

# PUBLIC HEALTH REPORTS

VOL. 46

OCTOBER 9, 1931

NO. 41

## EXPERIMENTAL TRANSMISSION OF ENDEMIC TYPHUS FEVER OF THE UNITED STATES BY THE RAT FLEA (*XENOPSYLLA CHEOPIS*)

By R. E. DYER, *Surgeon*, E. T. CEDER, *Assistant Surgeon*, A. RUMREICH and L. F. BADGER, *Passed Assistant Surgeons, United States Public Health Service*

The importance of the rat flea as a vector of endemic typhus fever in the United States has been shown by the recovery of the virus of this disease from fleas taken from wild rats trapped at typhus foci in Baltimore and Savannah (1) (2). The importance of these observations has been emphasized by the recovery of typhus virus from wild rats by Mooser, Castaneda, and Zinsser (3).

Kemp has recently confirmed our observations by the recovery of typhus virus from rat fleas taken at typhus foci in Texas (4).

A preliminary report on the transmission of endemic typhus virus from rat to rat by means of the rat flea (*Xenopsylla cheopis*) has been made (5). In the experiments described in that report fresh non-infected white rats were exposed in glass boxes to rats infected with endemic typhus and to rat fleas. The brains and spleens from the fresh rats, on inoculation into guinea pigs, produced a reaction clinically identical with the reaction of endemic typhus. These strains have since been shown to be identical with endemic typhus by the production of agglutinins for *proteus* X<sub>19</sub>, type O, in monkeys and rabbits, by the presence of rickettsiae in smears from the tunica vaginalis of guinea pigs, by the presence of the typical lesions in the brains of guinea pigs, and by cross-immunity tests with known strains of endemic typhus. Since the publication of the preliminary report above mentioned, we have recovered the virus of endemic typhus from white rats exposed to infected rat fleas but not exposed to infected rats. In these experiments fleas (*Xenopsylla cheopis*) infected with typhus virus were placed in freshly sterilized boxes with fresh white rats. That the virus recovered from these fresh rats is the virus of endemic typhus has been shown by the production of agglutinins for *proteus* X<sub>19</sub>, type O, in monkeys and rabbits, by the presence of rickettsiae in smears from the tunica vaginalis of guinea pigs, by the presence of the typical pathological lesions of endemic typhus in the brains of guinea pigs, and by cross-immunity tests with known strains of endemic typhus.

It has further been found that the typhus virus is present in the flea for at least nine days after feeding on infected rats.

Typhus virus has also been repeatedly recovered from the feces of infected fleas. Rickettsiae have been observed in smears from infected fleas.

CONCLUSION

The virus of endemic typhus has been experimentally transmitted from rat to rat by means of the rat flea (*Xenopsylla cheopis*).

REFERENCES

- (1) Dyer, R. E., Rumreich, A., and Badger, L. F.: Pub. Health Rep., 46: 334, Feb. 13, 1931.
- (2) Dyer, R. E., Rumreich, A., and Badger, L. F.: Jour. Am. Med. Assn., 97: 589, Aug. 29, 1931.
- (3) Mooser, H., Castaneda, M. R., and Zinsser, H.: Jour. Am. Med. Assn., 97: 231, July 25, 1931.
- (4) Kemp, H. A.: J. Am. Med. Assoc., 97: 775, Sept. 12, 1931.
- (5) Dyer, R. E., Ceder, E. T., Rumreich, A., and Badger, L. F.: Pub. Health Rep., 46: 1869, Aug. 7, 1931.

AGGLUTININ ABSORPTION IN UNDULANT FEVER  
(BRUCELLOSIS)<sup>1</sup>

By EDWARD FRANCIS, *Medical Director, United States Public Health Service*

Likeness is the quality which has combined into the one genus, *Brucella*, the three microorganisms which affect primarily goat, cow, and hog, but which are transmissible to man and other animals.

TABLE 1.—Comparison of two methods of classification

Culture	Pathological source of culture	Classification of culture by the National Institute of Health by reciprocal agglutinin absorption	Classification of cultures by Dr. I. F. Huddleson by the bacteriostatic action of dyes
428	(?) Human	Melitensis	Melitensis.
McC	Cow's milk	do	Bovine abortus.
H-1	Cervical seal of cow	do	Do.
41-2	Human blood	do	Do.
H-5	Cow's milk	do	Do.
B-8	Bovine fetus	do	Do.
C-15	Cow's milk	do	Do.
89	Human blood	do	Melitensis.
R. H. W	do	do	Do.
E. F.-1	do	do	Do.
W. T. H.-1	do	do	Do.
456	Cow's fetus	Abortus	Bovine abortus.
C-10	Cow's milk	do	Do.
88	Human blood	do	Do.
633	Bovine fetus	do	Do.
634	do	do	Melitensis.
635	do	do	Do.
426	(?) Human	do	Do.
L. Z	Human blood	do	Porcine abortus.
E. M	Human abscess	do	Do.
A. B. C.	Human blood	do	Do.
41-1	do	do	Do.

<sup>1</sup> From the National Institute of Health, formerly the Hygienic Laboratory, Washington, D. C.

Differences must necessarily be found as a basis for separation into species. Hence, the striving to find differential characters which might serve to trace each organism, wherever found, back to its original source—goat, cow, or hog. Differences have been sought in cultural characteristics, serological reactions, pathological changes, hydrogen sulphide metabolism, bacteriostatic action of dyes, and utilization of dextrose.

TABLE 2.—Absorption of agglutinins from melitensis type serum and from abortus type serum by cultures to be classified

Type serum	Agglutination of cultures																Culture to be classified				
	Brucella abortus type culture 456								Brucella melitensis type culture 428												
	10	20	40	80	160	320	640	1280	10	20	40	80	160	320	640	1280	10	20	40	80	
<b>MELITENSIS TYPE SERUM 428</b>																					
Not absorbed.....	4	4	4	4	4	4	1	0	4	4	4	4	4	4	3	0					
Absorbed by—																					
Melitensis 428.....	0	0	0	0	0	0			0	0	0	0	0	0			McC	0	0	0	0
Culture McC.....	0	0	0	0	0	0			1	0	0	0	0	0			H-1	0	0	0	0
Culture H-1.....	1	0	0	0	0	0			0	0	0	0	0	0			41-2	0	0	0	0
Culture 41-2.....	3	0	0	0	0	0			0	0	0	0	0	0			H-5	0	0	0	0
Culture H-5.....	0	0	0	0	0	0			0	0	0	0	0	0			B-8	0	0	0	0
Culture B-8.....	0	0	0	0	0	0			0	0	0	0	0	0			C-15	0	0	0	0
Culture C-15.....	0	0	0	0	0	0			0	0	0	0	0	0			89	0	0	0	0
Culture 89.....	0	0	0	0	0	0			0	0	0	0	0	0			R. H. W.	0	0	0	0
Culture R. H. W.....	0	0	0	0	0	0			0	0	0	0	0	0			E. F.	0	0	0	0
Culture E. F.....	0	0	0	0	0	0			0	0	0	0	0	0			W. T. H.	0	0	0	0
Culture W. T. H.....	1	0	0	0	0	0			0	0	0	0	0	0							
A abortus 456.....	0	0	0	0	0	0			4	4	4	4	1	0							
Culture C-10.....	0	0	0	0	0	0			4	4	4	4	0	0			C-10				
Culture 88.....	0	0	0	0	0	0			4	4	4	4	0	0			88	1	0	0	0
Culture 633.....	1	0	0	0	0	0			4	4	4	4	4	0			633	1	0	0	0
Culture 634.....	0	0	0	0	0	0			4	4	4	3	0	0			634	1	0	0	0
Culture 635.....	2	0	0	0	0	0			4	4	4	4	3	0			635	1	0	0	0
Culture 426.....	0	0	0	0	0	0			4	4	4	4	1	0			426	0	0	0	0
Culture L. Z.....	0	0	0	0	0	0			4	4	4	4	0	0			L. Z.	0	0	0	0
Culture E. M.....	0	0	0	0	0	0			4	4	4	4	1	0			E. M.	0	0	0	0
Culture A. B. C.....	0	0	0	0	0	0			4	4	4	4	0	0			A. B. C.	0	0	0	0
Culture 41-1.....	0	0	0	0	0	0			4	4	4	4	0	0			41-1	0	0	0	0
<b>ABORTUS TYPE SERUM 456</b>																					
Not absorbed.....	4	4	4	4	4	4	1		4	4	4	4	4	1	0						
Absorbed by—																					
Melitensis 428.....	4	4	4	4	4	0	0	0	0	0	0	0	0	McC	3	0	0	0			
Culture McC.....	3	4	4	4	4	0		0	0	0	0	0	0	H-1	0	0	0	0			
Culture H-1.....	4	4	4	4	1	0		0	0	0	0	0	0	41-2	2	2	0	0			
Culture 41-2.....	4	4	4	4	4	0		0	0	0	0	0	0	H-5	0	0	0	0			
Culture H-5.....	4	4	4	4	4	0		0	0	0	0	0	0	B-8	0	0	0	0			
Culture B-8.....	4	4	4	4	4	0		0	0	0	0	0	0	C-15	0	0	0	0			
Culture C-15.....	4	4	4	4	4	0	0	0	0	0	0	0	0	89	1	0	0	0			
Culture 89.....	4	4	4	4	3	0	0	0	0	0	0	0	0	R. H. W.	0	0	0	0			
Culture R. H. W.....	4	4	4	4	4	0	0	0	0	0	0	0	0	E. F.	0	0	0	0			
Culture E. F.....	4	4	4	4	4	0	0	0	0	0	0	0	0	W. T. H.	0	0	0	0			
Culture W. T. H.....	4	4	4	4	4	0		1	0	0	0	0	0								
A abortus 456.....	0	0	0	0	0	0		0	0	0	0	0	0	C-10							
Culture C-10.....	0	0	0	0	0	0		0	0	0	0	0	0	88	2	0	0	0			
Culture 88.....	0	0	0	0	0	0		0	0	0	0	0	0	633	1	0	0	0			
Culture 633.....	0	0	0	0	0	0		1	2	1	0	0	0	634	2	0	0	0			
Culture 634.....	3	0	0	0	0	0		1	1	1	0	0	0	635	1	0	0	0			
Culture 635.....	0	0	0	0	0	0		2	0	0	0	0	0	426	0	0	0	0			
Culture 426.....	0	0	0	0	0	0		6	0	0	0	0	0	L. Z.	0	0	0	0			
Culture L. Z.....	0	0	0	0	0	0		0	0	0	0	0	0	E. M.	1	0	0	0			
Culture E. M.....	0	0	0	0	0	0		0	0	0	0	0	0	A. B. C.	0	0	0	0			
Culture A. B. C.....	0	0	0	0	0	0		0	0	0	0	0	0	41-1	0	0	0	0			
Culture 41-1.....	0	0	0	0	0	0		1	0	0	0	0	0								

With the view of testing the agreement of two methods of classification, an exchange of cultures under key numbers was effected between Dr. I. Forest Huddleson, of East Lansing, Mich., and the National Institute of Health, each being furnished with the history of a culture only after rendering a report upon its key number.

Table 1 shows the classification of 22 *Brucella* cultures by the method of agglutinin absorption at the National Institute of Health, in comparison with the classification of the same cultures by the bacteriostatic action of dyes in the hands of Doctor Huddleson. The results of the two methods are not exactly comparable, because the agglutinin absorption test makes no claim of being able to separate bovine *abortus* from porcine *abortus*, of which latter there were four cultures, according to the dye method. Of the remaining 18 cultures there was agreement in the classification of 9 and disagreement in the classification of 9. The latter 9 are therefore the cultures of greatest interest, 6 of which reacted as *melitensis* by agglutinin absorption but reacted as bovine *abortus* to the dyes, while the remaining 3 reacted as *abortus* by absorption, but reacted as *melitensis* to the dyes. Which method is entirely correct, if either, is not clear.

#### TECHNIQUE

The method employed in performing agglutinin absorption tests was essentially that used by Alice C. Evans (1).

*Antiserums.*—Type serums were prepared from rabbits by the intravenous injection of type cultures of *Brucella abortus* 456 and *Brucella melitensis* 428. For the purpose of reciprocal absorption tests, rabbit serums were prepared with each of the cultures to be classified. A uniform titer of 1:640 against the organism injected is desirable in all serums which are to be absorbed, because this contributes very materially to uniformity in results, thus aiding in the interpretation of results.

Six days after a single intravenous injection of a killed culture, a preliminary test of agglutinins was made on a sample of blood taken from the ear. This test usually showed a titer of 1:640, or a little higher, against the organism injected; in this case the rabbit was etherized and bled to death from the heart or carotid artery on the sixth day. If the titer on the sixth day was only 1:320, killing was postponed two or three days. In the latter case the titer frequently reached 1:1280 or 1:2560.

An occasional poor agglutinogenic culture required two or three injections, separated by intervals of two days, in order to produce a titer of 1:640 in a rabbit. The material for each injection consisted of 0.2 c. c. of a formalin-killed concentrated stock suspension of organisms having a turbidity of 25,000 according to the silica standard. This amount of antigen was diluted with physiological

saline solution to a volume of 2 c. c. and injected slowly into the marginal vein of a rabbit's ear.

Clearness of a serum and freedom from opalescence are promoted by withholding all food from a rabbit for 24 to 48 hours before bleeding. Serums used in these studies were preserved by adding only a small platinum loopful of pure tricresol to each 5 c. c. of serum. Glycerin is not only a good preservative but has the advantage of clearing a cloudy serum. An equal amount of pure undiluted neutral glycerin should be added to a serum if glycerin is used as a preservative. Serums were not inactivated. Preserved serums were stored at 10° C.

*Preparation of stock antigens.*—All cultures were grown on beef infusion glucose agar in Blake bottles for three days at 37° C. Each bottle was inoculated with the entire growth from a glucose agar slant suspended in 1 c. c. of saline solution. In case an organism required carbon dioxide, several cotton-stoppered Blake bottles were placed within a large desiccator, the air was exhausted from the desiccator, a volume of carbon dioxide was admitted approximately equal to 10 or 15 per cent of the volume of the desiccator, and finally air was admitted to replace all vacuum. At the end of 72 hours the growth was washed off in saline solution containing 1 per cent commercial formalin, using 20 c. c. per Blake bottle. After standing six days the formalinized suspension of organisms was thrown down in the centrifuge, the clear supernatant fluid was poured off, and the bacterial mass was resuspended in saline solution containing 0.5 per cent of formalin and standardized to a turbidity of 25,000. Formalinized, concentrated, stock antigens which had been stored for two years at 10° C. have given satisfactory results in absorption tests and in ordinary agglutination tests. Absorption tests were not done with heat-killed or with living antigens.

If virulent cultures are used in making antigens, great care should be exercised in determining the death of the organisms in the 0.5 per cent formalin suspension, by sterility tests on glucose agar slants, before allowing laboratory workers to use the antigen for agglutination tests or for intravenous injection of rabbits.

*Turbidity standard.*—Stock antigens suspended in physiologic saline solution containing 0.5 per cent formalin were standardized to a turbidity of 25,000 according to the Standard Methods of Water Analysis, published by the American Public Health Association (1925).

*An agglutinin absorption test.*—In setting up an absorption test a balance must be observed between the titer of the serum, the amount of the serum used, the amount of bacteria (absorbing dose), and the total volume of the whole mixture. The unit amount of serum used in a test was 0.5 c. c. of a serum having a titer of 1:640; the unit amount of bacteria employed was the bacterial mass contained in

6 c. c. of a suspension having a turbidity of 25,000, and the total volume of the test was 2.5 c. c. In this combination the ingredients are so balanced that the serum, after absorption by the bacterial dose, will no longer agglutinate the absorbing culture. This phase of the test is shown in each test in Tables 2 and 3.

Preserved antisera having a natural titer of 1:640 were ready for absorption without adjustment of titer, but if the titer was 1:1280 or 1:2560, then an amount of such a serum necessary for the test was diluted at the time of testing with sufficient saline solution to reduce its titer to 1:640. The unit amount of a 640 serum used in a test was 0.5 c. c., but this was diluted 1:5 with saline solution, which gave it a volume of 2.5 c. c.

Stock antigens killed with formalin and standardized to a turbidity of 25,000 were measured out, 6 c. c. to a centrifuge tube, to which was then added about 25 c. c. of saline solution for the purpose of "washing" the bacteria. The bacteria were thrown down in the centrifuge, the clear supernatant fluid was poured off, and to the bacterial sediment were added 2.5 c. c. of a 1:5 dilution of a serum whose titer was 1:640. Thorough mixing of serum and bacterial sediment in the centrifuge tubes was obtained by stirring with a capillary pipette, into which the mixture was alternately sucked and rapidly expelled. The centrifuge tubes were then covered with rubber caps to prevent evaporation and were incubated in a water bath at a temperature of 37° to 42° C. for six hours, after which they were transferred to the cold room at 10° C. overnight. During absorption in the water bath the mixtures were agitated several times. The centrifuge tubes were not calibrated nor was any correction made for saline remaining in the packed bacteria mass, as the error from that source was considered to be not only very small but constant for all tests.

Ordinary agglutination tests were performed the next morning, testing the absorbed serum for agglutination of the type *abortus* culture, the type *melitensis* culture, and the culture to be classified as follows: The rubber-capped tubes were centrifuged for about an hour and a quarter. The clear absorbed serum was pipetted off and set up in 0.5 c. c. amounts in agglutination tubes in dilutions of 1:5, 10, 20, 40, 80, and 160, remembering that the absorbed serum was already in dilution of 1:15. To each tube was then added 0.5 c. c. of the formalinized stock antigen, the turbidity of which had been reduced from 25,000 to 500 by adding 1 part of the concentrated antigen to 49 parts of saline solution so that the final turbidity in the agglutination tubes was 250. It was kept in mind that the absorbed serum was a 1:5 dilution of a 640 serum, and therefore the addition of 0.5 c. c. of diluted antigen to 0.5 c. c. of the diluted absorbed serum produced

a final dilution of serums in the agglutination tubes to 1: 10, 20, 40, 80, 160, and 320.

Incubation of the agglutination tubes was at 37° to 42° C. in the water bath for two and one-half hours. They were then placed in the cold room at 10° C. overnight and recorded the next morning. Since the agglutination phase is usually not completed by the next morning it is advisable to allow the test to remain at room temperature for 24 additional hours if complete results are desired. Complete sedimentation of bacteria and water-clear supernatant fluid were indicated by 4. Lesser degrees of clearing were indicated by 3, 2, and 1. All serums in a test were absorbed only once. No sample of serum was reabsorbed.

#### INTERPRETATION OF ABSORPTION TESTS

By reference to Table 2 one sees the following reactions between type serums 428 and 456 and their type cultures 428 and 456: (1) Either type serum (unabsorbed) agglutinated both type cultures completely or partially in dilution of 1:640. (2) Either type serum after absorption by its homologous culture lost all agglutinins for both type cultures. (3) Either type serum after absorption by the heterologous type culture lost all agglutinins for the heterologous culture but still agglutinated its homologous culture to a considerable degree, thus showing that the two type cultures were serologically different.

Using type *melitensis* serum 428 and type *abortus* serum 456 as a basis for classification of the cultures to be studied, the following results were obtained: (1) A culture which absorbed from type serum 428 all agglutinins for type cultures 428 and 456 and for itself was regarded as similar serologically to type culture 428. (2) A culture which absorbed from type serum 456 all agglutinins for type cultures 456 and 428 and for itself was regarded as similar serologically to type culture 456. On this basis of classification the first 10 cultures of Table 2 down to and including culture W. T. H. are similar serologically to *Brucella melitensis* 428, and the last 10 cultures at the end of Table 2 are similar serologically to *Brucella abortus* 456.

Culturally, the members of either group of 10 cultures differed among themselves in regard to the carbon dioxide requirement of isolation.

#### INTERPRETATION OF RECIPROCAL ABSORPTION TESTS

Table 2 presents the results of absorption of agglutinins from type serums by the cultures to be classified. Table 3 presents the absorption of agglutinins by the type cultures from antiserums of the cultures to be classified.

The *first 10 cultures* of Table 2 are represented in Table 3 by rabbit serums 1, 4, 8, 9, 10, 11, 12, 14, 15, and 17, all of which reacted as

*melitensis* serums as follows: (1) Each serum (unabsorbed) agglutinated both type cultures and its own homologous culture completely or partially in dilution of 1:640. (2) Each serum after absorption by its homologous culture lost all agglutinins for both type cultures and for its homologous culture. (3) Each serum after absorption by type *abortus* culture 456 lost all agglutinins for 456 but still agglutinated to a considerable degree type *melitensis* culture 428 and its own homologous culture, thus showing that it was different from the type *abortus* serum. (4) Each serum after absorption by type *melitensis* culture 428 lost all agglutinins for *melitensis* 428, for *abortus* 456, and for its own homologous culture, thus showing that each serum was similar to type *melitensis* serum 428.

The last 10 cultures at the bottom of Table 2 are represented in Table 3 by rabbit serums 18 to 27, all of which reacted as *abortus* serums as follows: (1) Each serum (unabsorbed) agglutinated both type cultures and its own homologous culture completely or partially in dilution of 1:640. (2) Each serum after absorption by its homologous culture lost all agglutinins for both type cultures and for its homologous culture. (3) Each serum after absorption by type *melitensis* culture 428 lost all agglutinins for 428 but still agglutinated to a considerable degree type *abortus* culture 456 and its own homologous culture, thus showing that the serum was different from the type *melitensis* serum. (4) Each serum after absorption by type *abortus* culture 456 lost all agglutinins for *abortus* 456, for *melitensis* 428, and for its own homologous culture, thus showing that each serum was similar to type *abortus* serum 456.

















TABLE 3.—Reciprocal absorption of agglutinins from antiseraums of cultures to be classified—Continued

Antiseraums of cultures to be classified	Agglutination of cultures															Cultures to be classified																						
	Brucella abortus type culture 456					Brucella mellitensis type culture 428					Culture E. M.					Culture A. B. C.																						
	10	20	40	80	160	320	640	1280	10	20	40	80	160	320	640	1280	10	20	40	80	160	320	640	1280	10	20	40	80	160	320	640	1280						
(25) E. M. rabbit serum: Not absorbed..... Absorbed by— Abortus 456..... Mellitensis 428..... Culture E. M.....	4	4	4	4	4	2	0	4	4	4	4	4	4	0	0	4	4	4	4	4	4	4	4	3	0	4	4	4	4	4	4	4	0					
(26) A. B. C. rabbit serum: Not absorbed..... Absorbed by— Abortus 456..... Mellitensis 428..... Culture A. B. C.....	4	4	4	4	4	4	0	4	4	4	4	4	4	2	0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	0	4	4	4	4	4	4	4	0
(27) 41-1 rabbit serum: Not absorbed.....	4	4	4	4	4	4	0	4	4	4	4	4	4	3	0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	1	4	4	4	4	4	4	4	0
Absorbed by— Abortus 456..... Mellitensis 428..... Culture 41-1.....	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0





## SERUMS OF COW, GUINEA PIG, AND MAN

The rabbit is the animal of choice for the preparation of anti-serums for the study of cultures by agglutinin absorption, but in this study serums of cow, guinea pig, and man were available in connection with a few cultures.

Culture McC. was isolated from the milk of a cow by guinea pig inoculation, hence the serums of this cow and guinea pig were absorbed. (See Table 3, serums 2 and 3.) The results were in no way different from those obtained with the McC. rabbit serum; all reacted as *melitensis* serums.

Culture H-1 was isolated from a guinea pig after inoculation with the cervical seal of a cow whose milk had caused undulant fever in J. J. H. Serums of the man, cow, and guinea pig (see Table 3, serums 5, 6, and 7) reacted after absorption, as did the H-1 rabbit serum; all were *melitensis* serums.

Culture E. F. was isolated from the blood of E. F. directly on culture medium. The human serum E. F., after absorption with *melitensis* type culture 428 failed to agglutinate *melitensis* 428, *abortus* 456, and its homologous culture E. F., in which respect it reacted, as did the E. F. rabbit serum.

## DISSIMILAR CULTURES ISOLATED FROM ONE INDIVIDUAL

(1) Cultures 41-1 and 41-2 (see histories of cultures) were isolated from different portions of the same sample of human blood, the former growing directly in air, the latter requiring carbon dioxide for isolation.

Culture 41-1 was classified as *abortus* by agglutinin absorption and as porcine *abortus* by the bacteriostatic action of dyes, but the absorption test does not distinguish between bovine *abortus* and porcine *abortus*.

Culture 41-2 was classified as *melitensis* by agglutinin absorption, as *Brucella abortus* (Bang) by the carbon dioxide requirement of isolation, and as bovine *abortus* by the bacteriostatic action of dyes.

The isolation from the same blood sample of two cultures differing from each other serologically and in the CO<sub>2</sub> requirement of isolation raised the question as to whether either culture might also contain organisms belonging to the other culture. The purity of both cultures, however, was established by the monovalent character of their respective rabbit antisera. Neither antiserum after absorption by its homologous culture showed agglutinins for the other culture. (See Table 3, serums 8 and 27.)

(2) Cultures 88 and 89 (see histories of cultures) were isolated from the blood of human case C. G., the former requiring CO<sub>2</sub> for isolation while the latter grew directly in atmospheric air.

Culture 88 was classed as *abortus* by agglutinin absorption and as bovine *abortus* by the bacteriostatic action of dyes. Culture 89 was classed as *melitensis* both by absorption and by the dyes.

Neither culture contained a mixture of both organisms, as shown by the monovalent character of the rabbit serums prepared from each culture. (See Table 3, serums 12 and 19.)

The serum collected August 28, 1930, from the patient C. G., from whom both cultures were isolated June 10, 1930, reacted by agglutinin absorption as a *melitensis* serum. (See Table 3, serum 13.)

#### CONCLUSION

Chief interest in these studies centers about the serological reactions of certain cultures of *Brucella abortus* (Bang).

A *Brucella* organism which manifests the cultural character of requiring carbon dioxide for its isolation is *Br. abortus* (Bang), and yet certain ones of such cultures (McC., H-1, 41-2, H-5, and C-15) are shown by agglutinin absorption to give the *melitensis* A serological reaction of *Brucella melitensis* (Bruce). Any contention that agglutinin absorption is a reliable test for the differentiation of *Brucella abortus* of Bang from *Brucella melitensis* of Bruce is not supported by these studies.

#### PRESUMPTIVE DIFFERENTIAL TEST

*Abortus* and *melitensis* cultures may be quickly but only tentatively separated serologically by their agglutination in one or the other of the following previously absorbed serums: (1) A type *abortus* serum which has been absorbed by a type *melitensis* culture or (2) a type *melitensis* serum which has been absorbed by a type *abortus* culture.

The result of such an incomplete test is not to be taken as final evidence but only as suggestive.

#### HISTORIES OF CULTURES

Culture 428 is the type culture of the group designated *Brucella melitensis* variety *melitensis* A by Alice C. Evans (1), who received this strain in 1921 from Feusier and Meyer (2), in whose article it bears the designation of Group III, No. 7.

Culture McC. was isolated November 15, 1930, by Edward Francis, at the National Institute of Health, Washington, D. C., from the spleen of a guinea pig which had been inoculated intraperitoneally October 5 with 2 c. c. of "clear milk" from a cow belonging to Doctor McC., of Chillum, Md. The "clear milk" sample was expressed from the four quarters when the cow was two months dry and two months pregnant. The same organism was also isolated from nine other guinea pigs inoculated October 5 with the same milk sample from the McC. cow. From the 10 guinea pigs 71 cultures were isolated in an atmosphere containing approximately 10 per cent of carbon dioxide, while 71 control culture tubes similarly inoculated from the 10 guinea pigs, but incubated in atmospheric air,

remained sterile. Mrs. McC. became ill from drinking the cow's milk, and her blood serum was reported positive for undulant fever in dilution of 1:320 by the Maryland State Board of Health. Milk from the McC. cow for the inoculation of guinea pigs on October 5, 1930, was kindly furnished by Dr. W. E. Cotton, Director United States Agricultural Experiment Station, Bethesda, Md. For the serological reactions of cow, guinea pig, and rabbit serums, see tests (2), (3), and (1), Table 3.

*Culture H-1* was isolated in November, 1929, by Dr. F. P. Mathews, of Purdue University, Lafayette, Ind., from the spleen of a guinea pig which he injected with a portion of the cervical seal of a cow of the H. herd, which was about to calve. Doctor Mathews stated that "the organism was isolated in an atmosphere of carbon dioxide and did not grow in ordinary aerobic conditions." On receipt of the culture, December 6, 1929, at the National Institute of Health, it gave scant growth in atmospheric air but luxuriant growth in air containing 10 per cent CO<sub>2</sub>. For the serological reactions of cow, owner (J. J. H.), guinea pig, and rabbit serums, see tests (6), (5), (7), and (4), Table 3. This unusual combination of material bearing on the identity of the H-1 culture is due to the interest and prompt action of Dr. Walter W. Lee (3), then assistant secretary of the Indiana State Board of Health.

*Cultures 41-1* and *41-2* were isolated by Dr. I. H. Borts (4) in June, 1929, at Iowa City, Iowa, from blood of a case of undulant fever (WB) which terminated in death in August, 1929. Two blood specimens collected in June, 1929, both agglutinated *Brucella melitensis* variety *abortus* in dilution of 1:320. Culture *41-1* was isolated from that portion of a blood sample which was incubated in atmospheric air, while *41-2* was isolated from another portion of the same blood sample but which was incubated in a desiccator from which 10 per cent of the air had been displaced by carbon dioxide. On receipt of these cultures at the National Institute of Health, August 25, 1930, *41-1* grew well in atmospheric air, but *41-2* grew only in air containing 10 per cent carbon dioxide.

*Culture H-5* was isolated in an atmosphere of 10 per cent carbon dioxide by Dr. I. F. Huddleson, Michigan State College, East Lansing, Mich., September 20, 1930, from milk of a cow in the M. herd. On receipt of the culture at the National Institute of Health, October 6, 1930, it failed to grow in air but grew luxuriantly in 10 per cent CO<sub>2</sub>. In January, 1931, the growth in atmospheric air occurred only at points of heaviest inoculum and not between these points.

*Culture B-8* was isolated January 10, 1924, by Dr. F. P. Mathews, Purdue University, Lafayette, Ind., from the stomach contents of a fetus of a cow by direct culture, and Doctor Mathews adds, "presumably by the use of increased CO<sub>2</sub> content, although no record is available in regard to this feature." On receipt of the culture at the National Institute of Health, November 10, 1929, it grew well in atmospheric air.

*Cultures C-10* and *C-15* were isolated under increased CO<sub>2</sub> content of the atmosphere in April, 1928, by Dr. F. P. Mathews (5), Purdue University, Lafayette, Ind., from two guinea pigs which had been inoculated, respectively, with milk from cow 10 and cow 15 of the Earlham College herd at Richmond, Ind. On June 11, 1928, Doctor Mathews forwarded these cultures to the National Institute of Health with the statement that "C-10 had not yet been trained to grow under aerobic conditions and C-15 had been trained to grow under aerobic conditions only with great difficulty."

*Cultures 88* and *89* were isolated by Jordan and Borts (6), June 10, 1930, at Iowa City, Iowa, from the blood of a case of undulant fever (C. G.), a Mexican who had been in the United States but a few weeks. One sample of blood was divided into two portions. One portion, after inoculation into culture medium, was incubated under 10 per cent carbon dioxide tension and yielded culture 88,

which failed to grow in ordinary air. The other portion, after inoculation into culture medium, was incubated in ordinary air and yielded culture 89, which would grow as well in 10 per cent CO<sub>2</sub>. On receipt at the National Institute of Health, July 1, 1930, 88 grew luxuriantly in air containing 10 per cent CO<sub>2</sub>, but in atmospheric air growth occurred only at points of heaviest inoculum and not between such points. Culture 89 grew luxuriantly in atmospheric air. The patient's blood serum collected August 28, 1930, completely agglutinated *abortus* 456 and *melitensis* 428 in dilution of 1:320 and agglutinated *melitensis* 428 partially in dilution of 1:640.

**Culture R. H. W.** was isolated April 17, 1928, without the use of CO<sub>2</sub> by W. G. Carhart, pathologist, United States Veterans' Hospital, Whipple, Ariz., from the blood of a patient (R. H. W.) planted on blood agar, growth appearing on the third or fourth day after planting. R. H. W. was a rancher and stated that he probably contracted the infection by delivering aborting goats, since of 1,800 goats due to kid, 400 aborted. The patient's serum, collected May 29, 1928, agglutinated *abortus* 456, *melitensis* 428, and his own culture, R. H. W., in dilution of 1:640.

**Culture E. F.-1** was isolated from blood drawn November 13, 1928, from E. F. at Washington, D. C., by Surg. W. T. Harrison, who planted the blood clots into flasks of glucose (1 per cent) bouillon (200 c. c.) which were incubated in air at 37° C., and later subcultured to glucose agar slants in air. Onset of illness was November 6, 1928. The source of infection was probably recently isolated cultures with which E. F. was working in the laboratory and which were of *melitensis*, bovine, and porcine types. The patient's serum collected December 3, 1928, agglutinated *abortus* 456, *melitensis* 428, and his own culture, E. F., in dilution of 1:10240. The following cultures were similarly isolated by Doctor Harrison from blood drawn from E. F. on the dates indicated:

E. F.-2, November 23, 1928.

E. F.-3, December 3, 1928.

E. F.-4, December 11, 1928.

E. F.-5, December 19, 1928.

E. F.-6, January 4, 1929.

These cultures showed spontaneous sedimentation in 0.85 per cent sodium chloride solution.

**Culture W. T. H.-1** was isolated from blood drawn March 18, 1929, from W. T. H. at Washington, D. C., by Medical Director G. W. McCoy, who planted the blood clots into flasks of glucose (1 per cent) bouillon (200 c. c.) which were incubated in air at 37° C. and later subcultured to glucose agar slants in air. Onset of illness was March 10, 1929. The source of infection was probably one of six cultures which W. T. H. had isolated from blood which he drew from E. F. between November 13, 1928, and January 4, 1929, because W. T. H. had made no other contacts with other *Brucella* cultures at any time. The patient's serum collected March 18, 1929, agglutinated *abortus* 456 and *melitensis* 428, in dilution of 1:160. The following cultures were similarly isolated by Doctor McCoy from blood drawn from W. T. H. on the dates indicated:

W. T. H.-2, April 2, 1929.

W. T. H.-3, April 15, 1929.

W. T. H.-4, May 6, 1929.

**Culture 456** was isolated in September, 1917, from a cow's fetus at Laurel, Md., and was received from the Bureau of Animal Industry, Department of Agriculture, Washington, D. C. (See Alice C. Evans (1).)

**Cultures 633, 634, and 635** were isolated by Doctor Zeller, in Germany, from aborted bovine fetuses in March and April, 1930. When received July 9, 1930,

at the National Institute of Health from Dr. I. F. Huddleson, East Lansing, Mich., the cultures grew well in atmospheric air.

*Culture 426* is the type culture of the group designated *Brucella melitensis*, variety *abortus*, by Alice C. Evans (1), who received this culture in 1921 from Feusier and Meyer (2), in whose article it bears the designation of group I, No. 20.

*Culture L. Z.* was isolated by Edward Francis from the blood of L. Z., patient of Dr. Harry V. Paryzek, Cleveland, Ohio. On receipt of the whole-blood sample at the National Institute of Health, Washington, D. C., August 4, 1928, the clot was planted into 200 c. c. of glucose bouillon and incubated in atmospheric air. Subcultures were made on glucose agar slants and incubated in air. The patient's serum received August 4, 1928, agglutinated *abortus* 456 in dilution of 1:5120 and *melitensis* 428 in dilution of 1:2560. At the time he became ill the patient was employed in a sausage factory cutting up pork more frequently than he did beef.

*Culture E. M.* was isolated June 15, 1929, from E. M., a patient at the North Hudson Hospital, Weehawken, N. J. At the time of admission to hospital (April 2, 1929) the patient was employed on the hog feed farms at Secaucus, N. J. The source of the culture was the pus from a "fixation abscess" which had been produced on the abdominal wall of the patient in the region of the appendix. The pus was planted on culture medium June 15, 1929, and was incubated in atmospheric air.

*Culture A. B. C.* was isolated by Edward Francis, March 10, 1928, from the blood of A. B. C., a patient at the United States Naval Hospital, Washington, D. C. Twenty cubic centimeters of blood collected March 10, 1928, were allowed to clot in four portions of 5 c. c. each. The clots were planted each into 200 c. c. of glucose bouillon and incubated in atmospheric air. Subcultures were made to glucose agar slants and incubated in air. The serum collected March 10, agglutinated cultures 456 and 428 in dilution of 1:160, partial in 1:320. The same organism was isolated from the patient by the same technique on March 17, April 24, and June 1, 1928.

*Culture 41-1.* (See above.)

*Note:* While this article was in press, *Culture C. S.* was isolated from human blood. It adds one more to the list of *Brucella abortus* (Bang) cultures which by agglutinin absorption give the *melitensis* A serological reaction of *Brucella melitensis* (Bruce).

*Culture C. S.* was one of 12 cultures isolated by Edward Francis, National Institute of Health, Washington, D. C., from the blood of C. S., a patient in the United States Marine Hospital, Detroit, Mich. (Dr. J. H. Linson in charge). Every step in the isolation of the culture was so controlled as to determine whether primary growth was dependent on the presence of carbon dioxide.

Samples of blood received September 15, 18, and 22, 1931, were planted on duplicate sets of culture media, one set being incubated in an atmosphere of 10 per cent carbon dioxide and the other in atmospheric air. Four cultures were isolated from each of the three blood samples, the 12 successful isolations being on media incubated in 10 per cent CO<sub>2</sub>, whereas there were 12 failures to isolate a culture on the duplicate sets of media incubated in atmospheric air. The patient's serum collected September 2, 1931, agglutinated *Brucella abortus* 456 in dilution of 1:640 and *Brucella melitensis* 428 in dilution of 1:1,280. By agglutinin absorption, the patient's serum reacted as a *melitensis* serum.

## REFERENCES

- (1) Evans, Alice C.: The Serological Classification of *Brucella Melitensis* from Human, Bovine, Caprine, Procine, and Equine Sources. Pub. Health Rep., **38**: 1948-1963 (Aug. 24, 1923). Studies on *Brucella (alkaligenes) melitensis*. Hygienic Laboratory Bulletin No. 143 (1925).
- (2) Feusier, M. L., and Meyer, K. F.: J. Infect. Dis., **27**: 185-206 (1920).
- (3) Lee, Walter W.: Undulant Fever in Indiana. Monthly Bulletin, Indiana State Board of Health, **33**: 21-22 (February, 1930).
- (4) Hardy, Jordan, Borts, and Hardy: Pub. Health Rep., **45**: 2525 (Oct. 17, 1930). (Appendix, Case 4 D, p. 2563.) National Institute of Health Bulletin No. 158, p. 80 (1930).
- (5) Farbar, M. E., and Mathews, F. P.: An epidemic of Undulant Fever, with a Study of the Associated Milk Supply. Annals of Internal Medicine, **2**: 875-880 (March, 1929).
- (6) Jordan, C. F., and Borts, I. H.: Pub. Health Rep., **46**: 2437-2443 (Oct. 9, 1931).

## DOUBLE INFECTION BY ORGANISMS OF THE BRUCELLA GROUP

### Report of a Case

By CARL F. JORDAN, M. D., Assistant Professor of Hygiene and Preventive Medicine, State University of Iowa, Iowa City, Iowa; and I. H. BORTS, M. D., Chief Bacteriologist, State Hygienic Laboratories, Iowa City, Iowa

In the literature on undulant or Malta fever there are numerous case reports. With the exception of one case reported by Hardy, Jordan, Borts, and Hardy (1), all have been regarded as infections by a single variety or species of the *Brucella* group. We present here a report of another patient with undulant fever, from whose blood culture two varieties (*abortus* and *melitensis*) of *Brucella melitensis* were isolated.

### CASE REPORT

C. G., male, age 30, Mexican laborer, admitted to the Santa Fe Hospital, Fort Madison, Iowa, on May 9, 1930.

*History.*—For one week previous patient had complained of weakness, general aching, headache, and feverishness. The signs of jaundice had also developed. There were marked anorexia and occasional vomiting. Owing to language difficulties the attending physician was not able to obtain the details of the history.

The past medical history was essentially negative.

*Physical findings.*—

General: Temperature 104.6°; pulse, 80; respiration, 24; blood pressure, 108/50. Anemic in appearance, weak, and poorly nourished.

Head: Eyes, ears, nose, and throat essentially negative.

Neck: There was tenderness over the anterior cervical glands.

Lungs: Clear.

Heart: No enlargement, rhythm regular, a faint systolic murmur was heard at apex and base.

Abdomen: Moderate tenderness in epigastrium just above the umbilicus. The liver and spleen were not felt.

Skin: More yellow than normal.

Extremities: Normal.

Reflexes: Normal.

*Provisional diagnosis.*—Typhoid, typhus, or undulant fever.

*Laboratory findings.*—

Urine: Free from albumin, casts, and sugar.

Blood: R. B. C. 3,800,000; W. B. C. 4,500; Hb. 70 per cent.

Agglutination tests on blood serum received at the State laboratory May 14, 1930, showed no reaction for typhoid fever, but *Br. melitensis* was agglutinated in dilutions to 1:320. On July 2, the agglutination titer was 1:1280.

A blood culture, consisting of 100 c. c. of fresh beef liver infusion broth containing 3–5 c. c. of the patient's blood, received by us May 23, was incubated under atmospheric conditions, subcultures being made May 27, May 31, and June 3, 1930, to beef liver infusion agar pH 6.6 in Petri plates in duplicate sets. One set was incubated under atmospheric conditions and the other under an atmosphere of 10 per cent carbon dioxide tension. Growth appeared June 10 on a plate incubated under atmospheric conditions and also on one under an atmosphere of 10 per cent carbon dioxide tension. The organisms on both plates were Gram negative, resembled *Brucella* morphologically, and were agglutinated by specific immune serum.

Several stool specimens cultured by the Amoss method (2) did not reveal organisms of the *Brucella* group.

*Identification of strains.*—In view of the patient's recent entrance from Mexico into the United States and his contact with goats, we had entertained the possibility of his suffering from a *Brucella* infection of the *melitensis* variety. For this reason one of us (I. H. B.) attended to the technical work involved.

When cultured according to Huddleson's dye method (3), the organism which grew under atmospheric conditions proved to be *Brucella melitensis*, variety *melitensis* (Lab. strain No. 89); that isolated under 10 per cent carbon dioxide tension, *Brucella melitensis*, variety *abortus* (Lab. strain No. 88).

These strains were forwarded to Dr. Edward Francis, of the National Institute of Health, at Washington, D. C., and to Dr. I. Forest Huddleson, Michigan State Agricultural College, East Lansing, Michigan. Both Francis (4) and Huddleson corroborated our findings. They used the agglutinin absorption and the dye test, respectively. From a second blood culture taken June 28, but one organism was isolated, namely, *Brucella melitensis*, variety *melitensis*.

*Animal inoculations.*—In order to determine the pathogenicity of the organisms isolated from the blood culture of this case, one-fourth



c. c. of a dilute suspension (1:100 dilution of a suspension having a turbidity corresponding to 500 parts per million by the silica standard) was made from 72-hour cultures of laboratory strains Nos. 88 and 89 and inoculated into each of two guinea pigs. Prior to inoculation all of the guinea pig sera failed to agglutinate our standard *Brucella* antigen. After six weeks these pigs were again bled, the serum in each instance agglutinating *Br. abortus* antigen, in dilutions ranging from 1:320 to 1:5,120.

One of the pigs inoculated with Culture No. 89 was autopsied after eight weeks. The spleen was three times the normal size, contained several pin-head sized abscesses, and was bound down to the posterior wall by dense fibrous adhesions. The liver was somewhat enlarged, and diffusely studded with pin-point abscesses. Lymph glands in the groin and axilla, and of the mesenteric, iliac, and bronchial groups were enlarged to the size of a large navy bean. The glands were firm and on section contained thick creamy pus. The costo-sternal articulations were markedly arthrosed, being involved in a dense mass of fibrous tissue. The lungs contained many small pea-sized abscesses. The serum of blood taken at autopsy agglutinated *Brucella* antigen in dilutions through 1:5,120. *Brucella melitensis*, variety *melitensis*, was isolated from all organs. The mate of this pig was posted with similar findings with the exception that the costo-sternal articulations were not involved and the serum titer was 1:2,560. It is interesting to note that these findings closely simulate the pathology found in guinea pigs experimentally inoculated with freshly isolated strains of the *swis* variety of *Br. melitensis*.

One of the pigs inoculated with Culture No. 88 showed several pin-point abscesses in the liver. The spleen was twice the normal size, and no abscesses could be demonstrated. There was no evidence of lymph gland involvement. The remaining organs were apparently normal. The blood serum agglutinated *Brucella* antigen through 1:640. *Br. melitensis*, variety *abortus*, was isolated from the spleen and liver. The mate of this pig presented identical findings.

It is quite evident from the pathological standpoint as well as from the agglutinin absorption tests as carried out by Francis and the dye method of Huddleson that we were dealing with two distinct varieties of organisms of the *Brucella* group.

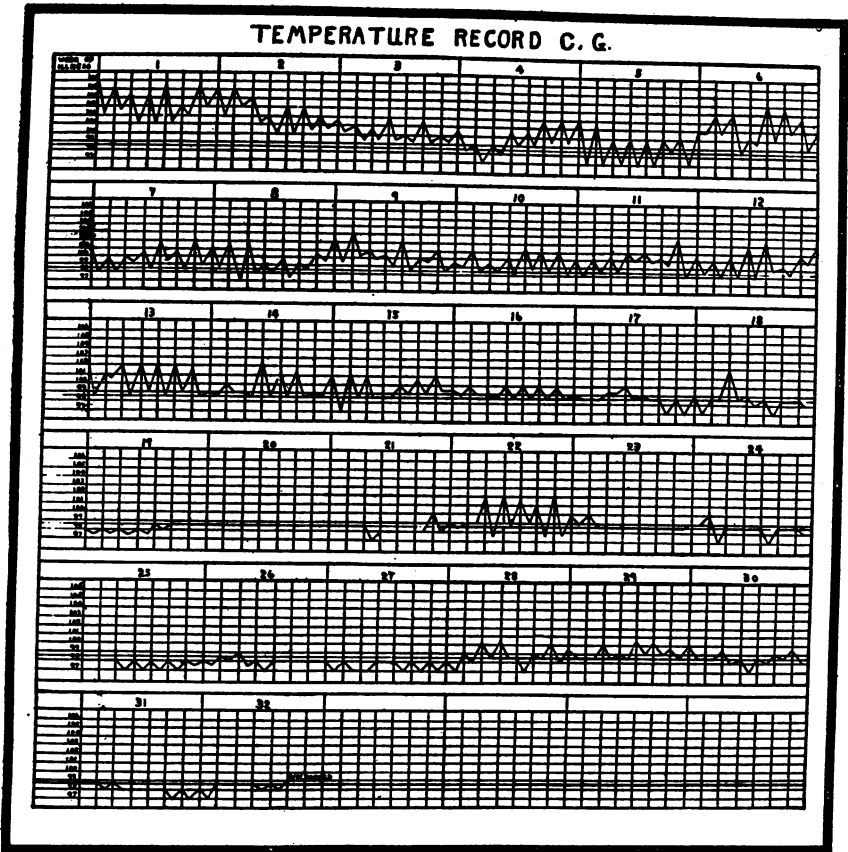
*Epidemiological data.*—On June 28 the patient was seen in the Santa Fe Hospital, an American woman who had lived for years among Mexicans ably assisting as interpreter. Remarks were at times incoherent, due to the feverish state.

The patient's home was in Juriria, Guanajuato, Mexico. He had made several trips to the United States from Mexico, between the years 1924 and 1930. While in Mexico, he did farm work, and had eight goats, which were usually milked by his mother and sisters.

He did not drink goat's milk, but ate cheese made from this milk. It was impossible to elicit accurate information relative to infectious abortion in animals.

The patient drank cow's milk at times. He had one cow which was sold to enable him to come to the United States.

He left Mexico in February, 1930, along with other Mexicans and a labor agent, going through Laredo to Fort Worth, from there to Kansas City, and finally to Sibley, Mo. He arrived at Sibley about



a month before admission to the hospital and about three weeks before the onset of his illness. While there, he had no contact with livestock, used only canned milk, and ate no butter—Mexicans, it was stated, eat lard instead of butter.

*Course and treatment.*—The patient's temperature (see temperature chart) was 106° on May 9, the day of admission. He continued to run a septic type of temperature, ranging from 98° to 99° in the morning to 101° and 103° every afternoon until September 1. Vaccine therapy was instituted July 2 and continued until July 9. The patient's condition improved slightly, but there was no appreciable

change in the temperature. On August 31, 0.1 gram acriflavine was given intravenously, and on September 1, 0.2 gram. The temperature became normal and remained so until September 6, when it again rose to 101.8°. On September 7, 0.4 gram of acriflavine was administered, following which the temperature again became normal and remained so several weeks.

The patient was "weak and emaciated" on September 24, but "gaining ground slowly". During the period October 1 to 8 another exacerbation of fever occurred, the temperature reaching 102° on the 5th and 6th, and then returning to normal. On November 12, patient was "gaining rapidly in weight and general appearance." He was granted a pass to Mexico and left the hospital December 17, 1930.

#### COMMENT

The following evidence indicates that the *melitensis* variety of *Br. melitensis* was in all likelihood acquired in Mexico.

(1) Undulant fever cases due to *Br. melitensis* occurred in Texas and were described in 1911 by Ferenbaugh (5) and by Gentry and Ferenbaugh (6). Cases occurring in Arizona were reported by Yount and Looney (7), those of 1922 by Watkins and Lake (8), and those in Southwestern United States by Lake (9). Goats were regarded as the source of infection.

A case of undulant fever with isolation of *Br. melitensis*, variety *melitensis*, from blood and urine was reported in 1918 by Woolsey (10). The patient was a Mexican and apparently developed the infection in Mexico.

(2) From 69 cases of undulant fever in Iowa in which blood cultures were positive, 71 organisms have been isolated. Forty-five strains were of variety *suis*, 25 of variety *abortus*, while the only *melitensis* variety is that isolated from the case here reported. Variety *melitensis* infection is not endemic in Iowa.

(3) *Br. melitensis* variety *melitensis* infection is known to be endemic in Mexico.

Letters were directed June 30, 1930, to health officers of Tampico, Mexico City, and Vera Cruz requesting information relative to the incidence of undulant fever and infectious abortion in goats and cows. Dr. E. Garcia, writing from Tampico, July 7, stated that no cases of undulant fever had been reported, but that infectious abortion occurred in goats and frequently in cows. Undulant fever cases were reported in the vicinity of Mexico City by Dr. E. Lando, officer in charge of the bureau of interchange.

Dr. Miguel E. Bustemante, director of the sanitary bureau of Vera Cruz, in a letter dated August 5, 1930, referred to undulant fever studies carried out in 1919-1920 by Dr. Fernando Ocaranza, director of the medical faculty at the National University of Mexico, and Dr. Gerar de Varela, bacteriologist of the Institute of Hygiene, Poptla

Tacuba. Doctor Bustemante stated that undulant fever cases were for the most part confined to the central plateau of Mexico, in the States of Pueblo, Mexico, Guanajuato, and San Luis Potosi.

#### SUMMARY

A Mexican laborer, aged 30, left his native country in February, 1930, took sick during April in Missouri, and was treated for undulant fever in a hospital in Iowa for 32 weeks. The blood culture yielded two strains of *Brucella melitensis*—variety *melitensis* and variety *abortus*. The *melitensis* variety of *Brucella* infection was in all likelihood acquired in Mexico because (1) with this one exception, all of the undulant fever cases in Iowa have, so far as known, been due to *Brucella melitensis*, variety *abortus* or variety *suis*, variety *melitensis* not being endemic in Iowa; (2) *Brucella melitensis*, variety *melitensis* infection is known to be endemic in Mexico; (3) the patient had contact with and used dairy products from goats in Mexico but not in the United States.

The source of the *abortus* variety of organism is not so clear. A double infection may have developed before the patient left Mexico, as he used milk in addition to caprine dairy products. On the other hand, it is possible that the bovine infection was superimposed after the patient's arrival in Iowa. Pasteurized milk was used, but several cases of undulant fever are known to have occurred in the same community, with dairy products as the probable source of infection, one other case occurring within the same period.

#### ACKNOWLEDGMENTS

We desire to acknowledge the collaboration of Dr. F. D. Ullrich, of Fort Madison, Iowa, who supervised the care of the patient, forwarded blood specimens, and made available the clinical and in part the epidemiological data relative to this case. We wish also to acknowledge the services rendered by Doctors Francis and Huddleson in corroborating our findings as to identification of the organisms isolated from the blood culture.

#### REFERENCES

- (1) Hardy, A. V., Jordan, C. F., Borts, I. H., and Hardy, G. C.: Pub. Health Rep. 45: 2525, (Oct. 17) 1930 (Appendix, Case 4 D, p. 2563). National Institute of Health Bulletin No. 158, page 80 (December), 1930.
- (2) Amoss, H. L., and Poston, M. A.: Undulant (Malta) fever; Isolation of *Brucella* organisms from stools. J. A. M. A., 93: 170-171 (July 20), 1929.
- (3) Huddleson, I. Forest: The differentiation of the species of the genus *Brucella*. Technical Bulletin No. 100. Bacteriological Section, Michigan Agricultural Experiment Station 1929.
- (4) Francis, Edward: Agglutinin absorption in undulant fever. Pub. Health Rep. 46: 2416-2437 (Oct. 9), 1931.
- (5) Ferenbaugh, Thomas L.: Endemic Mediterranean fever (Malta fever) in Southwest Texas. J. A. M. A., 57: 730-731 (Aug. 26), 1911.

- (6) Gentry, E. R., and Ferenbaugh, Thomas L.: Endemic Malta (Mediterranean) fever in Texas with isolation of *Micrococcus melitensis* from two patients. *J. A. M. A.*, **57**: 889-891 (Sept.), 1911.
- (7) Yount, C. E., and Looney, R. N.: Malta fever, with preliminary report on cases occurring in Arizona. *Arizona Medical Journal*, **1**: 18-26 (1913).
- (8) Watkins, W. Warner, and Lake, G. C.: Malta fever, with special reference to the Phoenix, Arizona, epidemic of 1922. *J. A. M. A.*, **89**: 1581-1584 (Nov. 5), 1927.
- (9) Lake, G. C.: Malta fever in Southwestern United States. *Pub. Health Rep.*, **37**: 2895-2899 (Nov. 24), 1922.
- (10) Woolsey, Ross A.: Malta fever, with report of case. *Missouri State Medical Association Journal*, **15**: 164-166 (May), 1918.

## COURT DECISION RELATING TO PUBLIC HEALTH

*Conviction for unlawful possession of plants known as "marajuana" upheld.*—(Louisiana Supreme Court; *State v. Bonoa*, 136 So. 15; decided May 25, 1931.) Act 41 of 1924 provided in section 1 as follows:

That no person shall possess, sell, dispose of, transport, deliver, in any form whatever in the State of Louisiana, the plant known as marajuana or any of its derivatives, either dried or in the form of cigarettes, tobacco, or any other way whatsoever.

Violation was made a misdemeanor, punishable by fine and imprisonment. The defendant was charged with unlawfully possessing plants known as marajuana, in that he had a number of the plants growing on his premises. These plants were growing in what was termed a second back yard immediately in the rear of the first. The two yards were separated by a shed through which one had to go to enter the second yard from the first. The defendant was convicted and appealed to the supreme court.

One of the defendant's contentions was that section 1 of the act involved was unconstitutional and void in so far as it attempted to prohibit the possession of plants termed "marajuana," as the section by so doing sought to prohibit the possession of something unknown. It was urged that there was no such plant known as marajuana and that hence the terminology used conveyed no conception of what was prohibited. Concerning this the supreme court stated that it did not find any difficulty in holding that the use of the word "marajuana" in connection with the word "plant" conveyed to the mind exactly what the legislature intended to convey, namely, the plant scientifically known as *Cannabis indica* or *Cannabis americana*. "Besides," said the court, "whatever doubt there may be as to what was meant by the use of the word is removed not only by the title of the act, where the plant is referred to as '*Cannabis indica*, *Cannabis americana*, or marajuana,' but also by section 4 of the act, where the plant is similarly designated, the name '*Cannabis indica*' being well known scientifically."

Another ground urged by the defendant against the validity of section 1 was that, in so far as it prohibited the possession of the

marajuana plant in any form whatsoever, it was an infringement upon liberty and the rights to property in violation of the State and Federal constitutions. The court stated the defendant's views in this respect as follows:

The theory of the accused seems to be that, although the marajuana plant may be used in forms, such as cigarettes or tobacco, injurious to the public health, morals, and safety, yet it may be used for valuable purposes, such as the manufacture of hemp rope and twine, in the preparation of useful drugs, and for the production of seed which forms a large part of the rations of the millions of pet canary birds in this country, and that only in so far as the plant is sold, used, and possessed for deleterious purposes may such sale, use, or possession be prohibited without infringing, in violation of the State and Federal constitutions, upon the liberty of the people.

The court's holding with regard to this contention was adverse to the defendant, the view being taken that the legislature had not exceeded its powers by enacting section 1 of the act. In disposing of this point the court stated, in part, as follows:

One who has upon his premises to his knowledge a growing crop of Cannabis indica or Cannabis americana or marajuana, or any number of the plants growing thereon, possesses these plants within the meaning of section 1 of the statute. \* \* \*

The act was passed under the police power of the State. In *State v. McCormick* (142 La. 580, 77 So. 288, 289, L. R. A. 1918C, 262) it was said: "The legitimate exercise of the police power is not subject to restraint by constitutional provisions for the general protection of rights of individual life, liberty, and property." *State v. Schlemmer* (42 La. Ann. 1166, 8 So. 307, 10 L. R. A. 135). And the fourteenth amendment to the Constitution of the United States does not interfere with the proper exercise of that power. (6 R. C. L. pars. 193, 194; *L'Hote v. New Orleans*, 177 U. S. 596, 20 S. Ct. 788, 44 L. Ed. 903.)"

The marajuana plant is a plant possessing properties deleterious to health and dangerous to the public safety and morals. \* \* \* To permit the plant to be possessed in the State, even in its growing form, is virtually as unsafe as to permit its possession in the manufactured forms of cigarettes and tobacco, so readily and easily may it be converted into those forms.

The marajuana plant is not one of the crops of this State. While the plant may be put to valuable uses, nevertheless its deleterious properties may be fairly considered as outweighing those uses.

## DEATHS DURING WEEK ENDED SEPTEMBER 19, 1931

*Summary of information received by telegraph from industrial insurance companies for the week ended September 19, 1931; and corresponding week of 1930. (From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce)*

	Week ended Sept. 19, 1931	Corresponding week, 1930
Policies in force.....	74, 883, 159	75, 532, 011
Number of death claims.....	12, 059	13, 466
Death claims per 1,000 policies in force, annual rate.....	8. 4	9. 3
Death claims per 1,000 policies, first 38 weeks of year, annual rate.....	9. 9	9. 7

**Deaths<sup>1</sup> from all causes in certain large cities of the United States during the week ended September 19, 1931; infant mortality, annual death rate, and comparison with corresponding week of 1930. (From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce)**

[The rates published in this summary are based upon midyear population estimates derived from the 1930 census]

City	Week ended Sept. 19, 1931				Corresponding week, 1930		Death rate <sup>2</sup> for the first 38 weeks	
	Total deaths	Death rate <sup>2</sup>	Deaths under 1 year	Infant mortality rate <sup>3</sup>	Death rate <sup>2</sup>	Deaths under 1 year	1931	1930
Total (82 cities).....	7,453	10.9	732	4.57	10.3	728	12.2	12.1
Akron.....	30	6.1	5	49	7.1	3	7.9	7.9
Albany.....	32	12.9	2	49	11.4	2	13.9	15.0
Atlanta.....	60	11.3	15	153	15.2	10	15.2	16.9
White.....	37		8	127		6		
Colored.....	23	( <sup>9</sup> )	7	201	( <sup>9</sup> )	4	( <sup>9</sup> )	( <sup>9</sup> )
Baltimore.....	206	13.2	22	75	14.5	17	14.6	14.1
White.....	152		14	61		11		
Colored.....	54	( <sup>9</sup> )	8	125	( <sup>9</sup> )	6	( <sup>9</sup> )	( <sup>9</sup> )
Birmingham.....	53	10.3	1	10	11.2	7	13.8	13.9
White.....	29		1	17		3		
Colored.....	24	( <sup>9</sup> )	0	0	( <sup>9</sup> )	4	( <sup>9</sup> )	( <sup>9</sup> )
Boston.....	202	13.4	20	57	13.2	25	14.3	14.3
Bridgeport.....	34	12.1	1	17	7.8	0	11.3	11.2
Buffalo.....	129	11.6	20	82	11.3	19	13.3	13.1
Cambridge.....	17	7.8	0	9	11.0	3	12.3	11.8
Camden.....	25	11.0	1	17	10.5	3	14.5	13.7
Canton.....	16	7.8	2	46	6.4	4	10.3	10.1
Chicago.....	632	9.5	54	48	9.9	52	10.9	10.5
Cincinnati.....	147	16.8	22	132	13.1	8	16.2	15.7
Cleveland.....	198	11.3	15	44	10.0	19	11.4	11.3
Columbus.....	79	13.9	4	39	13.4	5	13.9	15.8
Dallas.....	41	7.9	6	7	7.9	7	11.4	11.7
White.....	29		5			6		
Colored.....	12	( <sup>9</sup> )	1		( <sup>9</sup> )	1	( <sup>9</sup> )	( <sup>9</sup> )
Dayton.....	52	13.1	8	112	12.4	10	11.9	10.6
Denver.....	64	11.4	5	48	12.1	12	14.1	14.9
Des Moines.....	24	8.7	3	53	6.9	3	11.2	11.9
Detroit.....	219	7.2	32	51	8.5	44	8.4	9.5
Duluth.....	56	18.4	3	74	10.3	1	11.4	11.2
El Paso.....	24	11.9	4		10.1	7	16.2	17.7
Erie.....	24	10.6	1	19	12.6	2	10.8	11.4
Fall River.....	21	9.5	3	68	11.3	0	11.4	12.1
Ft. Int.....	21	6.7	8	102	7.6	5	7.1	9.3
Fort Worth.....	21	9.7	1		11.4	6	11.0	11.2
White.....	28		0			4		
Colored.....	3	( <sup>9</sup> )	1		( <sup>9</sup> )	2	( <sup>9</sup> )	( <sup>9</sup> )
Grand Rapids.....	28	8.5	4	59	10.5	3	9.2	10.4
Houston.....	83	14.0	7		12.5	10	11.3	12.2
White.....	55		5			2		
Colored.....	28	( <sup>9</sup> )	2		( <sup>9</sup> )	8	( <sup>9</sup> )	( <sup>9</sup> )
Indianapolis.....	98	13.8	5	41	11.7	10	14.1	14.8
White.....	79		4	38		10		
Colored.....	19	( <sup>9</sup> )	1	67	( <sup>9</sup> )	0	( <sup>9</sup> )	( <sup>9</sup> )
Jersey City.....	75	12.3	6	53	11.5	7	11.7	11.4
Kansas City, Kans.....	30	12.7	1	21	11.1	4	12.7	11.6
White.....	26		1	25		4		
Colored.....	4	( <sup>9</sup> )	0		( <sup>9</sup> )	0	( <sup>9</sup> )	( <sup>9</sup> )
Kansas City, Mo.....	97	12.4	6	46	10.3	6	13.3	13.4
Knoxville.....	27	12.9	7	149	11.3	4	12.5	14.0
White.....	22		7	167		3		
Colored.....	5	( <sup>9</sup> )	0		( <sup>9</sup> )	1	( <sup>9</sup> )	( <sup>9</sup> )
Long Beach.....	28	9.6	0	0	6.9	0	9.9	9.9
Los Angeles.....	252	10.0	15	44	10.5	24	10.8	11.1
Louisville.....	70	11.8	13	111	8.8	12	14.5	13.7
White.....	51		10	98		8		
Colored.....	19	( <sup>9</sup> )	3	199	( <sup>9</sup> )	4	( <sup>9</sup> )	( <sup>9</sup> )
Lowell.....	18	9.3	1	25	7.8	2	12.7	13.5
Lynn.....	14	7.1	0	0	9.2	3	9.7	10.6
Memphis.....	102	20.6	8	85	10.9	5	16.8	17.6
White.....	42		7	117		1		
Colored.....	60	( <sup>9</sup> )	1	29	( <sup>9</sup> )	4	( <sup>9</sup> )	( <sup>9</sup> )
Miami.....	20	9.3	3	76	5.6	2	11.9	11.2
White.....	13		2	71		1		
Colored.....	7	( <sup>9</sup> )	1	88	( <sup>9</sup> )	1	( <sup>9</sup> )	( <sup>9</sup> )

See footnotes at end of table.

**Deaths<sup>1</sup> from all causes in certain large cities of the United States during the week ended September 19, 1931, infant mortality, annual death rate, and comparison with corresponding week of 1930. (From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce)—Continued**

City	Week ended Sept. 19, 1931				Corresponding week, 1930		Death rate <sup>2</sup> for the first 38 weeks	
	Total deaths	Death rate <sup>3</sup>	Deaths under 1 year	Infant mortality rate <sup>4</sup>	Death rate <sup>2</sup>	Deaths under 1 year	1931	1930
Milwaukee	97	8.6	14	61	8.9	14	9.5	9.7
Minneapolis	105	11.6	14	90	11.2	10	11.5	10.7
Nashville	57	19.1	13	194	9.1	6	17.1	16.7
White	39		10	199		5		
Colored	18	( <sup>5</sup> )	3	177	( <sup>5</sup> )	1	( <sup>5</sup> )	( <sup>5</sup> )
New Bedford <sup>7</sup>	23	10.7	3	80	6.0	2	12.2	10.9
New Haven	31	9.9	0	0	12.2	2	12.6	13.1
New Orleans	130	14.5	14	77	13.6	10	17.2	17.5
White	78		5	41		4		
Colored	52	( <sup>5</sup> )	9	147	( <sup>5</sup> )	6	( <sup>5</sup> )	( <sup>5</sup> )
New York	1,343	9.9	121	51	8.8	123	11.4	11.0
Bronx Borough	190	7.4	12	27	6.4	10	8.4	8.0
Brooklyn Borough	460	9.1	48	51	8.5	58	10.5	10.0
Manhattan Borough	508	14.6	41	70	12.6	42	17.3	16.3
Queens Borough	140	6.3	16	44	5.5	13	7.4	7.1
Richmond Borough	45	14.4	4	72	9.2	2	14.1	14.5
Newark, N. J.	94	11.0	11	58	10.4	6	11.8	11.2
Oakland	52	9.3	5	64	9.1	5	10.5	11.0
Oklahoma City	35	9.3	4	55	12.5	7	11.1	10.8
Omaha	52	12.5	3	34	13.6	2	14.1	13.8
Paterson	32	12.0	4	69	10.5	3	13.5	12.4
Peoria	18	8.7	3	79	14.8	2	12.7	12.6
Philadelphia	442	11.7	54	78	12.2	48	13.3	12.8
Pittsburgh	160	12.3	25	86	12.3	25	14.8	13.9
Portland, Oreg.	62	10.5	3	36	9.5	1	11.7	12.2
Providence	57	11.7	6	55	11.1	10	12.9	13.2
Richmond	54	15.3	6	87	13.4	5	15.8	15.1
White	32		1	22		1		
Colored	22	( <sup>5</sup> )	5	217	( <sup>5</sup> )	3	( <sup>5</sup> )	( <sup>5</sup> )
Rochester	82	12.9	7	64	10.1	4	12.1	11.6
St. Louis	201	12.7	19	64	8.6	13	15.6	14.4
St. Paul	44	8.3	0	0	8.0	1	10.9	10.2
Sal. Lake City <sup>8</sup>	35	12.8	2	30	10.4	5	12.3	12.5
San Antonio	52	11.3	12		13.2	7	14.8	17.1
San Diego	41	13.7	3	61	12.2	1	13.7	14.5
San Francisco	146	11.7	6	40	11.9	7	13.2	13.1
Schenectady	13	7.0	0	0	13.1	0	10.6	11.4
Seattle	78	10.9	0	0	7.4	2	11.5	10.9
Somerville	15	7.4	0	0	8.5	0	9.1	9.9
South Bend	15	7.2	2	50	8.4	1	8.1	9.0
Spokane	19	8.5	1	26	9.9	0	12.4	12.4
Springfield, Mass.	24	8.2	5	77	10.7	2	11.9	12.2
Syracuse	46	11.3	3	36	9.2	4	11.8	11.7
Tacoma	26	12.6	0	0	8.3	1	12.1	12.6
Toledo	56	9.9	6	55	12.0	12	12.0	12.7
Trenton	37	15.6	2	35	13.5	1	16.8	16.8
Utica	20	10.2	2	52	11.3	1	14.1	15.0
Washington, D. C.	141	14.9	12	66	12.0	8	16.0	15.2
White	96		8	65		6		
Colored	45	( <sup>5</sup> )	4	69	( <sup>5</sup> )	2	( <sup>5</sup> )	( <sup>5</sup> )
Waterbury	21	10.9	1	30	5.2	2	9.8	9.9
Wilmington, Del. <sup>7</sup>	36	17.6	5	108	13.7	3	14.2	14.4
Worcester	42	11.1	3	41	11.2	2	12.3	13.0
Yonkers	18	6.8	3	79	6.5	2	8.7	8.1
Youngstown	32	9.7	1	14	11.9	2	10.3	10.3

<sup>1</sup> Deaths of nonresidents are included. Stillbirths are excluded.

<sup>2</sup> These rates represent annual rates per 1,000 population, as estimated for 1931 and 1930 by the arithmetical method.

<sup>3</sup> Deaths under 1 year of age per 1,000 live births. Cities left blank are not in the registration area for births.

<sup>4</sup> Data for 77 cities.

<sup>5</sup> Deaths for week ended Friday.

<sup>6</sup> For the cities for which deaths are shown by color, the percentage of colored population in 1920 was as follows: Atlanta, 31; Baltimore, 15; Birmingham, 39; Dallas, 15; Fort Worth, 14; Houston, 25; Indianapolis, 11; Kansas City, Kans., 14; Knoxville, 15; Louisville, 17; Memphis, 33; Miami, 31; Nashville, 30; New Orleans, 26; Richmond, 32; and Washington, D. C., 25.

<sup>7</sup> Population Apr. 1, 1930; decreased 1929 to 1930, no estimate made.



# 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

### CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended September 26, 1931, and September 27, 1930

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended September 26, 1931, and September 27, 1930

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Sept. 26, 1931	Week ended Sept. 27, 1930	Week ended Sept. 26, 1931	Week ended Sept. 27, 1930	Week ended Sept. 26, 1931	Week ended Sept. 27, 1930	Week ended Sept. 26, 1931	Week ended Sept. 27, 1930
<b>New England States:</b>								
Maine.....	5	1		1	15		1	0
New Hampshire.....	4	2			1		0	0
Vermont.....		1			1	1	0	0
Massachusetts.....	30	50	4		18	50	4	3
Rhode Island.....	1	6			6		0	0
Connecticut.....	3	7		3	5	4	2	1
<b>Middle Atlantic States:</b>								
New York.....	55	54	16	12	55	45	5	7
New Jersey.....	15	46		2	10	16	4	1
Pennsylvania.....	68	125			91	51	6	6
<b>East North Central States:</b>								
Ohio.....	80	63	10	11	28	21	1	9
Indiana.....	19	8	6	5	12	2	1	3
Illinois.....	63	102	266	3	85	20	11	5
Michigan.....	20	44			13	18	8	3
Wisconsin.....	10	11	10	34	8	21	0	1
<b>West North Central States:</b>								
Minnesota.....	10	13	2		2	1	0	0
Iowa.....	9	5			2	2	2	0
Missouri.....	55	27	1			13	0	4
North Dakota.....	2	1				8	4	3
South Dakota.....	1	3			1	9	0	1
Nebraska.....	14	5				1	0	0
Kansas.....	6	7			6	4	0	1
<b>South Atlantic States:</b>								
Delaware.....	2			1			0	0
Maryland <sup>1</sup> .....	40	14	8	4	2	4	1	0
District of Columbia.....	11	15	2		1	3	1	0
West Virginia.....	28	21	12	1	5	13	0	0
North Carolina.....	129	118	1	14	4	10	0	3
South Carolina.....	28	38	113	160	7		0	0
Georgia <sup>1</sup> .....	56	21	6	15	2	5	0	0
Florida <sup>1</sup> .....	17	5		1		4	0	0
<b>East South Central States:</b>								
Kentucky.....	147				10		0	1
Tennessee.....	74	18	2	5		12	4	0
Alabama <sup>1</sup> .....	95	30	1	5	1	16	1	2
Mississippi.....	112	23					0	0

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

<sup>2</sup> Week ended Friday.

<sup>3</sup> Typhus fever, 1931, 10 cases: 1 case in Maryland; 3 cases in Georgia; 3 cases in Florida; 2 cases in Alabama; and 1 case in Texas.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended September 26, 1931, and September 27, 1930—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Sept. 26, 1931	Week ended Sept. 27, 1930	Week ended Sept. 26, 1931	Week ended Sept. 27, 1930	Week ended Sept. 26, 1931	Week ended Sept. 27, 1930	Week ended Sept. 26, 1931	Week ended Sept. 27, 1930
<b>West South Central States:</b>								
Arkansas.....	28	7		2	2		0	0
Louisiana.....	44	43			3	3	2	0
Oklahoma <sup>1</sup> .....	76	35	12	2		2	0	1
Texas <sup>2</sup> .....	22	15	2	2			0	0
<b>Mountain States:</b>								
Montana.....	2				3	2	0	0
Idaho.....	2	2					0	0
Wyoming.....		1			1		0	0
Colorado.....	10	10			6	7	0	2
New Mexico.....	2	3			1		0	0
Arizona.....	4	6	3		1		0	1
Utah <sup>1</sup> .....			5			2	1	2
<b>Pacific States:</b>								
Washington.....	7	3			8	4	0	2
Oregon.....	1	5	15	17	7	16	0	0
California.....	56	39	23	39	37	56	6	4
Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Sept. 26, 1931	Week ended Sept. 27, 1930	Week ended Sept. 26, 1931	Week ended Sept. 27, 1930	Week ended Sept. 26, 1931	Week ended Sept. 27, 1930	Week ended Sept. 26, 1931	Week ended Sept. 27, 1930
<b>New England States:</b>								
Maine.....	7	21	0	12	0	0	4	9
New Hampshire.....	2	1	0	2	0	0	3	9
Vermont.....	4	0	3	3	0	0	0	1
Massachusetts.....	105	32	75	72	0	0	7	11
Rhode Island.....	8	2	9	3	0	0	1	1
Connecticut.....	81	5	2	14	0	0	5	2
<b>Middle Atlantic States:</b>								
New York.....	327	65	124	71	0	8	54	54
New Jersey.....	93	6	35	47	0	0	16	21
Pennsylvania.....	49	10	143	138	0	0	59	88
<b>East North Central States:</b>								
Ohio.....	14	100	139	184	1	19	183	75
Indiana.....	3	6	18	48	3	12	16	12
Illinois.....	62	43	110	142	11	12	53	43
Michigan.....	138	13	60	101	1	1	22	24
Wisconsin.....	70	20	21	41	4	6	8	5
<b>West North Central States:</b>								
Minnesota.....	62	17	30	32	3	4	19	7
Iowa.....	9	21	13	18	8	7	8	2
Missouri.....	0	18	21	36	5	8	18	30
North Dakota.....	2	2	10	11	1	1	5	4
South Dakota.....	1	4	1	4	1	1	5	1
Nebraska.....	1	26	4	12	0	10	1	7
Kansas.....	1	48	20	35	3	1	14	11
<b>South Atlantic States:</b>								
Delaware.....	0	0	1	4	0	0	1	3
Maryland <sup>1</sup> .....	5	2	33	11	0	0	53	51
Distriet of Columbia.....	2	0	9	3	0	0	3	2
West Virginia.....	3	3	24	19	0	7	68	53
North Carolina.....	5	5	75	96	0	1	41	40
South Carolina.....	0	2	18	21	2	0	49	35
Georgia <sup>2</sup> .....	4	1	25	16	0	0	33	35
Florida <sup>3</sup> .....	1	2	3	4	0	0	12	6
<b>East South Central States:</b>								
Kentucky.....	2	1	31	16	0	0	61	54
Tennessee.....	7	2	65	30	3	2	82	42
Alabama <sup>4</sup> .....	1	1	28	45	1	0	31	21
Mississippi.....	2	2	21	12	3	0	27	35

<sup>1</sup> Week ended Friday.

<sup>2</sup> Typhus fever, 1931, 10 cases: 1 case in Maryland; 3 cases in Georgia; 3 cases in Florida; 2 cases in Alabama; and 1 case in Texas.

<sup>4</sup> Exclusive of Oklahoma City and Tulsa.

*Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended September 26, 1931, and September 27, 1930—Continued*

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Sept. 26, 1931	Week ended Sept. 27, 1930	Week ended Sept. 26, 1931	Week ended Sept. 27, 1930	Week ended Sept. 26, 1931	Week ended Sept. 27, 1930	Week ended Sept. 26, 1931	Week ended Sept. 27, 1930
<b>West South Central States:</b>								
Arkansas.....	1	1	14	4	1	0	15	15
Louisiana.....	0	11	11	8	0	1	56	27
Oklahoma <sup>1</sup> .....	0	9	24	34	1	14	49	59
Texas <sup>2</sup> .....	0	8	30	11	1	4	20	7
<b>Mountain States:</b>								
Montana.....	5	0	9	15	2	0	10	15
Idaho.....	0	1	2	1	0	0	5	0
Wyoming.....	0	7	5	7	1	0	1	0
Colorado.....	0	4	11	9	1	0	7	11
New Mexico.....	2	2	2	8	0	0	5	20
Arizona.....	0	1	5	5	0	0	3	6
Utah <sup>3</sup> .....	1	2	3	3	0	0	2	2
<b>Pacific States:</b>								
Washington.....	4	3	42	31	6	12	4	5
Oregon.....	1	1	9	13	6	2	8	4
California.....	10	65	62	59	6	7	8	11

<sup>1</sup> Week ended Friday.

<sup>2</sup> Typhus fever, 1931, 10 cases: 1 case in Maryland; 3 cases in Georgia; 3 cases in Florida; 2 cases in Alabama; and 1 case in Texas.

<sup>3</sup> Figures for 1931 are exclusive of Oklahoma City and Tulsa.

### SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
<i>August, 1931</i>										
California.....	21	148	49	7	197	8	22	145	28	83
Florida.....	12	12	4	66	5	1	0	6	1	13
Idaho.....	1	9			6		1	18	1	8
Illinois.....	17	179	9	64	218	1	116	242	37	106
Louisiana.....	1	69	17	62	6	30	0	46	6	245
New York.....	37	233		13	793		2,638	393	6	187
Oklahoma <sup>1</sup> .....	4	97	67	262	4	89	3	40	15	199
Oregon.....		19	31	8	29		1	20	35	21
Pennsylvania.....	47	186		2	413	3	34	327	0	177
Porto Rico.....		29	59	3,424	18	1	3		0	12
Texas.....	1	80	23	947		9	8	77		123
Virginia.....	4	123	505	91	101	56	13	125	3	254
Washington.....	4	18	18		32		14	45	47	29

<sup>1</sup> Exclusive of Oklahoma City and Tulsa.

<i>August, 1931</i>		Cases	Chicken pox—Continued.	Cases
<b>Anthrax:</b>			Oklahoma <sup>1</sup> .....	9
California.....	1		Oregon.....	38
Illinois.....	1		Pennsylvania.....	138
New York.....	2		Porto Rico.....	1
Pennsylvania.....	2		Virginia.....	84
<b>Chicken pox:</b>			Washington.....	47
California.....	129		<b>Diarrhea and dysentery:</b>	
Florida.....	3		Virginia.....	1,691
Idaho.....	4		<b>Dysentery:</b>	
Illinois.....	66		California (amebic).....	6
Louisiana.....	5		California (bacillary).....	11
New York.....	194		Florida.....	1

<sup>1</sup> Exclusive of Oklahoma City and Tulsa.

Dysentery—Continued.	
Illinois.....	134
Illinois (amebic).....	4
Illinois (bacillary).....	7
Louisiana.....	13
New York.....	21
Oklahoma <sup>1</sup> .....	41
Porto Rico.....	17
Filariasis:	
Porto Rico.....	3
Food poisoning:	
California.....	19
German measles:	
California.....	24
Illinois.....	9
New York.....	42
Pennsylvania.....	14
Washington.....	15
Granuloma, coccidioidal:	
California.....	1
Hookworm disease:	
California.....	2
Louisiana.....	11
Impetigo contagiosa:	
Oregon.....	5
Washington.....	3
Lead poisoning:	
Illinois.....	4
Leprosy:	
California.....	1
Louisiana.....	1
Porto Rico.....	2
Lethargic encephalitis:	
California.....	2
Louisiana.....	1
New York.....	12
Oregon.....	4
Pennsylvania.....	9
Washington.....	5
Mumps:	
California.....	149
Florida.....	6
Idaho.....	5
Illinois.....	127
Louisiana.....	12
New York.....	261
Oklahoma <sup>1</sup> .....	2
Oregon.....	27
Pennsylvania.....	380
Porto Rico.....	4
Washington.....	22
Ophthalmia neonatorum:	
California.....	2
Illinois.....	7
New York.....	3
Oklahoma <sup>1</sup> .....	1
Pennsylvania.....	13
Porto Rico.....	4
Paratyphoid fever:	
California.....	7
Illinois.....	9
Louisiana.....	3
New York.....	16
Oregon.....	1
Porto Rico.....	3

<sup>1</sup> Exclusive of Oklahoma City and Tulsa.

Paratyphoid fever—Continued.	
Texas.....	5
Washington.....	1
Puerperal septicemia:	
New York.....	13
Pennsylvania.....	22
Washington.....	1
Rabies in animals:	
California.....	36
Louisiana.....	4
New York <sup>1</sup> .....	3
Oregon.....	1
Relapsing fever:	
California.....	4
Rocky Mountain spotted or tick fever:	
Oregon.....	2
Scabies:	
Oklahoma <sup>1</sup> .....	1
Oregon.....	2
Septic sore throat:	
California.....	4
Illinois.....	3
Louisiana.....	1
New York.....	11
Oklahoma <sup>1</sup> .....	22
Oregon.....	3
Tetanus:	
Illinois.....	13
Louisiana.....	3
New York.....	11
Oklahoma <sup>1</sup> .....	2
Pennsylvania.....	6
Porto Rico.....	3
Tetanus, infantile:	
Porto Rico.....	5
Trachoma:	
California.....	7
Illinois.....	11
Oklahoma <sup>1</sup> .....	10
Porto Rico.....	2
Trichinosis:	
Illinois.....	1
New York.....	3
Pennsylvania.....	1
Tularaemia:	
California.....	1
Illinois.....	2
Louisiana.....	1
Virginia.....	2
Typhus fever:	
Florida.....	3
New York.....	2
Virginia.....	2
Undulant fever:	
California.....	4
Idaho.....	2
Illinois.....	8
Louisiana.....	3
New York.....	11
Oklahoma <sup>1</sup> .....	1
Oregon.....	2
Pennsylvania.....	3
Virginia.....	2
Washington.....	7

<sup>1</sup> Exclusive of New York City.

Vincent's angina:	Cases	Whooping cough—Continued.	Cases
New York <sup>1</sup> .....	76	Louisiana.....	18
Oklahoma <sup>1</sup> .....	4	New York.....	1,754
Oregon.....	13	Oklahoma <sup>1</sup> .....	35
Whooping cough:		Oregon.....	43
California.....	704	Pennsylvania.....	1,479
Florida.....	5	Porto Rico.....	165
Idaho.....	5	Virginia.....	518
Illinois.....	1,067	Washington.....	164

<sup>1</sup> Exclusive of Oklahoma City and Tulsa.<sup>1</sup> Exclusive of New York City.

*Cases of certain communicable diseases reported for the month of March, 1931, by State health officers*

State	Chicken pox	Diph- theria	Measles	Mumps	Scarlet fever	Small- pox	Tuber- cu- losis	Typhoid and para- typhoid fever	Whoop- ing cough
Maine.....	216	12	214	262	143	0	47	4	176
New Hampshire <sup>1</sup> .....									
Vermont.....	68	4	25	145	43	0	19	0	96
Massachusetts.....	1,050	201	2,023	683	1,637	0	582	9	877
Rhode Island.....	93	26	52	128	266	0	55	0	38
Connecticut.....	392	33	3,065	327	277	0	147	2	396
New York.....	3,038	534	8,213	1,913	4,119	36	1,849	38	2,223
New Jersey.....	2,044	273	3,275	267	1,339		475	8	706
Pennsylvania.....	4,795	415	15,170	2,228	2,464	0	740	55	1,007
Ohio.....	2,452	199	3,501	1,803	2,285	256	661	21	440
Indiana.....	473	124	3,026	84	1,347	447	194	7	232
Illinois.....	1,563	518	7,163	1,497	2,415	169	1,079	15	657
Michigan.....	1,574	160	789	618	1,752	86	625	11	879
Wisconsin.....	1,845	55	1,887	3,382	654	24	120	5	497
Minnesota.....	783	89	455		501	30	210	5	238
Iowa.....	471	25	82	158	492	335	23	4	85
Missouri.....	448	298	1,853	168	1,591	213	254	31	107
North Dakota.....	154	19	156	117	106	35	21	4	60
South Dakota.....	201	43	330	11	94	112	17	0	41
Nebraska.....	390	42	30	602	226	224	20	2	79
Kansas.....	686	57	118	522	279	487	163	2	122
Delaware.....	21	11	388	101	101	0	18	1	9
Maryland.....	683	64	4,829	382	371	0	249	11	124
District of Columbia.....	204	61	950		127	0	82	1	35
Virginia.....	840	110	3,358		205	10	158	8	519
West Virginia.....	343	38	364		118	56	67	16	208
North Carolina.....	718	104	2,980		219	5		5	637
South Carolina.....	304	132	485	139	25	12	139	18	182
Georgia.....	186	29	546	178	337	3	130	27	131
Florida.....	290	35	702	35	26	6	44	11	60
Kentucky <sup>1</sup> .....									
Tennessee.....	443	57	1,651	159	561	73	229	28	169
Alabama.....	248	86	2,000	353	113	56	511	14	77
Mississippi.....	1,090	60	326	510	110	177	159	15	391
Arkansas.....	300	20	127	82	92	107	7	12	97
Louisiana.....	86	88	78	10	100	121	135	24	23
Oklahoma <sup>4</sup> .....	82	40	102	23	133	260	32	12	61
Texas.....		149			142			15	
Montana.....	126	14	43	196	106	19	64	6	173
Idaho.....	87	13	57	83	121	31	13	20	179
Wyoming.....	107	2	14	48	121	16	2	4	64
Colorado.....	378	42	1,453	275	219	22	54	2	283
New Mexico.....	113	20	289	95	43	16	78	3	32
Arizona.....	54	12	622	26	21	9	97	2	20
Utah <sup>1</sup> .....									
Nevada.....	20	1	263	7	1	0	9	0	2
Washington.....	575	35	219	246	221	165	59	13	260
Oregon.....	297	18	331	276	93	112	45	8	50
California.....	2,509	222	5,969	1,492	620	216	962	33	1,211

<sup>1</sup> Report not received.<sup>2</sup> Pulmonary.<sup>3</sup> Reports received weekly.<sup>4</sup> Exclusive of Oklahoma City and Tulsa.

Case rates per 100,000 population (annual basis) for the month of March, 1931

State	Chicken pox	Diph- theria	Measles	Mumps	Scarlet fever	Small- pox	Tuber- cu- losis	Typhoid and para- typhoid fever	Whoop- ing cough
Maine.....	318	18	315	385	210	0	69	6	259
New Hampshire <sup>1</sup> .....	222	13	82	474	140	0	62	0	314
Vermont.....	238	55	554	187	448	0	159	2	240
Massachusetts.....	157	44	88	216	449	0	93	0	64
Rhode Island.....	232	24	2,206	236	200	0	106	1	285
Connecticut.....	278	49	752	175	377	3	169	3	201
New York.....	580	77	929	76	380	-----	135	2	204
New Jersey.....	579	50	1,833	269	298	0	89	7	122
Pennsylvania.....	427	35	626	314	398	45	115	4	77
Ohio.....	170	45	1,088	30	484	161	70	3	83
Indiana.....	237	78	1,065	227	366	26	163	2	100
Illinois.....	372	38	186	146	414	20	148	3	208
Michigan.....	730	22	746	1,338	259	9	47	2	197
Wisconsin.....	357	41	207	-----	228	14	96	2	108
Minnesota.....	224	12	39	75	234	159	11	2	40
Iowa.....	144	67	597	54	512	69	82	10	34
Missouri.....	285	33	268	201	182	60	36	7	103
North Dakota.....	338	72	555	19	158	188	29	10	69
South Dakota.....	331	36	25	511	192	190	17	2	67
Nebraska.....	426	35	73	324	173	303	101	1	76
Kansas.....	103	54	1,901	495	495	0	88	5	44
Delaware.....	486	46	3,438	272	264	0	177	8	88
Maryland.....	487	146	2,269	0	303	0	196	2	84
District of Columbia.....	406	53	1,623	-----	99	5	76	4	251
Virginia.....	229	25	243	-----	79	37	45	11	139
West Virginia.....	261	38	1,061	-----	79	2	-----	2	231
North Carolina.....	206	89	327	94	17	8	94	12	122
South Carolina.....	75	12	221	72	136	1	53	11	63
Georgia.....	223	27	541	27	20	5	34	8	46
Florida.....	197	25	733	71	249	32	102	12	75
Kentucky <sup>3</sup> .....	109	38	878	155	50	25	224	6	34
Tennessee.....	630	35	188	295	64	102	92	9	226
Alabama.....	189	13	80	52	58	67	14	8	61
Arkansas.....	47	48	43	6	55	67	74	13	13
Louisiana.....	46	22	57	13	75	146	18	7	84
Oklahoma <sup>4</sup> .....	-----	29	-----	-----	28	-----	-----	3	-----
Texas.....	276	31	94	429	232	42	140	13	379
Montana.....	229	34	150	219	319	82	34	53	472
Idaho.....	549	10	72	246	621	82	10	21	329
Wyoming.....	425	47	1,633	309	246	25	61	2	318
Colorado.....	309	55	790	260	117	44	213	8	87
New Mexico.....	142	32	1,635	68	55	24	255	5	53
Arizona.....	254	13	3,340	89	13	0	114	0	25
Utah <sup>3</sup> .....	426	26	162	182	164	122	44	10	193
Nevada.....	359	22	400	333	112	135	54	10	60
Washington.....	496	44	1,181	295	123	43	190	7	240
Oregon.....	-----	-----	-----	-----	-----	-----	-----	-----	-----
California.....	-----	-----	-----	-----	-----	-----	-----	-----	-----

<sup>1</sup> Report not received.  
<sup>2</sup> Pulmonary.

<sup>3</sup> Reports received weekly.  
<sup>4</sup> Exclusive of Oklahoma City and Tulsa.

RECIPROCAL NOTIFICATIONS

Notifications regarding communicable diseases sent during the month of August, 1931, by departments of health of certain States to other State health departments

Disease	Calif- ornia	Connec- ticut	Illinois	Maine	Minne- sota	Missouri	New Jersey	New York
Diphtheria.....	-----	2	-----	-----	-----	-----	-----	-----
Gonorrhoea.....	-----	-----	-----	-----	-----	-----	-----	-----
Malaria.....	1	-----	-----	-----	-----	-----	-----	-----
Pneumonia.....	1	-----	-----	-----	-----	-----	-----	-----
Poliomylitis.....	-----	2	-----	1	2	1	1	3
Scarlet fever.....	-----	-----	-----	-----	1	-----	-----	2
Trachoma.....	-----	-----	-----	-----	1	-----	-----	-----
Tuberculosis.....	-----	-----	16	-----	32	-----	-----	-----
Typhoid fever.....	-----	-----	-----	-----	1	-----	2	5

## GENERAL CURRENT SUMMARY AND WEEKLY REPORTS FROM CITIES

The 97 cities reporting cases used in the following table are situated in all parts of the country and have an estimated aggregate population of more than 33,240,000. The estimated population of the 90 cities reporting deaths is more than 31,695,000. The estimated expectancy is based on the experience of the last nine years, excluding epidemics.

Weeks ended September 19, 1931, and September 20, 1930

		1931	1930	Esti- mated ex- pectancy
<b>Diphtheria: Cases reported</b>				
48 States	-----	1, 149	504	-----
67 cities	-----	217	291	468
<b>Measles:</b>				
45 States	-----	400	463	-----
97 cities	-----	142	101	-----
<b>Meningococcus meningitis:</b>				
43 States	-----	68	67	-----
97 cities	-----	41	28	-----
<b>Poliomyelitis:</b>				
43 States	-----	1, 268	503	-----
<b>Scarlet fever:</b>				
48 States	-----	1, 226	1, 050	-----
67 cities	-----	366	381	332
<b>Smallpox:</b>				
45 States	-----	69	128	-----
97 cities	-----	4	28	7
<b>Typhoid fever:</b>				
46 States	-----	1, 037	940	-----
97 cities	-----	267	137	157
<b>Influenza and pneumonia: Deaths reported</b>				
60 cities	-----	377	355	-----
60 cities	-----	0	0	-----

## City reports for week ended September 19, 1931

The "estimated expectancy" given for diphtheria, poliomyelitis, scarlet fever, smallpox, and typhoid fever is the result of an attempt to ascertain from previous occurrence the number of cases of the disease under consideration that may be expected to occur during a certain week in the absence of epidemics. It is based on reports to the Public Health Service during the past nine years. It is in most instances the median number of cases reported in the corresponding weeks of the preceding years. When the reports include several epidemics, or when for other reasons the median is unsatisfactory, the epidemic periods are excluded, and the estimated expectancy is the mean number of cases reported for the week during nonepidemic years.

If the reports have not been received for the full nine years, data are used for as many years as possible, but no year earlier than 1922 is included. In obtaining the estimated expectancy, the figures are smoothed when necessary to avoid abrupt deviation from the usual trend. For some of the diseases given in the table the available data were not sufficient to make it practicable to compute the estimated expectancy.

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
<b>NEW ENGLAND</b>								
<b>Maine:</b>								
Portland	0	0	0	-----	0	0	0	1
<b>New Hampshire:</b>								
Concord	0	0	0	-----	0	0	0	0
Manchester	0	0	0	-----	0	0	0	0
Nashua	0	0	0	-----	0	0	0	0
<b>Vermont:</b>								
Barre	0	0	0	-----	0	0	0	0
Burlington	0	0	0	-----	0	0	0	0
<b>Massachusetts:</b>								
Boston	10	14	10	4	0	3	0	8
Fall River	1	2	0	1	0	1	0	1
Springfield	0	1	0	-----	0	0	1	3
Worcester	1	3	1	1	0	0	17	2
<b>Rhode Island:</b>								
Pawtucket	0	1	2	0	0	1	0	0
Providence	0	3	1	-----	0	7	1	1
<b>Connecticut:</b>								
Bridgeport	1	2	1	1	1	0	0	3
Hartford	0	1	0	-----	0	0	1	2
New Haven	0	0	0	-----	0	1	0	0

City reports for week ended September 19, 1931—Continued

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
<b>MIDDLE ATLANTIC</b>								
New York:								
Buffalo.....	0	7	2	0	0	1	1	7
New York.....	12	74	33	8	3	16	13	86
Rochester.....	2	2	0	0	0	3	8	1
Syracuse.....	1	1	0	0	0	1	0	1
New Jersey:								
Camden.....	0	2	0	0	0	0	0	2
Nowark.....	1	8	3	0	0	4	0	7
Trenton.....	0	1	0	0	1	2	0	1
Pennsylvania:								
Philadelphia.....	11	27	3	2	1	5	3	24
Pittsburgh.....	4	11	8	6	1	9	0	19
Reading.....	0	1	0	0	0	0	0	0
<b>EAST NORTH CENTRAL</b>								
Ohio:								
Cincinnati.....	2	5	5	0	0	0	1	4
Cleveland.....	12	22	0	2	0	10	28	12
Columbus.....	0	2	4	1	1	0	1	4
Toledo.....	2	4	0	0	0	1	0	4
Indiana:								
Fort Wayne.....	0	1	1	0	0	0	0	2
Indianapolis.....	1	4	1	0	0	2	8	1
South Bend.....	0	0	0	0	0	0	0	2
Terre Haute.....	1	1	0	0	0	0	0	1
Illinois:								
Chicago.....	22	56	27	2	3	8	7	26
Springfield.....	2	0	0	0	0	0	3	1
Michigan:								
Detroit.....	8	29	7	1	1	1	2	14
Flint.....	0	2	1	0	0	0	6	2
Grand Rapids.....	1	0	0	0	0	3	0	0
Wisconsin:								
Kenosha.....	0	0	0	0	0	0	13	0
Madison.....	0	1	0	0	0	0	3	0
Milwaukee.....	12	5	2	0	0	4	12	5
Racine.....	3	0	0	0	0	0	9	0
Superior.....	0	1	0	0	0	0	0	0
<b>WEST NORTH CENTRAL</b>								
Minnesota:								
Duluth.....	0	0	0	0	0	0	1	2
Minneapolis.....	7	14	2	2	2	2	23	4
St. Paul.....	5	7	1	0	0	2	2	0
Iowa:								
Davenport.....	3	0	0	0	0	0	0	0
Des Moines.....	0	0	1	0	0	0	0	0
Sioux City.....	0	1	0	0	0	0	1	0
Waterloo.....	0	0	1	0	0	0	0	0
Missouri:								
Kansas City.....	0	2	2	0	0	1	0	2
St. Joseph.....	1	0	1	0	0	0	0	3
St. Louis.....	2	17	8	0	0	1	1	3
North Dakota:								
Fargo.....	1	0	0	0	0	0	1	0
Grand Forks.....	0	0	0	0	0	0	0	0
South Dakota:								
Aberdeen.....	12	0	0	0	0	0	0	0
Sioux Falls.....	0	0	0	0	0	0	0	0
Nebraska:								
Omaha.....	0	5	2	0	0	0	0	1
Kansas:								
Topeka.....	0	1	1	1	0	0	1	0
Wichita.....	2	1	4	0	0	1	1	0
<b>SOUTH ATLANTIC</b>								
Delaware:								
Wilmington.....	0	1	0	0	0	0	0	0
Maryland:								
Baltimore.....	12	15	8	3	0	3	4	10
Cumberland.....	0	1	0	0	0	0	0	1
Frederick.....	0	0	0	0	0	0	0	0
District of Columbia:								
Washington.....	0	9	9	1	1	0	0	6
Virginia:								
Lynchburg.....	0	2	1	0	0	2	0	0
Norfolk.....	0	1	1	0	0	0	0	2
Richmond.....	0	12	5	1	0	0	0	2
Roanoke.....	0	3	6	0	0	0	0	1



## City reports for week ended September 19, 1931—Continued

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
<b>SOUTH ATLANTIC—CON.</b>								
<b>West Virginia:</b>								
Charleston	0	0	0	0	0	1	0	0
Wheeling	0	1	0	0	0	0	0	0
<b>North Carolina:</b>								
Raleigh	1	2	1	0	0	0	0	0
Wilmington	0	0	0	0	0	0	0	0
Winston-Salem	1	2	3	0	0	0	0	0
<b>South Carolina:</b>								
Charleston	0	1	0	3	0	0	0	2
Columbia	0	1	1	0	0	0	0	1
Greenville	0	1	0	0	0	0	0	0
<b>Georgia:</b>								
Atlanta	1	5	3	0	0	1	1	4
Brunswick	0	0	0	0	0	0	0	0
Savannah	0	1	0	4	0	0	0	2
<b>Florida:</b>								
Miami	0	2	1	0	0	1	0	1
Tampa	0	1	0	0	0	0	0	0
<b>EAST SOUTH CENTRAL</b>								
<b>Kentucky:</b>								
Covington	0	0	0	0	0	0	0	0
<b>Tennessee:</b>								
Memphis	1	3	7	0	0	0	0	1
Nashville	0	2	4	0	0	0	0	6
<b>Alabama:</b>								
Birmingham	0	3	0	0	0	0	0	2
Mobile	0	1	3	0	0	0	0	0
Montgomery	0	2	2	0	0	0	0	0
<b>WEST SOUTH CENTRAL</b>								
<b>Arkansas:</b>								
Fort Smith	0	0	2	0	0	1	0	0
Little Rock	0	0	1	0	0	1	0	5
<b>Louisiana:</b>								
New Orleans	1	8	1	1	0	0	0	8
Shreveport	0	1	0	0	0	3	0	0
<b>Oklahoma:</b>								
Muskogee	0	0	3	0	0	0	0	0
<b>Texas:</b>								
Dallas	0	6	2	0	0	0	0	1
Fort Worth	1	1	1	0	0	0	0	1
Galveston	0	0	0	0	0	0	0	2
Houston	0	5	7	0	0	0	0	4
San Antonio	0	2	0	0	0	0	0	0
<b>MOUNTAIN</b>								
<b>Montana:</b>								
Billings	0	0	0	0	0	7	0	0
Great Falls	1	0	0	0	0	0	0	1
Helena	0	0	0	0	0	5	0	0
Missoula	0	0	0	0	0	0	0	1
<b>Idaho:</b>								
Boise	1	0	0	0	0	0	1	1
<b>Colorado:</b>								
Denver	2	8	1	0	0	2	2	5
Pueblo	1	0	0	0	0	0	4	0
<b>New Mexico:</b>								
Albuquerque	0	0	0	0	0	0	0	0
<b>Arizona:</b>								
Phoenix	0	0	0	0	0	0	0	1
<b>Utah:</b>								
Salt Lake City	0	2	1	0	0	0	2	1
<b>Nevada:</b>								
Reno	0	0	0	0	0	0	0	0
<b>PACIFIC</b>								
<b>Washington:</b>								
Seattle	7	3	0	0	0	0	1	0
Spokane	1	1	0	0	0	0	0	0
Tacoma	1	2	4	0	0	0	0	2
<b>Oregon:</b>								
Portland	1	5	2	0	0	4	5	2
Salem	0	0	0	0	0	0	1	0
<b>California:</b>								
Los Angeles	2	13	7	19	1	4	4	24
Sacramento	1	1	4	0	0	3	1	3
San Francisco	9	8	0	1	0	20	3	6

City reports for week ended September 19, 1931—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
<b>NEW ENGLAND</b>											
<b>Maine:</b>											
Portland.....	1	0	0	0	0	0	0	2	0	5	22
<b>New Hampshire:</b>											
Concord.....	0	0	0	0	0	0	0	0	0	0	7
Manchester.....	1	0	0	0	0	0	0	0	0	0	16
Nashua.....	0	0	0	0	0	0	0	0	0	0	-----
<b>Vermont:</b>											
Barre.....	0	1	0	0	0	1	0	0	0	0	1
Burlington.....	0	0	0	3	0	0	0	0	0	1	7
<b>Massachusetts:</b>											
Boston.....	16	16	0	0	0	9	3	3	1	24	202
Fall River.....	1	4	0	0	0	0	0	0	0	1	21
Springfield.....	1	0	0	0	0	0	0	0	0	1	19
Worcester.....	3	6	0	0	0	2	1	1	0	13	42
<b>Rhode Island:</b>											
Pawtucket.....	0	0	0	0	0	1	0	0	0	0	12
Providence.....	2	7	0	0	0	1	2	0	0	5	57
<b>Connecticut:</b>											
Bridgeport.....	2	1	0	0	0	1	0	0	0	1	34
Hartford.....	1	1	0	0	0	1	0	1	0	5	36
New Haven.....	1	0	0	0	0	2	2	2	0	2	31
<b>MIDDLE ATLANTIC</b>											
<b>New York:</b>											
Buffalo.....	6	6	0	0	0	9	1	1	0	21	125
New York.....	27	22	0	0	0	83	37	25	6	166	1,343
Rochester.....	2	13	0	0	0	0	1	0	0	6	76
Syracuse.....	2	7	0	0	0	1	0	0	0	24	46
<b>New Jersey:</b>											
Camden.....	0	0	0	0	0	0	1	3	0	3	25
Newark.....	3	6	0	0	0	7	1	0	0	81	100
Trenton.....	1	2	0	0	0	3	1	0	0	1	37
<b>Pennsylvania:</b>											
Philadelphia.....	19	28	0	0	0	35	10	1	0	109	442
Pittsburgh.....	11	12	0	0	0	8	3	5	0	24	160
Reading.....	0	0	0	0	0	0	1	0	0	0	19
<b>EAST NORTH CENTRAL</b>											
<b>Ghio:</b>											
Cincinnati.....	6	17	0	1	0	4	2	1	0	10	147
Cleveland.....	13	10	0	0	0	12	4	130	7	102	196
Columbus.....	3	2	0	0	0	5	1	0	0	7	79
Toledo.....	4	5	1	1	0	6	2	0	0	19	56
<b>Indiana:</b>											
Fort Wayne.....	1	0	0	0	0	0	1	1	0	5	23
Indianapolis.....	3	5	0	0	0	7	1	0	0	8	-----
South Bend.....	1	1	0	0	0	1	1	0	0	0	15
Terre Haute.....	1	0	0	0	0	0	0	0	0	0	18
<b>Illinois:</b>											
Chicago.....	33	40	0	0	0	46	6	6	0	182	632
Springfield.....	0	2	0	0	0	0	1	0	0	0	15
<b>Michigan:</b>											
Detroit.....	27	9	0	0	0	25	4	8	1	147	229
Flint.....	6	3	0	1	0	0	0	1	0	6	21
Grand Rapids.....	5	3	0	0	0	2	0	0	0	8	28
<b>Wisconsin:</b>											
Kenosha.....	0	1	0	0	0	0	2	0	0	5	4
Madison.....	1	0	0	0	-----	0	0	0	-----	0	-----
Milwaukee.....	8	4	0	0	0	6	1	0	0	49	97
Racine.....	2	3	0	0	0	0	0	0	0	4	9
Superior.....	1	2	0	0	0	1	0	0	0	0	6

## City reports for week ended September 19, 1931—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuber- culo- sis, deaths re- ported	Typhoid fever			Whoop- ing cough, cases re- ported	Deaths, all causes
	Cases, esti- mated expect- ancy	Cases re- ported	Cases, esti- mated expect- ancy	Cases re- ported	Deaths re- ported		Cases, esti- mated expect- ancy	Cases re- ported	Deaths re- ported		
WEST NORTH CENTRAL											
Minnesota:											
Duluth.....	4	6	0	0	0	2	0	8	0	0	36
Minneapolis....	16	6	0	0	0	0	1	2	0	8	105
St. Paul.....	8	0	0	0	0	1	1	0	0	7	49
Iowa:											
Davenport.....	0	0	0	0	0	0	0	0	0	3	---
Des Moines.....	2	1	0	2	0	0	0	1	0	0	24
Sioux City.....	0	1	0	0	0	0	1	0	0	2	---
Waterloo.....	1	0	0	0	0	0	0	0	0	1	---
Missouri:											
Kansas City....	4	0	0	0	0	6	2	0	0	3	97
St. Joseph.....	0	0	0	0	0	0	0	0	0	0	30
St. Louis.....	12	13	0	0	0	13	6	7	0	51	200
North Dakota:											
Fargo.....	2	0	0	0	0	0	0	0	0	1	---
Grand Forks....	0	0	0	0	0	0	0	0	0	0	---
South Dakota:											
Aberdeen.....	0	0	0	0	0	0	0	0	0	7	---
Sioux Falls....	0	0	0	0	0	0	0	0	0	0	11
Nebraska:											
Omaha.....	1	0	0	0	0	2	1	0	0	0	52
Kansas:											
Topeka.....	1	1	0	0	0	0	2	0	0	0	10
Wichita.....	2	4	0	0	0	1	0	2	0	0	34
SOUTH ATLANTIC											
Delaware:											
Wilmington....	0	1	0	0	0	0	0	0	0	2	36
Maryland:											
Baltimore.....	6	10	0	0	0	11	8	5	2	125	206
Cumberland....	0	1	0	0	0	1	1	0	1	0	13
Frederick.....	0	0	0	0	0	0	0	0	0	0	---
District of Colum- bia:											
Washington....	6	4	0	0	0	11	3	2	2	25	141
Virginia:											
Lynchburg.....	0	2	0	0	0	2	1	0	0	0	15
Norfolk.....	1	3	0	0	0	4	1	3	0	11	---
Richmond.....	4	8	0	0	0	0	2	0	1	2	45
Roanoke.....	1	0	0	0	0	1	1	0	0	2	18
West Virginia:											
Charleston....	1	0	0	0	0	0	2	0	0	3	26
Wheeling.....	1	0	0	0	0	0	2	0	0	0	15
North Carolina:											
Raleigh.....	0	2	0	0	0	1	0	0	0	12	9
Wilmington....	0	0	0	0	0	1	0	0	0	3	18
Winston-Salem..	2	1	1	0	0	1	1	0	0	12	15
South Carolina:											
Charleston....	0	4	0	0	0	3	2	1	1	0	22
Columbia.....	0	2	0	0	0	3	0	2	0	0	22
Greenville....	0	0	0	0	0	0	0	0	0	0	---
Georgia:											
Atlanta.....	5	1	0	0	0	3	3	2	0	1	60
Brunswick....	0	0	0	0	0	0	0	1	0	0	5
Savannah....	0	0	0	0	0	1	0	0	0	1	26
Florida:											
Miami.....	0	0	0	0	0	0	1	2	0	0	20
Tampa.....	1	0	0	0	0	2	0	0	1	0	26

City reports for week ended September 19, 1931—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
<b>EAST SOUTH CENTRAL</b>											
Kentucky:											
Covington.....	0	1	0	0	0	0	1	0	0	0	17
Tennessee:											
Memphis.....	2	3	0	0	0	11	5	3	0	11	102
Nashville.....	2	1	0	0	0	5	5	0	0	7	57
Alabama:											
Birmingham..	4	4	0	0	0	5	4	4	0	4	53
Mobile.....	0	2	0	0	0	1	0	0	0	0	19
Montgomery..	0	3	0	0			0	1		6	
<b>WEST SOUTH CENTRAL</b>											
Arkansas:											
Fort Smith....	1	0	0	0			0	0		0	
Little Rock...	1	0	0	0	0	1	1	0	0	0	6
Louisiana:											
New Orleans...	2	3	0	0	0	10	4	9	0	0	130
Shreveport...	1	1	0	0	0	1	0	2	1	6	26
Oklahoma:											
Muskogee.....	0	0	0	0	0	0	0	1	0	0	
Texas:											
Dallas.....	2	6	1	0	0	4	2	0	0	10	41
Fort Worth...	2	4	0	0	0	2	1	1	0	0	31
Galveston....	0	0	0	0	0	0	0	0	0	0	11
Houston.....	1	3	0	0	0	5	1	1	1	0	83
San Antonio..	1		0				0				
<b>MOUNTAIN</b>											
Montana:											
Billings.....	0	0	0	0	0	0	0	0	0	1	12
Great Falls...	0	0	1	0	0	0	0	0	0	0	7
Helena.....	0	0	0	0	0	0	0	0	0	1	7
Missoula.....	0	1	0	0	0	2	0	0	1	0	8
Idaho:											
Boise.....	0	0	0	0	0	0	0	0	0	1	5
Colorado:											
Denver.....	4	9	0	0	0	8	2	0	0	7	64
Pueblo.....	0	0	0	0	0	0	1	2	0	0	12
New Mexico:											
Albuquerque..	0	0	0	0	0	3	1	1	0	0	7
Arizona:											
Phoenix.....	1	0	0	0	0	1	0	0	0	0	
Utah:											
Salt Lake City.	1	0	0	0	0	2	2	1	0	1	35
Nevada:											
Reno.....	0	0	0	0	0	0	0	0	0	0	6
<b>PACIFIC</b>											
Washington:											
Seattle.....	5	8	1	0			1	1		12	
Spokane.....	2	0	1	0			1	0		0	
Tacoma.....	1	1	1	0	0	0	0	0	0	3	26
Oregon:											
Portland.....	3	0	2	1	0	4	2	0	0	0	62
Salem.....	0	0	0	0	0	0	0	0	0	0	
California:											
Los Angeles...	9	16	1	0	0	18	2	3	1	10	252
Sacramento...	1	0	0	0	0	2	0	2	0	3	30
San Francisco..	6	3	0	2	0	9	0	12	1	5	



City reports for week ended September 19, 1931—Continued

Division, State, and city	Meningo- coccus meningitis		Lethargic en- cephalitis		Pellagra		Poliomyelitis (infan- tile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, esti- mated expect- ancy	Cases	Deaths
<b>SOUTH ATLANTIC<sup>1</sup></b>									
<b>Maryland:</b>									
Baltimore.....	0	0	0	0	0	0	1	2	0
Cumberland.....	1	0	0	0	0	0	0	0	0
<b>Virginia:</b>									
Lynchburg.....	0	0	0	0	0	1	0	0	0
Richmond.....	0	0	0	0	0	0	0	1	0
<b>North Carolina:</b>									
Raleigh.....	0	0	0	0	0	0	0	1	0
<b>South Carolina:</b>									
Charleston.....	0	0	0	0	6	0	0	0	0
Columbia.....	0	0	0	0	0	1	0	0	0
<b>Georgia:</b>									
Atlanta <sup>1</sup> .....	0	0	0	0	0	0	0	1	1
Brunswick.....	0	0	0	0	1	0	0	0	0
Savannah <sup>1</sup> .....	1	0	0	0	0	0	0	0	0
<b>EAST SOUTH CENTRAL</b>									
<b>Tennessee:</b>									
Memphis.....	1	0	0	0	0	1	0	5	1
Nashville.....	1	0	0	0	0	0	0	1	0
<b>WEST SOUTH CENTRAL</b>									
<b>Louisiana:</b>									
New Orleans.....	0	0	1	1	1	0	0	2	0
<b>Texas:<sup>1</sup></b>									
Dallas.....	0	0	0	0	1	1	0	0	0
Houston.....	0	0	0	0	0	1	0	0	0
<b>MOUNTAIN</b>									
<b>Montana:</b>									
Great Falls.....	0	0	0	0	0	0	0	1	0
Missoula.....	0	0	0	0	0	0	0	1	1
<b>New Mexico:</b>									
Albuquerque.....	0	0	0	0	0	0	0	1	1
<b>Utah:</b>									
Salt Lake.....	1	0	0	0	0	0	1	0	0
<b>Nevada:</b>									
Reno.....	0	0	0	0	0	0	1	1	0
<b>PACIFIC</b>									
<b>Washington:</b>									
Seattle.....	0	0	0	0	0	0	0	2	0
Tacoma.....	0	0	0	0	0	0	0	2	1
<b>Oregon:</b>									
Portland.....	0	0	0	0	0	0	1	1	1
<b>California:</b>									
Los Angeles.....	0	1	0	0	1	1	2	1	0
San Francisco.....	1	1	0	0	1	0	0	1	1

<sup>1</sup> Typhus fever, 6 cases: 1 case at Atlanta, Ga.; 2 cases at Savannah, Ga.; 2 cases at Miami, Fla.; and 1 case at Fort Worth, Tex.

The following tables give the rates per 100,000 population for 98 cities for the 5-week period ended September 19, 1931, compared with those for a like period ended September 20, 1930. The population figures used in computing the rates are estimated mid-year populations for 1930 and 1931, respectively, derived from the 1930 census. The 98 cities reporting cases have an estimated aggregate population of more than 33,000,000. The 91 cities reporting deaths have more than 31,500,000 estimated population.

Summary of weekly reports from cities, August 16 to September 19, 1931.—Annual rates per 100,000 population compared with rates for the corresponding period of 1930<sup>1</sup>

## DIPHTHERIA CASE RATES

	Week ended—									
	Aug. 22, 1931	Aug. 23, 1930	Aug. 29, 1931	Aug. 30, 1930	Sept. 5, 1931	Sept. 6, 1930	Sept. 12, 1931	Sept. 13, 1930	Sept. 19, 1931	Sept. 20, 1930
98 cities.....	30	33	31	38	37	40	35	44	34	40
New England.....	67	44	41	53	55	39	58	60	36	34
Middle Atlantic.....	19	27	18	29	24	29	26	26	22	30
East North Central.....	28	40	33	45	38	43	32	63	29	74
West North Central.....	31	25	36	27	26	35	34	56	42	48
South Atlantic.....	24	40	63	64	34	66	45	68	73	46
East South Central.....	35	12	52	12	81	48	99	24	93	24
West South Central.....	68	63	34	66	107	56	41	45	52	63
Mountain.....	44	44	17	70	52	44	26	35	17	26
Pacific.....	35	22	24	16	27	32	29	22	29	18

## MEASLES CASE RATES

	29	28	22	20	19	24	14	16	22	16
98 cities.....	29	28	22	20	19	24	14	16	22	16
New England.....	63	65	63	22	58	36	29	41	31	19
Middle Atlantic.....	25	31	13	22	14	27	8	10	18	16
East North Central.....	37	21	23	7	11	12	13	9	17	14
West North Central.....	13	19	8	27	9	31	11	15	13	19
South Atlantic.....	20	20	4	32	8	28	6	0	14	22
East South Central.....	23	6	6	12	6	24	6	0	0	0
West South Central.....	7	0	24	10	0	19	3	20	0	0
Mountain.....	70	26	52	35	52	53	35	35	122	44
Pacific.....	22	40	53	30	67	34	45	16	53	18

## SCARLET FEVER CASE RATES

	43	32	41	41	48	42	49	50	57	61
98 cities.....	43	32	41	41	48	42	49	50	57	61
New England.....	99	51	46	56	87	60	106	56	87	77
Middle Atlantic.....	38	25	30	26	37	24	30	26	43	45
East North Central.....	57	35	43	47	56	47	64	84	62	90
West North Central.....	19	35	31	43	30	58	36	35	59	45
South Atlantic.....	36	30	30	72	51	72	55	56	71	44
East South Central.....	17	30	70	102	87	60	64	36	81	36
West South Central.....	27	35	64	14	55	63	41	24	52	52
Mountain.....	44	88	165	88	26	35	61	79	87	76
Pacific.....	31	28	39	26	43	28	39	63	55	62

## SMALLPOX CASE RATES

	1	2	1	2	1	3	1	3	1	4
98 cities.....	1	2	1	2	1	3	1	3	1	4
New England.....	0	0	0	0	0	0	2	0	0	0
Middle Atlantic.....	0	0	0	0	0	0	0	0	0	0
East North Central.....	0	0	0	0	4	2	2	2	1	9
West North Central.....	6	8	4	8	4	14	6	27	0	21
South Atlantic.....	4	2	4	0	0	4	0	0	0	0
East South Central.....	0	0	0	0	0	0	6	0	0	0
West South Central.....	0	7	0	3	0	0	0	0	0	0
Mountain.....	0	0	0	0	0	0	0	0	0	0
Pacific.....	4	10	4	10	2	12	0	8	4	4

<sup>1</sup> The figures given in this table are rates per 100,000 population, annual basis, and not the number of cases reported. Populations used are estimated as of July 1, 1931 and 1930, respectively.

<sup>2</sup> Terre Haute, Ind., not included.

<sup>3</sup> St. Paul, Minn., and Fort Smith, Ark., not included.

<sup>4</sup> San Antonio, Tex., not included.

<sup>5</sup> St. Paul, Minn., not included.

<sup>6</sup> Fort Smith, Ark., not included.

Summary of weekly reports from cities, August 16 to September 19, 1931—Annual rates per 100,000 population compared with rates for the corresponding period of 1930—Continued

TYPHOID FEVER CASE RATES

	Week ended—									
	Aug. 22, 1931	Aug. 23, 1930	Aug. 29, 1931	Aug. 30, 1930	Sept. 5, 1931	Sept. 6, 1930	Sept. 12, 1931	Sept. 13, 1930	Sept. 19, 1931	Sept. 20, 1930
98 cities.....	21	19	22	24	20	21	23	26	42	22
New England.....	5	17	22	12	7	12	7	22	22	12
Middle Atlantic.....	14	13	20	20	13	20	13	24	16	15
East North Central.....	11	9	10	10	16	12	10	17	91	11
West North Central.....	19	21	13	19	6	14	13	21	38	29
South Atlantic.....	55	60	38	88	49	58	79	70	26	68
East South Central.....	70	78	47	42	41	48	35	48	47	48
West South Central.....	91	24	98	66	76	45	91	52	48	63
Mountain.....	9	26	9	44	4	9	35	62	26	0
Pacific.....	8	6	12	8	10	8	27	4	35	14

INFLUENZA DEATH RATES

91 cities.....	2	3	2	4	2	3	4	3	3	3
New England.....	2	0	0	0	2	0	2	0	2	2
Middle Atlantic.....	2	3	2	3	1	3	4	4	3	2
East North Central.....	2	1	1	4	1	2	3	3	3	2
West North Central.....	3	0	3	3	3	6	9	0	6	0
South Atlantic.....	6	8	6	8	2	8	2	2	4	0
East South Central.....	0	0	13	6	6	0	0	19	0	26
West South Central.....	0	4	0	7	10	11	17	0	0	7
Mountain.....	0	9	0	0	0	9	0	0	0	18
Pacific.....	7	7	2	2	2	0	2	0	2	0

PNEUMONIA DEATH RATES

91 cities.....	48	45	48	52	50	53	55	54	59	57
New England.....	36	56	46	51	24	56	58	68	50	56
Middle Atlantic.....	56	53	60	57	62	65	65	63	66	65
East North Central.....	32	27	28	50	33	36	36	43	45	42
West North Central.....	44	36	50	39	73	51	44	45	44	75
South Atlantic.....	63	52	69	60	61	68	63	58	57	53
East South Central.....	57	65	57	45	38	91	82	26	57	71
West South Central.....	59	57	59	36	83	50	73	57	82	46
Mountain.....	44	53	61	53	96	53	70	123	78	115
Pacific.....	53	40	29	45	19	27	46	25	84	40

1 Terre Haute, Ind., not included.

2 St. Paul, Minn., and Fort Smith, Ark., not included.

3 San Antonio, Tex., not included.

4 St. Paul, Minn., not included.

5 Fort Smith, Ark., not included.



## FOREIGN AND INSULAR

### CANADA

*Provinces—Communicable diseases—Week ended September 12, 1931.*—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the week ended September 12, 1931, as follows:

Province	Cerebro-spinal fever	Influenza	Poliomyelitis	Small-pox	Typhoid fever
Prince Edward Island <sup>1</sup> .....					
Nova Scotia <sup>2</sup> .....		3			
New Brunswick.....					1
Quebec.....			75		32
Ontario.....	1	2	18	2	32
Manitoba.....			2		13
Saskatchewan.....	1			12	2
Alberta.....			3		2
British Columbia.....	1		2		2
Total.....	3	5	100	14	86

<sup>1</sup> No case of any disease included in the table was reported during the week.

<sup>2</sup> Two cases of undulant fever.

*Quebec Province—Communicable diseases—Week ended September 12, 1931.*—The Bureau of Health of the Province of Quebec, Canada, reports cases of certain communicable diseases for the week ended September 12, 1931, as follows:

Disease	Cases	Disease	Cases
Chicken pox.....	3	Mumps.....	2
Diphtheria.....	34	Pollomyelitis.....	75
Erysipelas.....	5	Scarlet fever.....	26
German measles.....	1	Tuberculosis.....	36
Itch.....	1	Typhoid fever.....	32
Measles.....	15	Whooping cough.....	35

### CUBA

*Habana—Communicable diseases—Four weeks ended September 12, 1931.*—During the four weeks ended September 12, 1931, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chicken pox.....	1		Measles.....	38	3
Diphtheria.....	6	1	Scarlet fever.....	1	
Leprosy.....	2		Tuberculosis.....	26	4
Malaria.....	15	3	Typhoid fever.....	18	2

<sup>1</sup> Many of these cases are from the island of Cuba, outside of Habana.

**CZECHOSLOVAKIA**

*Communicable diseases—June, 1931.*—During the month of June, 1931, certain communicable diseases were reported in the Republic of Czechoslovakia, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax.....	16	—	Puerperal fever.....	27	11
Cerebrospinal meningitis.....	10	3	Scarlet fever.....	1,134	21
Diphtheria.....	1,158	64	Trachoma.....	209	—
Dysentery.....	19	2	Typhoid fever.....	326	25
Malaria.....	125	—	Typhus fever.....	2	—
Paratyphoid fever.....	16	1			

**JAMAICA**

*Communicable diseases—Four weeks ended September 12, 1931.*—During the four weeks ended September 12, 1931, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island of Jamaica, outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis.....	1	2	Paratyphoid fever.....	—	1
Chicken pox.....	—	1	Pollomyelitis.....	—	1
Diphtheria.....	1	1	Scarlet fever.....	—	3
Dysentery.....	—	3	Tuberculosis.....	39	65
Leprosy.....	—	1	Typhoid fever.....	25	62
Lethargic encephalitis.....	—	1			

**TRINIDAD**

*Port of Spain—Vital statistics—August, 1930, 1931.*—The following statistics for the month of August, 1930 and 1931, are taken from a report issued by the public health department of Port of Spain, Trinidad:

	1930	1931		1930	1931
Number of births.....	123	144	Death rate per 1,000 population...	18.2	21.1
Birth rate per 1,000 population.....	21.5	24.7	Deaths under 1 year.....	23	15
Number of deaths.....	104	123	Deaths under 1 year per 1,000 births.....	269.2	104.2











**CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued**

**PLAGUE—Continued**

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

Place	Week ended—												
	July, 1931				August, 1931				September, 1931				
	4	11	18	25	1	8	15	22	29	6	12	19	26
Siam.....													
Bangkok.....													
Nagara Rajshim.....													
Spain: Hospitalet—Barcelona Province.....													
Syria: Beirut.....													
Tripolitanis.....													
Tunisia: Tunis.....													
Union of South Africa:													
Cape Province.....													
Plague-infected rats.....													
Orange Free State.....													
	Mar., 1931	Apr., 1931	May, 1931	June, 1931	July, 1931	Aug., 1931	Sept., 1931	Oct., 1931	Nov., 1931	Dec., 1931	Jan., 1932	Feb., 1932	Mar., 1932
British East Africa (see also table above):													
Kenya.....	7	345	245	154	494	187							
Indo-China (see also table above).....	4	11		2	1								
Madagascar (see also table above):													
Ambosatra Province.....	70	30	19	15	1								
Antistrabe Province.....	86	29	18	15	1								
Mlaninarivo Province.....	83	48	7	12	13								
Moramanga Province.....	74	47	2	12	8								
Tananarive Province.....	19	6	2	2	1								
Tsiyuanis Province.....	1		2	1	1								
Tsiyuanis Province.....	90	41	18	10	5								
Tsiyuanis Province.....	81	40	18	9	5								

! Reports incomplete.





















