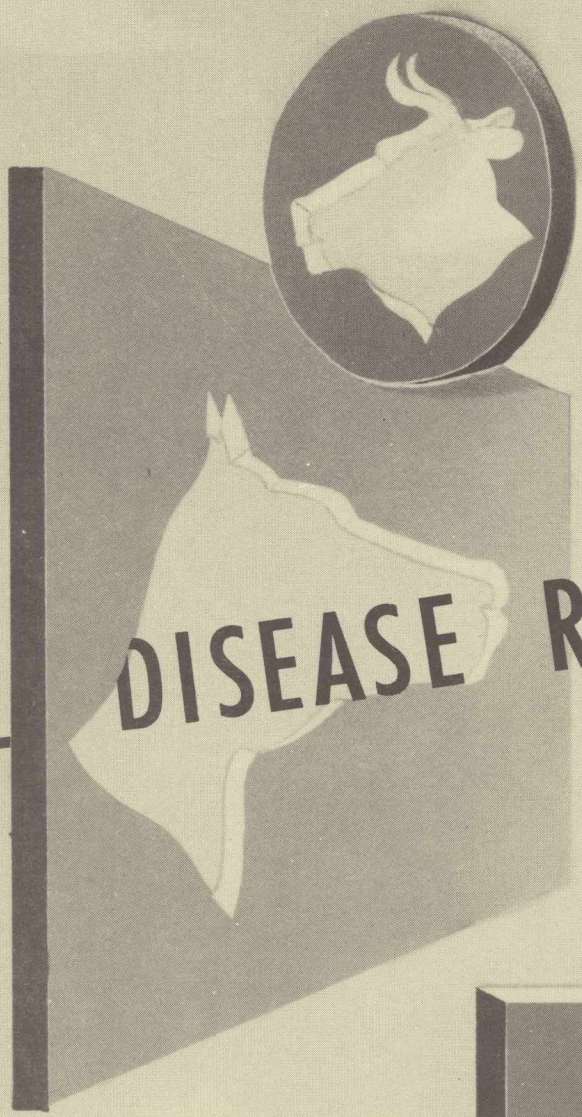
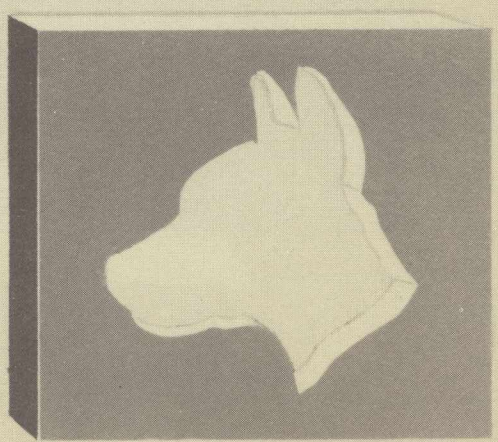
CDC BULLETIN

OCTOBER - 1951



ANIMAL DISEASE REPORTING



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

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Vol. X, No. 10 OCTOBER-1951

Contents

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Public Health Service
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An Animal Disease Reporting Program for Indiana

John H. Scruggs, Veterinarian*
L. Otis Emik, Scientist (R)**

There is a rapid awakening throughout the United States to a need for adequate reporting of communicable diseases in animals, particularly those diseases which may be transmitted to man. Several States now have systems for reporting and are working to improve their systems by solving the problems which they have encountered.

The Indiana program is being developed to improve methods of reporting by the veterinarian, to initiate an organized procedure for handling the data, to provide regular reports to the veterinarian and other interested parties, and finally to render, or assist in rendering, indicated services in communicable disease control based on the information gained from the reporting. The success of such a program depends upon the enthusiastic cooperation of the veterinary profession, the State health department, the State department of agriculture, the chief State livestock sanitary officials, other interested agencies, and the farmer or other owner of animals.

The tentative program was submitted to the Indiana veterinary profession through the medium of local meetings in the nine veterinary districts of the State. Each district voted to participate in and to support such a program. It was presented at joint meetings of county medical societies and veterinarians in conjunction with the development of local rabies control programs. Subsequent to talks on the diagnosis and therapy of rabies in man and animals, the need for more accurate information on rabies in animals, especially clinical cases, was shown. The possible value of similar information for other diseases of animals was discussed. Methods were demonstrated for the preparation of specimens for mailing and their subsequent laboratory confirmation for rabies.

A Veterinary Disease Report Form has been designed for use by Indiana veterinarians in such reporting. The top half of the obverse side and the bottom half of the reverse side of this form are shown in figure 1. Addresses of veterinarians are printed by addressograph plate on the reverse side of both the top half and the bottom half. Code numbers for machine tabulation have been incorporated in the plate to denote the reporting veterinarian, the city or county, and the State. The date denoting the end of the reporting period will also be stamped on the card before it is sent to the veterinarian.

This card will be mailed to the veterinarian near the end of each reporting period. It will appear on his desk as current business mail at the appropriate time. Very few minutes will be required to fill in the desired information, sign the card, and drop the bottom half in the outgoing mail. This form does not provide information concerning the identification of the animal or its owner, but where diseases are not present in eqizootic proportions, this information would be of questionable value. When diseases do occur in significant numbers and control measures or investigations are to be instigated, the veterinarian will be contacted to confirm the number of cases and establish their precise location, their ownership, and related information.

This method for the collection of data provides a measure of the completeness of reporting and should lead to the compilation of data which will be comparable between areas and time intervals. Perfection cannot be expected overnight. Useful information concerning the relative incidence and prevalence of the most common diseases may be anticipated at an early stage. This is a voluntary program. The results, through the medium of reports to the veterinarians and the provision of aid in epizootic control, must justify the program to all concerned.

Some additional States are interested in developing programs for the reporting of animal diseases, especially those diseases which may be transmitted to man. The defense implications of such a program provide additional incentive for its establishment in key States throughout the United States. The

*Veterinary Public Health Services, CDC.
**Epidemiologic Services, CDC.

unified cooperation of professional, State, and federal organizations will be prerequisite to the establishment of such programs, and their success will be measured by the services rendered.

Figure 1
PORTIONS OF THE NEWLY DESIGNED VETERINARY DISEASE REPORT FORM

(top half, obverse side)

VETERINARY MORBIDITY REPORT

All diseases of animals which can be transmitted to man may become of epidemic or epizootic importance under the right circumstances. Those diseases considered most likely to occur have been listed. You may have occasion to report others such as:

ringworm
trichinosis
infectious mastitis
swine influenza
brucellosis and tuberculosis in animals other than cattle
psittacosis
glanders
tularemia

Extra space has been provided for this purpose.

Your voluntary cooperation is needed. This form has been designed to conserve your time and effort. Its completion and prompt return will be greatly appreciated.

(bottom half, reverse side)

ANIMAL DISEASE REPORT

Entered in the appropriate squares are the numbers of cases of animal diseases transmissible to man personally observed by me during the reporting period ending _____

_____ D.V.M.
(signature)

John R. Doe, D. V. M.
12 High Street
Brownsville, Indiana

124-002-13

Diseases	Swine	Cattle	Sheep	Horses	Dogs	Poultry			
Rabies, clinical									
Erysipelas									
Leptospirosis									
Encephalomyelitis									
Anthrax									
Others									
Others									

PLEASE SIGN AND RETURN THIS CARD PROMPTLY EVEN THOUGH YOU HAVE NO DISEASES TO REPORT.

The Complement Fixation Test

Elizabeth I. Parsons*

The use of the complement fixation reaction in the diagnosis of disease was first introduced by Bordet and Gengou in 1901. With serums from individuals suspected of having typhoid fever, combined with typhoid antigens, they were able to demonstrate positive fixation of complement in cases of typhoid fever. Since that time the complement fixation reaction has been widely used as an aid in the diagnosis of bacterial, viral, parasitic, fungal, and rickettsial diseases.

While the test is relatively simple to carry out, the technique is somewhat more complicated than those of the agglutination or precipitation tests and, as a result, are more subject to error. The following reagents are used: (1) specific antigen, either in suspension or in a soluble state; (2) heat-stable antibody (patient's serum); (3) complement (fresh serum from normal animals, usually the guinea pig); (4) sensitized red cells (sheep or human hemolytic systems are usually used). All reagents must be carefully tested for hemolytic and anticomplementary activity and the amounts to be used must be carefully adjusted. The proper controls should always be included.

The test is performed in two phases involving two different reactions. The first phase consists of an antigen-antibody mixture to which complement is added. Complement will not be "fixed" in the presence of either antigen or antibody alone, or in the mixture if the antigen and antibody are not specifically related and, therefore, do not combine. If an antigen and its specific antibody are present, they will combine and the complement will be anchored to the combination and removed from the solution. Fixation may take place at 37° C. for 1 hour, at room temperature for several hours, or at ice-box temperature overnight. Procedures using ice-box temperature are considered most sensitive as a rule. In determining the exact temperature and time for fixation, the rapid deterioration of complement at the higher temperatures must be taken into consideration.

The exact mechanism of the combination of complement with antigen-antibody mixtures is not known. Presumably, an invisible precipitin reaction occurs between antigen and antibody. Experiments have shown that the rate and degree of combination of complement depend on the size of the particles present; and it is probable that the physical state of the surfaces of the particles also is of importance.

Since the particles, or precipitate, formed by the antigen-antibody combination on which complement is absorbed are invisible to the naked eye, and since fixation of complement is not seen, an indicator must be added to demonstrate the presence or absence of free (unfixed) complement. For this purpose a hemolytic system (sensitized cells) is used. Addition of the cells constitutes the second phase of the test. The mixtures are held for 1 hour at 37° C. If complement has been fixed by the specific antigen-antibody combination, no hemolysis will result during incubation; if complement is left free, hemolysis will result. The former is a positive reaction, while the latter is a negative reaction. Some serums show partial or incomplete fixation of complement, which results in partial hemolysis after addition of the sensitized cells.

The complement fixation reaction for the diagnosis of syphilis was first introduced by Wassermann in 1906. He used extracts of the livers of stillborn infants as antigen, since large numbers of spirochaetes were present and it was impossible to grow the spirochaete in artificial media. It was later found that extracts of normal livers and other organs gave equally good results. For many years an alcoholic extract of the lipoids of beef hearts has been generally used as antigen for this test. Therefore, the Wassermann reaction is not basically an application of the principle of the fixation of complement by a specific antigen-antibody combination. It may be regarded as an application of this technique to the detection of the reaction between the lipoid "antigen" and the "reagin" in syphilitic serum. It is not known whether the syphilitic "reagin" is a true antibody, but experiments have shown that it definitely combines with the lipoid "antigen." It is entirely distinct from the *Treponema* immobilizing substance, which appears to bear a definite and specific relation to immunity to syphilis.

*Laboratory Services, CDC.

While the use of the Wassermann reaction in the diagnosis of syphilis has been largely replaced by various types of flocculation tests, the principle of complement fixation is now widely used in the diagnosis of such diseases as the psittacosis group of viruses, lymphogranuloma venerum, murine and epidemic typhus, Q fever, amebiasis, histoplasmosis, and some others.

Community Fly Control Operations - Oklahoma, 1950

C. Heard Field* and Melvin E. Griffith, Scientist (R)**

From a small beginning in 1949, when several cooperative community fly control insecticidal projects were operated in Oklahoma, a comprehensive over-all plan of promotion and operations has been developed. In the conception of a plan for State-wide development of these activities, promotional policies have been based upon a realistic acceptance of public interest in the spectacular nature of insecticidal control. This interest has been deliberately fostered as a direct means of focusing attention on community and individual premises environmental conditions. Spot maps indicating number of fly attractants and breeding sources found in reconnaissance sanitary surveys have been effectively used in promotion of premises sanitation and improvements in garbage collection and disposal.

FLY CONTROL TRAINING COURSE

Local health departments were selected as the logical agency for handling detailed promotion and technical supervision of local operational activities. In order to develop the interest of local health department sanitation personnel, and to better qualify them for technical direction of proposed local activities, a Fly Control Training Course was organized with the cooperation of Training Services Headquarters, CDC, and The School of Public Health, University of Oklahoma. The course was conducted at the Extension Study Center, University of Oklahoma, Norman, Okla., May 8-11, 1950. Approximately 50 certificates were issued for attendance at the training course. These included, in addition to county sanitarians, one sanitary engineer from the State Department of Health, six students from the University School of Public Health, two representatives from Arkansas CDC Activities, and one county health officer.

1950 FLY CONTROL OPERATIONS

Full-scale development of planned 1950 operations was somewhat complicated by excessive rainfall during July and August. It was anticipated that chemical insecticidal operations would not begin until the latter part of June or until early July when equipment would be available from the DDT Malaria Eradication residual spray program. Approximately 20 towns were either operating or in the process of beginning operations at the close of the fiscal year. Official weather reports showed 23 days of rainfall during July, and these general rains continued into August. This unseasonable weather not only interfered with operating projects but also served to reduce fly populations so that much of the need for extensive chemical insecticidal operations was obviated.

Despite these difficulties, a sufficient number of projects were operated to gain experience and develop refinements of procedure to formulate more comprehensive plans for full future projection of the activity on a State-wide basis.

PROMOTIONAL PROCEDURES

An outstanding factor in formulating promotional plans for this activity has been the lack of necessity for developing public interest and demand. Rather, the problem has been to channel existing interest in chemical control into public

*CDC Fly Control Project, Phoenix, Ariz. Formerly CDC Activities, Oklahoma, Oklahoma City, Okla.
**Division of International Health. Formerly State CDC Entomologist, Oklahoma.

interest in the correction of community environmental conditions that create the fly problem.

The two most effective methods of developing this public interest in community environmental sanitation have been as follows: (1) a sanitary reconnaissance survey to obtain statistical data on the number of fly attractants and breeding sources, garbage storage, and collection and disposal practices; and (2) use of an organized series of color slides showing actual local conditions favorable for fly breeding.

SANITARY RECONNAISSANCE SURVEY

The sanitary reconnaissance survey was designed to obtain basic information for both promotion and future operational activities. The Garbage and Refuse Disposal Report form devised by CDC Typhus Control Section is used for recording garbage collection and disposal data. A coded record form devised by the State CDC Entomologist (figure 1) is used to record all data on fly attractants and breeding places in each block. Data thus accumulated are tabulated and used for local publicity and preparing maps for use in talks before local officials and civic groups.

The local health department is furnished with an analysis of inadequacies of community garbage storage, collection, and disposal practices, and also with specific recommendations for corrections and improvements.

In order to simplify mapping procedure, the best locally available map is utilized. The city is subdivided into zones, taking advantage of existing ward divisions where possible. Zone lines are drawn to group blocks of similar socio-economic conditions. Data on fly attractants and breeding situations are used for classifying blocks according to their potential fly infestation. Colored cellulose tape is used to graphically show these block classifications on the map.

ORGANIZED SERIES OF COLOR SLIDES

A promotional technique, developed by one of the county sanitarians, which was widely adopted and effectively used by a number of local health departments was an organized series of color slides showing actual local conditions. Such series are usually organized to show outstanding conditions of which the community is justifiably proud, such as modern public buildings, fire departments, street equipment, and high class residential areas. This is followed by the "other side of the picture" showing open garbage dumps, inadequate garbage collection equipment, open garbage containers, slum areas, and stock barns.

These slides with appropriate running comments are shown to civic, church, and official groups. The plan is being rounded out by sets of slides furnished by CDC Headquarters showing sanitary landfill operations. These latter sets will be circulated by the State Central Office to supple-

Figure 1

FIELD RECORD OF FLY ATTRACTANTS AND BREEDING PLACES

Ward or Zone_____ City_____ Inspector_____ Date_____

Temperature Range_____ Precipitation_____ Wind_____

Block	Place		Attractant				Conditions			Time	Fly Count	Notes
	10	20	30	40	50	60	70	80	90			

PLACE - **10. Outside:** 11. Street or alley; 12. Ditch or drain; 13. Yard; 14. Animal pen; 15. Other. **20. Inside:** 21. Privy; 22. Animal shelter; 23. Residence; 24. Business building; 25. Other.
ATTRACTANT - **30. Excreta:** 31. Human; 32. Horse-mule; 33. Cow; 34. Fowl; 35. Other. **40. Garbage:** 41. Mixed; 42. Vegetable; 43. Animal; 44. Dish water; 45. Other. **50. Refuse:** 51. Mixed; 52. Manufactured (papers, boxes, cans, bottles); 53. Natural (grass, leaves, brush); 54. Dead animal; 55. Other. **60. Commercial Wastes:** 61. Slaughterhouse; 62. Cannery; 63. Grain mill; 64. Brewery; 65. Other.
CONDITIONS - **70. Amount:** 71. Bushel or less; 72. Bushel to barrel; 73. Barrel or more. **80. Accumulations:** 81. Scattered; 82. Pile; 83. Open container; **90. Decay:** 91. Fresh; 92. Stale; 93. Putrefied.

Indicate **1** Type of **place**, **1** type of **attractant**, all **3 conditions** for each entry.

Oklahoma State Department of Health, Bureau of Sanitary Engineering, CDC Activities.

ment local slide series.

SANITATION ADVISORY COUNCILS

An outstanding example of effective use of two basic promotional plans to develop community interest and backing for a fly control program was the organization of a permanent Sanitary Advisory Council composed of representatives of civic clubs, the PTA, and other civic-minded groups in Wewoka (Seminole County). The County Sanitarian first requested each civic organization to name a representative to work with him as an informal Fly Control Committee. The original idea for this group was to organize a "speakers bureau" for disseminating information collected in the sanitary reconnaissance survey. Group discussions of the local sanitation problems aroused such keen interest among those participating that it resulted in a permanent organization to act in an advisory capacity to the County Sanitarian. The effectiveness of this influential group no doubt will result in organization of similar groups throughout the State.

FINANCING LOCAL OPERATIONS

Under the somewhat unusual tax structure of Oklahoma, a constitutional limitation of 15 mills has been placed on ad valorem taxes that may be levied within each county. This limitation includes ad valorem taxes for all purposes, including the cities and schools in the county. Consequently, incorporated cities and towns are forced to depend almost entirely for revenue on municipally owned utilities and levies for special purposes such as garbage collection fees and sewer fees. This situation has, somewhat paradoxically, greatly simplified local financing of fly control operations, as well as furnished a precedent for additional financing of improvements to garbage collection and disposal systems. The majority of the projects are being financed from special charges added to the water bill or special levies in the garbage collection fees to include Fly Control Operations.

In order to assist some of the communities in their original financing, the State Department of Health set up a revolving fund for purchase of chemicals for resale to local communities. Approximately $8,500.00 worth of chemicals were supplied through this revolving fund. Equipment maintenance and special technical supervision furnished for local programs were financed by a per diem maintenance charge for the use of vehicles and equipment. Under this operation plan, the entire cost of the program is locally financed except for over-all technical supervision by State Office CDC personnel.

CDC PROMOTIONAL AND TECHNICAL GUIDANCE

Over-all planning, program development, and technical consultation service have been supplied by State Office CDC personnel. District CDC supervisors cooperated with local health departments in program promotion and in crew training and technical supervision of local programs. Two of the district supervisors were discontinued on CDC pay roll by reduction in force on June 30, 1950. These two supervisors were retained on State pay roll through September and continued the same activities. CDC vehicles and equipment were used on a loan basis by local communities. Approximately 400 days' actual operational use was made of this equipment.

Tables 1 and 2 show detailed data on operations in which CDC personnel actively participated in a technical or promotional capacity.

Local financing of the projects naturally involves a much greater degree of local autonomy than would exist where considerable State or Federal financial participation is involved. Wide variations in local operations evident in tables 1 and 2 are inherent in the plan of operations. In some communities minimum chemical treatments were used, while in other communities local officials insisted on considerably more premises treatment than would have been necessary. This situation will, no doubt, be gradually improved as local officials gain more experience.

STANDARD RECOMMENDATIONS FOR INSECTICIDAL TREATMENTS

Widespread use of DDT in 1948 and 1949 had resulted in marked DDT resistance in the fly populations of Oklahoma, especially in the Southeastern counties where CDC Malaria Eradication Activities were concentrated. Chlordan residual treatment was effectively used on several of the 1949 cooperative community fly control projects where DDT-resistant strains of flies were present. Consequently, CDC recommendations for chlordan formulations were adopted as standard recommendations for 1950 operations. All communities, except as noted in table 1 used 2½ percent chlordan solutions or emulsions for space spraying. Residual spray treatments were 1¼ percent emulsion, applied with 5004 "Teejet" nozzle at 40 p.s.i. (100 mg/sq. ft.).

EQUIPMENT

According to best available information,

Table 1

CHLORDAN SPACE SPRAYING*

Community	Type Equipment	Blocks Treated	Gallons Solution	Total Man-hours Labor	Per Block	
					Gallons Concentrate	Man-hours Labor
Norman**	TIFA	12,744	7,450	448	0.580	0.035
Lawton***	TIFA	1,983	1,835	109	0.925	0.055
Hobart	TIFA	850	1,600	193	1.880	0.230
Snyder	Exhaust Gen.	160	200	38	1.250	0.240
Loneway	Exhaust Gen.	50	85	24	1.700	0.480
Muskogee	Lawrence	1,065	3,988	432	3.740	0.405
McAlester	TIFA	1,691	2,565	218	1.510	0.130
Shawnee†	TIFA	3,527	4,788	480	1.360	0.136
State Total		22,070	22,511	1,942	1.020	0.088

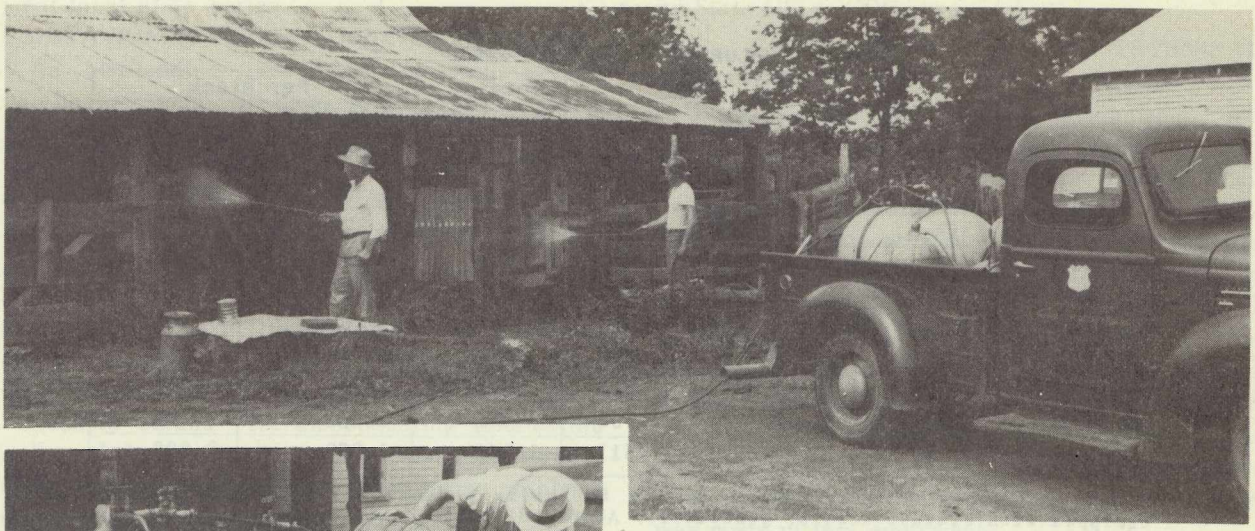
*Alley fogging was carried out in the following communities using CDC vehicles equipped with exhaust aerosol generators: Atoka, Blaine County (7 communities), Hugo, Heavener, Idabel, Broken Bow, Haileyville, Antlers, Wewoka, and Tulsa County (5 communities). Reports for city of Tulsa were incomplete and not included in this report.
**Norman used DDT-chlordan-diesel solution (strength not reported).
***Lawton used 25 percent DDT-2 percent pyrethrins concentrate diluted 6 to 1 in diesel fuel.
†Shawnee used 5 percent DDT-diesel solution.

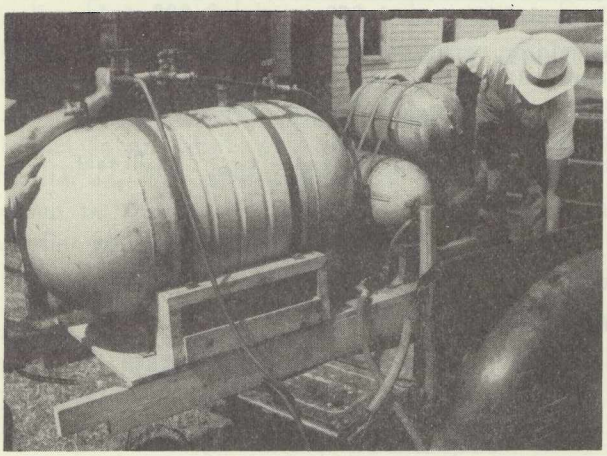
Table 2

CHLORDAN RESIDUAL SPRAYING

Community	No. Vehicles		Premises Treated	Gallons 40% Concentrate	Man-hours Local Labor	Per Premises	
	CDC	Local				Gallons Chemical	Man-hours Labor
Atoka	1		964	116	360	0.120	0.373
Blaine County*	1		1,825	110	380	0.055	0.208
Durant**	1	1	880	62	336	0.070	0.381
Hugo**	2		1,912	175	728	0.090	0.380
Hobart	1		280	47	111	0.170	0.396
Heavener	1		1,300	194	559	0.150	0.430
Talihina	1		220	70	167	0.318	0.759
Idabel**	1		1,875	80	454	0.043	0.242
Broken Bow**	1		551	26	200	0.047	0.363
Checotah		1	240	22	96	0.092	0.400
Eufaula		1	815	66	430	0.081	0.527
Okfuskee County***	1		422	80	376	0.190	0.890
McAlester**	1		740	33	159	0.044	0.215
Quinton	1		313	44	208	0.140	0.664
Krebs	1		507	80	419	0.160	0.826
Haileyville	1		350	54	244	0.154	0.697
Stuart	1		133	20	72	0.150	0.540
Antlers	1		1,287	103	448	0.080	0.348
Wewoka**	2		1,833	112	458	0.060	0.250
Tulsa County†	1		1,955	75	642	0.040	0.328
Sand Springs	1		2,205	100	622	0.045	0.282
State Total			20,607	1,669	7,469	0.080	0.362

*Blaine County - 7 communities.
**Sanitary survey made prior to spray operations.
***Okfuskee County - Rural premise spraying.
†Tulsa County - 5 communities.





Portable residual spray unit fabricated in Oklahoma State CDC shops for use on Eufaula, Okla., community fly control program.
ABOVE Spray unit in operation.
LEFT Close-up of unit. Large tank contains emulsion—3 smaller ones are air reservoirs.

approximately 25 Oklahoma communities owned and operated space spray equipment for fly control during 1950. Only those operations directed by local health departments on the State-wide Community Fly Control Program are included in this report.

Practically all communities operating residual spray programs utilized the CDC trucks equipped with constant pressure spray units. The spray units are adaptions of the units developed on the Tennessee and North Carolina Malaria Control Residual Spray Activities.

Exhaust aerosol generators were installed on most of this equipment. All of the spray equipment was fabricated in the CDC shops.

SYSTEMATIC VISUAL INSPECTIONS AS A GUIDE FOR LOCAL FLY CONTROL PROGRAMS

Probably the most useful control technique developed during the season's operations was the adoption of visual inspection for guidance and evaluation of community fly control programs. After a considerable amount of trial with various random sampling methods (fly grills, tanglefoot plates, and other devices) used in measuring fly populations, visual inspection was selected as most adaptable for use on Oklahoma operations. Visual inspection offers the advantages of simplicity, rapidity, complete coverage of all blocks, and economy of control, obtainable by constantly surveying the distribution of the real sources of fly production.

The visual survey techniques described in CDC publications were simplified for use by relatively untrained local personnel. In normal operations only house flies and their close relatives (blowflies and fleshflies) are counted. Another variation in Oklahoma practice is the use of the highest single fly count in a block to determine the block index rather than an average of a definite number of counts per block. Blocks are classified as A, B, and C with high count index classifications of 0-9, 10-24, and 25 plus, respectively.

Complete development of this system of evaluation and guiding control operations was greatly hampered by the unusual weather conditions, but the records on the McAlester study project indicate that considerable economies can be effected in chemical control by full adoption of the visual inspection method. It also serves to definitely locate the most important foci of fly production, thus permitting intelligent concentration of sanitation activities.

Spokane Rodent Control Program

William A. Hendrix, Sanitarian (R)*

During the summer of 1948, a survey made by the Washington State Department of Health revealed that the rat population in Spokane had increased to a point where it could become a health menace. This information gained added importance when plague was found in wild rodents in eastern Washington near Spokane. With heavy rat population in the city and the presence of plague in wild rodents in areas near Spokane, there was a possibility that plague could be transmitted to rats within the city, and thus to humans. Although no immediate plague problem existed, it was thought that steps should be taken to decrease the rat population before there was a critical situation.

At the request of the Spokane City Health Officer and the Commissioner of Public Affairs, rodent control specialists were assigned, through the State department of health, to the Spokane City Health Department in February 1949.

The first goal was to sell a permanent rodent control program to all of the city officials, to civic and business organizations, and to the general public in order to obtain their support and cooperation. A number of meetings were held with building owners and the managers association, real estate representatives, civic organizations, and officials of the city government. This goal was partially attained when the Building and Home Owners Association, the Real Estate Board, and the Retail Trade Bureau of the Chamber of Commerce endorsed the program; the city council adopted a rodent control and universal compulsory garbage collection ordinance as recommended; and the pest control operators pledged their cooperation.

With the preliminary promotional work completed, a 2-week training program was given by the rodent control specialist to all city sanitarians, pest control operators, and other interested persons. The training concerned diseases carried by rats; rat habits and characteristics; kinds of rats; garbage storage, collection, and disposal (in order of importance as listed); survey of buildings; detecting rat signs; trapping; poisoning and ratproofing. For practical experience, a building housing three establishments was surveyed and ratproofed and the rodents therein eradicated by the pest control operators and local sanitarians.

The basic program was as follows:

1. Ratproofing to be started in the downtown area on a block-by-block basis. After buildings were ratproofed, the rats therein were to be eradicated. One local rat control sanitarian was assigned to this area on full-time basis.

2. Six district sanitarians and four milk sanitarians assumed the responsibility for the program in the outlying districts. Particular emphasis was to be placed on food handling establishments, and since most of the establishments were under the supervision of a district sanitarian, it was logical for them to assume the responsibility of the rodent control program along with their other activities.

As of July 1951, the program had progressed as follows:

1. Downtown area (approximately 1,330 premises): 1,043 premises surveyed for ratproofing, 919 premises ratproofed, 729 premises from which rats had been eradicated.

2. Outlying districts: 362 premises surveyed, 295 premises ratproofed, 217** premises from which rats had been eradicated.

3. Ninety percent of all food handling establishments in the city had been ratproofed and freed of rats.

4. Compulsory garbage collection had been established.

5. A contract had been awarded to a local pest control operator for permanent rodent control service at the city dumps. Only noncombustible materials were placed on the dump, as the city has an incinerator which operates effectively in the disposal of combustible materials.

6. The basements, alleys, and back premises had been cleared of rubbish and debris to prevent rat harborage.

7. Garbage storage and collection was greatly improved. This has reduced the rat and fly population.

8. Environmental sanitation had been greatly improved in the business areas.

*CDC Representative, Region VIII.

**A number of establishments which were ratproofed were found to be rat-free and therefore needed no eradication.

9. The program had proved to be a good public relations project and, as a result, has improved the status of the health department in the community.

It is the plan of the city health department to have the entire downtown area ratproofed and freed of rats (as far as practicable) by January 1952.

"Salmonella" Food Poisoning

MILDRED M. GALTON*

Salmonella has been known to be associated with food poisoning since shortly after Salmon and Smith (1885) first described a member of the group. Early workers attempted to classify the *Salmonella* into the following three groups (5) according to pathogenicity and host specificity: (1) those organisms that are of human origin and are pathogenic for man only; (2) those of animal origin and nonpathogenic for man; (3) those of animal origin, and primarily infecting animals but also causing a mild gastro-enteritis in man. In recent years, the use of newer selective media for the isolation of *Salmonella* and more adequate antigenic analysis of these organisms have disclosed the infection of humans with the "purely animal" strains, and the infection of animals with "purely human" strains. Of the more than 150 antigenic types of *Salmonella* now recognized, few, if any, are limited to one host (2). All types must be considered as potential pathogens for man and/or animals.

Hormaeche and his associates (29,30) observed that the clinical syndrome produced in persons contracting *Salmonella* infection depends largely upon the age and general resistance of the individual and to a lesser extent upon the type of *Salmonella*. Thus infants and young children are most susceptible to *Salmonella* infection. Edwards, Bruner, and Moran (10) have noted a greater susceptibility to *Salmonella* infections in young animals.

The accepted differentiation of the various clinical manifestations of salmonellosis (25) may be described as: (1) *Salmonella* fever, a mild febrile illness; (2) *Salmonella* septicemia, remittent fever, more severe with localization of infection in various tissues in later stages; (3) *Salmonella* gastro-enteritis (food poisoning), the most common form; (4) extraintestinal infections (localized), such as cholecystitis, osteomyelitis, and otitis; and (5) the normal carrier state.

A few *Salmonella* types appear to be involved predominantly in certain forms of salmonellosis. For instance, *Salmonella paratyphi A* and *Salmonella cholerae-suis* occur more frequently in *Salmonella* fever and septicemia, the latter type being fatal in many cases; *Salmonella typhimurium* and *Salmonella newport* more commonly cause gastro-enteritis; and *Salmonella pullorum* is primarily the cause of an infection of fowl. However, all types should be considered as capable of causing food poisoning. In general, the incubation period is from 12 to 36 hours. Onset of illness is sudden, accompanied by vomiting, diarrhea, abdominal pain, fever, and sometimes prostration. The duration is seldom longer than 3 to 4 days. *Salmonella* food poisoning is considered a type of infection, i. e., the illness is caused by the multiplication of the organism in the intestinal tract rather than by the ingestion of preformed toxins (8). The belief that a "toxin" type of *Salmonella* food infection occurs was proposed by Savage (cited by Dolman) (9) when *Salmonella* could not be isolated from suspected food or from the patient in outbreaks of food poisoning in which the incubation period was short. Numerous experiments involving the feeding of filtrates or heat-killed *Salmonella* cultures to animals and human volunteers have been conducted. These studies have failed to demonstrate the existence of preformed *Salmonella* toxins.

INCIDENCE OF "SALMONELLA" GASTRO-ENTERITIS

Definite data concerning the incidence of *Salmonella* food poisoning in the United States are not available due to the many unreported sporadic cases. These cases usually are mild and are of

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short duration. Thus statistics regarding incidence must be based upon large outbreaks that come to the attention of physicians, public health authorities, and *Salmonella* typing centers. Dolman (9) states that *Salmonella* food poisoning probably is more prevalent in Great Britain than in North America. Conybeare, Allison, and Taylor (7) have shown the actual numbers of outbreaks of food poisoning (*Salmonella* and otherwise) reported to the Ministry of Health during a 20-year period (1927-47). According to their figures, more than 75 percent of the outbreaks were due to *Salmonella*. From 1927 to 1942, not more than 100 outbreaks of *Salmonella* food poisoning per year were reported. Since 1942 the incidence in England has increased rapidly to more than 650 outbreaks in 1947.

Hobbs (28) reported that of 3,495 incidents of food poisoning investigated by the Public Health Laboratory Service in England from 1941 to 1948, approximately 91 percent were caused by organisms of the *Salmonella* group.

Rubenstein, Feemster, and Smith (40) report the occurrence of 356 epidemic cases in 17 outbreaks in Massachusetts. Valuable information regarding the occurrence and distribution of *Salmonella* in the United States was presented by Edwards, Bruner, and Moran (11) in a report of results obtained in typing 12,331 cultures isolated from man and from domestic and wild animals during the period 1934 to 1947. Similarly, Seligmann, Saphra, and Wasserman (44) reported 2,000 *Salmonella* cultures from humans typed in the New York Center. Felsenfeld and Young (14) typed 6,802 *Salmonella* cultures from 500 outbreaks in North and South America from 1943 to 1948. The fact that gastro-enteritis is by far the most prevalent of *Salmonella* infections in man is further emphasized by these reports. More than half of the cultures on which clinical data were available were obtained from cases of gastro-enteritis.

SOURCES OF "SALMONELLA" GASTRO-ENTERITIS

There are two opportunities for food to serve as a means of transmitting human *Salmonella* infections. Firstly, food is an excellent medium for transmission from the human carrier. Although the carrier state of *Salmonella* other than the human adapted strains (*Salmonella typhosa, S. paratyphi A,* and *S. paratyphi B*) is generally considered to be a temporary condition, their importance should not be overlooked. As a result of investigations in the New York Salmonella Center, Seligmann, Saphra, and Wassermann concluded that irrespective of the adaptation of the *Salmonella* type, healthy persons are important vectors. From 1,000 positive cultures, 19.5 percent of the isolations were from healthy carriers, many of them food handlers to whom outbreaks were traced. Edwards, Bruner, and Moran (10) have found an even higher percentage of isolations from asymptomatic carriers, amounting to 30 percent. The author and Hardy (20) found that, of 745 *Salmonella* isolations from routine fecal specimens in Florida, 46 percent were from patients with known histories who were food handlers and apparently were normal.

Permanent carriers of the *Salmonella* types that are not specifically adapted to man but that frequently cause food poisoning seldom are found, but such carriers do exist. Rubenstein, Feemster, and Smith (40) reported two permanent carriers of *Salmonella oranienburg* and one of *Salmonella derby*. In 1945, D'Albora, Ingegno, and Edson (1) found a person who was a chronic carrier of *Salmonella montevideo*. In this laboratory, *S. montevideo* was isolated intermittently for 9 months from a 1-year-old child after it had recovered from a severe diarrhea.

Secondly, the great hordes of animals associated with man serve as an excellent source of *Salmonella* food poisoning, through food, or by direct association. According to Edwards, Bruner, and Moran (10), fowls are the largest single reservoir of *Salmonella* in this country. These authors found a larger number of *Salmonella* types in fowl than in any other species except man. Hinshaw and McNeil (25) report that 58 types have been isolated from avian species. In 1944, they reported (26) that of 47 types found in birds, 41 had been found in man also. Further, they observed cases of gastro-enteritis among attendants on poultry farms caused by contact with acute outbreaks in poultry. Until recent years *S. pullorum* usually was considered as nonpathogenic for man. Now this type also has been incriminated as a cause of one large outbreak of food poisoning (38) and several sporadic cases (12,32). In Florida, *S. pullorum* has been isolated from the feces of a 12-year-old child ill with gastro-enteritis, and from a hospitalized adult with a mild enteric fever.

Reports of raw, frozen, or dried eggs as being sources of *Salmonella* outbreaks appear frequently. Such an outbreak attributed to raw eggs which contained *S. montevideo* was reported by Watt (47). Schneider (43) isolated *Salmonella tennessee* from frozen whole eggs and from powdered eggs.

Extensive studies on the occurrence of *Salmo-*

nella types in dried-egg powder have been reported by Solowey, *et al.*, (46) Gibbons and Moore (23), and British investigators (36). The British workers attributed their marked increase of *Salmonella* infections, especially of the types common in this country, to the consumption of American egg powder. Garrod and McIlroy (21) describe an outbreak of *S. typhi-murium* due to infected duck eggs.

McCullough and Eisele (35) were able to produce clinical salmonellosis in 32 human volunteers by experimental infection with strains of *Salmonella meleagridis* and *Salmonella anatum* derived from spray-dried whole egg.

As observed by Hinshaw, McNeil, and Taylor (26), salmonellae invade many hosts. Not only are chickens and ducks susceptible, but also turkeys, pigeons, quail, pheasants, and many other species of birds. In a search of infected poultry ranches for other animal reservoirs of *Salmonella*, Hinshaw and McNeil (27) isolated *S. typhi-murium* from snakes, cats, and house flies. The transmission of *Salmonella* by flies has also been reported by Ostrolenk and Welch (39).

The prevalence of *Salmonella* in swine and cattle, the major sources of meat for man, is well known. In a recent study of 2,788 *Salmonella* cultures derived from animals other than man or fowls, Bruner and Moran (4) found that 76 percent, including 37 types, came from swine and 15 types came from 69 outbreaks in cattle. Many of the cultures from hogs were isolated from the enteric lymph glands of normal animals. The occurrence of *Salmonella* in the lymph glands of normal hogs was first demonstrated by Hormaeche and Salsamendi (31), and Rubin, Scherago, and Weaver (41). This work stimulated a study by Cherry, Scherago, and Weaver (6) of the occurrence of *Salmonella* in retail meat products; more recently a similar study of market meat, eggs, and milk has been conducted by Felsenfeld, Young, and Yoshimura (15). As would be expected, in both studies a higher percentage of *Salmonella* was isolated from pork samples than from beef samples. Inadequately cooked pork products containing *Salmonella* frequently are cited in outbreaks of food poisoning. Hauser, Treuting, and Breiffelh (24) describe an outbreak due to *Salmonella berta* in sausage.

A survey on salmonellosis in domestic animals in England was made by Smith and Buxton (45). These investigators examined the feces of healthy adult cattle, sheep, horses, hogs, goats, chickens, turkeys, ducks, and geese. They found that the *Salmonella* types isolated from these healthy animals were, with the possible exception of *S. pullorum*, those that are commonly incriminated in outbreaks of food poisoning in man and that frequently cause clinical disease in domestic animals. They emphasize the importance of these symptomless fecal carriers from both the public health and the agricultural points of view.

Extensive investigations on salmonellosis in cattle in Great Britain have been made by Field (16-18). The author points out the possibilities of meat, meat products, or milk of bovine origin being sources of food poisoning; and he recommends strict attention to the hygiene of milk and milk-product production, and to hygiene in slaughterhouses. He further recommends adequate ante- and post-mortem examination of emergency-slaughtered cattle to prevent distribution of contaminated meat products.

In a recent review, Koller (34) observed that the possibility of complete eradication of *Salmonella* from livestock was hopeless, since the best veterinary meat inspection is not sufficient to identify all cattle and swine harboring *Salmonella* and thus to prevent transmission to humans. He recommends general hygienic measures for animals and rigid hygienic control in the meat industry. He further emphasizes the need for pasteurization of milk and meat products, and for regular medical inspection of food handlers and of sanitary facilities in food industries.

Only recently concerted attention has been given to *Salmonella* infections in domestic pets. The high incidence of *Salmonella* and the variety of types in dogs obtained in this laboratory (19) suggest that these animals may be an excellent source of infection for man. Probably cats have received even less attention than dogs. The isolation of *Salmonella braenderup* from a case of enteritis in a man and from his cat was reported by Kauffmann and Henningsen (33). Salsamendi (42) obtained *S. anatum* from cats, and Mera (37) isolated *S. paratyphi A* from the animal. Watt, *et. al.* (48) and Edwards, *et. al.* (13) report the isolation of six new *Salmonella* types from normal cats.

There are few animal species that have not been found to harbor *Salmonella*. Rats and mice (22,49) are frequent suspects in the investigation of outbreaks in public food establishments. Horses and sheep less frequently are involved as a source of *Salmonella* infection in man (11).

After reviewing some of the factors responsible for the transmission of *Salmonella* food poisoning, the application of control measures recommended

by Buonomini(5) seems a most desirable procedure. These steps include: (1) provision of a pure water supply; (2) proper removal and disposal of sewage; (3) control of milk supplies, and pasteurization; (4) veterinary control of animals; (5) bacteriological control of foods; (6) systematic destruction of rats and mice; (7) systematic destruction of flies and other insects; and (8) control of healthy carriers with compulsory reporting of cases. A recent memorandum on food poisoning issued by the British Ministry of Health(3) further emphasized the necessity for adequate field and laboratory investigations during outbreaks.

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Have you read...?

BACILLARY DYSENTERY

Bacillary dysentery (Editorial). J.A.M.A. 146 (16): 1514-1515 (1951). This is a brief discussion of the "disease that has been widely distributed throughout the world from time immemorial." It is pointed out that, "The disease has been traced from the acute to the chronic phase in the same human being, so that the chronic type is now better understood."

MALARIA

Eradication of malaria (Editorial). J.A.M.A. 146(17): 1599 (1951). This editorial points out that emphasis is now on Nation-wide malaria eradication rather than on control of malaria, as in the past. Some of the methods used to reduce endemic malaria to its present low level are cited.

(Continued on page 27)

Training of Health Educators

Ruth Sumner, Scientist*

Never has health education been more important than it is today. Improved health of the general public, will be the result when each individual is sufficiently motivated to take the action necessary to retain or to acquire good health. Health education might be defined as the process whereby the individual or the group is moved to take this desirable action. Key persons in this process are the health educators. Before we consider the training of these educators, let us consider the work that they do.

WORK OF THE HEALTH EDUCATOR

The administrator, with the assistance of the other staff members, is responsible for planning the services provided by his agency. The health educator assists with the educational activities to make these services as effective as possible. For example, the nurses may wish to have Mothers' or Fathers' classes for expectant parents; the sanitation personnel may develop food handlers' schools; the administrator and the other specialized professional personnel may wish to have staff conferences for in-service training. The health educator may assist in the organization of these activities and in the utilization of methods of conducting group discussions and conferences. He may also assist in the selection, preparation, and utilization of appropriate flip charts, exhibits, demonstrations, and films or other audio-visual aids that may be needed in these group work activities. The health educator may assist the administrator and the staff in the preparation of materials such as the house organ, special articles for publication in the county medical society bulletin, pamphlets, newspaper articles, and annual reports.

The health educator may assist the agency with its many types of planned orientation sessions for new staff members, and individual or group visitors such as members of the board of health, city or county governing officials, girl or boy scouts, classes from schools, or visitors from other agencies or foreign countries. He may be responsible for the educational techniques used in such orientation programs.

The health educator works with many community groups either as a member of or as a consultant to the groups. These groups might include special committees such as citizen fact-finding committees, small neighborhood or over-all community councils, teachers or parent-teacher groups, and school health councils. He assists in the coordination of the educational activities of the health agencies in the community, and in the interpretation of health education to such other professional groups as medical or dental students. In connection with these group activities the health educator may write either news releases or radio scripts, or both, or work with others in the development of this publicity material; assistance may also be rendered to these groups in the techniques of developing group discussions or conferences.

Many of the more experienced health educators assist in the planning and development of field training experiences for health educators, health officers, nurses, nutritionists, sanitation personnel, and other public health workers.

The health educator works with all segments of the community. Therefore he should like people and enjoy working with all types of people. Some of his understanding of people is learned early in life as part of his growing up; he learns to recognize and appreciate the fundamental importance of individuals and groups in a democracy. All members of an organization perform an important function, and improved teamwork will develop where this is recognized.

Because some of the activities of a health educator have been indicated above, this does not mean that every health educator will participate in all of these activities in any one position, or in any one year of employment. In addition, as new health hazards become evident, public health activities will change, and the activities of the health educator must change to meet these new needs. An example of this might be the assignment of a health educator to work on civil defense activities.

TRAINING HEALTH EDUCATORS

Undergraduate Training. Undergraduate college

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training is extremely important. It is essential that the candidate have a broad background in the biological and social sciences, in psychology, and in education. Let us now examine the reasons why these subjects are so important.

We study the biological sciences to learn how the human body is constructed and how it functions, as well as to learn the structure of other living things. We need to know how the various components of the human body and of other organisms function in order to understand the interactions of organisms that cause disease as we know it.

By the study of psychology we learn some of the reasons why we behave as we do: Why does one physically well child appear shy and another very forward? What happens when we are angry, sad or happy, or feel rejected, or feel wanted? How and when are people motivated? The health educator applies all of this knowledge in his work with individuals and with groups.

Through the study of the social sciences we learn how our social patterns develop—community customs, superstitions, how government came into being, how monogamy and the family pattern developed. The health educator with some background in social science will look for natural boundaries in a community, i. e., what groups normally work together, and why persons from certain other areas, because of community customs, may have difficulty working together.

In the courses in education, the health educator studies how our educational system has developed, and learns methods and philosophy of teaching, as well as methods of determining what has been learned by the group or the individual.

The Apprenticeship Period. The apprenticeship period is planned so that the individual may learn what public health is and what public health personnel do. It is a period of trial when he is determining whether or not he has the aptitude and qualifications for a career in public health and health education, and whether he wishes to continue training for such a career. This period also provides a time for the supervisors to observe him in action and to evaluate his qualifications for the position of health educator.

This apprenticeship period is helpful as a refined screening device which will prevent a long expensive training period being wasted on individuals who find that they are not really interested in or qualified to continue in this profession. During this period the apprentice observes the many activities of the organization. He may work as a receptionist, or as a record clerk in a clinic, where he can observe methods of filing materials and of previewing films, as well as other activities of the clinics including the work of the nurses, the sanitarians, and other personnel in the agency. If the individual shows interest and promise he continues through the apprenticeship period; if not, he discontinues the training.

When he completes the apprenticeship he is then ready to begin his academic training in a school of public health, and because of the apprentice training the following academic training will be much more meaningful to him.

Training in the Graduate School of Public Health. During this period of training, the individual learns the theory and the science of the public health field through the study of public health administration, epidemiology, statistics, nutrition, parasitology, sanitation, mental health, and the other subjects presented in this enriched curriculum. He also is learning the many educational techniques that are helpful and the importance of careful planning and evaluation.

Graduate Field Experience. The health educator now has an opportunity to put into practice the many educational skills and techniques learned through all of his previous training. He still has the guidance of the health educator supervisor where he is assigned, but he delves deep into problems and is responsible for a high quality of performance. He gains confidence in his professional activities. At the end of this experience, he is prepared for a position where he will work independently and assume greater responsibility.

In-service Training. When the professionally trained health educator accepts a position, he anticipates guidance from his administrator as well as assistance from other health educators who have more experience. In-service training is made possible through staff conferences within the organization, and through consultation services available from State or federal agencies. This may mean moral support as well as technical guidance, and the result will mean professional growth on the job.

As new public health hazards appear the health educator will need additional training to meet these new activities. This may be achieved through attendance at national meetings, or it may mean participation in special conferences or institutes.

In-service training should be a continuous process throughout the professional career of

the public health educator.

SUMMARY

The training of a public health educator might be likened to building a home, where the undergraduate training becomes the foundation for the entire structure; the apprenticeship and graduate training might be the building of the first and second story of the home; the graduate field training compares with the building of the roof and other finishing touches; and the in-service and advanced training might be compared to addition of new features and the repairs on the structure which are needed from time to time.

In the building of a home, these many features are essential, and likewise a fully qualified health educator can profit most where all these types of training are made possible.

Are You a Good Supervisor?

George B. Tremmel, Sr. Sanitarian (R)*

Do you know if you are a good supervisor? Many of us are good supervisors in all respects, but do we know why? What makes a good supervisor? Broadly summarized, it is the practice of the Golden Rule, "Do unto others as you would have others do unto you." Another way of saying it would be that good supervisors constantly apply the principles of human relations in their dealings with employees.

It is difficult for one to evaluate his supervisory ability from the above broad statements. To be a good supervisor, one must first understand the principles of good supervision and then strive to practice these principles. To do this, some device is needed by which the supervisor can test his understanding of the principles of good supervision and analyze and rate their application to his performance. In daily dealings with his fellow employees, a good supervisor must thoughtfully apply the primary rule of human relations as set forth in the Golden Rule. Skill in any art comes from thoughtful practice. The following are suggested as the Ten Commandments of a good supervisor:

1. Be democratic—smile and be cheerful.
2. Give sincere appreciation for a job well done.
3. Do not criticize or condemn employees; instead offer constructive suggestions.
4. Be interested in your employees—make them feel important.
5. Encourage personnel initiative by asking questions instead of giving orders.
6. Correct mistakes as tactfully as possible; be firm with the employee, but never hurt his feelings.
7. Give employees an opportunity to demonstrate their abilities.
8. Encourage employees to submit suggestions or ideas. Listen to them.
9. Keep employees informed about their work—stimulate their interest.
10. Call your employee by name. It sounds good to him.

Daily application of those rules and their use as a yardstick for periodic self-analysis and appraisal are recommended for those who earnestly desire to be good supervisors.

*Administrative Services, CDC.

The Work of a Public Health Engineer

Charles D. Spangler, Sr. Sanitary Engineer*

The position of public health engineer is a continuation and expansion of that of the sanitary engineer who has mainly been concerned with water supply and liquid waste disposal problems. In addition to these, the public health engineer is concerned with any factor of the environment which affects the health of the individual or the family. His interests have expanded to include milk and food control; solid waste collection and disposal (garbage and refuse); insect and rodent control; elimination of nuisances; swimming pool, camp, and resort sanitation; school sanitation; industrial hygiene; air pollution; and housing and city planning. Each year brings new discoveries and challenges in this already wide field. The job of the public health engineer is one of the most varied and interesting in the public health field. Not only can he apply his engineering knowledge in solving public health problems in his field, but he also has an opportunity to exercise his abilities as an administrator and executive.

Most public health engineers serve with city or county health departments or as regional engineers in State health departments. In a city or county health department, the engineer usually heads the sanitation program and may have working with him a number of sanitarians who are responsible to him. His job is to study local health problems and persuade the board of health, the general public, and local officials that something should be done, that something can be done, and that he can do it. With their support he can make up a plan to solve the problem at hand, put the plan into operation, and supervise it to make sure the results are satisfactory. When everything is running smoothly, the routine details can be turned over to the operating personnel and other problems can be considered.

Milk control is based upon legal ordinances which are enforced by the health departments. Such a program is based on the education of the farmers and plant personnel in sanitary handling and proper processing of milk. Therefore the engineer should know the details of this industry in order to deal fairly with its problems.

The food handling industry has different processing methods and more varied equipment than does the milk industry, and offers many challenges to design and management. Seeing that food handling establishments have satisfactory equipment is not enough; the hardest job of the public health engineer is to see that proper operational pro-

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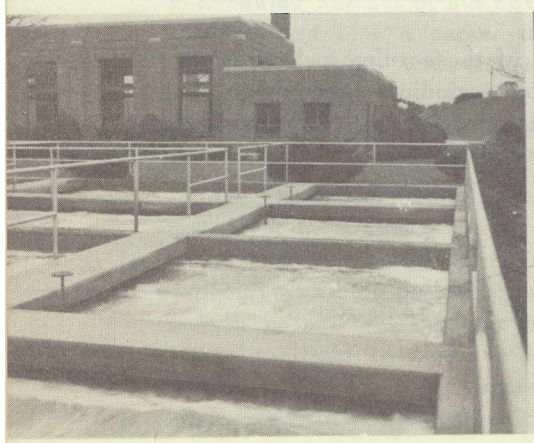
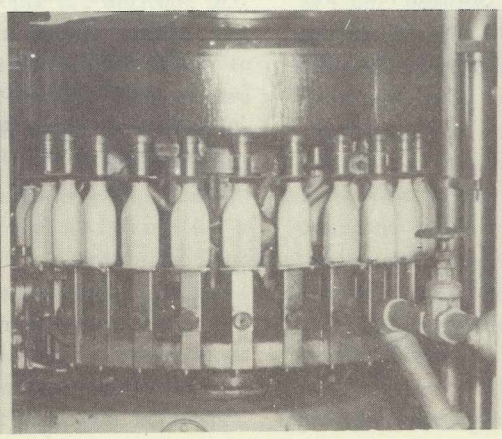
THE EXPANDING FIELDS OF PUBLIC

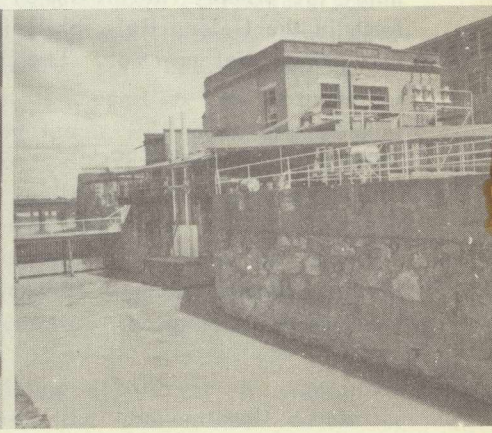
WATER SUPPLY



MILK SANITATION



INDUSTRIAL WASTE DISPOSAL



cedures are instituted and carried out.

Insect and rodent control takes the engineer into the fields of biology and entomology where, again, he can use the engineering approach to organize the work of men and the use of materials to accomplish control at the lowest possible cost. The engineer should be constantly on the alert to take advantage of knowledge concerning new insecticides, rodenticides, and equipment in order to make programs more effective or to lower costs.

The method of garbage and refuse collection and disposal has a direct bearing on the insect and rodent populations. Usually the public health engineer is not responsible for this program, but he should be an adviser or consultant to the responsible party. Otherwise all of the efforts of the health departments toward insect and rodent control may be of no avail if conditions are such that insects and rodents have ample food and harborage. Basic sanitation is still the most important factor.

The word "nuisances" means just that to the public health engineer. Many times the connection between a nuisance and public health seems remote; but a good system for handling nuisances will do much to create good will toward the health department and to interest the public in the work of the department. Report forms have been worked out which insure prompt action by the sanitarian and also make it easy to make frequent analyses of types of complaints, locations, frequency, and other factors. This information properly used can demonstrate the need for ordinances or preventive programs.

Industrial hygiene is a challenge to the public health engineer. Most of the environmental problems of industry can be solved by using common sense and by good housekeeping, but some require a high degree of technical knowledge regarding dusts, organic solvents, toxic materials of all kinds, and local and general exhaust ventilation. The larger plants may have their own industrial hygiene personnel, but the local health department can be of real help to small industries by offering them a good consultation service in this field.

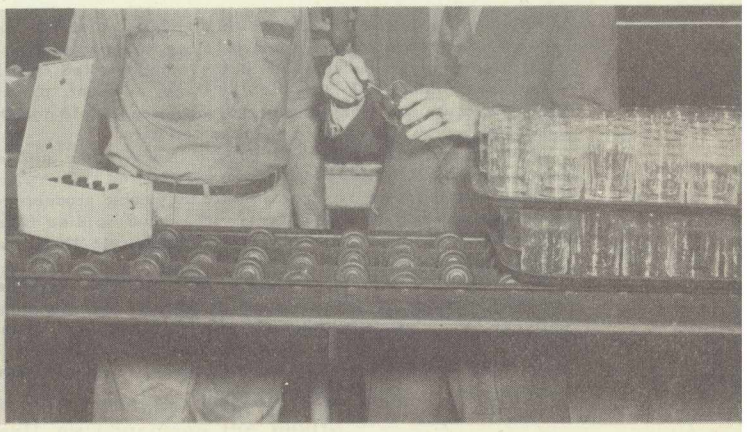
Bathing places, camps, and resorts bring up special public health problems. The control of bathing places is a special aspect of water supply treatment and also of basic sanitation and safety. Camp and resort conditions vary from the usual water, sewage, garbage, insect control, and food and milk handling situations. Swimming pool operators need special short training courses to help them to operate the pools properly. Short courses might be given to resort operators, and frequent inspection should be given to camps and resorts. Many urban dwellers who go to rural camps are not able to distinguish serious sanitation hazards from rural inconveniences. They may drink from or swim in contaminated waters; they may drink raw milk and eat foods which have not been refrigerated properly; they may be exposed to insect vectors of disease. All of these hazards can be remedied or eliminated by trained and reliable resort operators.

Most large towns have good water and sewage facilities, but the very small towns need frequent

HEALTH ENGINEERING INCLUDE:

HOUSING

RESTAURANT SANITATION



help with operational problems. The fringe areas of large towns also have some very difficult water and sewage problems that the public health engineer may be able to eliminate by assisting in the planning activities. By careful planning, most public health problems can be eliminated before they arise. The engineer should be a member or should sit in on sessions of the community planning commission.

The same situation exists as to housing. Most of the sanitation headaches in urban areas can be eliminated by the removal or rehabilitation of substandard housing. The health departments are interested in providing good physical, mental, and moral environments for the citizens in their areas.

The public health engineer is also concerned with home safety. Through the sanitarians, nurses, and health educators, the health department has direct contact with homes and groups of individuals and therefore has an excellent opportunity to reduce home accidents. Home accidents take as great a toll of human life and suffering as do highway accidents, and most of these home accidents are preventable. The elimination of physical hazards in the home environment is an engineering design problem.

The pollution of air is somewhat like the pollution of water. Industries and homes pour smoke, dusts, and toxic gases into the atmosphere. Odors also can create disagreeable conditions that may have an indirect bearing on the health and comfort of the individuals exposed. This is of concern to the public health engineer.

Every year we discover some other factors in the environment that affect the health of people. These are of concern to the public health engineer and sometimes are his responsibility.

The area of interest of the public health engineer is broad and varied and is not static. His is one of the most interesting and responsible positions in the field of public service. A good job well done will give the engineer a great deal of personal satisfaction and a feeling that perhaps a small piece of the world and a few of its people are better off as a result of his efforts than they otherwise would be.

Human Behavior Patterns*

R. E. Kious**

"Good morning, Ray," called Cliff Melton cheerfully as he met his friend and health department colleague, Ray Godwin. "How's everything this morning?"

"Good morning, Cliff. Everthing's fine, thanks," Ray replied.

The two friends and co-workers walked on down the street toward the health department which was a few blocks away.

"Cliff, I wanted to ask you about that new deter....."

"Good morning, Mr. Harrison," called Cliff. "How's the little girl coming along?"

"Oh, she's doin' jus' fine, Mistah Cliff, jus' fine."

"Who's that?" asked Ray.

"That's Mr. Harrison, janitor at the Central Building. His little girl sprained her wrist last week and....."

"Hi, Mary," Cliff called before he could finish his explanation.

From across the street Mary answered his

*If there is any originality in this article, it stems from a combination of the work of many other persons. A bibliography is appended, and to the authors cited therein I feel most indebted for the rich heritage; however, it must be made clear that they are in no way responsible for the manner in which their ideas are presented here.

My gratitude is expressed to the many other authors whose articles I have read but did not record.

Deep appreciation is extended to the many students of the Topeka Field Training Center who have applied these and other principles of behavior to corroborate their own results and those of the authors.

My apologies and appreciation are likewise extended to the countless people from all walks of life for their patience in answering what, in their opinion, at least, seemed stupid questions. Also to those whom I used in experiment without consent and who, I hope, have forgiven me, I extend appreciation.

**Topeka, Kans., Field Training Center, CDC.

greeting and smiled broadly.

"How many girls will you have at camp next week?" he almost shouted.

"Forty if they all make it," she called back.

Cliff's face turned serious for a moment and then brightened with, "It sounds like a big job, Mary, but I'm sure you can handle them. See you later."

"Who's that," asked Ray.

"That's Mary Linquist, a girl scout leader, she....."

"Good morning, Mr. Grey," said Cliff courteously.

"Good morning, Cliff," came an almost gruff voice from a large, formidable looking man whose stern features were supported by a somewhat aloof attitude.

"Good Heavens," exclaimed Ray, "he looks as if he eats nails for breakfast! Who in the world is he?"

"He's president of the Central National; yeah, he's really mean. Know what he does for a hobby?" Cliff asked.

"Probably makes recordings of people being boiled alive. What," asked Ray, shaking his head, "does he do?"

"He has....good morning, Mr. Eidson. He has a bird hospital, sets broken wings and legs, then nurses them until they are strong again. You certainly can't tell what a person is made of on the inside by just looking at the outside, can you?"

"You sure couldn't in this case," agreed Ray.

"It's very doubtful to me whether we could in any case," commented Cliff. "Good morning, Mrs. Heberling," he called.

The two turned into the Health Department and were presently at their desks. Cliff busily checked to see if any emergency calls might alter his planned schedule.

Ray, however, sat thoughfully staring at his desk. Presently he looked up at Cliff and opened his mouth as if to say something, closed it again, and looked back at his desk.

The obvious struggle Ray was having within himself was nothing new. It had been going on for weeks. Now he looked up again with a determination to get whatever was bothering him off his chest.

"Cliff," he said, "I would like to talk to you for a few minutes if you have time."

"Sure," answered Cliff, "here's the dope on that new detergent you were asking about."

"It isn't that, Cliff," replied Ray very seriously now. "It's about this ability you seem to have in dealing with people. You get your work done twice as fast as I do and with a lot less trouble, too. Seems like you know everyone in town and something about what they do."

"Wait a minute now," said Cliff laughing. "I'm not that good, but I am meeting more people every day, and it is true that they do the most unexpected things to make my work easier."

"I wish I had that talent, but I guess old Dame Nature just cut me short there," sighed Ray.

"No, she didn't," Cliff quickly cut in. "Perhaps you haven't taken the time to develop that talent, but it's there. Why don't you sort of study this human behavior project with me, Ray? It's a lot of fun and pays dividends in many ways."

"I'd really like to," cried Ray eagerly, "but how do I go about it, how do I get started?"

"Well, let me tell you what got me started," Cliff said. Both men settled themselves as comfortably as straight-backed office chairs will allow and Cliff began: "A few years ago I picked up a magazine while waiting in a dentist's office and started browsing through it. I can't even remember the name of the magazine or the article or the author. I read that 90 percent of the people who lose their jobs lose them because they can't get along with people. I always thought people lost their jobs because they didn't know their business. I checked these figures in other sources and found there was some range but most of the figures were near the 90 percent mark.

"While checking this I ran across other statistics indicating that the temperament of nearly all jobs is 85 percent getting along with people and 15 percent technical ability.

"These figures were also substantiated by other authorities, but all hastened to add that each is an inseparable part of the other. That is, getting along with people isn't enough; we must definitely and thoroughly have the other 15 percent. On the other hand, this 15 percent is of little use if we are unable to apply it."

"Here's another figure that won't be at all new to you, Ray. You've heard it many times from many of our leaders in public health."

"I know what you're going to say," Ray chimed in, "that about 90 percent of our work is educating the people with whom we work as well as educating the public."

"Right you are," agreed Cliff, "and if we are going to do any educational work, we certainly need to get along with the people we are trying to educate unless, of course, we want to try to dump that responsibility on the courts.

"You know, Ray, I've tried to think of some part of our job that doesn't involve an individual or a group of people, and, to save my life, I can't. These statistics I, more or less, stumbled onto, and the fact that we are always working with people set me to thinking. I decided to learn what I could about human behavior, but I was really apprehensive about it. I figured all this behavior stuff was only for the psychologist and psychiatrist. I was lucky, however, for on the first trip to the library I picked up a good book on human behavior. In it I read that human conduct operates according to definite laws and is orderly – that is, one may expect similar responses to similar situations in most people. For instance, if you went out on the street and kicked the first 10 people you met a lusty blow on the shins, you would be well assured they wouldn't like it. They would all react similarly in that they would all be angry. The same thing is true with what you say. Tell these 10 people they look stupid and repulsive and they aren't going to like it; or tell someone outside of this group you think that of them, and I'll wager you 10 to 1 they will find it out, and they still aren't going to like it.

"About the first principle I learned in getting along with people is that you must never do anything to lower a person's self-esteem if you wish to make and keep a friend. An individual spends nearly all of his time thinking about himself when he isn't on special projects. You and I do this, and so do all other people Another thing, did you know you would rather be you than any other person in the world? Now wait a minute, let me explain that. Sure you would like to look like Clark Gable, sing like Bing Crosby, and fight like Joe Louis. Yes, you would like to have all these attributes, but you would still rather be you. The point is that every person you meet would rather be himself than anyone else; so if he thinks that much of himself, it is obvious we should never do anything to indicate that we have a lower opinion of that self. We hurt people in a hundred different ways – little satirical things we say or insinuate, or even the manner in which we say things. You see this ego, or self, is a very delicate apparatus – far more sensitive than the finest radar. It picks up not only sound, but looks and impressions too. This ego of ours has the oddest habit of selecting things and recording them – things often not having the remotest connection. Our sensitive ego is vigorously activated by the slightest suspicion of potential harm. Once damaged, even slightly, it turns the entire attitude of the individual into that of resentment, a most unproductive form of creative thinking.

"You know, Ray, while we are thinking so much about ourselves, we also are always thinking about what we want. This we carry over into our work in that we are always thinking about what we want the other fellow to do, and we give little thought to what he may want to do. It seems to me we must be interested in what the other fellow wants and do what we can to help him get it. I have found that it isn't too hard to get many things we want if we take time to get the other fellow to want them too. Emerson, the poet, was trying to get his calf into the barn one time. He pulled and tugged on the halter while the hired man, with his shoulder to the calf's rump, pushed for all he was worth. The calf, with the exasperating stubborness and awkardness possessed by calves alone, braced his forefeet and resisted all endeavor. Emerson's plump and pleasant housekeeper watched the proceeding with grim interest. Finally, she poured milk over her fingers, stuck them into the calf's mouth, and backed slowly into the barn with the calf eagerly following. Well, the calf got what he wanted and Emerson got what he wanted, but until the housekeeper came along neither was sure of what the other wanted. Most people are just about like that, it seems to me.

"People need nourishment for their self-esteem, Ray. If you find someone has done something well, be sincere and hearty in your praise. Don't flatter though, because it is too easy to see through it, and the so-called 'flannel mouth' loses friends rapidly.

"Criticism is feared by everyone and this fear probably is second only to the fear of poverty. Criticism is also dangerous because it wounds a man's self-esteem and, of course, it is futile because it puts one on the defensive and makes him try to justify himself. There is nothing that so kills a man's ambition as direct criticism. Call attention to errors indirectly,

give a man an incentive to work, and allow every person to save face.

"Ray, I have made it a habit never to check any establishment without first finding something I can genuinely praise the manager for. I'll admit it is sometimes hard to find, but even an old shack has enough cracks and holes in it to make ventilation unusually good. Another habit I have formed is that of never considering the health problem the first part of my job. The fellow who runs the place, who spends the money, and who can make the work of the inspector easy commands my first attention. If I have him on my side, my worries are over. Fortunately he reacts according to definite patterns so I proceed along those lines."

"Cliff," Ray interrupted, "just this morning I heard you call Mr. Sellers and tell him you would be over at 9:30 to do an inspection. What in the world kind of business is that, letting him know when you are coming? You won't be able to catch him at anything, and the place will probably be all shined up."

"Mr. Sellers and I have a mutual respect for each other and for our respective professions. We make appointments regularly and set aside time for them," Cliff said. "No more of this 'cops and robbers' stuff for me. I used to stop in when I knew the managers least expected me. Of course, I found things wrong and I really jumped on them. Then, while their self-esteem screamed in anguish and their attitude curdled and slowly congealed into a solid block of resentment I tried to explain what I wanted and why. Well, it just won't work. Now, I know what the individual manager hopes to do, and he knows what I hope to do, and together we strive toward a mutual goal; I try to do things for him and he does things for me. Every manager and I automatically become partners after I explain that we're in this together, and believe me, it works much better.

"Ray, it's almost 9:15 and we've got to get along. I've only mentioned a couple of behavior patterns that all people seem to have, but that may be enough for a start. Meantime try to develop a genuine interest in all other people you meet. You will be surprised how interesting it is once you get started. Start conscientiously trying to remember peoples' names. Don't tell me that you can't; I've tried it, and I know that anyone can remember names if he wants to.

"Here's a list of books and there are many more in the library. In these you will find definite behavior patterns outlined.

"Let's ask the boss if we can't spend a couple of hours each week discussing these things, sort of like we do new milk stone removers and new cleaners.

"One last thing, Ray. Please don't make the same mistake I did in studying people. I was always looking for their defects and trying to get them to change their habits and attitudes, trying to get them to practice the principles we have been talking about. It was a long time before it occurred to me that perhaps I might have some shortcomings. Now everything I learn about human behavior I apply to myself in seeking self-improvement. The pathology of the behavior of others I leave to their doctor and psychiatrist.

"It's odd how much other people improved their behavior when I improved mine."

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Problems in Improving Reported Morbidity Data as a Tool for Epidemiological Research

R. E. Serfling, Sr. Scientist, and Ida L. Sherman*

The dual objectives of the morbidity reporting system, (1) immediate recognition of communicable disease as it occurs in the population and, (2) compilation of data for administrative planning and epidemiological analysis, although well known, often fail to be adequately considered in discussions of morbidity reporting problems among epidemiologists, statisticians, administrative health officers, and others who use the data for one purpose or another. The public health nurse has the individual case as her primary interest, the statistician and public health administrator give first attention to population differences in incidence, and the epidemiologist, although vitally interested in all aspects of reporting, often cannot give the long range functions of reporting the attention they deserve.

Although the reporting system in its present form, despite many inadequacies, appears to be successful in providing sufficient notifications to assure the health officer that he can reliably appraise the current communicable disease situation in his community, these same data have limited usefulness for measurement of variation in trends, geographic and seasonal distribution, and other factors involved in the epidemiological analysis of communicable disease. The data now obtained serve as effectively as they do because the local health officer and state epidemiologist can supplement the reported figures in various ways by means of informal reports of field workers, conversations with physicians, and other bits of miscellaneous information. For analysis of data, however, only the reported figures are left; the intangibles which the health officer or epidemiologist used to supplement the morbidity reports in meeting daily program needs are no longer available, and even if they were, would not be suitable for quantitative studies.

DETECTION OF SINGLE CASES AND OUTBREAKS

In examination of factors which explain the general acceptance of the present reporting system as adequate in detection of single cases and outbreaks, three come immediately to attention.

First, the sense of adequacy actually extends only to certain of the more severe diseases for which (a) there is an accepted public health action to be taken, or (b) there is a high degree of public health, medical, or popular interest. Diphtheria, poliomyelitis, syphilis, and Rocky Mountain spotted fever are examples of such diseases.

A second reason for reassurance results from the fact that in practice the reporting system is supplemented by many other sources of information, e.g., leads obtained from public health and school nurses, hospitals, informal conversations with physicians, laboratory reports, and even newspaper clippings.

In the third place, death certifications afford confirmatory evidence that no severe outbreaks pass unrecognized. The continuing decline in the annual death rate for many communicable diseases indicates that even though all cases may not be recognized, a sufficient number of them come to the attention of health authorities to enable maintenance of a moderate to low incidence level. Again such confirmation is restricted to certain diseases.

MEASUREMENT OF CHANGES IN INCIDENCE

The sense of adequacy which results from the reasonably good performance of the morbidity reporting system with respect to detection of cases and outbreaks cannot be extended to the use of reported morbidity in measurement of geographic differences in incidence; in time trends; and in changing incidence by sex, age, and race.

The weaknesses of our present system become immediately evident when comparative measurements of incidence are attempted. For this purpose, the incomplete reporting, varying from disease to disease, from time to time, and from place to place, cannot be supplemented by the diverse tips, leads, and clues which enable the reporting system to function as a detection mechanism. For a few notifiable diseases, the reported

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data serve as a reasonably acceptable index over periods of time during which concomitant factors have not caused a marked change in the reporting system itself. Thus smallpox, typhoid fever, and diphtheria have a long history of severity; the set of symptoms which give rise to clinical diagnosis have remained essentially the same for a long period of time; and public health action in case-finding has been intensive for many years. As a result of the relative stability of these factors, the time trends of morbidity rates for these diseases reflect changes in incidence in a manner that appears in accord with related information.

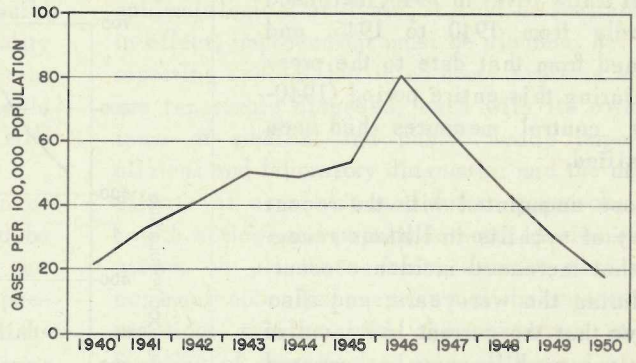
In other reportable diseases, great variation in reported incidence may result from such factors as: (1) the attitude of the private physician toward reporting; (2) incomplete etiological definition of reportable disease entities; (3) variation in clinical diagnosis according to local experience with infectious disease; (4) variation in follow-up and verification of physicians' reports; (5) variation in use and verification of supplementary reports, e.g., school and public health nurses' reports, laboratory reports, and others; (6) variations in laboratory procedures and in the criteria selected for querying physicians for case reports as a result of laboratory findings.

In some cases, the effect of external factors in the reporting system is readily apparent. In others, the influences may be detected only indirectly or through collateral information. Some examples of the effects of various influences on morbidity reports are shown in figures 1-3.

Syphilis Rates in Illinois. In Illinois, as in other States, the venereal disease control program developed during the late thirties was given a great deal of attention during the war years. Recent morbidity rates for

Figure 1

REPORTED CASES OF PRIMARY AND SECONDARY SYPHILIS
ILLINOIS, 1940-1950

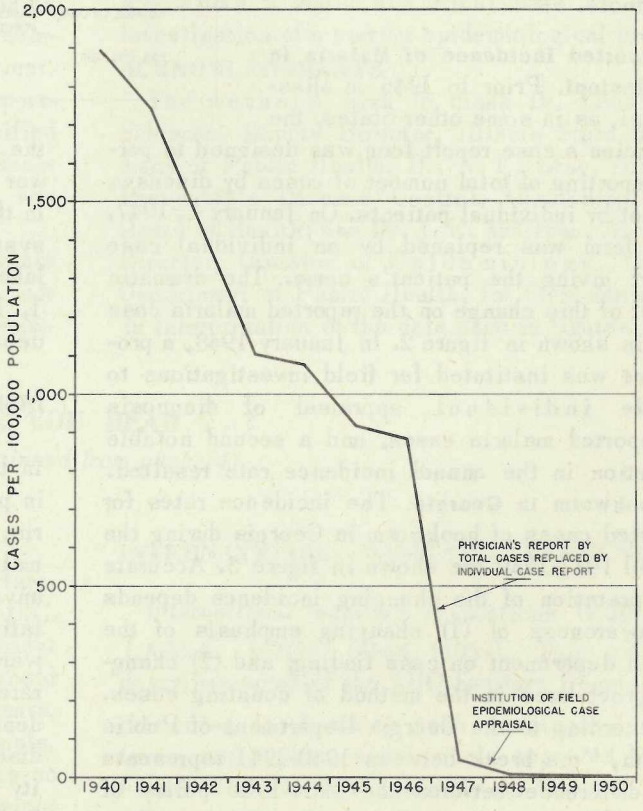


SOURCE OF DATA: CASES - ILLINOIS DEPARTMENT OF PUBLIC HEALTH
POPULATION - U.S. BUREAU OF THE CENSUS

FSA PHS CDC ATLANTA, GA. SEPT. 1951

Figure 2

ANNUAL REPORTED INCIDENCE OF MALARIA
MISSISSIPPI, 1940-1950



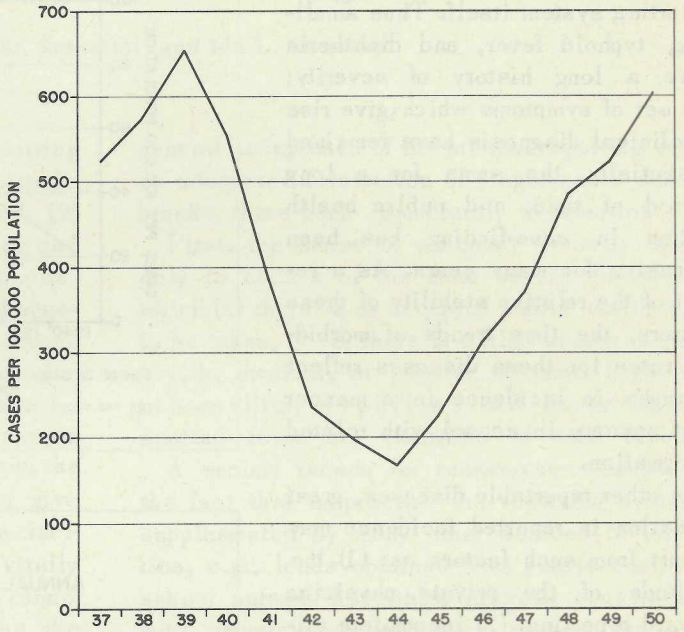
SOURCE OF DATA: CASES-MISSISSIPPI STATE BOARD OF HEALTH
POPULATION-U.S. BUREAU OF THE CENSUS

FSA PHS CDC ATLANTA, GA. SEPT. 1951

primary and secondary syphilis are shown in figure 1. From these rates it appears that infectious syphilis was at a low level in 1940, increased markedly from 1940 to 1946, and declined from that date to the present. During this entire period (1940-1950) control measures had been intensified.

Those acquainted with the recent history of syphilis in Illinois recognize that increased incidence occurred during the war years, and also believe that the current low level of infectious syphilis may be accepted as approaching the true incidence. The low level in 1940 is attributed to under-reporting which diminished during the intensive control program period of subsequent years, and thus induced a change in reporting practices which prevents a precise appraisal of the effect of the program in Illinois.

Figure 3
REPORTED INCIDENCE OF HOOKWORM
GEORGIA, 1937-1950



SOURCE OF DATA: CASES - GEORGIA DEPARTMENT OF PUBLIC HEALTH
POPULATION - U.S. BUREAU OF THE CENSUS

FSA PHS CDC ATLANTA, GA. SEPT. 1951

Reported Incidence of Malaria in Mississippi. Prior to 1946 in Mississippi, as in some other States, the physician's case report form was designed to permit reporting of total number of cases by diseases but not by individual patients. On January 1, 1947, this form was replaced by an individual case report giving the patient's name. The dramatic effect of this change on the reported malaria case rate is shown in figure 2. In January 1948, a procedure was instituted for field investigations to enable individual appraisal of diagnosis of reported malaria cases, and a second notable reduction in the annual incidence rate resulted.

Hookworm in Georgia. The incidence rates for reported cases of hookworm in Georgia during the period 1937-1950 are shown in figure 3. Accurate interpretation of the changing incidence depends on awareness of (1) changing emphasis of the health department on case finding, and (2) changing procedures in the method of counting cases.

According to the Georgia Department of Public Health, "the break between 1940-1941 represents the difference between the 1934-1940 policy of counting reports from all sources and the policy adopted in 1947, and now projected backward to 1941, of counting only positives reported by State laboratories. Fluctuations since 1941 reflect the decrease of case finding activities during the war years and a subsequent return to normal levels in the post-war period. A completely new reporting system, based entirely on direct tabulations from laboratory reports was placed in effect on January 1, 1951 and reporting of hookworm by health departments and physicians was discontinued."

DISCUSSION

The foregoing examples illustrate some artifacts in the notifiable disease data caused by changes in programs, diagnostic concepts, laboratory criteria, and reporting procedures. In the case of the malaria or hookworm reports, it is unlikely that anyone acquainted with the problems of interpretation of reported disease data would miss the warning given by the abrupt annual change in rates. The inherent danger signal is not so evident in the reported case data for many other diseases, and those familiar with reported morbidity data know that snares, traps, and hidden pitfalls lurk in all the reportable disease records to entangle the unwary and to frustrate the informed. This large body of data is, consequently, of limited usefulness, even in pin-point studies of

situations with which individual epidemiologists are familiar.

In improvement of death registration, the introduction of uniformity of reports and reporting procedures served as a foundation on which to build toward complete and correct reporting. Morbidity reporting, however, is essentially a different procedure from death registration, and it should not be expected that a similar line of action will be of the same effectiveness.

In mortality reporting, the initial problem of defining the event on which the report should be made is a simple one, since in man, death is one of the most easily recognized of biological phenomena, and therefore the first step in establishing a reporting system, that of defining the event to be reported, is clear-cut. Classification of the reported events can be taken up as a separate problem. Once a record has been obtained of all the events and a classification has been made, both internal and external evidence may be used to appraise the reliability of classification and to work toward its improvement.

In morbidity reporting, however, the event of reporting, although defined for each reportable disease, depends on a decision, frequently complex, which must precede reporting of the event. Since classification precedes the event of reporting, one has only a record of events classified independently by a large number of individuals with different training, experience, interests, and willingness to report.

In consequence, the total number of events reported depends upon a variety of factors, not readily subject to quantitative measurement, which can exert as great an influence on the data as can the true fluctuations of incidence in the population. In planning improvement in the usefulness of reported morbidity data for administrative and epidemiological analysis, it must be realized that, in effect, improvement must be planned, not in one reporting system, but in as many systems as there are reportable diseases, each with its own problems of medical and public health importance; clinical and laboratory diagnosis; and the unknown effects of current and future research, public health action, and popular interest. A simultaneous attack on all these fronts against each of the communicable diseases cannot be considered a practical problem with the resources at hand. Scrutiny of present-day epidemiological problems reveals several whose solution might be hastened if adequate and complete statistics on incidence were available.

Efforts to concentrate immediate improvement of the reporting system on a selected communicable disease problem would, while serving as a testing ground for further improvement of the whole system, provide a working area of tractable size and afford a solid statistical base for broader investigation of a current epidemiological problem.

ACKNOWLEDGMENTS

The authors wish to thank Dr. Leonard M. Schuman, Deputy Director, Illinois State Department of Public Health; Dr. A. L. Gray, Director, Preventable Disease Control, Mississippi State Board of Health; and Dr. J. E. McCroan, Assistant Director, Division of Epidemiology, Georgia Department of Public Health, for their assistance in interpretation of the data used in figures 1-3.

HAVE YOU READ. . . ?

(Continued from page 14)

BIOLOGICAL WARFARE

What you should know about biological warfare. U.S. Government Printing Office, Washington, D.C. (February 1951). This official U. S. Government booklet points out that "Biological attacks could be made by enemy forces or by secret agents. The attacks could be aimed at people, animals, or food crops. But – biological warfare is no secret super-weapon. There are defenses against it and you should know what they are." This booklet points out some of the things that should be done as defensive measures.

INTERNATIONAL SANITARY REGULATIONS

International sanitary regulations (Editorial). J.A.M.A. 147(1): 62-64 (1951). This editorial describes some of the WHO Sanitary Regulations, pertaining to diseases such as plague, yellow fever, and typhus, unanimously approved by the Fourth World Health Assembly on May 25, 1951. Unless modified by the Fifth World Health Assembly the regulations will go into force in all countries concerned on October 1, 1952.

PICTORIAL REVIEW

AN INTRODUCTION TO BACTERIOLOGY (SERIES)

PART I Basic Biology of Bacteria

PRODUCTION NO.: CDC 5-174.0, released 1950.

DATA: Filmstrip, 35 mm., sound, color, 7 minutes, 56 frames.

PURPOSE

To provide elementary and refresher instruction in bacteriology.

AUDIENCE

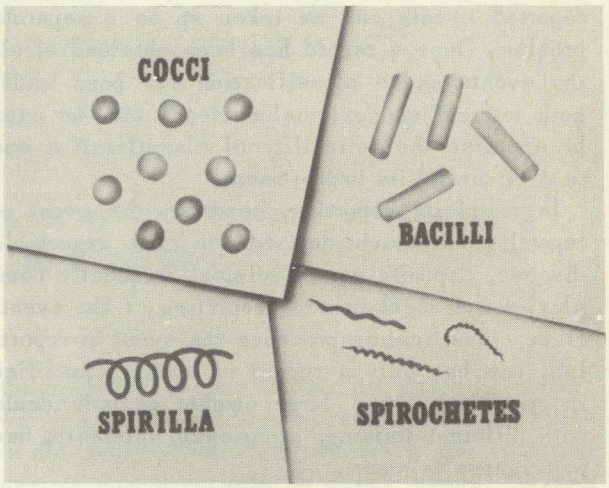
Sanitarians, sanitary engineers, nurses, and bacteriology laboratory technicians.

CONTENT

Closely associated with us in our environment are a multiplicity of tiny one-celled plants called bacteria. Those which are capable of producing diseases are called pathogenic bacteria. When public health workers take samples of food or make swab tests from dishes used by the public, and follow up with laboratory tests, they are establishing the presence or absence of these pathogens. It is therefore important for these workers to become familiar with the nature, physiology, and nomenclature of both harmful and harmless bacteria.

The microscope reveals bacteria to be simple cells, each containing a mass of protoplasm. They are classified partly according to their shape: cocci (spherical), bacilli (straight rod form), vibrios (short curved rod form), spirilla (longer curved rod), spirochetes (corkscrew form); and also by their grouping as illustrated by the cocci: diplococci (developing in pairs), streptococci (clinging together like a chain), and staphylococci (in irregular groups like clusters of grapes). The majority of known species of bacteria are either bacilli or cocci. Bacilli outnumber the latter 3 to 1.

If surrounding conditions such as temperature, humidity, acidity, and food supply are favorable, each bacterium divides by a process known as fission to form two daughter cells which in turn



mature and divide. This reproductive cycle, if unchecked, can reproduce billions of offspring in a single day from each bacterium.

In order to survive periods of unfavorable conditions, certain bacilli form within each cell a spore which contains the protoplasm of the cell condensed into a single round or oval granule. Spores can resist unfavorable conditions such as drought, sunlight, heat, and even a certain amount of boiling or baking for long periods. When the spore again finds a favorable environment, e.g., a surgical wound, it reverts to its rod-like shape and multiplies rapidly.

Bacilli and some spiral species of bacteria have fine hair-like flagella which propel them through liquids. In order to feed, bacteria must be immersed in solutions of nutrients; they cannot grow or multiply without abundant moisture. It is for this reason that food may be preserved by drying

it thoroughly.

Some bacteria require free access to oxygen and are therefore called aerobic. Certain other bacteria, e.g., those which cause botulism, thrive only in the absence of air because they get oxygen from surrounding compounds. These are called anaerobic.

Bacteria may be further differentiated by their choice of food. Those which live in the soil and water and feed entirely on inorganic matter are called autotrophic. Those which require dead organic matter for food are called saprophytic, while those which feed on the tissues of living organisms, thus producing disease, are called pathogenic. These pathogens flourish best at the body temperature of the organism on which they feed, and are destroyed by high temperatures. Thus fevers are useful and we can disinfect by boiling. Pathogenic bacteria vary in other reactions to environment. Their multiplication in food may be stopped in many cases by low temperatures or freezing, hence our refrigerators and deep-freezers; by an acid, hence pickling in vinegar; by a salt brine; and by sugar, as by preserving in syrup.

PART II Identifying Pathogens

PRODUCTION NO.: CDC 5-175.0, released 1950.

DATA: Filmstrip, 35 mm., sound, color, 9 minutes, 64 frames.

PURPOSE

To illustrate and describe pathogenic bacteria and laboratory techniques for their identification.

AUDIENCE

Sanitarians, sanitary engineers nurses, and laboratory technicians.

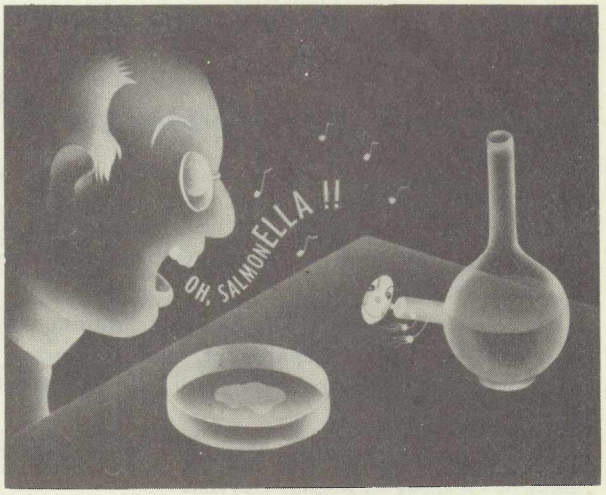
CONTENT

Bacteriologists have found that out of more than 1,300 kinds of bacteria which they have identified, 70 are pathogenic (disease producing). Of these, at least seven genera are of perpetual concern in routine investigations of the safeness of water, milk, and other foods.

Polluted water may harbor *Salmonella typhosa* (causing typhoid fever) or *Shigella* (causing bacillary dysentery). Raw milk may contain *Streptococcus* (causing septic sore throat), *Mycobacterium* (causing tuberculosis), *Brucella* (causing brucellosis), and *Shigella* (causing infant diarrhea). In foods may lurk *Staphylococcus* (causing acute food poisoning), *Clostridium* (from improperly canned foods and causing botulism), and *Salmonella* (causing paratyphoid fever and acute food poisoning).

Usually a combination of two or more of five different methods are used in laboratories to identify pathogens:

1. Microscopic Examination. The suspected material is smeared on a clean slide and stained with a simple stain such as methylene blue or with a differential stain such as by Gram's method. The latter differentiates *Mycobacterium*, *Clostridium*, *Streptococcus*, and *Staphylococcus*, which appear dark purple (Gram positive), from *Shigella*, *Salmonella*, and *Brucella*, which are bleached by alcohol (Gram negative) and are recolored by a contrasting dye. Gram positive and Gram negative bacteria are thus distinguished but further methods must be used to distinguish those in either group.



Scientists call bacteria by names derived from condensed and broadly descriptive words of Latin and Greek origin.

2. Study of Colony Growth. Certain nutrient substances (culture media) either in the form of broth or as solid slants or plates induce bacteria to multiply to the extent that a generous supply of the organism is present. Pure cultures are necessary for identification. To prepare them it is convenient to spread thinly (streak) a small drop of broth culture on the surface of a culture plate. After incubation for an optimum time, each isolated bacterium that was streaked onto the plate

will have increased to a mass of descendants called a colony. Any of these colonies may be transferred to a new medium. This is called subculturing. Smearing, staining, and microscopically examining the pure culture often enables one to identify it from the shape, color, and grouping of the bacteria.

3. **Study of Enzyme Action.** Bacteria are capable of forming enzymes or digestive juices which by their decomposing or synthesizing action on various substances and solutions aid in identifying themselves. Some may clot milk, acidify, form gas, or cause putrefaction and/or fermentation. Their selective pattern of behavior in accomplishing some of these phenomena and not others identify them to the skilled bacteriologist.

4. **Animal Inoculation.** In studying pathogens, it is frequently advisable to inject them into test animals that will react in a certain known way to a given pathogen; e.g., rabbit fever (tularemia) bacteria grow slowly and uncertainly on a culture medium but often rapidly in a guinea pig.

5. **Serologic Tests.** The reaction between an unknown species of bacteria and the serum of certain specially treated animals often identifies the bacteria and indicates its concentration in the sample. Some commonly used serologic tests are: (a) agglutination; (b) precipitin; (c) bacteriolytic; and (d) complement fixation.

Meticulous care through tests and counter tests is the price of positive identification of pathogens.

Foreign Visitors to CDC

During the months of July and August the fol- foreign public health officers and trainees were visitors to CDC:

Mr. Jose M. Azevedo III, Sanitary Engineer, Sao Paulo Water Works Department, and Professor of Sanitary Engineering, University of Sao Paulo, Sao Paulo, Brazil.

Dr. L. J. E. Fernando, Medical Officer, Government of Ceylon, Colombo, Ceylon.

Dr. Eunice Pereira, Medical Officer, VD Clinic, General Hospital, Colombo, Ceylon.

Dr. Jen-Lan Shih, Physician, Dept. of Maternity and Child Health, National Institute of Health, Formosa, China.

Dr. Joaquin G. Santos, Director, Unidad Sanitaria of Concepcion, San Salvador, El Salvador.

Dr. Mohamed Abdel Kader, Assistant Director, Rural Health Administration, Dakahlea Province, Cairo, Egypt.

Dr. Erich W. Kirchberg, Entomologist, Robert-Koch Institute, Berlin, Germany.

Dr. Emmanuel Andreadis, Director, Island of Samos, District Health Department, Vathy, Samos, Greece.

Dr. Chamseddme M. H. Mofidi, Teheran University Medical School and Pasteur Institute, Teheran, Iran.

Dr. Kalaya Visesbadhya, Medical Officer, Bangkok Hospital, Bangkok, Thailand.

Dr. Anant Krishana Anwikar, Medical Officer of Health, Central Province Public Health Service, c/o Public Health Department, Secretariat, Negpur, India.

Dr. Raden Mochtar, Chief Officer, Public Health Education Service, Ministry of Health, Prapatan 10, Djakarta, Indonesia.

Dr. Julie S. Sulieman, In Charge, Maternal and Child Health, Ministry of Health, Djakarta, Indonesia.

Dr. Zabihollah Ghorban, Chief Medical Officer, Public Health Departments of Fars Province, Shiraz, Iran.

Dr. Einar Pedersen, Deputy Director, Division of Epidemiology and Hygiene, Norwegian Public Health Service, Oslo, Norway.

Dr. B. N. Clark, Deputy Chief Health Officer, Union Health Department, Pretoria, South Africa.

Mr. Udom Kanishtharat, Public Health Engineer, Department of Public Health, Bangkok, Thailand.

Dr. Tanong Viriyachati, Health Officer, Department of Health, Ministry of Health, Bangkok, Thailand.

ENTEROBACTERIACEAE

F. KAUFFMANN

1951, 338 pp. Ejnar Munksgaard, Copenhagen

In this volume is included the available pertinent information concerning the classification and differentiation of the enteric bacteria. The organization of the book and the nomenclature employed therein follow the report of the Enterobacteriaceae Subcommittee of the Nomenclature Committee of the International Association of Microbiologists to the Fifth International Congress of Microbiology in Rio de Janiero in 1950.

The author defines the family Enterobacteriaceae and outlines his conception of its composition and relationships. Thereafter the following groups which are of interest to medical and veterinary bacteriologists are considered in nine chapters: *Salmonella*, Arizona, Ballerup-Bethesda, *Escherichia*, Alkalescens-Dispar, *Klebsiella*, *Shigella*, Providence (29911 of Stuart), and *Proteus*. As would be expected from the personal interests of the author, the main emphasis is placed on serologic identification of types in those groups on which sufficient investigation has been done to permit serologic typing. Nevertheless, the division into groups is accomplished by biochemical methods and the biochemical activities of the types within the groups are carefully cataloged.

The properties of the various classes of antigens found in the enteric bacteria, the serologic behavior of these antigens, the numerous variations to which they are subject, and their relation to serologic identification of types are carefully and lucidly explained. Simplified methods for the diagnosis of the more important types are included.

In addition to a discussion of typing, the chapter on the *Escherichia* group includes discussions of the *Escherichia coli* flora of healthy individuals, type distribution in normal and pathological material, and the pathogenicity of *Escherichia* types. The newer knowledge of the relation of certain *E. coli* types to epidemic infantile gastroenteritis is stressed.

The discussions of the various groups are followed by a chapter devoted to intergroup antigenic relationships. Throughout the work the author stresses the fact that the family of enteric bacteria is made up of a series of related types which are not susceptible to division into sharply defined groups. Many intermediate strains occur which arbitrarily must be placed into one group or another by agreement.

The book is concluded by a chapter devoted to media and methods used in the study of enteric bacteria. The scope and documentation of the book are indicated by the fact that it contains 100 tables and a 10-page bibliography. The volume is clearly and accurately printed and is well indexed. The book is the only available work in which accumulated knowledge of the enteric bacteria is brought together. It is authoritatively written by the foremost worker in the field and will provide an invaluable addition to the libraries of all workers interested in enteric bacteriology and in serologic identification of bacteria of all types.

P. R. Edwards, Bacteriologist

The Interdepartmental Committee on Pest Control

The Interdepartmental Committee on Pest Control, meeting on May 18, 1951, at the National Institutes of Health, Bethesda, Md., elected Dr. H. L. Haller, a representative of the Department of Agriculture, Chairman, and Dr. S. W. Simmons, a representative of the U. S. Public Health Service, Secretary.

Assembled meetings of the Committee have not been held for some time, but they will be held quarterly hereafter with extra meetings being called by the Chairman if indicated.

The first meeting of the Interdepartmental Committee on Pest Control was held on March 13, 1946, and consisted of representatives from the following Departments: War, Navy, Agriculture, Federal Security Agency, and Interior. The functions of the Committee, as set forth in the minutes of the first meeting, were as follows:

(a) Cooperative planning in the field of research and free interchange of information on results; (b) collaboration in preparing and issuing information to the public on matters which cover the general field of chemicals used in pest control; (c) unification of policies on the use of such chemicals when they are applied for controlling pests over large areas; and (d) collaboration and coordination in planning and executing control programs where there is a joint interest.

The Committee is composed of two or three representatives from each Department or Agency, but members have the privilege of inviting other specialists for the benefit of their advice and counsel when needed.

As stated in the minutes of the first meeting, and as is now the case:

"The Interdepartmental Committee should not duplicate or conflict with the activities of other groups concerned in insect and pest control that have been established. It should augment their activities by providing a means of crystallizing and pointing up work of the several units of the government interested in and responsible for work in research, education, and control of pests. It is not expected or intended, however, that responsibilities of the various units of the government will be assumed by the Committee. It will rather aid in carrying out the activities of the several Federal agencies to the best interest of social progress through joint consideration of matters of mutual interest."

During the past number of years, under the Chairmanship of the late Dr. S. A. Rohwer and the Secretaryship of Dr. Paul A. Neal, the Committee has taken a leading part in the adoption of coined names for insecticides and has considered various problems presented to it by both governmental agencies and industrial interests. It is hoped that in the future this Committee will be active in coordinating the release of policy information in the field of pesticides. It stands ready to consider for discussion major problems which those interested in pest control might care to bring before it.

The present members and their affiliations are, as follows*:

Department of Agriculture: Dr. W. G. Reed, Production and Marketing Administration, and Dr. H. L. Haller, Bureau of Entomology and Plant Quarantine; U. S. Public Health Service: Dr. Paul A. Neal, National Institutes of Health, and Dr. S. W. Simmons, Communicable Disease Center; Federal Security Agency: Dr. A. J. Lehman, Food and Drug Administration; Department of Interior: Dr. Clarence Cottam, Fish and Wildlife Service; Department of the Navy: Commander Frank R. Philbrook, Bureau of Medicine and Surgery, Lieutenant Commander Richard T. Holoway, Bureau of Medicine and Surgery, and Mr. Harry Fleisher, Bureau of Ships; Department of the Army: Lieutenant Colonel Frederick W. Whittemore, Jr., Office of the Surgeon General, Dr. Ray Treichler, Office of the Quartermaster General, and Mr. W. D. Reed, Office of the Chief of Engineers; Department of the Air Force: Major L. C. Kossuth, Office of the Surgeon General, USAF.

The next meeting of this committee was scheduled to be held on September 21, 1951.

*The complete addresses of the Committee members may be obtained from the secretary, Dr. S. W. Simmons, Chief, Technical Development Services, Communicable Disease Center, U. S. Public Health Service, P. O. Box 769, Savannah, Ga.

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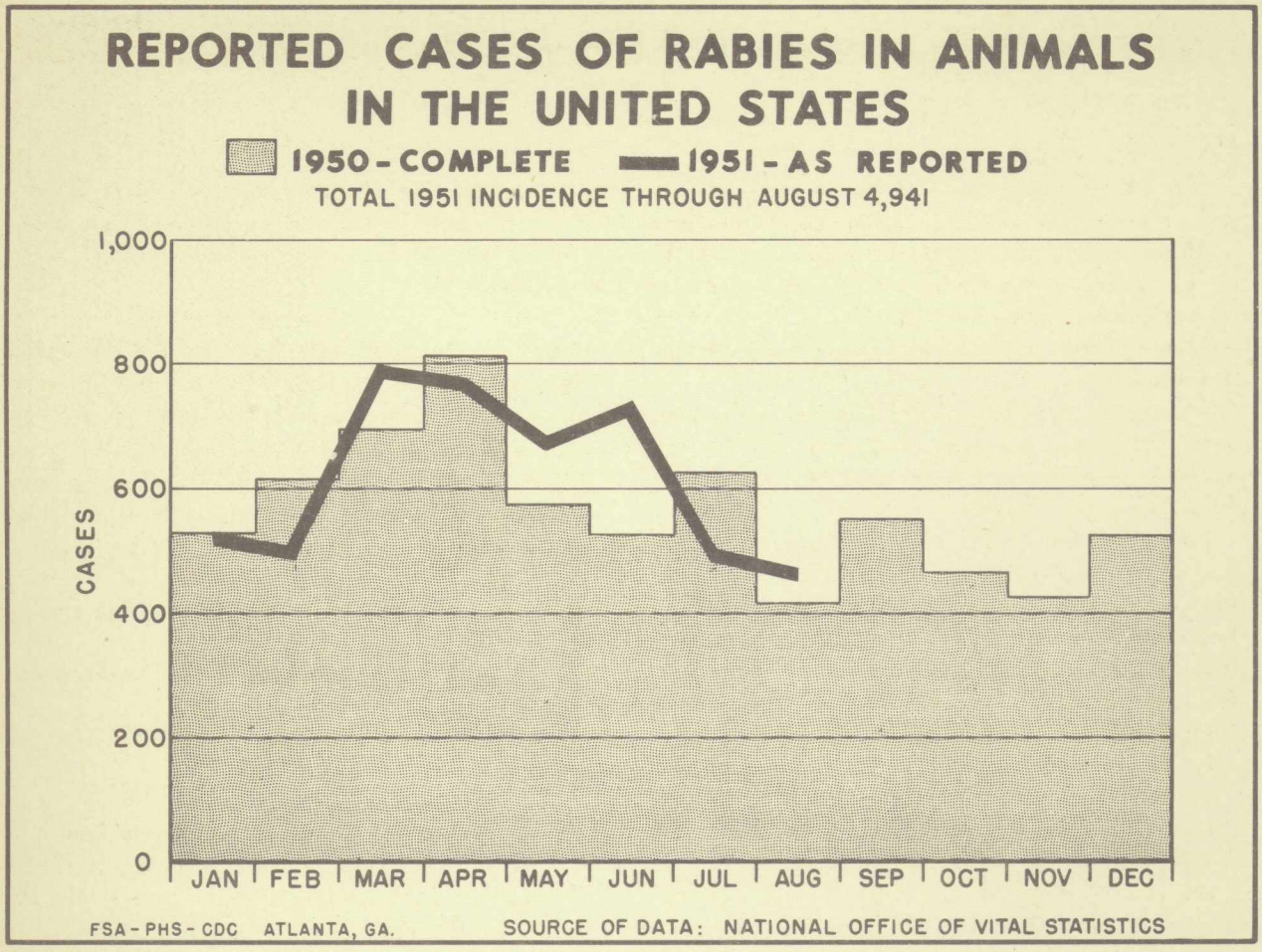

Recent Publications by CDC Personnel

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Mohr, C. O.: Entomological background of the distribution of murine typhus and murine plague in the United States. Am. J. Trop. Med. 31(3): 355-372 (1951).

Schubert, J. H., Stanford, S. M., and Tiffany, E. J.: Comparative evaluation of several complement fixation techniques for laboratory diagnosis of the rickettsioses. J. Lab. & Clin. Med. 37(3): 388-393 (1951).

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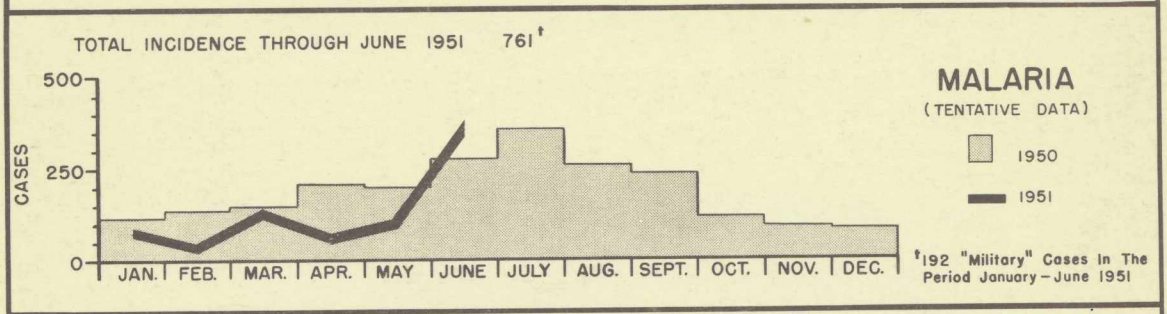
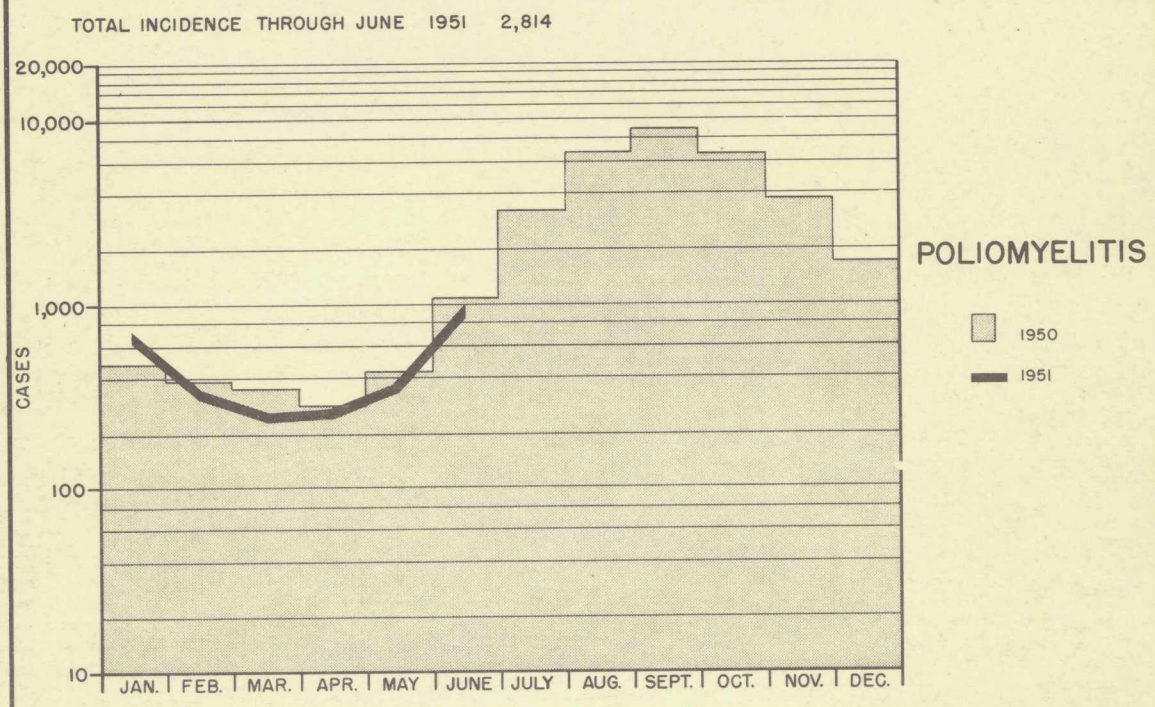
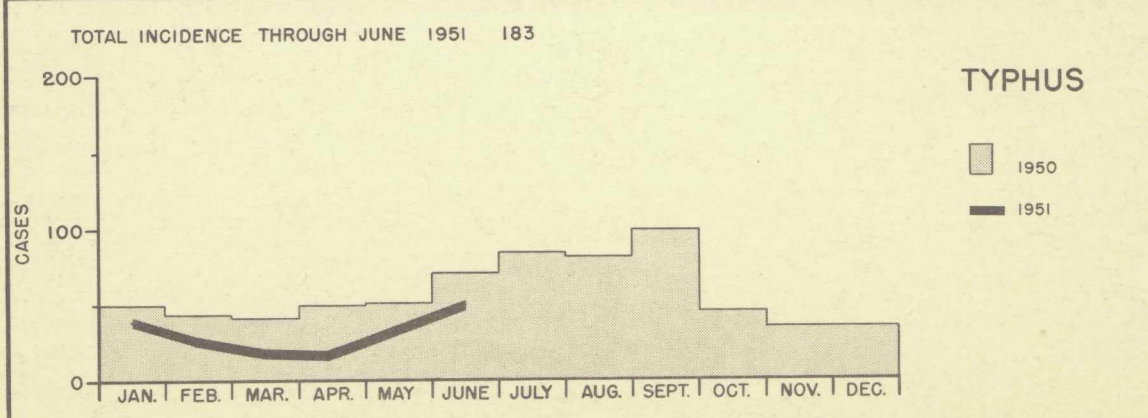
MORBIDITY TOTALS FOR THE UNITED STATES *
MALARIA, POLIOMYELITIS, TYPHUS

1950 - COMPLETE 1951 - AS REPORTED







FSA-PHS-CDC ATLANTA, GA.

*SOURCE OF DATA: NATIONAL OFFICE OF VITAL STATISTICS