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## A PLAN FOR RODENT CONTROL IN CITIES

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Nearly every health officer has felt the urge, either upon his own initiative or upon the solicitation of citizens, to engage in a campaign of rat extermination. Very often such an effort follows the familiar pattern of trapping and poisoning, with publicity setting forth the destructive proclivities and disease dissemination possibilities of rodents. After a brief flurry such a campaign usually subsides quickly, with dubious or negligible accomplishments. A rat campaign based upon a misconception of the factors involved may be termed a futile public health effort.

While the important role played by rats and their ectoparasites in the transmission of disease is widely recognized by public health officials, the methods which may be utilized for the effective control of these pests on a city-wide scale appear to be less well known. If results are to be achieved in proportion to the efforts and expenditure made, careful planning of the entire program is necessary.

Designed especially for cities, the plan here outlined may readily be adjusted to existing conditions. Obviously the extent and direction of the program will depend upon size, location, and environment. Furthermore, the financial status of the city, as well as the availability of personnel and equipment, will largely influence the results.

The various administrative steps, procedures, and activities designed to promote a successful rodent control campaign in cities may be summarized as follows:

1. Trained leadership.
2. Office space and equipment.
3. Field equipment.
4. Records.
5. Survey of actual and potential harborages.
6. Trapping.
7. Identification and classification of rodents and their ectoparasites.
8. Ratproofing ordinance.
9. Cooperation with other city departments and agencies.
10. Education and publicity.
11. Enforcement of provisions of ratproofing ordinance.
12. Permanent control measures.

The logic of the measures herein described is predicated on the fact that in large centers of population rats are dependent upon man for the two absolute necessities of life, food and shelter. Of these two essentials to rat life it is most difficult and often impracticable to prevent access to food. However, measures for the removal of food beyond the reach of rats are of utmost importance in controlling the rat population.

Rat control of enduring character cannot be accomplished without the elimination of active and potential harborages. Therefore, an effective program should be based on the principle of permanent harborage elimination. All other measures are either palliative or accessory.

As a guide to those contemplating the inauguration of a rodent control program a brief description is given of various phases of such a project.

*Trained leadership.*—To insure the success of a plan of rodent control it is essential that the work be supervised by a thoroughly trained person. This person should have teaching and executive abilities and should be capable of assuming charge of personnel and all field activities. When trained personnel are not available, arrangements should be made to have a suitable member of the health department staff trained in a large city where effective rodent control measures are actively pursued. The United States Public Health Service may be consulted in such matters; it stands ready to give information and assistance in planning a course of instruction. A minimum period of 90 days should be allotted for the necessary training.

*Office space and equipment.*—Very little office space and equipment are needed in order to conduct a rodent-control program. A desk, telephone, typewriter, and a large and a small filing cabinet are essential. As the work progresses additional space and equipment can usually be acquired.

*Field equipment.*—Transportation is the most important item of field equipment. A light automobile with a pick-up body is ideal for the transportation of sanitary inspectors, the distribution of supplies, and the delivery of rats to the laboratory or incinerator.

*Records.*—The recording of data can be accomplished by the use of three separate forms designed for the following purposes:

(a) Field form.—This form should be designed to record detailed rat infestation and ratproofing data relating to the individual building and premises inspected and should be completed in the field. Provision should be made for the inclusion of all recommended corrective measures.

(b) Office form.—This form is designed for the recording of pertinent statistical data obtained from field reports and for a ready reference file.

(c) Laboratory forms.—When laboratory investigations are to be conducted in conjunction with rodent control activities, a field card similar to an ordinary

shipping tag may be used for recording the time, number, district, place, and means by which such rodents were obtained.

(d) The recording of laboratory data relative to rodents and their ectoparasites should be accomplished by the use of a separate identifying serial number for each premise from which rodents are recovered. The serial number given the rodents and ectoparasites should correspond with the serial number given the premises.

Districts may be designated by letters, and subdivisions of a district by numerals. For example, District A, A1, District B, B1, etc.

*Survey of actual and potential harborages.*—For survey purposes a large map of the city should be obtained and districts outlined according to general types and uses of buildings, i. e., residential, retail, wholesale, manufacturing, warehouse, market, waterfront, etc. Dumps existing within the city or in close proximity thereto for the disposal of waste should be placed in a separate district. For descriptive purpose those districts embracing types of buildings, such as residential, which are widely scattered or cover a comparatively large geographical area may be further subdivided into smaller geographical units.

A number of typical buildings, including outbuildings and grounds, in each district should be inspected in order to determine existing conditions as to ratproofing and rodent infestation. The following points should be noted and recorded during this survey:

- (a) Type of building—whether wood, brick, cement, stone, etc.
- (b) Presence or absence of a basement.
- (c) Presence or absence of rat infestation and harborages. When infestation and harborage are found, the location and extent should be noted, together with an estimation of the probable number of rodents present.
- (d) Presence of potential or used rat runs.
- (e) Presence and accessibility of food attractive to rats, either within the building or on the premises.
- (f) Trash or rubbish which might afford harborage for rodents.
- (g) Ground burrows.
- (h) Method of garbage disposal, whether buried or stored in ratproof containers.
- (i) General condition of the buildings as to their state of repair.

*Trapping.*—When a determination of the species and index of ectoparasites is desired, live rats should be trapped in each district by means of cage or small steel traps. For general trapping, however, the best results are obtained by the use of baited wooden snap traps indoors and steel traps in the open. Trapping should be done systematically by districts in order to secure representative specimens from all parts of the city. All traps should be visited daily, baiting and resetting in new locations as indicated. Trapped live rats in their cages should be delivered daily to a central laboratory for examination, classification, and recovery of ectoparasites.

Rats caught alive in steel traps may be killed on the spot and put in white cotton bags for transportation to the laboratory. Dead rats should be delivered to the laboratory when necessary to examine them

for specific diseases or other purposes. All rats should be disposed of by incineration.

The recovery and classification of ectoparasites is of considerable importance from a public health standpoint, as it affords a means of determining the potential susceptibility of a municipality to rat-borne endemic and epidemic diseases.

*The collection of ectoparasites.*—In order to determine the prevalence and species of ectoparasites infesting live rats, it is necessary to devise a procedure which will prevent the escape and permit the recovery of all the ectoparasites infesting the rat at the time of death. Various procedures have been employed. The choice will depend on available facilities and the advisability of animal inoculation to determine the presence of endemic or epidemic disease in rats. Where animal inoculation of pooled parasites is to be done, the lethal agent should be a gas with little or no bactericidal properties. In an article published in 1939, Eskey and Haas (13) report that tests show that hydrocyanic acid gas caused only slight and variable reduction in the virulence of cultures of *P. pestis*, while chloroform in saturated atmospheres was capable of destroying the organisms. When animal inoculation is not planned, the following procedure will be found satisfactory: Upon delivery to the laboratory live rats should be killed either by crushing their necks with heavy forceps or by administration of chloroform. When chloroform is used the rats should be anesthetized in a glass or white enamel container in order that ectoparasites leaving the body during the process may be seen and recovered. In the case of rats caught in steel traps and killed at the place of capture, the bodies and containers should be brought to the laboratory where they may be subjected to a gaseous insecticide and the parasites recovered in the same manner as previously described. The inner surface of the containers should be carefully searched for parasites which may have left the body. When live rats are killed by means of forceps, the bodies should be immediately suspended by the tail over a large white enameled pan containing water. This may be accomplished by the use of heavy spring paper clips attached to a wire strung over the pan at a height which permits the rat's nose barely to clear the water. Within a period of 2 hours a large percentage of the infesting fleas will leave the cooling body and jump into the water, from which they may be easily recovered. Remaining fleas may be dislodged and recovered by combing the suspended body. Other ectoparasites, such as mites and lice, may be recovered by combing the fur over a large sheet of white paper. By stroking with a fine steel comb against the direction of the hair the ectoparasites may be seen and removed. This method must also be used to recover fleas from rats killed by chloroform. All ectoparasites should be preserved in vials contain-

ing 50 percent alcohol for future classification. Vials should be identified with the district number and the same serial number given to the rodents from which the ectoparasites were recovered.

*Identification and classification of rodents.*—Rodents should be classified and identified as to species. The prevalent species for the locality can readily be identified by a laboratory attendant after a brief period of training, while the unusual specimen may be preserved for examination by a more competent authority. The sex, approximate age, pregnancy, and pathology found at post mortem should also be recorded.

*Enactment of a ratproofing ordinance.*—This procedure usually requires a considerable period of time and necessitates consultations by the city health officer with various members of the city council and administrative officials. Whether the ordinance is to be enacted as a part of the sanitary or building code will be determined by local circumstances. Violations of the code should be made a responsibility of the health department. Whatever the type of ratproofing ordinance enacted, it should contain the following basic provisions:

(a) Provision for the ratproof construction of all new buildings erected after the date the ordinance becomes effective.

(b) Provision for the ratproofing of existing buildings and their equipment when used commercially for the purpose of manufacturing, processing, distributing, or storing foods, food products, or wastes, either in bulk or nonratproof containers.

(c) Provision for the control of rats on public and private dumps and premises.

(d) Provision for the proper storage of garbage in ratproof containers and its disposal in such a manner as not to attract rats.

A model ratproofing ordinance is contained in Supplement 131 to the PUBLIC HEALTH REPORTS, a copy of which may be secured by addressing The Surgeon General, United States Public Health Service, Bethesda, Md.

*Cooperation with other city departments and agencies.*—The progress of a rat control program is made much easier by close cooperation with the fire, police, building, sanitary, and other city departments or agencies which are in any way concerned with the construction, maintenance, or servicing of buildings or their contents. Representatives of these organizations are in a position to obtain and relay information concerning rat infestation. When properly informed they are capable of acting as advance agents in distributing information on the value of ratproofing.

*Education and publicity.*—The dissemination of information concerning the purpose, value, and methods of rat control is an important part of an effective program. The assistance which can be secured from city and civic organizations through the medium of talks and conferences will materially lighten the work of the health department in this respect. Contacts should be made with builders, contractors, and architects in order to explain the purpose and ad-

vantage of ratproofing new buildings. The cheapest and best way to ratproof a building is to include ratproof specifications in the construction plans.

Spectacular publicity campaigns are undesirable and seldom produce permanent results. The publication, in the health section of local newspapers, of interesting facts relating to rats, together with the reasons and methods for their control, is a valuable educational procedure. Pamphlets containing similar information may be prepared for distribution to schools, civic and other organizations. Patience and perseverance are the keynotes in bringing to the attention of the public the need for protection against property damage and health hazards caused by rats.

School authorities should be consulted about incorporating facts concerning the history, habits, characteristics, economic and health hazards of rats in appropriate courses, such as environmental hygiene or related subjects.

Exhibits at State and county fairs provide an excellent means of disseminating information concerning rat control. By means of specimens, views, models, and drawings such exhibits impress onlookers with the economic damage inflicted and the health hazards ascribed to rats. The more common types of rat harborages and the methods used for their elimination should be demonstrated. The main theme of the exhibit might appropriately be captioned, "No rat home, no rat food: no rats."

At the 1942 Minnesota State Fair an exhibit on rat control prepared and staged by the Minnesota State Department of Health, in cooperation with the department of health of Minneapolis, was viewed with interest by 22,000 persons during a 10-day period. A moving picture film on the subject of rat control was shown to approximately 13,000 people.

*Enforcement of the ratproofing code.*—Every effort should be made to promote ratproofing through cooperation, education, and demonstrations. The cost of ratproofing new buildings under construction is so small that it requires no particular financial consideration. On the other hand, the cost of ratproofing old buildings may present an important economic problem, the solution of which requires good judgment coupled with justice and reason. A health department which obtains the confidence of the public and builds a favorable reputation through the wise and just administration of ratproof laws and procedures is much more likely to achieve success than would be the case were compliance too frequently made mandatory through legal action.

When it becomes necessary or advisable to test the legality of a ratproof code in the courts, the test case should be chosen with care. In the case of existing buildings the evidence of marked rat infestation

should be carefully verified and the practicability of the corrective procedures plainly outlined. A store or market used for the purpose of distributing bulk foods to the public offers the best chance for a successful test.

*Permanent control procedures.*—Having gained, by means of the preliminary survey, information as to existing rat harborages and infestation, active permanent control measures may be inaugurated.

Conferences should then be held with owners, agents, or operators of infested buildings. The sanitary, health, fire, and trade hazards resulting from rat infestation should be pointed out and the remedies plainly indicated. Permanent control procedures, in order of importance, are as follows:

- (a) Ratproofing of all new buildings during the period of construction.
- (b) Ratproofing of existing buildings and fixtures found to be infested. The consent and cooperation of owners or operators should be obtained for the ratproofing of a few especially chosen, heavily rat infested buildings for demonstration purposes. A record of the costs should be kept and care exercised that such costs are kept within reasonable bounds as related to the building and business investment. The successful outcome of these demonstrations will furnish references and publicity which will be invaluable in continuing the work and obtaining future cooperation in ratproofing procedures.
- (c) Elimination of accumulated waste material. Waste material such as boxes, barrels, packing, sacks, etc., should be removed both from the buildings and premises.
- (d) Storage of goods. All goods and supplies should be properly stored in a neat and orderly manner in small units and elevated from the floor. This arrangement promotes more complete visibility, prevents rats from securing an undisturbed nesting place, and makes detection easier.
- (e) Trapping. This is of permanent value only in connection with ratproofing. Flat double action snap traps are best for inside use and the ordinary steel traps for outside use.
- (f) Fumigation. This is an emergency measure which is highly effective in securing a large and immediate reduction of the rat population in restricted areas. It should be applied in all cases where buildings or premises are infected or suspected of being infected with rat-borne disease. Following fumigation enduring rat control measures such as harborage elimination, protective ratproofing, and sanitation should be inaugurated. As fumigants which are lethal to rats are also lethal to man, the procedure should be undertaken only by experienced public health officials or licensed pest control operators.
- (g) Poisoning. This method of destroying rats should be restricted to those instances where the existence of rat-borne disease necessitates the application of all possible emergency measures. The longer this procedure is applied the less effective it becomes.

#### SUMMARY

Rodent control, like other important public health measures, requires foresighted planning if expectations are to be realized. The solution of the problem will be found in the continuous application of control measures rather than in evanescent campaigns. Preconceived ideas concerning results to be obtained by poisoning and trapping of

rats must be discarded in favor of the slower and more difficult method of "building them out," i. e., ratproofing. At the same time food supplies must be made inaccessible, thereby serving the double purpose of depriving rodents of sustenance and conserving commodities vitally needed for human consumption.

Special emphasis has been placed on ratproofing and harborage elimination for the reason that this plan is designed for use in cities where the objective is to secure economical and enduring control of rats as a preventive measure. Where plague or typhus exists, or is suspected in either human or rodent form, more vigorous action is indicated. Under these circumstances emergency measures such as fumigation, trapping, and poisoning should be promptly undertaken and continued as long as laboratory examinations indicate the presence of infection.

The plan outlined, with modifications adapted to local requirements and conditions, has produced satisfactory results in the past and, in the hands of conscientious administrators, will continue to do so in the future.

#### ACKNOWLEDGMENTS

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#### REFERENCES

For the benefit of those desiring more detailed information on this subject the following references will be found of value:

- (1) Boston, R. J.: Public health engineering phases of murine typhus control. *Am. J. Pub. Health*, **30**: 619-626 (June 1940).
- (2) Boston, R. J.: Advances in methods of murine typhus control. *Am. J. Pub. Health*, **31**: 720-727 (July 1941).
- (3) Holsendorf, B. E.: Rat harborage and ratproofing. *Pub. Health Rep.*, **52**: 75-81 (Jan. 15, 1937). Reprint No. 1798.
- (4) Silver, James, Crouch, W. E., and Betts, M. C.: Ratproofing buildings and premises. U. S. Dept. of Agric., Farmers' Bull. No. 1638. U. S. Government Printing Office, 1930.
- (5) Holsendorf, B. E.: The rat and ratproof construction of buildings. Supplement 131 to the Public Health Reports. U. S. Government Printing Office, 1937.
- (6) Heiser, V. G.: Relative efficiency of rat traps. *Pub. Health Rep.*, **29**: 341-342 (Feb. 6, 1914). Reprint No. 167.
- (7) Long, J. D.: Choice of rat poison in antiplague work. *Pub. Health Rep.*, **51**: 551-554 (May 1, 1936).
- (8) Moore, Roy: Rodent control in food establishments. *Am. J. Pub. Health*, **27**: 62-66 (January 1937).
- (9) Silver, James: Rat control. U. S. Dept. of Agric., Farmers' Bull. No. 1533. U. S. Government Printing Office, 1933.
- (10) The rat: A health menace that should be eradicated. *Pub. Health Rep.*, **43**: 2157-2159 (Aug. 17, 1928).
- (11) The rat: Arguments for its elimination and methods for its destruction. *Pub. Health Bull. No. 180*. U. S. Government Printing Office, 1928.
- (12) Rats responsible for infection. *Pub. Health Rep.*, **42**: 1112 (Apr. 22, 1927).
- (13) Eskey, C. R., and Haas, V. H.: Plague in the western part of the United States. *Pub. Health Rep.*, **54**: 1467-1481 (Aug. 11, 1939).
- (14) Eskey, C. R.: Flea infestation of domestic rats in San Francisco, Calif. *Pub. Health Rep.*, **53**: 948-951 (June 10, 1938).



## THE BACTERIOSTATIC ACTION OF SULFADIAZINE ON *E. TYPHOSA* IN CARRIERS AND CASES<sup>1</sup>

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The favorable results of sulfonamide therapy in *Shigella dysenteriae* infections encouraged us to extend our observations to typhoid fever. Watt and Peterson (1) have reported that they found sulfaguanidine noneffective in the treatment of cases and carriers. The response to sulfadiazine is considered here.

*Techniques.*—Two quantitative tests, designed to measure relatively the number of viable *Eberthella typhosa* in the lower enteric tract and in the feces, were used. In one test fecal specimens were obtained by rectal swabs and were inoculated to S. S. (*Shigella-Salmonella*) agar in a uniform manner. After incubation the suspicious clear colonies were counted. Four such colonies were picked from each plate for identification. If at least three proved to be *E. typhosa*, and if the suspicious colonies appeared to be of one type, the count was accepted as a relative measure of the number of viable *E. typhosa* in the lower enteric tract. In the other test passed fecal specimens, collected in glycerine saline preservative, were mixed with saline to give a heavy suspension which was adjusted approximately by turbidity. Tenfold dilutions of each specimen were prepared from 1:10 to 1:100,000. One cubic centimeter of the original suspension and 1 cc. of each dilution were inoculated to pour plates of bismuth sulfite agar (Wilson Blair medium). Only two plates with low dilutions and one with a high dilution were used when preceding tests revealed few or no organisms. After 48 hours suspicious colonies were counted and fished. If all or almost all of the fished colonies proved to be *E. typhosa*, the number per cubic centimeter of the heavy suspension was calculated.

A third nonquantitative cultural procedure was employed. The rectal swabs, after being used for inoculating plates, were dropped into tubes containing selenite F enrichment. Following incubation, the swabs were again used for plating to S. S. agar. A portion of the plate was heavily inoculated and the remainder was lightly streaked from this, using a needle with a ball tip.

Para-amino benzoic acid, 5 mg. percent, was added to the medium which was used for cultures in the case of individuals receiving sulfadiazine.

Routinely we sought to obtain three pretreatment cultures from carriers and two from cases of typhoid fever. During medication and for 1 week thereafter cultures were taken daily. This prescribed procedure could be followed in most cases.

<sup>1</sup> From the Division of Infectious Diseases, National Institute of Health.

*Observations on chronic carriers.*—The carriers studied were inmates of New York State mental hospitals.<sup>2</sup> They are listed by sex and age in table 1. All but 2 were females and all but 3 were above 50 years of age. The 19 carriers available for treatment included 15 found to be excreting many organisms. There were 389 positive reports among the 428 fecal cultures which had been performed prior to this study. Eosin-methylene blue agar had been used in culturing specimens from 2 individuals who had 21 of the 39 reported negative examinations.

The pretreatment cultures on the carriers were made on S. S. agar plates only. The average numbers of colonies considered to be those of *E. typhosa* are shown in table 1. The maximum count was 1,000

TABLE 1.—The sex and age of the chronic typhoid carriers treated with sulfadiazine, and the relative numbers of *E. typhosa* in the feces before, during, and after treatment

Carrier	Sex	Age	Average number of suspicious colonies per S. S. agar plate inoculated by rectal swab			Average number of <i>E. typhosa</i> per cc. of a heavy fecal suspension	
			Before treatment	During treatment	After treatment	During treatment	After treatment
E. D.	F	56	<sup>1</sup> Many	<sup>1</sup> Few	1,000		
E. M.	F	68	1,000	0	1,000		
M. C.	F	52	1,000	0	1,000		2,800,000
E. A.	F	75	1,000	0	630	0	10,000,000
C. A.	F	66	1,000	0	386	0	7,400,000
C. N.	M	65	833	0	715	233	8,045,000
P. W.	F	72	750	0	500	1,420	4,800,000
A. A.	F	47	733	0	660		42,000
M. M.	F	46	500	21	733		10,000,000
A. L.	F	38	467	2	143		
E. L.	F	72	458	0	358	165	305,000
M. D.	F	63	367	0	450	68	900,000
T. H.	M	55	334	0	1	25	19,000
A. S.	F	65	250	0	295	1,369	190,000
M. J.	F	56	175	0	32	100	4,500,000
M. C.	F	75	34	0	4	0	300
A. W.	F	58	3	0	6	10,000	10,000
D. A.	F	67	1	0	11		
J. R.	F	81	1	0	0		
Total			8,906	23	7,924	3,380	<sup>2</sup> 36,159,300
Average			495	1	417	338	<sup>2</sup> 3,615,930

<sup>1</sup> Counts were not made on the first case treated.

<sup>2</sup> For the 10 cases examined during treatment.

since numbers above this could not be accurately estimated. In the 15 carriers who were excreting many organisms, 42 of the 45 pretreatment cultures were positive on direct plating; in the 4 carriers excreting few organisms, 5 of 12 tests were positive.

The number of suspicious colonies found on the daily cultures progressively decreased under treatment. The rapidity of change varied, but in most of them there was a marked reduction by 48 hours. This usually continued until the organisms were not found by direct

<sup>2</sup> Arrangements for this study were made by the New York State Departments of Health and Mental Hygiene, and the patients were treated with the permission and cooperation of the respective superintendents and attending physicians in the hospitals concerned.

plating. The observations during treatment, as recorded in the table, represent the maximum therapeutic response. In all instances the average number of colonies on 3 successive examinations is given. The 3 cases which did not have negative plates for at least 3 successive days developed toxic manifestations which made it inadvisable to continue the drug. *E. typhosa* were frequently isolated from the enrichment medium or found on the bismuth sulfite pour plates when the specimen by direct plating was negative.

Treatment was continued in some cases for 7 days, in others for 14, and in 2 for 21 days. Three to seven days after treatment was withdrawn suspicious colonies reappeared on the S. S. agar plates. These increased in number. After 10 days to 2 weeks the average numbers of suspicious colonies approximated those found before treatment.

The growth on the S. S. agar plates inoculated from the passed fecal specimens did not differ materially from that on plates inoculated by rectal swabs. The variations with treatment were those described above.

The bismuth sulfite pour plates were used during and following treatment. The findings in a total of 67 counts are given. The ratio of the number of *E. typhosa* being excreted with and without treatment was in the order of 1:10,000.

Five carriers were observed alternately on and off treatment. Suspicious colonies decreased in number or disappeared with the first course of treatment, then reappeared after the drug was withdrawn. Following renewal of treatment they again decreased or entirely disappeared, but returned after a second withdrawal of medication.

Coliform organisms were markedly reduced in number during treatment. Swabs heavily coated with feces were used to inoculate plates of MacConkey agar. Before and after treatment a confluent overgrowth was usually obtained; during treatment few or no coliform colonies appeared.

There were irregularities in the quantitative observations described. This could be attributed in part to the inexact quantitative nature of the measures employed. Apparently there was also in some patients a fluctuation in the discharge of organisms. This was particularly evident in the case of one carrier—following a series of negative findings the plates began suddenly to be crowded with suspicious colonies. This was encountered first when the patient was off treatment but was observed a second time when she was again on treatment. This was the only case in which there was an increase in suspicious organisms during treatment. Here the plates had many suspicious colonies for 4 successive days, after which they became negative again.

*Cultural findings on convalescent carriers and cases.*—The following observations were made on patients in the Shreveport Charity

Hospital, Shreveport, La.<sup>3</sup> On August 11, 1942, the date of beginning this part of the study, there were 17 patients on the isolation wards with, or convalescing from, typhoid fever. Five with active symptoms and the 3 convalescents found to have consistently positive stools were placed on treatment. All patients admitted subsequently were included in the study. As of October 31, 1942, there were 24 patients in the series. Three were excluded from this analysis because of the lack of positive cultures. The cases represent the severe, hospitalized, endemic infections. Negroes predominate. Thus far they are equally divided by sex, and distributed by age in the first 4 decades.

Before treatment *E. typhosa* were found in 27 (46 percent) of 59 cultures on S. S. agar plates. During medication there was only 1 positive S. S. plate (a convalescent carrier) after the third day of treatment. By enrichment, *E. typhosa* was found in 36 (86 percent) of 42 examinations before treatment, in 3 (8 percent) of 36 tests after 1 week's medication, and in none of the 30 examinations after 2 weeks of treatment. The bismuth sulfite pour plates were regularly positive before treatment in all convalescent carriers and in all but 1 case. One-half of these tests were still positive after 1 week. Late in treatment there were 3 (6 percent) positive findings in the 51 tests of cases and 10 (48 percent) in 21 examinations of convalescent carriers.

The numbers of colonies believed to be those of *E. typhosa* per S. S. agar plate are tabulated in table 2. The data given correspond with data on chronic carriers recorded in table 1. There was a wider variation from individual to individual. Under medication there was a prompt decline. All plates were negative on the fourth day of treatment and continued so, except for the one test on a convalescent carrier. After medication was withdrawn, this same person again had positive S. S. agar plates, as did two of the cases.

The counts as determined by the bismuth sulfite pour plates are shown in the last columns of table 2. The average of all pretreatment cultures is given. The others are averages of 3 consecutive daily examinations on the sixth, seventh, and eighth; thirteenth, fourteenth, and fifteenth days of treatment; and on the sixth, seventh, and eighth days after medication was withdrawn. The next preceding or subsequent finding was used when cultures were not obtained on the specified days. (In 1 case, treated for more than 2 weeks, the later maximum therapeutic response was used.) These counts decreased with varying rapidity under treatment, but by the end of 1 week all were low and after 2 weeks positive colonies were rarely

<sup>3</sup> Arrangements for this study were made through Dr. G. W. McCoy, Professor of Preventive Medicine, Louisiana State Medical School, and the Louisiana State Health Department. It was conducted with the approval of Dr. Edgar Galloway, Superintendent, and the assistance of the resident house staff and the clinical pathological laboratory.

found. The magnitude of the reduction was as follows: In the cases (excluding the relapse) an excretion of 1,000,000 organisms before sulfadiazine was reduced to 130 by 1 week's treatment and to 1 by 2 weeks' medication; in convalescent carriers an excretion of 12,000 before treatment was reduced to 18 after 1 week and to 1 after 2 weeks' treatment. There was a particularly rapid disappearance of the pathogens from the stools of the individual whose treatment was started on the first day of a clinical relapse. An average count of 5,250,000 per cc. of a heavy fecal suspension for the 3 days before treatment was reduced to 200 in 2 days, to 10 in 3 days, and to 3 in 4 days. All cultures thereafter were negative.

TABLE 2.—Color, sex, and age of convalescent carriers and culturally positive cases of typhoid fever treated with sulfadiazine, and the relative number of *E. typhosa* in the feces before, during, and after treatment

Time in illness when sulfadiazine was started	Case	Color	Sex	Age	Average number of suspicious colonies per S. S. agar plate			Average number of <i>E. typhosa</i> per cc. of a heavy fecal suspension			
					Be- fore treat- ment	Dur- ing treat- ment	After treat- ment	Immedi- ately before treatment	During treatment		One week after treat- ment
									At end of 1 week	At end of 2 weeks	
Convalescence	A. J.	N	F	17	{ 42 100 0	{ 0 0 0	{ + — —	65,000 100,000 8,333	0 10 284	1 — 15	100,000 100,000 —
	A. L.	N	F	24	{ + 0	{ 0 0	{ 0 0	28,333 100	1 1	0 3	0 838
	J. W.	N	M	17	{ + 0	{ 0 0	{ 0 —	1,500 52,666	77 1.	0 0	0 0
	E. P. <sup>1</sup>				0	0	—				
Total counts					142	0	+	255,932	374	19	200,838
Average counts					28	0	+	36,562	53	3	40,167
Fourth week	L. T.	N	M	36	0	0	0	—	0	0	0
	F. S.	N	M	10	275	0	0	—	1	—	0
Third week	L. E.	N	M	24	+	—	—	88	—	—	—
	B. S.	N	F	22	—	—	—	100	0	0	—
	L. W.	N	F	23	—	—	1,000	50,000	50	0	10
	V. P.	W	F	38	300	0	—	3,000	18	0	3
	V. M.	W	F	10	0	0	0	300	8	0	0
Second week	E. P.	W	M	13	50	—	0	5,000	15	0	52,666
	R. T.	N	F	8	0	—	—	20,000	0	0	0
	A. P.	W	M	3	1,000	0	+	—	7	0	3
	H. M.	N	M	7	0	0	—	100	7	0	0
	R. M.	W	M	3	1,000	0	0	500,000	60	3	5
	R. T.	W	M	22	55	—	—	100,000	67	0	—
	A. D.	N	M	10	+	—	—	430	1	—	0
	F. J.	N	M	34	0	0	0	4	1	0	0
First week	E. S.	W	F	18	—	—	—	100,000	66	1	0
	L. J.	N	F	35	0	0	—	50	3	0	—
	A. J.	W	F	3	—	0	0	1,500,000	0	1	0
First day (relapse)	L. W. <sup>2</sup>				1,000	0	0	5,250,000	0	0	—
Total counts					3,680	0	1,000 <sup>3</sup>	7,529,072	301.3	2.3	52,684.3
Average counts					282	0	100 <sup>3</sup>	470,567	17	.1	3,763
											41.4

<sup>1</sup> + = positive, but plates unsatisfactory for counts.

<sup>2</sup> — = No count made.

<sup>3</sup> Repeat course of treatment.

<sup>4</sup> Excluding the one case with high count.

The infection recurred in 1 convalescent carrier (A. J.) after 11 days of medication as a first course and after a longer second course. There was an early recurrence following a similar first course in another convalescent carrier (J. W.) but not following his second course. Patient E. P. was admitted late in the second week of his disease. He became culturally negative under treatment. On the fourth day off medication cultures showed a few organisms and on the following 3 days, many. He was placed on treatment again and after 24 hours the daily cultures had few or no suspicious colonies. On the sixth and seventh days of medication when stool cultures were negative the patient had an elevation of temperature to 103.4°F. and *E. typhosa* was isolated on blood culture. He was treated as a convalescent carrier but the findings suggest that this may have been an aborted clinical relapse. Another patient (L. W.) had a definite clinical, as well as bacteriological, relapse. She received treatment beginning in the third week of her illness. Three stool specimens were obtained in the first 5 days after the medication was discontinued; all were negative. On each of the next 5 days she had from 4 to 35 *E. typhosa* per cc. of a heavy fecal suspension. She then began to excrete many organisms and on the sixth day thereafter fever developed. Treatment was started and, as stated above, the number of organisms rapidly decreased. A third patient (A. P.) began to discharge *E. typhosa* on the fifth day following the discontinuation of medication. During 9 days of further observation the highest count was 250 per cc. of a heavy fecal suspension, and the boy remained well. Treatment was not renewed because of a low neutrophile count. The child was discharged for follow-up at home. There were scattered post-treatment positive observations in some other cases which revealed the presence of only small numbers of *E. typhosa*. A more prolonged follow-up than was possible in these cases is obviously needed. Pending this, comment relative to bacteriological relapse is reserved.

Blood cultures are being taken every 2 days, but these have not yet provided significant laboratory evidence concerning the bacteriostatic action of the drug on organisms in the blood stream or in the internal tissues.

*Comment.*—The bacteriological findings indicate clearly that sulfadiazine markedly reduces the number of viable *E. typhosa* in the fecal discharges. The reduction was observed in cases treated early where the number of organisms would not tend to decrease in an unmodified course of the disease and in chronic carriers where the excretion would continue at a constant level. In the cases treated late and in the convalescent carriers the changes were observed immediately and regularly after the beginning of medication. This timing and the

rapidity of the modification differentiated the observed responses from changes which occur in the natural course of the infection.

The evidence indicates an adequate trial of sulfadiazine in typhoid fever but conclusions as to its therapeutic value must await the objective measures provided by a large series of cases.

Our findings do not encourage the hope that the chronic carrier state may be avoided by treating the persisting convalescent carrier. Chemotherapy failed to modify permanently the infection in the convalescent carrier whose treatment started late in convalescence.

#### SUMMARY

Sulfadiazine was used in the treatment of 19 chronic carriers, 4 convalescent carriers (including 1 treated as a case), 21 clinical cases, and 1 clinical relapse.

Quantitative cultural tests clearly demonstrated that this sulfonamide has a marked bacteriostatic effect on *E. typhosa* in the enteric tract.

The chronic-carrier state was not terminated by this treatment.

#### REFERENCE

- (1) Watt, James, and Peterson, J. S.: Sulfaguanidine noneffective in the treatment of typhoid fever and typhoid carriers. Pub. Health Rep., **57**: 872-873 (June 5, 1942).

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### RELAPSING FEVER: THE TICK *ORNITHODOROS TURICATA* AS A SPIROCHETAL RESERVOIR <sup>1</sup>

By GORDON E. DAVIS, *Senior Bacteriologist, United States Public Health Service*

On August 29, 1936, 86 *Ornithodoros turicata* were collected from the sand and from a cottontail rabbit (*Sylvilagus* sp.) taken in a prairie dog (*Cynomys* sp.) burrow near Ashland, Clark County, Kansas (Davis, 1936). A strain of relapsing fever spirochetes was recovered by feeding a group of these ticks on a white rat. One of the nymphs reared to a female served as the origin of the ticks and spirochetes used in a study of this species of *Ornithodoros* as a spirochetal reservoir.

F1 generation: A lot of 36 larvae from the female was allowed to engorge on a white rat; relapsing fever was produced in the host. Seventeen ticks that survived the larval molt were tested individually. Spirochetes were recovered from 6, or 35 percent. One tick from which spirochetes were recovered following each of 5 nymphal feedings (Nov. 30, 1938 to Dec. 12, 1939) and the first adult feeding (Jan. 24, 1940) was used to continue the study.

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<sup>1</sup> From the Rocky Mountain Laboratory of the Division of Infectious Diseases of the National Institute of Health.

**F2 generation:** From the first oviposition there were 111 eggs and 82 larvae. Sixty-three larvae were tested in 6 groups of from 4 to 28.

One host died before testing was completed, but spirochetes were recovered from the remaining 5. Fifty-seven ticks survived the larval molt. These were tested by feeding separately on white mice. At the first feeding spirochetes were recovered from 47 and at the second feeding spirochetes were recovered from 55, or 96 percent, of the ticks tested. All ticks were reared to adults. There were 30 males and 27 females. One of each sex failed to transmit the spirochete.

**F3 generation:** One hundred and three larvae from one of the F2 generation ticks were tested individually by feeding on white mice. Forty mice became infected. At the first nymphal feeding, spirochetes were recovered from an additional 36. A high mortality occurred among the ticks at the time of the larval molt but spirochetes were recovered from all of the 66 ticks surviving to the second nymphal feeding. There were 32 males and 34 females.

**F4 generation:** Forty-four larvae from a third generation female were tested individually. Spirochetes were recovered from 15 larvae and from 17 of 35 surviving first nymphs. Among 13 ticks developed from a second female of this generation, 9 were found to be carrying spirochetes, and of 59 ticks from another female, 24 were shown to be infective. There was a total of 44 males and 44 females. Fifty-eight percent of the former and 52 percent of the latter were shown to be carrying spirochetes. Progeny of 3 females were used since oviposition was much delayed in the females first selected.

**F5 generation:** One hundred and forty-five larvae from one of the F4 generation females tested resulted in 68 infected mice. At the first nymphal feeding spirochetes were recovered from each of the surviving 136 nymphs. All molted normally to second stage nymphs in from 8 to 12 days. A summation of the results from the larval and first nymphal feedings showed that at least 142 of the 145 larvae and all ticks that survived the larval molt were infective.

#### DISCUSSION

Beginning with a spirochete-bearing female reared from ticks collected in nature, the progeny resulting from the first oviposition by 1 female (in one instance 3 females) of each of the 5 succeeding generations were tested quantitatively for spirochetes. These tests covered a period of nearly 6 years.

With the exceptions noted, all tests were made by feeding the ticks individually, in each developmental stage, on white mice. Beginning with the fifth day after tick feeding, tail blood was examined for 4 successive days. The thick drop and Giemsa's method of staining were used.



The invasiveness of the spirochetes did not diminish over a period of nearly 6 years. They appeared in the peripheral blood of all mice which were hosts to the F5 generation of ticks on the first day of examination, and the fifth day after feeding.

Since factors, other than host availability, which regulate the populations of burrow-dwelling ticks are not definitely known, calculations based on laboratory observations cannot be safely applied to ticks under natural conditions. However, certain inferences may be drawn. In the F2 to F4 generations all surviving ticks were reared to adults with a total of 88 infective males and 83 infective females. In the F5 generation none were reared beyond the second nymphal stage as it became necessary to terminate the experiment. However, in the rearing of hundreds of ticks of several species of *Ornithodoros*, the period of greatest mortality is at the time of the larval molt. Ticks surviving the first ecdysis usually succeed in reaching the adult stage. The proportion of males and females approximates a 50-50 ratio. Although the males may continue to infect the rodent host at successive feedings through life, transmission during copulation has not been demonstrated (Davis, 1941). It is therefore concluded that males play no part in the continuity of the spirochete in the tick species.

From the first oviposition in the F2, F3, and F4 generations, there were, respectively, 26, 34, and 23 infective females, and, based on the 50-50 ratio, there were an additional 3 in the F1 generation and 68 in the F5 generation to perpetuate infective progeny.

Furthermore, in studies on the biology of *O. turicata*, oviposition has taken place at least five times within a 12-month period. The number of eggs deposited at the first oviposition was, as a rule, less than the number deposited at the second or third period.

The data presented indicate that in the formulation of the hypothesis of rodent hosts as spirochetal reservoirs, as stressed by a number of authors, the biological phenomenon of transovarial transmission has been neglected. Although ticks of the genus *Ornithodoros* have many hosts in common with ticks of other genera, the known transmission of relapsing fever spirochetes only by ticks of this genus suggests that these spirochetes are primarily commensals of these ticks rather than parasites of the rodent host.

#### SUMMARY AND CONCLUSION

A quantitative study of the transovarial transmission of spirochetes through five generations of *O. turicata* has been made.

Progeny found to be infective in each of the five generations amounted to 16 ticks (35 percent), 55 ticks (96 percent), 66 ticks (100 percent), 107 ticks (47 percent), and 136 ticks (100 percent), respectively.

These results indicate that the tick itself may be a more efficient "spirochetal reservoir" than the rodent host.

## REFERENCES

- Davis, Gordon E.: *Ornithodoros turicata*: The possible vector of relapsing fever in southwestern Kansas. Pub. Health Rep., **51**: 1719 (1936).  
———: *Ornithodoros turicata*: The male; feeding and copulation habits, fertility, span of life, and the transmission of relapsing fever spirochetes. Pub. Health Rep., **56**: 1799-1802 (1941).

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TULAREMIA: SPONTANEOUS OCCURRENCE IN SHREWS<sup>1</sup>

By GLEN M. KOHLS, Associate Entomologist, and EDWARD A. STEINHAUS, Associate Bacteriologist, United States Public Health Service

The occurrence of tularemia in the shrew, *Sorex vagrans monticola*, and the field mouse, *Microtus pennsylvanicus modestus*,<sup>2</sup> has recently been demonstrated in connection with field studies of tularemia being made at the Rocky Mountain Laboratory. The finding of infected shrews adds another species of the native fauna to the already considerable number known to contract this disease in nature.

On November 5, 1942, 3 shrews and 10 field mice of the species mentioned above were caught in traps set in a marshy area 3 miles east of Hamilton, Mont. No gross lesions were observed at autopsy. The spleens and livers of each species were pooled and injected into 4 guinea pigs. The latter died from 6 to 12 days later and the gross pathology was suggestive of tularemia. *Pasteurella tularensis* was isolated from the spleen and liver of 2 of the guinea pigs that received the shrew tissues and from 3 of those that received the field mouse tissues.

Infection in *Microtus californicus aestuarinus* in Contra Costa County, Calif., has been reported by Perry (1928) and in *Microtus pennsylvanicus* and *Microtus* sp. in Madison, Musselshell, and Wheatland Counties in Montana by Jellison, Kohls, Butler, and Weaver (1942).

## REFERENCES

- (1) Jellison, W. L., Kohls, G. M., Butler, W. J., and Weaver, J. A.: Epizootic tularemia in the beaver, *Castor canadensis*, and the contamination of stream water with *Pasteurella tularensis*. Am. J. Hyg., **36**: 168-182 (1942).  
(2) Perry, J. C.: Tularaemia among meadow mice (*Microtus californicus aestuarinus*) in California. Pub. Health Rep., **43**: 260-263 (1928).

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<sup>1</sup> From the Rocky Mountain Laboratory, Division of Infectious Diseases, National Institute of Health.

<sup>2</sup> The writers are indebted to E. Raymond Hall, of the Museum of Vertebrate Zoology, University of California, for these identifications.

# PREVALENCE OF DISEASE

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### REPORTS FROM STATES FOR WEEK ENDED MAY 22, 1943

#### Summary

Reports for the current week show no significant change as compared with similar reports for recent weeks. Of the first 9 common communicable diseases included in the following table, current totals of only influenza, meningococcus meningitis, poliomyelitis, and whooping cough are above figures for both the preceding week and the comparable 5-year (1938-42) medians. As compared with the corresponding period last year, increases have been recorded for the first 20 weeks of the current year for the dysenteries, infectious encephalitis, measles, meningococcus meningitis, poliomyelitis, scarlet fever, smallpox, endemic typhus fever, and whooping cough.

Meningococcus meningitis cases reported for the week totaled 544, as compared with 485 for the preceding week (exclusive of delayed reports). Increases for the week were reported in 6 of the geographic areas of the country. In the New England and Mountain States the incidence remained practically the same, while a decrease was shown in the West North Central States from 45 to 23. States reporting more than 20 cases for the week (last week's figures in parentheses) are as follows: New York, 89 (70); New Jersey, 41 (42); Pennsylvania, 39 (34); Tennessee, 32 (9); California, 31 (17); Virginia, 25 (19); Ohio, 22 (15).

A total of 36 cases of poliomyelitis was reported, as compared with 28 cases for the preceding week and a 5-year median of 26. Of the total, 13 cases were reported in California, 4 in Texas, and 19 in 12 other States.

Of 85 cases of typhoid fever, as compared with 54 last week and 110 for the 5-year median, 14 occurred in New York and 10 in Texas. No other State reported more than 5 cases.

Among other reports for the week were the following: Dysentery, all forms, 501 cases; encephalitis, infectious, 8; Rocky Mountain spotted fever, 9; tularemia, 28; endemic typhus fever, 52.

Deaths registered during the week in 88 large cities of the United States totaled 8,847, as compared with 9,202 last week and an average for the past 3 years of 8,215. The accumulated figure for the first 20 weeks of the year is 194,888, as compared with 177,243 for the corresponding period in 1942.

*Telegraphic morbidity reports from State health officers for the week ended May 22, 1943, and comparison with corresponding week of 1942 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Med- ian 1938- 42	Week ended—		Med- ian 1938- 42	Week ended—		Med- ian 1938- 42	Week ended—		Med- ian 1938- 42
	May 22, 1943	May 23, 1942		May 22, 1943	May 23, 1942		May 22, 1943	May 23, 1942		May 22, 1943	May 23, 1942	
NEW ENGLAND												
Maine.....	0	0	1				55	69	141	7	1	0
New Hampshire.....	3	0	0				60	45	40	1	1	0
Vermont.....	0	1	70				233	235	83	0	0	0
Massachusetts.....	2	5	5				1,844	1,219	1,053	18	7	1
Rhode Island.....	0	0	0				39	216	80	13	0	0
Connecticut.....	6	0	2		1	1	438	492	467	11	2	0
MIDDLE ATLANTIC												
New York.....	19	15	18	14	15	17	3,539	856	2,251	89	20	6
New Jersey.....	2	4	7	13	2	5	2,320	819	845	41	6	1
Pennsylvania.....	11	6	16	1			1,972	1,591	1,591	39	2	4
EAST NORTH CENTRAL												
Ohio.....	7	7	6	16	5	5	734	469	469	22	3	1
Indiana.....	3	2	4	13		5	458	58	58	11	0	0
Illinois.....	19	17	17	6	2	13	1,734	319	319	19	0	0
Michigan <sup>2</sup> .....	3	5	5	3		2	4,574	207	802	18	0	0
Wisconsin.....	4	0	1	39	26	26	2,319	1,383	1,383	10	0	1
WEST NORTH CENTRAL												
Minnesota.....	1	1	2	2		1	435	838	266	4	0	0
Iowa.....	3	3	3	2			127	278	278	4	1	1
Missouri.....	3	7	5	4		1	308	247	198	12	1	1
North Dakota.....	2	2	1	3		2	101	67	56	0	0	0
South Dakota.....	0	1	1				227	21	17	0	0	0
Nebraska.....	1	1	1	1	10		195	264	213	0	0	0
Kansas.....	2	1	3		3	3	494	378	407	3	1	1
SOUTH ATLANTIC												
Delaware.....	0	1	1				168	10	11	1	0	0
Maryland <sup>1</sup> .....	5	8	4	8	2	3	216	369	318	18	7	2
Dist. of Col.....	0	2	2	1	1		119	97	97	6	2	0
Virginia.....	4	4	9	110	106	106	376	155	413	25	6	3
West Virginia.....	7	3	5		13	16	97	51	51	3	0	1
North Carolina.....	5	4	6	4	8	3	402	352	472	16	1	1
South Carolina.....	5	11	5	215	188	188	87	213	68	5	0	0
Georgia.....	3	3	3	18	8	23	75	90	132	3	1	0
Florida.....	3	1	1	19		2	52	93	93	10	0	0
EAST SOUTH CENTRAL												
Kentucky.....	5	2	4	9	2	2	258	75	152	9	0	1
Tennessee.....	3	1	2	21	15	37	277	150	150	32	2	2
Alabama.....	0	6	6	264	119	53	114	96	176	9	2	1
Mississippi <sup>1</sup> .....	2	3	5							10	1	1
WEST SOUTH CENTRAL												
Arkansas.....	8	2	3	3	39	29	64	121	142	2	0	0
Louisiana.....	4	5	5	4	4	4	48	114	52	5	2	0
Oklahoma.....	2	3	3	8	31	31	71	180	164	1	0	0
Texas.....	22	21	23	482	302	302	443	733	733	11	1	1
MOUNTAIN												
Montana.....	0	0	0	6	2	2	175	113	78	0	0	0
Idaho.....	0	0	0	1			56	120	23	3	0	0
Wyoming.....	0	0	0	11	44		163	52	30	0	0	0
Colorado.....	6	5	6	20	42	4	451	248	248	2	0	0
New Mexico.....	1	0	0	2		1	32	41	99	1	0	1
Arizona.....	0	0	2	61	74	53	16	158	125	2	0	0
Utah <sup>1</sup> .....	0	0	0	6	8	3	98	1,104	317	2	0	0
Nevada.....	0	0					2	44		0	0	
PACIFIC												
Washington.....	2	2	0	2	3		386	657	486	9	6	0
Oregon.....	3	1	2	68	6	15	218	100	100	6	1	0
California.....	16	18	18	51	53	49	1,053	5,359	978	31	4	2
Total.....	194	184	238	1,501	1,124	1,124	27,723	20,966	20,966	544	81	48
20 weeks.....	25,120	5,439	6,650	72,641	74,496	145,395	396,365	372,732	372,732	9,849	1,567	973

See footnotes at end of table.

*Telegraphic morbidity reports from State health officers for the week ended May 22, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.*

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1938-42	Week ended—		Median 1938-42	Week ended—		Median 1938-42	Week ended—		Median 1938-42
	May 22, 1943	May 23, 1942		May 22, 1943	May 23, 1942		May 22, 1943	May 23, 1942		May 22, 1943	May 23, 1942	
NEW ENGLAND												
Maine.....	0	0	0	16	16	12	0	0	0	0	0	0
New Hampshire.....	0	0	0	7	4	4	0	0	0	0	0	0
Vermont.....	0	0	0	18	15	8	0	0	0	0	0	0
Massachusetts.....	0	1	0	537	256	214	0	0	0	2	2	2
Rhode Island.....	0	0	0	37	19	15	0	0	0	0	0	0
Connecticut.....	0	0	0	110	23	53	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York.....	0	1	0	569	309	554	0	0	0	14	5	5
New Jersey.....	1	2	0	137	117	229	0	0	0	1	2	2
Pennsylvania.....	0	0	0	269	324	388	0	0	0	3	4	5
EAST NORTH CENTRAL												
Ohio.....	0	1	0	231	223	228	6	0	0	5	7	5
Indiana.....	0	0	0	59	43	82	1	0	4	1	4	3
Illinois.....	1	1	1	161	145	394	1	0	6	2	1	4
Michigan <sup>2</sup> .....	0	1	0	129	220	384	0	1	1	3	3	3
Wisconsin.....	1	0	0	386	98	128	0	3	3	1	0	0
WEST NORTH CENTRAL												
Minnesota.....	0	0	0	69	62	70	0	0	1	0	2	1
Iowa.....	0	0	0	41	37	41	0	0	8	0	1	1
Missouri.....	0	1	0	44	48	68	0	0	3	1	0	0
North Dakota.....	0	0	0	6	6	12	0	0	1	0	0	0
South Dakota.....	0	0	0	14	22	12	0	0	11	0	0	0
Nebraska.....	0	0	0	20	11	11	0	0	1	0	2	0
Kansas.....	2	2	0	37	47	47	1	0	1	0	0	1
SOUTH ATLANTIC												
Delaware.....	0	0	0	5	18	10	0	0	0	0	0	0
Maryland <sup>2</sup> .....	0	0	0	100	71	49	0	0	0	0	1	2
Dist. of Col.....	0	1	0	12	12	12	0	0	0	0	0	0
Virginia.....	1	1	1	32	11	18	0	0	0	1	4	4
West Virginia.....	1	0	0	15	21	35	1	0	0	2	1	2
North Carolina.....	0	1	1	21	13	16	0	1	1	0	1	2
South Carolina.....	1	3	0	2	0	2	0	2	0	0	5	2
Georgia.....	0	1	0	1	6	16	0	1	2	5	5	6
Florida.....	0	1	1	25	0	4	0	0	0	5	4	4
EAST SOUTH CENTRAL												
Kentucky.....	1	1	0	14	48	48	0	0	1	3	0	5
Tennessee.....	0	1	0	26	28	43	1	0	1	3	0	4
Alabama.....	0	0	0	5	10	7	0	0	0	3	2	2
Mississippi <sup>2</sup> .....	3	1	1	11	2	3	1	0	1	1	1	1
WEST SOUTH CENTRAL												
Arkansas.....	0	3	1	2	0	4	1	0	1	4	1	2
Louisiana.....	2	0	1	7	9	7	0	3	0	4	13	7
Oklahoma.....	0	0	0	10	10	14	1	0	0	3	2	3
Texas.....	4	0	1	33	18	33	0	5	5	10	11	7
MOUNTAIN												
Montana.....	0	0	0	11	9	12	0	0	0	0	0	1
Idaho.....	0	0	0	119	2	2	0	0	0	0	0	0
Wyoming.....	0	0	0	34	11	5	0	0	0	0	0	0
Colorado.....	0	0	0	69	15	30	1	0	3	0	1	1
New Mexico.....	0	1	0	4	1	2	0	0	0	1	2	2
Arizona.....	3	0	0	8	8	8	0	0	0	0	2	1
Utah <sup>2</sup> .....	0	0	0	31	8	15	0	0	0	0	0	0
Nevada.....	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	2	0	0	30	23	25	0	1	1	2	1	0
Oregon.....	0	0	0	22	6	8	1	1	1	0	0	1
California.....	13	1	2	140	95	134	0	0	6	5	3	5
Total.....	36	26	26	3,686	2,500	3,672	16	18	63	85	93	110
20 weeks.....	519	417	417	79,410	74,581	96,417	517	437	1,441	1,168	1,600	1,670

See footnotes at end of table.

*Telegraphic morbidity reports from State health officers for the week ended May 22, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.*

Division and State	Whooping cough			Week ended May 22, 1943									
	Week ended		Median 1938- 42	An- thrax	Dysentery			En- ceph- alitis, infect- ious	Lep- rosy	Rocky Mt. spot- ted fever	Tula- remia	Ty- phus fever	
	May 22, 1943	May 23, 1942			Ame- bic	Bacil- lary	Un- spec- ified						
NEW ENGLAND													
Maine.....	23	21	36	0	0	0	0	0	0	0	0	0	
New Hampshire.....	0	1	4	0	0	0	0	0	0	0	0	0	
Vermont.....	10	23	27	0	0	0	0	0	0	0	0	0	
Massachusetts.....	132	193	176	0	0	0	0	0	0	0	0	0	
Rhode Island.....	41	47	29	0	0	0	0	0	0	0	0	0	
Connecticut.....	81	74	74	0	0	0	0	0	0	0	0	0	
MIDDLE ATLANTIC													
New York.....	260	441	409	0	3	47	0	5	0	0	0	1	
New Jersey.....	189	369	134	0	3	0	1	0	0	0	0	0	
Pennsylvania.....	213	231	276	0	0	1	0	0	0	0	0	0	
EAST NORTH CENTRAL													
Ohio.....	167	201	201	0	0	0	0	0	0	0	0	0	
Indiana.....	51	30	35	0	3	0	0	0	0	0	0	0	
Illinois.....	100	255	141	0	0	0	0	0	0	0	9	0	
Michigan <sup>2</sup> .....	291	233	233	0	0	2	0	0	0	0	0	0	
Wisconsin.....	273	184	170	0	0	0	0	0	0	0	0	0	
WEST NORTH CENTRAL													
Minnesota.....	78	41	41	0	2	0	0	0	0	0	0	0	
Iowa.....	44	20	30	0	0	0	0	0	0	0	0	0	
Missouri.....	21	12	19	0	0	0	1	0	0	0	0	0	
North Dakota.....	4	10	16	0	0	0	0	0	0	0	0	0	
South Dakota.....	2	1	2	0	0	0	0	0	0	1	0	0	
Nebraska.....	13	6	16	0	0	0	0	0	0	0	0	0	
Kansas.....	80	42	42	0	2	0	0	1	0	0	0	0	
SOUTH ATLANTIC													
Delaware.....	3	2	6	0	0	0	0	0	0	0	0	0	
Maryland <sup>1</sup> .....	103	65	65	0	0	0	2	0	0	1	0	0	
Dist. of Col.....	24	9	9	0	0	0	0	0	0	0	0	0	
Virginia.....	155	96	96	0	1	0	90	0	0	0	0	0	
West Virginia.....	52	12	32	0	0	0	0	0	0	0	0	0	
North Carolina.....	257	94	218	0	0	0	0	0	0	0	0	1	
South Carolina.....	45	117	105	0	0	14	0	0	0	0	1	1	
Georgia.....	23	43	58	0	0	23	1	0	0	0	1	9	
Florida.....	7	13	19	0	6	1	0	0	0	0	0	13	
EAST SOUTH CENTRAL													
Kentucky.....	7	72	72	0	0	0	0	0	0	0	0	0	
Tennessee.....	58	33	45	0	0	0	0	0	0	1	3	0	
Alabama.....	61	61	54	0	0	0	0	0	0	0	0	3	
Mississippi <sup>1</sup> .....				0	0	0	0	0	0	0	1	2	
WEST SOUTH CENTRAL													
Arkansas.....	39	13	21	0	1	1	0	0	0	0	6	0	
Louisiana.....	8	36	36	0	0	2	0	0	0	0	0	5	
Oklahoma.....	35	15	26	0	0	0	0	0	0	0	0	0	
Texas.....	621	118	309	0	13	236	0	1	0	0	2	17	
MOUNTAIN													
Montana.....	14	13	24	0	0	0	0	0	0	2	3	0	
Idaho.....	0	5	7	0	0	0	0	0	0	0	0	0	
Wyoming.....	1	10	3	0	0	0	0	0	0	1	0	0	
Colorado.....	30	23	38	0	0	0	0	0	0	1	0	0	
New Mexico.....	16	23	23	0	0	0	0	0	0	0	0	0	
Arizona.....	18	13	23	0	0	0	19	0	0	0	0	0	
Utah <sup>1</sup> .....	67	21	72	0	0	0	0	0	0	1	2	0	
Nevada.....	0	0		0	0	0	0	0	0	0	0	0	
PACIFIC													
Washington.....	25	58	58	0	0	0	0	0	0	0	0	0	
Oregon.....	28	10	23	0	0	0	0	0	0	1	0	0	
California.....	561	357	501	0	3	23	0	1	0	0	0	0	
Total.....	4,331	3,767	3,767	0	37	350	114	8	0	9	28	52	
20 weeks.....	81,117	76,786	80,002	26	597	4,111	987	219	9	65	344	919	
20 weeks, 1942.....				32	350	1,433	840	162	24	78	382	713	

<sup>1</sup> New York City only.

<sup>2</sup> Period ended earlier than Saturday.

<sup>3</sup> Later information shows no cases of diphtheria in New Hampshire for the week ended May 1 instead of 3 as previously reported.

## WEEKLY REPORTS FROM CITIES

City reports for week ended May 8, 1943

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0		0	10	1	0	0	1	0	0	18
New Hampshire:												
Concord	0	0		0	0	0	2	0	1	0	0	0
Vermont:												
Barre	0	0		0	1	0	0	0	1	0	0	0
Massachusetts:												
Boston	0	0		0	264	18	18	0	170	0	0	25
Fall River	0	0		0	86	0	2	0	0	0	0	5
Springfield	0	0		0	15	2	0	0	42	0	0	0
Worcester	0	0		0	173	1	15	0	17	0	0	4
Rhode Island:												
Providence	1	0		0	2	6	5	0	11	0	0	27
Connecticut:												
Bridgeport	0	0		0	1	1	6	0	4	0	0	0
Hartford	0	0		0	46	2	7	0	5	0	0	0
New Haven	0	0		0	11	0	0	0	2	0	0	4
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0		0	104	3	9	0	7	0	0	10
New York	11	3	13	4	1,306	84	91	2	353	0	3	66
Rochester	0	0		0	132	4	5	0	9	0	1	11
Syracuse	0	0		0	101	2	3	0	4	0	1	12
New Jersey:												
Camden	0	0		0	7	1	0	0	3	0	0	1
Newark	1	0	1	0	413	9	8	0	15	0	1	27
Trenton	0	0	2	1	40	0	4	0	5	0	0	0
Pennsylvania:												
Philadelphia	0	0	1	1	290	10	35	0	126	0	0	65
Pittsburgh	1	0		0	42	5	14	0	15	0	0	26
Reading	0	0		0	85	1	0	0	3	0	0	4
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0	1	1	58	0	4	0	41	0	0	0
Cleveland	8	0	5	2	31	4	16	0	56	0	0	33
Columbus	0	0		0	86	0	2	0	13	0	0	0
Indiana:												
Fort Wayne	0	0		0	6	0	1	0	8	0	0	0
Indianapolis	1	0		0	217	5	11	0	25	0	0	28
South Bend	0	0		0	6	0	0	0	1	0	0	4
Terre Haute	0	0		0	12	0	2	0	0	0	0	0
Illinois:												
Chicago	27	0	1	1	968	6	37	0	86	0	0	47
Springfield	0	0		0	25	0	2	0	1	0	0	10
Michigan:												
Detroit	1	0	1	2	1,793	12	15	0	34	0	0	93
Flint	0	0		0	283	0	0	0	2	0	0	28
Grand Rapids	0	0		0	18	0	3	0	5	0	0	10
Wisconsin:												
Kenosha	0	0		0	5	0	0	0	9	0	0	0
Milwaukee	0	0	1	1	569	0	1	1	156	0	0	29
Racine	0	0		0	0	0	1	0	0	0	0	0
Superior	0	0		0	29	0	0	0	5	0	0	1
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0		1	11	0	0	0	4	0	0	1
Minneapolis	1	0		0	239	0	1	0	26	0	0	19
St. Paul	0	0		0	23	0	4	0	5	0	0	55
Missouri:												
Kansas City	0	0		1	121	2	4	0	42	0	0	11
St. Joseph	0	0		0	11	0	2	0	0	0	0	3
St. Louis	0	0	3	1	52	8	16	0	11	0	0	15

## City reports for week ended May 8, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo.....	0	0	-----	0	5	0	3	0	1	0	0	1
Nebraska:												
Omaha.....	0	0	-----	0	10	0	1	0	8	0	1	0
Kansas:												
Topeka.....	0	0	-----	0	121	1	0	0	0	0	0	23
Wichita.....	0	0	-----	0	174	0	3	0	0	0	1	2
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	-----	0	18	5	2	0	0	0	0	0
Maryland:												
Baltimore.....	0	0	5	0	113	18	19	0	67	0	2	99
Cumberland.....	0	0	-----	0	0	0	0	0	0	0	0	0
Frederick.....	0	0	-----	0	6	0	1	0	0	0	0	0
Dist. of Col.:												
Washington.....	2	0	2	0	77	5	8	0	22	0	0	28
Virginia:												
Lynchburg.....	0	0	-----	0	4	2	0	0	0	0	0	13
Richmond.....	0	0	-----	1	13	2	4	0	3	0	0	0
Roanoke.....	0	0	-----	0	0	0	0	0	0	0	0	3
West Virginia:												
Charleston.....	0	0	1	0	1	0	0	0	1	1	0	0
Wheeling.....	0	0	-----	0	0	1	2	0	2	0	0	3
North Carolina:												
Winston-Salem.....	0	0	-----	0	9	0	1	0	1	0	0	34
South Carolina:												
Charleston.....	0	0	4	0	3	0	2	0	0	0	0	3
Georgia:												
Atlanta.....	0	0	9	1	17	0	3	0	2	0	0	2
Brunswick.....	0	0	-----	0	5	0	0	0	1	0	0	1
Savannah.....	0	0	1	1	0	2	1	0	1	0	0	0
Florida:												
Tampa.....	0	0	-----	0	2	0	2	0	0	0	0	1
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	0	0	-----	2	174	1	3	0	6	0	0	14
Nashville.....	0	0	-----	1	19	0	2	0	5	0	0	4
Alabama:												
Birmingham.....	1	0	3	0	8	2	1	0	1	0	0	1
Mobile.....	0	0	1	1	0	0	0	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0	1	0	9	0	5	0	0	0	0	1
Louisiana:												
New Orleans.....	0	0	5	1	25	3	7	0	1	0	0	2
Shreveport.....	0	0	-----	0	0	0	3	0	0	1	0	0
Texas:												
Dallas.....	0	0	-----	0	4	0	2	0	3	0	0	9
Galveston.....	0	0	-----	6	0	1	4	0	1	0	0	1
Houston.....	0	0	-----	0	4	0	8	0	0	0	0	11
San Antonio.....	1	0	1	1	9	0	5	0	0	0	0	0
MOUNTAIN												
Montana:												
Billings.....	0	0	-----	0	2	0	1	0	1	0	0	0
Great Falls.....	0	0	-----	0	24	0	0	0	1	0	0	0
Helena.....	0	0	-----	0	26	0	0	0	0	0	0	0
Missoula.....	0	0	-----	0	1	0	1	0	1	0	0	0
Idaho:												
Boise.....	0	0	-----	0	0	0	0	0	0	0	0	0
Colorado:												
Denver.....	3	0	5	2	276	0	3	0	6	0	0	13
Pueblo.....	0	0	-----	0	9	0	1	0	1	0	0	7
Utah:												
Salt Lake City.....	0	0	-----	0	72	5	1	0	8	0	0	32



## City reports for week ended May 8, 1943—Continued

	Diphtheria cases		Encephalitis, infectious, cases		Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polymyellitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths										
PACIFIC														
Washington:														
Seattle.....	3	0	-----	0	161	7	0	0	8	0	0	9		
Spokane.....	0	0	-----	0	46	0	3	0	2	0	0	9		
Tacoma.....	0	0	-----	0	6	0	0	0	1	0	0	0		
California:														
Los Angeles.....	2	0	13	2	143	4	9	4	21	0	0	56		
Sacramento.....	1	0	-----	0	8	2	1	0	3	0	0	16		
San Francisco.....	2	0	5	0	126	9	12	1	12	0	0	44		
Total.....	68	3	85	29	9,422	257	470	8	1,515	2	10	1,157		
Corresponding week 1942.....	62	4	63	25	6,022	46	310	3	1,153	0	18	1,278		
Average, 1938-42.....	76	-----	108	25	16,126	-----	362	-----	1,532	10	19	1,217		

*Dysentery, amebic.*—Cases: Boston, 7; New York, 2; Charleston, S. C., 1; San Francisco, 1.

*Dysentery, bacillary.*—Cases: Buffalo, 3; Rochester, 1; Detroit, 1; Charleston, S. C., 9; Los Angeles, 1.

*Dysentery, unspecified.*—Cases: San Antonio, 12.

*Typhus fever.*—Cases: Philadelphia, 1; Charleston, S. C., 1; Savannah, 1; Galveston, 1.

<sup>1</sup> 3-year average, 1940-42.

<sup>2</sup> 5-year median.

Rates (annual basis) per 100,000 population, by geographic groups, for the 88 cities in the preceding table (estimated population, 1942, 34,680,400)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Pollomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	2.5	0.0	0.0	0.0	1,515	77.0	136.6	0.0	631	0.0	0.0	206
Middle Atlantic.....	5.3	1.3	7.6	2.7	1,124	53.1	75.4	0.9	241	0.0	2.7	99
East North Central.....	22.2	0.0	5.3	4.1	2,398	15.8	55.5	0.6	258	0.0	0.0	165
West North Central.....	20.0	0.0	5.9	5.9	1,499	21.5	66.4	0.0	190	0.0	2.9	299
South Atlantic.....	3.5	0.0	38.2	5.2	465	60.7	78.1	0.0	174	1.7	2.5	325
East South Central.....	5.9	0.0	23.8	23.8	1,194	17.8	35.6	0.0	71	0.0	0.0	113
West South Central.....	2.9	0.0	20.5	5.9	160	11.7	99.7	0.0	15	2.9	0.0	70
Mountain.....	24.1	0.0	40.2	16.1	3,296	40.2	56.3	0.0	145	0.0	0.0	418
Pacific.....	14.0	0.0	31.5	3.5	856	38.4	43.7	8.7	82	0.0	0.0	234
Total.....	10.2	0.5	12.8	4.4	1,417	38.6	70.7	1.2	228	0.3	1.5	174

## PLAGUE INFECTION IN CALIFORNIA AND NEW MEXICO

Plague infection has been reported proved in pools of fleas and organs from rodents collected in Alameda and Monterey Counties, Calif., and Lincoln County, N. Mex., as follows:

## CALIFORNIA

*Alameda County:* May 17, organs from 5 rats caught at Moore Dry Dock, Oakland District No. 2.

*Monterey County—Fort Ord Military Reservation:* April 9, Area C-2, organs from 20 mice, *Microtus* sp.; April 14, Area D, pool of 21 fleas

from 19 mice, *Peromyscus* sp.; April 18, Area E (N), organs from 44 mice, *Microtus* sp.; April 19, Area E (N), organs from 2 ground squirrels, *C. beecheyi*, and 19 mice, *Microtus* sp., also, April 19, Area E (S), organs from 36 mice, *Microtus* sp., and Area D, organs from 9 mice, *Peromyscus* sp.; April 20, Area E (1), organs from 2 ground squirrels, *C. beecheyi*, and April 20, Field Ranch, 12 miles southwest of Salinas, a pool of 77 fleas from 22 mice, *M. californicus*, and 2 mice, *Peromyscus* sp.

#### NEW MEXICO

*Lincoln County*: April 27, in a pool of 16 fleas from 3 grasshopper mice, *Onychomys torridus*, taken 8 miles south of Carrizozo, Indian Rock area.

#### DEATH FROM PLAGUE IN CALIFORNIA

The case of plague reported in Siskiyou County, Calif., with onset on November 8 or 9, 1942, and stated to have recovered,<sup>1</sup> terminated fatally on January 10, 1943, according to Dr. Wilton L. Halverson, Director of Public Health of California. In a letter dated May 10, 1943, Dr. Halverson states that the diagnosis established at autopsy was "bubonic plague and chronic plague encephalitis."

#### TERRITORIES AND POSSESSIONS

##### Panama Canal Zone

*Notifiable diseases—March 1943.*—During the month of March 1943 certain notifiable diseases were reported in the Panama Canal Zone, and terminal cities, as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox.....	36	—	14	—	9	—	7	—	66	—
Diphtheria.....	12	—	5	1	1	—	—	—	18	1
Dysentery (amebic).....	1	1	1	—	2	—	4	—	8	1
Dysentery (bacillary).....	1	—	—	—	—	—	—	—	1	—
Malaria <sup>1</sup> .....	29	—	1	—	250	—	118	1	398	1
Measles.....	3	—	—	—	18	—	—	—	21	—
Mumps.....	42	—	—	—	27	—	7	—	76	—
Paratyphoid fever.....	—	—	1	—	3	—	1	—	4	1
Pneumonia.....	—	2	—	—	25	—	—	4	25	11
Tuberculosis.....	—	25	—	2	4	2	—	5	24	34
Typhoid fever.....	1	—	—	—	—	—	2	—	3	—
Whooping cough.....	—	—	—	—	4	—	—	—	4	—
Leprosy.....	—	—	—	—	—	—	1	—	—	1

<sup>1</sup> Exclusive of 155 recurrent cases.

<sup>2</sup> In the Canal Zone only.

<sup>1</sup> Public Health Reports, December 4, 1942, pp. 1879-80, and April 16, 1943, p. 640.

## FOREIGN REPORTS

### CANADA

*Provinces—Communicable diseases—Week ended April 24, 1943.*—During the week ended April 24, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		11		115	216	39	19	19	41	460
Diphtheria		12	1	12		6				31
German measles		1		12	58	7	18	24	12	132
Influenza		5	6		11	5			26	53
Measles		67	1	97	1,094	121	201	136	197	1,914
Meningitis, meningococcus		3		2	5	6			1	17
Mumps	1	75		61	849	97	75	155	79	1,392
Scarlet fever	3		36	88	198	33	36	51	32	477
Tuberculosis (all forms)	3	3	1	59	42	5		1		114
Typhoid and paratyphoid fever			3	7	2	1	2			15
Undulant fever					1					1
Whooping cough				78	141	87	8	28	29	371

### WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

#### CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January-February 1943	March 1943	April 1943—week ended—			
			3	10	17	24
ASIA						
Ceylon.....	C	36	11			
India.....	C	72,977	5,324			
Calcutta.....	C	293	254	70	80	
Madras.....	C	936	26	2		
Vizagapatam.....	C	4				

## PLAGUE

[C indicates cases; D, deaths; P, present]

Place	January-February 1943	March 1943	April 1943—week ended—			
			3	10	17	24
AFRICA						
Belgian Congo—Plague-infected rats	P					
British East Africa:						
Kenya	C	9	1	1		
Uganda	C	6				
Madagascar	C	17				
Morocco	C	23				
Union of South Africa	C	56	6			
ASIA						
India	C	834	187			
Indochina	C	3				
Palestine	C	17	11			
SOUTH AMERICA						
Peru:						
Lambayeque Department	C	2				
Libertad Department	C	6	3			
Lima Department	C	3				
Lima	C	1				
Plague-infected rats	P					
OCEANIA						
Hawaii Territory:						
Hamakua District <sup>2</sup>	D	2			1	
Plague-infected rats		26	21		3	

<sup>1</sup> At Jaffa and vicinity.<sup>2</sup> During the week ended May 8, 1943, 1 death from plague was reported in Honokaa, Hamakua District, T. H.

## SMALLPOX

[C indicates cases; D, deaths]

<b>AFRICA</b>						
Algeria	C	150	128			
Angola	C	493				
Belgian Congo	C	303	136	41	38	
British East Africa:						
Mombasa	C		3			
Tanganyika	C		11			
Dahomey	C	25				
Egypt	C	10	10			
French Guinea	C	7				
Gold Coast	C	2				
Ivory Coast	C	90				
Mauritania	C	1				
Morocco	C	266	5	1		
Mozambique	C	1				
Nigeria	C	959	347	237	254	
Niger Territory	C	46				
Senegal	C	16	2			
Sudan (French)	C	394				
Union of South Africa	C	57				
<b>ASIA</b>						
India	C	2,871	2,603	851	686	
Indochina	C	718	880			
Iran	C	40				
Iraq	C	117	39	3		
Palestine	C	28				
Syria and Lebanon	C	418	135	10		
<b>EUROPE</b>						
France	C	1				
Scotland	C	1				
Portugal	C	10	4	2	1	2
Spain	C	63	21			
Turkey	C	2,455	1,301			
<b>NORTH AMERICA</b>						
Canada	C	1				
Guatemala	C	2				
Mexico	C	22	5	8	2	3
<b>SOUTH AMERICA</b>						
Brazil	C	38		1		1
Colombia	C	14	27			
Ecuador	C	9	1			
Peru	D	6	2			
Venezuela	C	7	2			

## TYPHUS FEVER

[C indicates cases]

Place		January- February 1943	March 1943	April 1943—week ended—			
				3	10	17	24
AFRICA							
Algeria.....	C	1, 112	1, 584				
Belgian Congo.....	C	2	1				
British East Africa: Kenya.....	C	2	1				
Egypt.....	C	5, 705	4, 738	1, 719	1, 631	1, 920	
Gold Coast.....	C	3					
Morocco.....	C	2, 957	159	37	40		
Nigeria.....	C	1	1				
Spanish Morocco.....	C	1					
Union of South Africa.....	C	325	1				
ASIA							
Afghanistan.....	C	520					
China: Shanghai.....	C	6	6				
India.....	C	12	1 886				
Iran.....	C	120					
Iraq.....	C	83	182	92	20	35	
Palestine.....	C	18	13	11	1		
Syria and Lebanon.....	C	3	8	1			
EUROPE							
Bulgaria.....	C	235					
Germany.....	C	800					
Hungary.....	C	120	200	47	30	39	
Irish Free State.....	C		7	9	3		
Portugal.....	C				1		2
Rumania.....	C	1, 207	2, 054				1, 212
Slovakia.....	C	70	47		60		15
Spain.....	C	83	56		4	1	
Turkey.....	C	436	436				
NORTH AMERICA							
Guatemala.....	C	172	146				
Jamaica.....	C	5	1				
Mexico.....	C	306					
Puerto Rico.....	C	2					
SOUTH AMERICA							
Chile.....	C	38	1				
Ecuador.....	C	53	21	4	5		1
Peru.....	C	5					
Venezuela.....	C	1					
OCEANIA							
Australia.....	C	17	3	4	3	1	
Hawaii Territory.....	C	4	2		1		1

<sup>1</sup> Includes 33 cases in Baluchistan and 853 cases in Kashmir State, India.<sup>2</sup> For the month of April.<sup>3</sup> For 3 weeks.

## YELLOW FEVER

[C indicates cases; D, deaths]

<b>AFRICA</b>							
Belgian Congo:							
Stanleyville.....	D		1				
Yanonge.....	C	1					
<b>SOUTH AMERICA</b>							
Colombia: Intendencia of Meta.....	D	2					

## DEATHS DURING WEEK ENDED MAY 15, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended May 15, 1943	Correspond- ing week, 1942
Data for 88 large cities of the United States:		
Total deaths.....	9, 176	8, 165
Average for 3 prior years.....	8, 178	
Total deaths, first 19 weeks of year.....	185, 655	168, 764
Deaths under 1 year of age.....	629	529
Average for 3 prior years.....	512	
Deaths under 1 year of age, first 19 weeks of year.....	12, 875	10, 684
Data from industrial insurance companies:		
Policies in force.....	65, 527, 004	64, 979, 848
Number of death claims.....	14, 845	11, 054
Death claims per 1,000 policies in force, annual rate.....	11. 8	8. 9
Death claims per 1,000 policies, first 19 weeks of year, annual rate.....	10. 6	10. 1

## COURT DECISION ON PUBLIC HEALTH

*Kerato-conjunctivitis*—held compensable under workmen's compensation act.—(California Supreme Court; *Bethlehem Steel Co. v. Industrial Accident Commission et al.*, 135 P.2d 153; decided March 19, 1943.) The petitioner company brought a proceeding to review awards of compensation made by the State industrial accident commission under the workmen's compensation act to a number of petitioner's employees who had contracted kerato-conjunctivitis. The commission found that each of the employees contracted this contagious disease while working in the petitioner's shipyards, thereby sustaining an injury arising out of and in the course of his employment.

At the outset the Supreme Court of California said that it was well established that compensation was not due merely for injury caused by disease contracted by an employee while employed, but that (a) the injury must arise out of the employment and, where the injury is by disease, there must exist the relation of cause and effect between the employment and the disease, and (b) it must affirmatively appear that there exists a reasonable probability that the employee contracted the disease because of his employment. Further, said the court, it must be shown that the disease contracted was not merely a hazard of the community but that the employee was subjected to some special exposure in excess of that of the commonalty. In the absence of such showing, the employee's illness can not be said to have been proximately caused by an injury arising out of his employment or by reason of a risk or condition incident to the employment. "The employee's risk of contracting the disease by virtue of the employment must be materially greater than that of the general public, i. e., the injury must be a natural or a reasonably probable result of the employment or of the conditions thereof."

After reviewing the evidence, the court said that it was quite convincing that "the disease in the community outside of the shipyards was of much less proportion compared to the population." The finding of the commission that the epidemic in the shipyards constituted a special exposure in excess of that of the commonalty could not be disturbed.

With respect to whether the disease could be said to have been proximately caused by and to have arisen out of the employment by reason of such exposure, the court observed that all the claimants testified that they received treatment at the company's first-aid station for several specified eye injuries and irritations and that within a few days after treatment kerato-conjunctivitis developed. The court's conclusion, after considering the evidence, was that the question whether the disease arose out of and in the course of employment was one of fact for the commission's determination and that there was for application the time-honored rule that in the case of a conflict of evidence the commission's finding could not be disturbed where there was substantial evidence to support it.

The awards were affirmed.