs shortly after heavy doses were fed (10^9 MIGP doses). At 150 days postexposure, none of the five have developed any serologic evidence of infection. Thus it is concluded that cattle are not readily infected through ingestion of *C. burnetii.*

Gooding, Idaho, Investigation. In cooperation with other staff members of the Rocky Mountain Laboratory, the investigation of Q fever in Idaho has been continued at the Rocky Mountain Laboratory. To date, 6 human cases which occurred this spring and 10 past infections have been identified. Most of these cases had either direct or indirect contact with sheep. More than 1,500 sheep, representing 19 bands, were bled to obtain an index of infection. Definite serologic evidence of infection was demonstrated in only one band. However, sheep with low levels of complement-fixing antibodies against *C. burnetii* were found in several other bands. The Rocky Mountain Laboratory staff isolated a strain of *C. burnetii* from each first blood specimen from two human cases who were ill during February 1951.

EQUINE ENCEPHALOMYELITIS STUDIES

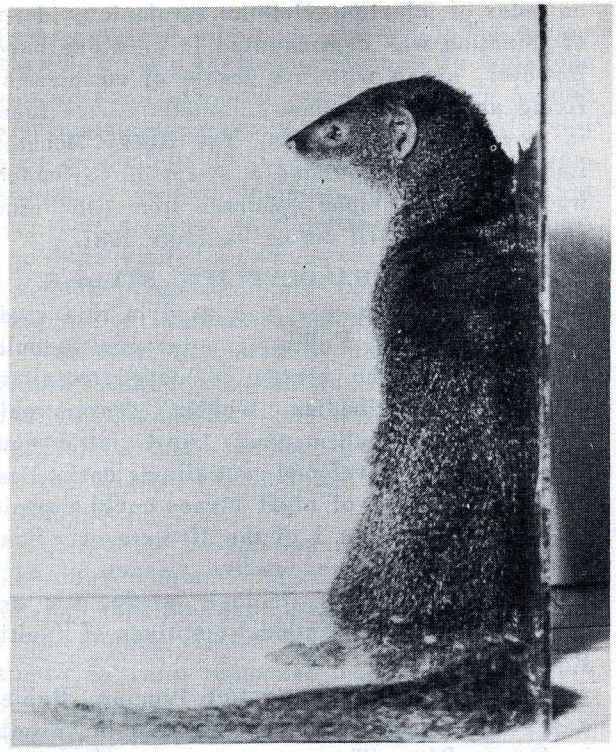
A total of 10 horses was used in this study at Hamilton, Mont. Following intradermal inoculation, some of the horses developed transitory neutralizing antibodies without demonstrable viremia. After subcutaneous and intravenous inoculation, all developed neutralizing antibodies, but in only three of eight horses could viremia be detected. All but 1 of the 10 were sacrificed and autopsied. Representative tissues of each were taken for histopathologic study, and are being studied by the National Institutes of Health.

RABIES

Puerto Rico Rabies Control Program. Rabies cases have continued to be reported in animals in Puerto Rico. Thirteen cases were diagnosed between April 1 and June 30, including seven in mongooses, one in cattle, two in horses, one in swine, and one in goats. This brings the total cases reported to 55 since the beginning of the outbreak in March 1950. The mongoose (*Herpestes javanicus*) continues to be the transmitter of the disease, and the infection appears to be distributed throughout the island.

It is significant to note that the efficient execution of procedures for the control of the disease in dogs, including mass canine immunization, has paid dividends, since the last case in dogs was reported January 29, 1951, while the disease has continued through the mongoose population with secondary transmissions to farm animals.

In order to implement the successful program which has prevented rabies from becoming established in the dog population, plans were drawn for controlling the disease in the mongooses of the island. The plan, now in operation, consists primarily of a program of training and educating the public to trap mongooses in rural areas of the island. Approximately 3,000 traps were constructed as models and distributed to centers throughout the island for the purpose of training the rural public in methods of constructing, baiting, and strategic placement of traps. Training centers were established and supervised by local



The Indian mongoose (*Herpestes javanicus*) principal transmitter of rabies in Puerto Rico. *Photo by Antonio Atiles. Courtesy Agricultural Extension Service, Puerto Rico.*

health units, Police Athletic League chapters, and agricultural extension services. An educational campaign stressing the importance of mongoose reduction was also launched.

Plans are being made for an intensive study of the natural history and habits of the mongoose and the epizootiology of rabies in this exotic carnivore.

Midwest-Northcentral Rabies Problem Arises. In the spring of 1951, rabies spread through many of the States in the upper Missouri and Mississippi valleys. Most of these areas had been rabies-free for many years. Iowa has been plagued with a high enzootic level of skunk rabies for the past few years. The situation has assumed epizootic proportions this year and has spread northward and westward into southern Minnesota, Kansas, Nebraska, North Dakota, and South Dakota. Both the larger striped skunk (genus *Mephitis*) and the small spotted skunk (genus *Spilogale*) are involved. The latter species is often referred to as a "civet cat."

As a result of requests from the affected areas, a Midwestern-Northcentral Regional Rabies Conference was held at Omaha, Nebr., May 21-22, 1951. Representatives were present from Iowa, Minnesota, Missouri, Nebraska, North Dakota, Colorado, and Montana, in addition to representatives of appropriate agencies of the Federal Government. Dr. Charles F. Blankenship, Medical Director of Region VII, was temporary chairman, and Dr. S. A. Rogers, Nebraska State Health Commissioner, was permanent chairman. Technical aspects of the conference were led by Dr. Ernest S. Tierkel, CDC, Dr. Joseph P. Lindoska, U. S. Fish and Wildlife Service, and Dr. L. T. Giltner, U. S. Bureau of Animal Industry. Each State delegation designated one of its members to present a consolidated report reflecting the interests, activities, and responsibilities for rabies control in the fields of public health, livestock disease control, and wildlife conservation.

At the conclusion of the conference the following recommendations were adopted by unanimous vote of the members:

"Whereas, rabies has become established and appears to be spreading through the upper Mississippi and Missouri Valleys, and so constitutes a serious threat to human health, agricultural economy, and wildlife resources of this area, representatives of the affected States and personnel of responsible Federal agencies met at Omaha, Nebraska, on May 21-22, 1951, and in closing agreed as follows:

"1. That each of the affected states inaugurate coordinated programs for the control of rabies; that each state's program can most effectively be carried out through the creation of a committee composed of representatives from those agencies at the state level responsible for public health, livestock disease control, and wildlife conservation.

"2. That each state arrange for adequate diagnostic facilities and that reports of rabies cases in animals be collected by an appropriate state agency, and that the State Health Officer include these data in the weekly telegraphic reports to the U. S. Public Health Service.

"3. That the epizootiology of rabies in wildlife is inadequately understood and that an investigation of this subject should be urged, so as to provide the information necessary for the intelligent and effective control of this disease.

"4. That technical assistance and guidance is available from the U. S. Public Health Service of the Federal Security Agency, the Fish and

Wildlife Service of the Department of the Interior, and the Bureau of Animal Industry of the U. S. Department of Agriculture."

St. Louis Rabies Control Program. Following a serious outbreak of rabies in St. Louis, Mo., the City Health Department, in cooperation with the State Division of Health and the County Veterinary Medical Society, organized an emergency rabies control program. Eighteen strategically located dog immunization clinics were set up and each operated from 4 to 8 p. m. for 7 days. A total of 38,000 dogs was vaccinated. It is estimated that an additional 20,000 more were immunized in the city by local practicing veterinarians in their own offices. The number of rabies cases has declined from 79 in May, to 46 in June, to 5 in July. The last rabid dog was reported July 18.

Rabies Training Courses. Two courses in the laboratory diagnosis of rabies were held. The first was held the week of May 14 at the Virus Laboratory, Montgomery, Ala. A total of 12 students attended from Alabama, Arkansas, Connecticut, Ohio, Cuba, the Dominican Republic, Jamaica, British West Indies, and Israel. The second course was held the week of June 18 at Columbia, Mo., and was sponsored jointly by the Bureau of Laboratories, Missouri Division of Health, School of Veterinary Medicine, University of Missouri, and the Communicable Disease Center. Fourteen students, representing Missouri, Nebraska, Kentucky, Iowa, and Illinois, attended the course at Columbia.

State Rabies Programs. In Texas an epizootic of rabies in foxes was successfully stopped in the eastern part of the State. The infection involved a 10-county, 200-mile eastward front which was moving toward Louisiana. In one county alone, 110 cattle died and 48 persons underwent the full series of anti-rabic treatment. Health officials were successful in carrying out a full scale control program with many other cooperating State and local agencies, involving mass canine immunization, stray dog control, and fox reduction programs. Plans are being made for all-out urban control programs in San Antonio, El Paso, Beaumont, Port Arthur, and Houston.

The intensified emergency control program in Spokane, Wash., has aided in bringing the spring rabies outbreak under control. A total of 16,500 dogs was immunized during the emergency campaign. Long range control programs are now being outlined and it is hoped that they will include the entire western Washington area.

The endemic rabies situation in Indiana showed marked improvement during the quarter. There has been an 18.1 percent decrease of positive animal cases compared with those of the same period last year. There was one human death in Knox County in April. More and more counties and townships are organizing rabies control programs with mass immunization as the principal feature. The State legislature has strengthened the quarantine laws.

BRUCELLOSIS

While obtaining specimens for culture for *Salmonella* in Florida poultry processing plants, it seemed desirable to collect blood specimens from some of the birds to examine for *Brucella* agglutinins. Blood specimens have been collected on 145 fryers and tested with both *Brucella* and *Bacterium tularense* antigens. A positive reaction with the *Brucella* antigen was obtained with the serum from one bird. These studies are still in progress.

The Missouri Department of Health plans to inaugurate *Brucella* ring test demonstrations in certain milk sheds. These studies will be in cooperation with State and Federal veterinary officials. A number of local health departments throughout the United States are experimenting with the ring test in surveying milk supplies to determine the prevalence of *Brucella* among dairy herds. The test is valuable in screening milk supplies of dairy herds.

PSITTACOSIS

A psittacosis quarantine review board consisting of Dr. G. L. Dunnahoo, Chief, Division of Foreign Quarantine; Dr. Dorland Davis, National Institutes of Health; Mr. Charles Henderson, Lawyer, Federal Security Agency; and Dr. James H. Steele, CDC, Chairman, met to make recommendations for modifying the psittacosis quarantine regulations. Dr. J. O. Dean, Assistant Surgeon General, Public Health Service, and Dr. J. A. Bell, National Institutes of Health, were also members but could not attend. These recommendations are now being reviewed by the Surgeon General and the Executive Council of State and Territorial Health officers. They will be published in the Federal Register as soon as they have been reviewed by these individuals and incorporated in the Public Health Service quarantine regulations.

ANTHRAX

Anthrax outbreaks have been reported in

Missouri, Kentucky, Tennessee, and Texas. A total of more than 20,000 animals was involved but, fortunately, no human cases have been reported. Texas officials reported that calves nursing infected cows died from the disease. There were also some cattle deaths due to the use of #4 spore vaccination in East Texas. These herds have been placed under quarantine and no milk may be sold for 3 weeks following the certification of disease or the use of vaccination.

FINAL REPORT OF THE NATIONAL MALARIA SOCIETY COMMITTEE ON CRITERIA TO DETERMINE WHEN MALARIA CEASES TO BE AN ENDEMIC DISEASE*

(The following report was approved by the National Malaria Society on November 8, 1950. The National Malaria Society Committee on Criteria to Determine when Malaria Ceases to be an Endemic Disease was composed of Dr. E. H. Hinman, Chairman; Dr. Charles N. Leach, Dr. E. F. Knipling, Mr. David Lee, Dr. E. C. Faust, Mr. Ralph S. Howard, Members; Dr. T. H. G. Aitken and Dr. Arnoldo Gabaldon, Corresponding Members; Professor John M. Henderson, Dr. F. C. Bishopp, Dr. Mark F. Boyd, Dr. Fred L. Soper, Dr. Thomas F. Sellers, Consultants; and Dr. Paul F. Russell, Dr. Justin M. Andrews, and Dr. Martin D. Young, *ex officio* Members.)

As endemic malaria approaches the vanishing point within any large area, the localization of residual cases becomes of paramount importance. The most objective means of establishing cases of malaria is to produce acceptable evidence of parasitemia. To identify primary indigenous cases, the basis of endemicity, adequate epidemiologic data must be available.

CRITERION OF CESSATION OF MALARIA ENDEMICITY

Malaria may be assumed to be no longer endemic in any given area when no primary indigenous case has occurred there for three years, if reporting, including the name and address of the patient and diagnosing physician, and case finding are actively promoted and adequate investigations are carried out.

This opinion is rendered with the full knowledge that relapses of malaria may occur after periods of latency exceeding three years, but it is believed that these instances will be so infrequent as to be inconsequential.

DEFINITIONS

1. Primary indigenous malaria is defined as the first parasite-positive evidence of infection, resulting from natural (mosquito) transmission within the given area.
2. Adequate investigation is defined as the epidemiologic investigation and appraisal of each reported case by qualified personnel. This involves verifying the diagnosis and determining if possible where and when the transmission occurred.

RECOMMENDATIONS

1. All slides considered to be positive should be submitted to a national depository for review.
2. The Public Health Service (Communicable Disease Center) should be designated as the national depository.
3. Consultants, including non-governmental authorities, should be appointed to review all controversial slides.
4. Non-governmental consultants should periodically examine and review the epidemiologic appraisals.
5. Inasmuch as determining the cessation of malaria transmission is dependent upon adequate epidemiologic intelligence, it is essential that every effort should be made to stimulate morbidity reporting, parasitologic confirmation, and case appraisal.

E. Harold Hinman, M. D., Chairman

*Reproduced with permission from the Journal of the National Malaria Society 10(2): 195–196 (1951)

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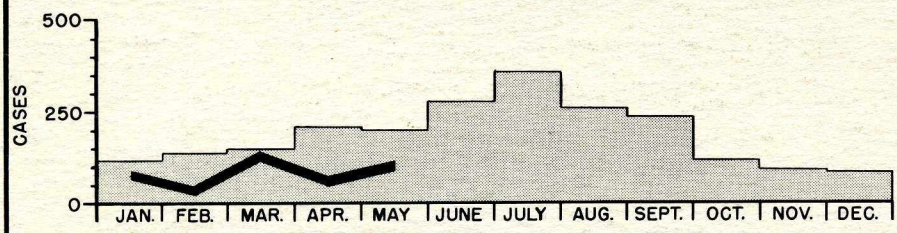
MORBIDITY TOTALS FOR THE UNITED STATES *
MALARIA, POLIOMYELITIS, TYPHUS

1950 - COMPLETE 1951 - AS REPORTED

TOTAL INCIDENCE THROUGH MAY 1951 402



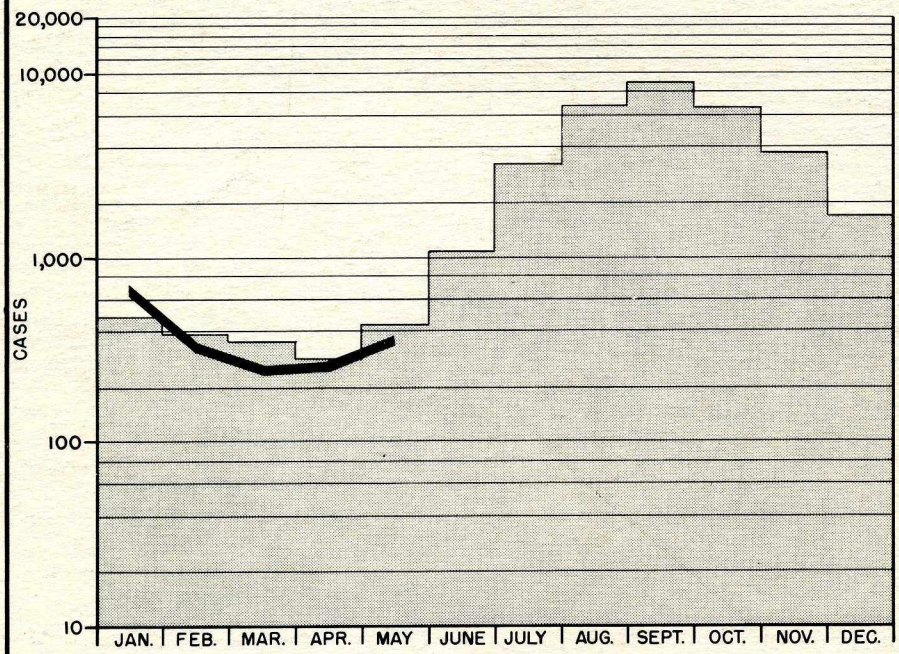
MALARIA
(TENTATIVE DATA)

1950

1951

† 62 (Civilian)
42 (Military)

TOTAL INCIDENCE THROUGH MAY 1951 1,893

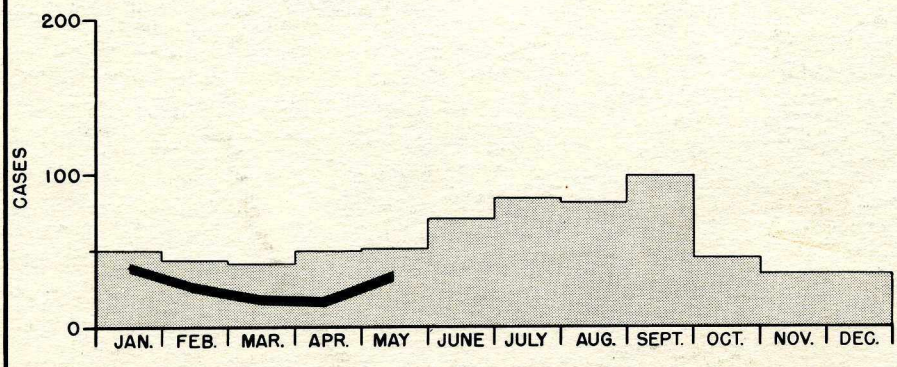


POLIOMYELITIS

1950

1951

TOTAL INCIDENCE THROUGH MAY 1951 134



TYPHUS

1950

1951

FSA-PHS-CDC ATLANTA, GA.

*SOURCE OF DATA: NATIONAL OFFICE OF VITAL STATISTICS