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STUDIES ON THE STANDARDIZATION OF VIBRION SEPTIQUE ANTITOXIN

By IDA A. BENGTSON, *Senior Bacteriologist, National Institute of Health, United States Public Health Service*

The increased production and use of gas gangrene antitoxins in late years have made desirable the establishment of standards and units of measurement for determining the potency of these products. The American unit for *perfringens* antitoxin was accepted for international use at the meeting of the Permanent Commission on Biological Standardization of the Health Organization of the League of Nations in June 1931. At the same meeting the Commission recommended "that the possibility be explored of obtaining international agreement on the adoption of a standard preparation and unit for gas-gangrene (*Vibrion septique*) antitoxin." The work here reported is a contribution toward that end and has involved (1) the preparation of dried toxin and antitoxin which may be used as standards in this country, (2) a comparison of these with the toxins and antitoxins of other countries, and (3) the testing of some of the commercial antitoxins produced in this country.

The antitoxins produced in this country by the biological establishments are usually the combined "tetanus-gas gangrene" antitoxin, intended as a prophylactic agent, which contains tetanus, *perfringens*, and *Vibrion septique* antitoxins and the "gas gangrene" antitoxin intended for curative purposes containing antitoxins against *Cl. perfringens* and *Vibrion septique* and sometimes against some of the other anaerobes concerned in gas gangrene.

These antitoxins have been used in a number of conditions in which the organisms of gas gangrene may occur, such as lacerated wounds, gunshot wounds, operative wounds, and compound fractures. During recent years the combined serum has been used to some extent in cases of gangrenous appendix, peritonitis, and intestinal obstruction and also in puerperal infections. In 200 cases of acute appendicitis studied by Weinberg, Prévot, Davesne, and

Renard (1), *Cl. perfringens* was found in 30 percent of the cases, and *Vibrion septique* and *Cl. histolyticus* were found in some of these.

A definite clinical evaluation of these antitoxins cannot be made at the present time. They probably should not be considered in the same category with tetanus and diphtheria antitoxins. The organisms of gas gangrene are invasive, in contrast to those of tetanus and diphtheria. On the other hand, they produce much less potent toxins. The recent work of Robertson and Felix (2) suggests that serums against *Vibrion septique* infections should be antibacterial as well as antitoxic. They produced an immune serum in a horse by intravenous injection with somatic antigen which was completely non-antitoxic, but which protected against infection by washed spores activated by means of $CaCl_2$. On the contrary, Craddock and Parish (3) reached the conclusion that *Vibrion septique* antitoxin confers complete protection against massive doses of living culture as well as against activated spores.

METHODS OF STANDARDIZING THE ANTITOXIN

Weinberg, Davesne, and Prévot originally based their unit of antitoxin on the amount which neutralized one minimal lethal dose of toxin in a rabbit weighing about 2,000 g. On this basis, a serum of which 1/1,000 cc protected against one minimal lethal dose contained 1,000 units. In 1932 these investigators determined the comparative strength of the test dose of toxin in rabbits and mice. The minimal lethal dose of a toxin fatal for rabbits in doses of 4.5 mg was equivalent to 15 minimal lethal doses in mice.

Glenny, Llewellyn-Jones, and Mason (5) proposed a provisional unit ascertained by intravenous inoculation of mice. In determining the test dose of toxin, a dilution of toxin containing as many fatal doses as possible in a conveniently small volume was chosen, and the amount was titrated against an arbitrarily selected antitoxin. It was found that 0.02 cc of the antitoxin just neutralized the test dose of 4 mg of dried toxin contained in 0.2 cc of saline (approximately 20 M.L.D.'s of the particular toxin used) when the mixture was inoculated into mice. This amount, 0.02 cc, of the antitoxin was therefore considered the unit.

Sordelli, Ferrari, and Mayer (6) favor the use of guinea pigs and found results more uniform in this species than in the white mouse. Using both the intravenous and the intramuscular routes of inoculation they found the M.L.D. to be approximately 2.5 mg by the intravenous and 3 mg by the intramuscular route. The test dose of toxin was fixed provisionally at 20 mg, corresponding to a little more than 5 M.L.D.'s. A test serum was titrated against this amount of toxin and the unit fixed as the largest amount of the serum which

did not neutralize the test dose of toxin in guinea pigs inoculated intramuscularly, 2 days being allowed as the time limit of the test.

Schlingman (7) used the rabbit as the test animal practicing the intravenous method of inoculation. The rabbit offers the advantage of easy inoculation by this route and is more susceptible to the action of the toxin than other species of laboratory animals. The unit of antitoxin was established as that quantity of serum which would neutralize 100 minimal lethal doses of toxin per kilogram of body weight. The test dose of toxin was fixed as the smallest amount of toxin which when mixed with one-tenth unit of antitoxin and injected intravenously would cause death of the rabbit within 24 hours. In testing a serum of unknown potency, varying amounts of the serum were titrated against the test dose of toxin. The smallest amount of antitoxin per kilogram of rabbit which would protect against the test dose of toxin was considered to contain one tenth unit. The unit proposed by Schlingman was later divided by 100.

EXPERIMENTAL

Preliminary to the work on the standardization studies of the antitoxin a cultural and serological study was made of a collection of 66 cultures of *Vibrion septique*.[1] Morphologically and culturally all the strains studied were typical *Vibrion septique* as described by Miss Muriel Robertson (8). The organism is more slender than *Cl. welchii* and readily forms spores, which are oval and usually subterminal. When occurring in the tissues, *Vibrion septique* is characterized by filamentous forms and by bulbous shapes described as "citron" or "navicular." In meat medium there is no proteolysis or blackening of the medium. There is a slight odor, which is not putrefactive. In addition to the carbohydrates usually listed as being fermented by *Vibrion septique*, viz, glucose, levulose, galactose, maltose, and salicin, the following were also fermented: mannose, trehalose, dextrin, and starch. There was slight or definite fermentation of inosite and slight fermentation of amygdalin by most of the strains.

All the strains were tested for toxin production by intraperitoneal inoculation of mice, and all caused death in doses varying from 0.01 to 0.5 cc of a 48-hour broth culture. A *Vibrion septique* antitoxin protected mice against the toxins of all the cultures. As has been pointed out by others, it is probably true that all strains of *Vibrion septique* produce toxin and that they do not lose this property.

[1] The writer is greatly indebted to Dr. Hilda Hempl Heller for her entire collection of *Vibrion septique* cultures, including cultures from 7 States in the United States, 13 cultures from the Western Front, and cultures from Denmark, France, Germany, Italy, Norway, and Switzerland. These were obtained from the following sources: man, cattle, sheep, hog, horse, guinea pig, goat, whale, soil. The remaining cultures were obtained from Dr. Weinberg, the Pasteur Institute, the National collection of type cultures of Great Britain, and the Parke, Davis and Lederle biological establishments.

Toxin.—A broth medium (beef infusion) adjusted to a reaction of pH 7.6 was prepared in 4-liter Erlenmyer flasks for use in the production of toxin. Prior to use, the medium was heated in the Arnold sterilizer to expel air, then cooled to 40° C., after which 2 percent of sterile horse serum was added. Incubation was carried out at 37° C. for 48 hours. The culture was then filtered through a Mandler filter. The filtrate was treated with ammonium sulphate in the proportion of 750 g of ammonium sulphate to each liter of filtrate. The toxin was thus agglomerated in small floccules, which rose to the surface. It was dried *in vacuo* over P_2O_5 and then placed in a ball mill and ground to an impalpable powder. The yield of toxin was 207 g from 44 liters of filtrate. Amber-colored U-tubes were used as containers, with the toxin in one arm and P_2O_5 in the other. The air was exhausted and the tubes were sealed under vacuum and stored in the dark at a temperature of 5° C.

Antitoxin.—The serum to be used for the standard antitoxin was obtained from Parke, Davis & Co. It was a concentrated serum of rather high potency. It was measured in 10 cc amounts into pyrex glass ampoules of about 30 cc capacity. The serum was dried *in vacuo* over P_2O_5, after which an agglutination tube containing P_2O_5 was placed in each vial. The vials were filled with nitrogen, then sealed and stored in the dark at a temperature of 5° C. When needed for use, the dried serum was diluted with a mixture of 1 part of physiological salt solution and 2 parts of glycerin to the desired amount. The dried antitoxin was in clear flakes which dissolved readily in salt solution.

Minimal lethal dose of toxin.—A number of tests were made on various animals to determine the minimal lethal dose by different routes. Through the intravenous inoculation of animals seemed to be the method of choice, the effect of subcutaneous and intramuscular inoculations of rabbits and guinea pigs was of special interest in view of the fact that Sordelli uses intramuscular inoculation for testing the potency of his antitoxins. However, the results obtained in all tests were not such as to be favorable for adaptation to the potency testing of serums. Large doses were required to produce death, and the results were irregular. It was necessary to use doses as high as 20 mg per kilogram in rabbits to cause death when inoculated intramuscularly. Guinea pigs were found to be resistant to doses as high as 15.6 mg when injected intramuscularly. Apparently the toxin is absorbed very slowly when introduced by the intramuscular or subcutaneous routes. It is difficult to understand Sordelli's success in the use of the intramuscular method of inoculation.

In contrast with the indeterminate results with subcutaneous and intramuscular inoculations, the intravenous method produced striking

results, particularly in rabbits. This species is highly sensitive to the action of the toxin by this route; and with somewhat over 1 minimal lethal dose, symptoms occurred and death supervened sometimes in as short a period as 2 or 3 minutes. The minimal lethal dose by this route was 1.3 mg per kilogram weight of rabbit and 0.16 mg for mice weighing approximately 20 g. On the basis of weight, the rabbit is therefore about 6 times as sensitive as the white mouse.

TESTS TO DETERMINE STANDARDS OF TOXIN AND ANTITOXIN

On the basis of sensitivity it would seem that the rabbit might be the most desirable animal for test purposes. A dose of 10 minimal lethal doses of toxin per kilogram was arbitrarily chosen as a test dose and the amount of antitoxin which just failed to neutralize this as the unit for measuring the potency of antitoxins. It was thought that a dose of toxin as large as 10 M.L.D's might be sufficient to insure titrations accurate within 10 percent. Rabbits in groups of 4 were inoculated with 13 mg (10 M.L.D's) of toxin per kilogram mixed with varying amounts of the antitoxin which had been selected for the standard.[2] The results of two tests are shown in table 1.

TABLE 1.—*Results of tests on rabbits to determine strength of antitoxin*

TEST 1

Number of rabbits	Toxin per kilogram	Antitoxin per kilogram	Number dying	Number surviving
	Mg	*Cc*		
4	13	0.0020	1 (37 hours)	3
4	13	.0018	3 (6, 6, 25 hours)	1
4	13	.0016	4 (½, 1, 1, 6 hours)	0
4	13	.0014	4 (less than ½ hour)	0

TEST 2

4	13	0.0024	0	4
4	13	.0022	1 (12 hours)	3
4	13	.0020	2 (4, 11 hours)	2
4	13	.0018	3 (29, 72, 72 hours)	1
4	13	.0016	4 (3, 3, 5, 7, hours)	0
4	13	.0014	4 (⅛, ¼, 3, 3 hours)	0

The doses of antitoxin are spaced at approximately 10-percent intervals figuring from the highest dose. In the first test, one of the rabbits on a dose of 0.0020 cc died. This amount is 25 percent over the dose on which all 4 rabbits died. In the second test one of the rabbits on a dose of 0.0022 cc died, and this dose is 35 percent over that which was fatal to all 4 rabbits.

In 4 tests (table 2) 15 of the 16 rabbits on the dose of 0.0016 cc of the antitoxin died in 24 hours or less. The tests therefore indicate that, while the amount of antitoxin (0.0016 cc) which just fails to

[2] The tests on rabbits were made with the standard serum before drying.

neutralize the test dose of toxin allowing none of the 4 rabbits to survive, can be fixed quite satisfactorily, allowing a time limit of 24 hours, the amount of antitoxin which protects all 4 rabbits against the toxin is less definite and quite far removed from the nonprotective dose. If the rabbit is used as the test animal it would seem necessary, therefore, to use as the test dose of antitoxin the amount which fails to protect practically all of the animals rather than an amount which is fatal to some while allowing others to survive.

TABLE 2.—*Results of tests in rabbits to determine the largest amount of antitoxin which fails to protect*

Number of rabbits	Toxin per kilogram	Antitoxin per kilogram	Number dying	Number surviving
	Mg	*Cc*		
4	13	0.0016	3 (½, 7, 22 hours)	1
4	13	.0016	4 (½, 1, 1, 6 hours)	0
4	13	.0016	4 (3, 3, 5, 7 hours)	0
4	13	.0016	4 (2, 2, 19, 25 hours)	0

Tests on mice.—Following the League of Nations method for testing *perfringens* antitoxin, tests were carried out on mice, using the intravenous route of inoculation. Groups of six mice each were used for these tests. In order to obtain a comparison between the results in rabbits and mice, proportionate amounts of antitoxin were used. The antitoxin was considered the fixed quantity and the smallest amount of toxin which failed to be neutralized by the dose of antitoxin used was determined. In these tests the dried serum was diluted to the desired strengths. Amounts of antitoxin corresponding to one half and one fourth the 0.0016 cc dose were used.

TABLE 3.—*Results of a test on mice using 0.0008 cc of antitoxin and doses of toxin spaced at 10 percent intervals*

Milligrams of toxin	M.L.D.'s	Number of mice	Number dying	Number surviving
4	25	6	0	[1] 6
4.5	28	6	2	4
5	31	6	6	[2] 0
5.5	36	6	6	0

[1] Lo dose. [2] L+ dose.

With differences of approximately 10 percent in the amounts of toxin a definite end point was obtained as shown in table 3. All of the mice on a dose of 5 mg died within 48 hours, 2 on dose of 4.5 mg died, and none on 4 mg died. The difference between the L+ and the Lo dose was therefore 1 mg, which is approximately 6 M.L.D.'s. In this test the amount of antitoxin used was half that used in rabbits, i.e., 0.0008 cc, and this amount was contained in 0.5 cc. This

necessitated diluting the toxin 1 to 50 instead of 1 to 100 in order that the volume of the mixture should not be too large for the size of the mouse.

Tests were then carried out using amounts of toxin spaced at approximately 5 percent intervals figuring from the smallest dose. In these tests one fourth the amount of antitoxin used in the rabbit tests was used, and the doses of toxin range from 2.1 to 2.6 mg per mouse. In this way the toxin could be diluted 1 to 100 and the volume of the mixture kept within 0.6 cc. The results of triplicate tests are shown in table 4.

TABLE 4.—*Results of tests on mice using 0.0004 cc of antitoxin and doses of toxin spaced at 5 percent intervals (72 hours time limit)*

Milligrams of toxin	M.L.D.'s	Test 1			Test 2			Test 3		
		Number	Died	Survived	Number	Died	Survived	Number	Died	Survived
2.2	13.8	6	0	6	6	0	6	6	0	6
2.3	14.4	6	0	6	5	1	5	5	0	[1] 6
2.4	15	6	3	3	6	4	2	6	2	4
2.5	15.6	6	5	1	6	5	1	6	4	2
2.6	16.3	-------	-------	-------	6	6	0	6	6	[2] 0

[1] Lo dose.
[2] L+ dose.

All mice except one on a dose of 2.3 mg survived, and all on the dose of 2.6 mg died. The difference between the Lo and the L+ dose was 0.3 mg, which is approximately 2 minimal lethal doses. The test dose of toxin may then be established as a dose of toxin lying between the Lo and the L+ dose, i.e., on a dose which is fatal to some mice while allowing others to survive. As indicated by the tests, 2.5 mg may be considered a suitable test dose of toxin. The amount of antitoxin used against this dose of toxin was 0.0004 cc, and this amount may therefore be used as the basis for the provisional unit of antitoxin. As will be brought out in the following paragraphs, 4 times this dose, or 0.0016 cc, proved to be a desirable unit. The dried serum was so diluted with glycerin and salt solution that 1 cc contained 50 units on this basis.

It may be concluded from a comparison of the results obtained in rabbits and mice that, while the rabbit may be employed as the test animal if a dose of toxin sufficiently large to be fatal to all the rabbits in 24 hours is used as the test dose, more satisfactory results are obtained with mice.

The uniformity of the results obtained with the test dose of toxin in mice is shown in table 5. In all the tests there were some survivals and some deaths. (The ideal division would of course be 3 survivals and 3 deaths.)

TABLE 5.—*Uniformity of results with the test dose of toxin in mice*

Date	Standard glycerinated antitoxin diluted 1:50	Toxin diluted 1:100	Number of mice inoculated	Number of mice dying within 72 hours	Number of mice surviving
	Cc	*Cc*			
Nov. 28, 1932	0.25	0.25	6	5	1
Nov. 30, 1932	.25	.25	6	4	2
Dec. 5, 1932	.25	.25	6	4	2
Dec. 19, 1932	.25	.25	6	1	5
Dec. 20, 1932	.25	.25	6	2	4
Dec. 22, 1932	.25	.25	6	5	1
Jan. 3, 1933	.25	.25	6	5	1
Jan. 6, 1933	.25	.25	6	2	4
Jan. 10, 1933	.25	.25	6	4	2
Jan. 11, 1933	.25	.25	6	2	4
Jan. 21, 1933	.25	.25	6	4	2
Jan. 23, 1933	.25	.25	6	4	2
Jan. 27, 1933	.25	.25	6	4	2
Jan. 28, 1933	.25	.25	6	2	4
Jan. 30, 1933	.25	.25	6	4	2
Feb. 2, 1933	.25	.25	6	4	2
Feb. 3, 1933	.25	.25	6	1	5

TITRATION OF PROPOSED STANDARD SERUMS OF OTHER COUNTRIES

Tests were made to determine the strength of the French standard supplied by Dr. Weinberg and the standard of Sordelli, of the Argentine Republic. The British standard serum was not available for test; but a statement received from Dr. Hartley, of the National Institute for Medical Research, indicates that 0.0016 cc of our standard is approximately 2.3 times the amount which the British are considering as their provisional unit.

The French unit was received in glycerinated form and diluted to contain 100 units per cc. The amount of our standard, 0.0016 cc, was found to be about 4.4 times as large as the French unit.

The unit of the Argentine Republic as expressed by Sordelli is 1 cc of his glycerolated serum diluted with 4 cc of salt solution. The test is carried out by intramuscular inoculation of guinea pigs. The test dose of toxin used by Sordelli is about 5 minimal lethal doses for a guinea pig. In our tests on mice, 0.25 cc of the 1 to 5 dilution of the antitoxin was found to protect against 3 minimal lethal doses of toxin but not against 4.5 minimal lethal doses. On this basis approximately 3.7 cc of the 1 to 5 dilution of the antitoxin is equivalent to our proposed unit. Our unit would therefore be approximately 3.7 times that of the Argentine Republic.

TITRATION OF COMMERCIAL SERUMS

Several commercial serums (A–D) were tested using the mouse test as described. All of these were combined serums labelled to contain 1,500 units of tetanus antitoxin, 1,000 units of *perfringens* antitoxin, and 1,000 units of *Vibrion septique* antitoxin. An illustration of a test is shown in table 6.

TABLE 6.—*Sample protocol of a test in mice to determine the potency of a commercial serum (Serum D)*

	Antitoxin		Toxin (1:100 dilution)	Result	
	Amount	Dilution			
	Cc		*Cc*		
I	0.25	1:100	0.25	Survived.	
	.25	1:200	.25	Survived.	
	.25	1:300	.25	Survived.	
	.25	1:400	.25	Survived.	
	.25	1:500	.25	Survived.	
	.25	1:600	.25	Survived.	
	.25	1:700	.25	Died.	
	.25	1:800	.25	Died.	
				Died	Survived
II	.34	1:650	.25	0	2
	.30	1:650	.25	0	2
	.27	1:650	.25	1	1
	.24	1:650	.25	2	0
	.21	1:650	.25	2	0
III	.31	1:650	.25	0	6
	.29	1:650	.25	0	6
	.27	1:650	.25	2	4
	.25	1:650	.25	4	2
	.23	1:650	.25	6	0
Control (standard glycerinated antitoxin)	.25	1:50	.25	4	2

$\frac{25}{100}\times\frac{1}{650}\times 4=1$ unit. $\frac{1}{650}$cc=1 unit. 1 cc contains 650 units.

Expressed in terms of 0.0016 cc, or 1 unit of the standard glycerinated serum of our standard serum, serum A contained 100 units, serum B 250 units, serum C 121 units, and serum D 650 units. The potency of these serums expressed in terms of the various proposed units is shown in table 7.

TABLE 7.—*Potency of commercial serums expressed in terms of different units*

(a) UNITS PER CUBIC CENTIMETER

Serum	Ratio of proposed units			
	American 1	British 1 to 2.3	French 1 to 4.4	Argentine 1 to 3.7
A	100	230	440	370
B	250	575	1,100	925
C	121	278	532	448
D	650	1,495	2,860	2,405

(b) UNITS IN TOTAL VOLUME

A, 4 cc	400	920	1,760	1,480
B, 5.9 cc	1,475	3,393	6,490	5,458
C, 5.8 cc	702	1,614	3,088	2,597
D, 4.9 cc	3,185	7,326	14,014	11,785

The results of the tests indicate that the amount under consideration as our provisional unit is probably not too large. Serum D expressed in terms of the other units would have a potency which would seem rather high.

TEST DOSE OF OTHER TOXINS IN MICE

In table 8 is shown the results of titrations to determine the test dose of various toxins received against one fourth of the provisional unit under consideration.

TABLE 8.—*The results of titrations to determine the test dose of various toxins against ¼ the provisional unit (0.25 cc of a 1:50 dilution of the standard antitoxin glycerinated)*

	Mg
National Institute of Health, U.S.A., toxin A	2.5
National Institute for Medical Research, Great Britain, toxin V.S. VI	.8
Pasteur Institute, toxin "dose test 5 m. 8"	5
Argentine Republic	7.4
Wellcome Research Laboratory, batch E	2.1
Great Britain NN1OST	4.1
Parke, Davis no. 094757	1.2

The protocol of the test to determine the test dose of the Parke, Davis toxin no. 094757 is shown in table 9. Preliminary tests had shown the dose to lie between 1 and 1.5 mg.

TABLE 9.—*Results of a test to determine the test dose of toxin no. 094757*

Standard glycerinated antitoxin diluted 1:50	Toxin diluted 1:100	Number of mice dying	Number of mice surviving
Cc	*Cc*		
0.25	0.10	0	6
.25	.11	0	6
.25	.12	5	1
.25	.13	6	0
.25	.14	6	0
.25	.15	6	0
.25	[1].25	4	2

[1] Standard.

The most suitable toxin for the test is one which is readily soluble in salt solution and of such strength that a sufficiently high concentration is contained in a volume not exceeding 0.3 to 0.4 cc. A total volume of 0.5 cc of the mixture of toxin and antitoxin is a suitable dose, though amounts up to 0.7 cc and 0.8 cc have been used apparently without deleterious effect.

Our own toxin was readily soluble, the solution being only slightly turbid. It was of such strength that a suitable volume of a 1 to 100 dilution could be tested against one fourth the unit under consideration. Other toxins of the same order were the Wellcome Research Laboratory toxin batch E, and the British toxin NN1OST. The French toxin and the Argentine Republic toxin were tested in dilutions of 1 to 50. The French toxin was very readily soluble, a perfectly clear fluid resulting. The Argentine Republic toxin dissolved easily, but a heavy precipitate settled on standing. This could, however, be easily suspended by shaking. The other two toxins, the British toxin V.S. VI and the Parke, Davis toxin were stronger, and with these

it would have been possible to carry out the test against one half unit instead of against one fourth. This is an advantage, as the test dose would contain approximately twice as many minimal lethal doses, which would make for greater accuracy in the test. The Parke, Davis was a satisfactory toxin, as it was readily soluble and of quite high potency. Some precipitate formed on standing, but this could be easily shaken into suspension. The British toxin V.S. VI was of nearly twice this strength, but difficultly soluble. This interferred with the test to the extent that our results showed a test dose of 1.6 mg against one half our unit instead of a test dose of 1.3 mg as labeled.

RELATIONSHIP OF TEST DOSE OF TOXIN TO THE LETHAL DOSE

The minimal lethal dose of three toxins was determined and information was received in regard to a fourth from Dr. Hartley. The relationship of the test dose of toxin against one fourth the proposed unit of antitoxin to the minimal lethal dose is shown in table 10. In the case of two toxins, the test dose contained approximately 15 to 16 minimal lethal doses, another contained 12.3, and another 10 minimal lethal doses.

TABLE 10.—*Relationship of test dose of toxins against ¼ the proposed unit of antitoxin to the minimal lethal dose*

Toxin	Test dose against ¼ unit antitoxin	M.L.D. of toxin	Number of M.L.D.'s in test dose
	Mg	*Mg*	
American	2.5	0.16	15.6
British V.S. VI	.65	.04	16
Wellcome Research, batch E	2.1	.17	12.3
Parke, Davis no. 094757	1.2	.12	10

SUMMARY

1. A standard antitoxin and a standard toxin have been prepared for use in determining the potency of *Vibrion septique* antitoxins.

2. The method of the intravenous inoculation of mice has been shown to be superior to that of the intravenous inoculation of rabbits.

3. Titrations accurate for differences of less than 10 percent have been obtained in the mouse test.

4. The relationship of the proposed antitoxin standards of other countries to the American proposed provisional standard was determined. The American unit under consideration was found to be 2.3 times the British proposed provisional unit, 4.4 times the French, and 3.7 times that of the Argentine Republic.

5. Titrations of four commercial American antitoxins indicated that the American provisional unit under consideration was of a size which might be considered suitable for expressing the potency of these antitoxins.

6. The test dose of the standard toxin against one fourth the unit of antitoxin under consideration was 2.5 mg. The test doses of other toxins against this same amount of antitoxin ranged from 0.8 to 7.4 mg.

7. In tests to determine the relationship of the test dose of toxin to the minimal lethal dose, it was found that in 2 of 4 toxins the test dose against one fourth the unit of antitoxin was approximately 15 to 16 minimal lethal doses, in one 12.3, and in another 10 minimal lethal doses.

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DEATH RATES FOR A LARGE GROUP OF INSURED PERSONS, 1933

In a summary of mortality records for several million insured persons (industrial policyholders) in the United States and Canada,[1] the Metropolitan Life Insurance Co. points out that 1933 was an excellent health year for the group of persons under study. Although the crude death rate for this insured group was 8.40 per 1,000, as compared with the previous minimum of 8.35[2] in 1932, the adjusted, or standardized, rate, allowing for change in the age composition during the last 2 years, is only 8.02 per 1,000 for ages 1 to 74, as compared with 8.13 for 1932. It is pointed out that early mortality figures for States and the Bureau of the Census figures for 85 large cities also bear evidence that 1933 was an excellent health year, so far as mortality can be used as a health index.

Mortality by age.—The year marked a continued decline in the death rate of children and adolescents, and at most of the childhood ages new rates were recorded in this group. At ages 1 to 4 the death rate in 1933 among white children was less than one third of the 1911 rate, and among colored children, one fourth the earlier figure. The declines in later childhood and adolescence are only a little less than

[1] Statistical Bulletin for January 1934.
[2] The recent annual death rates in this group of insured persons has varied between 70 and 75 percent of the rate for the registration area.

these. Continued improvement is also shown in the death rate of young adults. For the important working ages, up to 45, the 1933 rates for white persons were only one half of those of 20 years ago, while the decline among young colored adults was one fifth to one third.

The death rates for middle life and old age tended to show increases in 1933, except among white women. Although the rate for this age group was lower than that for 1911, no improvement has been shown during the last 12 years, and at the older ages, particularly among men, the rate has actually increased.

DEATH RATES FOR CERTAIN CAUSES

The Bulletin states that the important factors in the reduction in the gross death rate since 1911 were substantial declines in such important causes as tuberculosis, pneumonia, conditions arising out of pregnancy and childbirth, diphtheria, measles, whooping cough, and typhoid fever. In the case of tuberculosis and diphtheria, the improvement has been accelerated in recent years.

Tuberculosis.—The decline in the tuberculosis death rate among American and Canadian policyholders of this group, it is stated, has been practically continuous since 1911, when mortality for individual causes of death was first recorded, and has amounted to 71.1 percent in the 22 years. The reduction was 7.4 percent in 1933 as compared with the rate for 1932.

Typhoid fever.—The reduction of the typhoid fever death rate to a new minimum is cited as another triumph of official sanitary accomplishment. As compared with 1911, the decrease here amounts to 93 percent. Typhoid fever has become almost a negligible item in mortality statistics, although there are still a number of States and cities where the death rate from this cause remains surprisingly high.

Communicable diseases of childhood.—"Twenty-two years ago", the Bulletin states, "58.9 industrial policyholders in every 100,000 died of measles, scarlet fever, whooping cough, or diphtheria, instead of 7.4 per 100,000 who died from these diseases in 1933. New low points were recorded in that year for all except scarlet fever."

Influenza and pneumonia.—It is noted that a year which began with an influenza epidemic closed with the lowest pneumonia death rate in the history of this group; and even for influenza the figure was below the average for the 10 preceding years. The 1933 mortality with respect to these two diseases was much like that of 1929—each starting with a bad situation which was counterbalanced by marked improvement during the remainder of the year.

Diarrheal diseases.—Although the rate for diarrhea and enteritis at ages of one and over did not decline in 1933 from its previous minimum, the mortality from infantile diarrhea dropped to a new low

point. The rate for ages one and over was 4.6 per 100,000, representing a decline of 84 percent in this group since 1911.

Puerperal state.—The crude death rate for diseases of the puerperal state, which has been decreasing continuously for many years, fell to 9.4 per 100,000 in 1933, as compared with 10.7 in 1932 and 19.8 in 1911. It is pointed out, however, that the true rate should be based on live births, because of the changes in sex and age composition of the population and the fact that fewer women are exposed to this risk in recent years. This basic figure was not available for the persons included in the study.

INCREASED DEATH RATES

On the basis of crude death rates, three diseases—cancer, diabetes, and heart disease—recorded higher mortality in this group in 1933 than ever before. Most of the deaths from these causes fall in the higher age groups, and it is stated that there has been a shift in the age grouping of the policyholders whereby a larger proportion than formerly is now in the higher age groups. It was found necessary, therefore, to compute rates on a standardized age grouping.

Cancer.—When the cancer mortality rates are standardized, it is found that the increase in 1933 over 1932 was only eight-tenths of 1 percent, and over 1911 only 15.8 percent. The report states that the crude death rate gives an exaggerated picture of the rise in cancer deaths, but that even when all the elements are evaluated, such as an ageing population, improved definitions in reporting causes of death, and greater accuracy in diagnosis, there remains no doubt that the cancer death rate has been increasing and is still rising.

Diabetes.—The rise in the crude death rate for diabetes in this group of persons was 4.7 percent as compared with the rate for 1932, and 83.5 as compared with 1911. With standardized rates, however, the increase over 1932 was only one half of 1 percent, and that over 1911 only 37.7 percent. It is noted that mortality from diabetes is being steadily reduced among young people. The year 1933 was the ninth consecutive year to record a rise in the diabetes death rate in this group of insured persons.

Heart disease.—The crude death rate for diseases of the heart shows an increase, not uninterrupted, however, from 1923 to 1932. A different classification is used in 1933, and the rate for that year given in the accompanying table is not comparable with the rates for the earlier years. The Bulletin states, however, that the standardized rates show a lower figure for heart diseases in 1933 than for both 1930 and 1911, and only a slight rise as compared with 1932. With regard to types of diseases of the heart, it is stated:

> When analysis of what has happened in recent years is extended to the several types of cardiac impairments, we find much that is encouraging in the trend of

the heart disease death rate. First, only in the higher age groups is the mortality increasing; and the heart disease prevailing in this period of life is very largely of the arteriosclerotic or senescent type. Accordingly, the increased number of deaths is due, in great measure, to the aging of the population, whereby more and more persons attain those higher ages where senile degeneration of the heart is the most common cause of death. This may be a byproduct of the increase of the average duration of human life. The encouraging side of the picture is a marked declining tendency in the death rate from the endocardial and valvular affections in early adult and middle life. These types of cardiac disease have their origin largely in acute rheumatism, syphilis, certain communicable diseases of childhood, and focal infections. We may look forward to continued improvement as the result of the decline which is going on in the incidence of these controllable diseases.

Death rates per 100,000 for principal causes, ages 1 and over, for 1911 and 1928 to 1933

[Industrial insurance department, Metropolitan Life Insurance Co.

Cause of death	1933 [1]	1932	1931	1930	1929	1928	1927	1926	1925	1924	1923	1911
All causes of death	840.3	835.3	845.8	837.1	891.9	869.3	842.2	885.7	846.3	848.0	897.1	1,253.0
Typhoid fever	1.6	1.7	2.4	2.4	2.4	2.7	4.7	4.2	4.6	4.4	5.2	22.8
Communicable diseases of childhood	7.4	9.5	11.9	12.4	16.7	19.0	19.7	25.9	19.7	26.2	33.1	58.9
Measles	1.3	1.4	2.6	2.3	2.4	4.2	3.4	8.0	2.5	5.7	8.4	11.4
Scarlet fever	2.6	2.8	3.2	2.5	2.7	2.6	3.0	3.4	3.4	4.3	4.4	13.1
Whooping cough	1.0	1.4	1.7	1.9	3.0	2.7	3.1	5.0	3.6	3.5	4.8	7.1
Diphtheria	2.5	3.8	4.3	5.7	8.6	9.5	10.2	9.5	10.2	12.7	15.5	27.3
Influenza and pneumonia	73.6	74.5	81.3	75.9	111.7	94.8	78.7	105.6	88.3	84.4	107.7	131.2
Influenza	18.7	17.7	19.2	13.2	37.7	22.0	15.7	27.4	19.4	14.2	30.1	15.9
Pneumonia	54.8	56.7	62.1	62.7	74.0	72.8	63.0	78.2	69.0	70.2	77.6	115.3
Poliomyelitis	.6	1.0	2.6	1.1	.6	1.2	2.0	.7	1.4	1.0	.7	1.6
Tuberculosis, all forms	65.0	70.2	76.7	81.3	87.3	90.6	93.8	99.5	98.2	104.4	110.5	224.6
Tuberculosis of respiratory system	58.4	62.5	68.1	71.3	77.7	80.0	83.0	87.9	87.0	93.4	100.6	203.0
Cancer, all forms	95.6	92.4	85.4	79.5	78.8	77.0	75.6	75.1	71.8	71.5	72.7	68.0
Diabetes mellitus	24.4	23.3	21.4	18.7	18.6	17.9	17.1	17.0	15.5	15.1	16.2	13.3
Alcoholism	2.3	2.5	2.9	3.2	3.5	3.3	3.5	3.7	3.0	2.9	3.0	4.0
Cerebral hemorrhage, apoplexy	[2] 64.5	[2] 62.9	[2] 61.3	[2] 61.3	58.9	57.6	56.0	56.5	54.4	61.1	61.9	64.2
Diseases of heart [3]	[2] 63.4	157.5	150.1	147.1	149.0	144.4	134.7	136.4	128.7	125.2	128.7	141.8
Diarrhea and enteritis	4.6	4.6	5.9	8.0	7.9	8.7	9.1	10.5	12.3	11.3	11.1	28.0
Chronic nephritis (Bright's disease)	68.0	69.6	68.1	69.2	70.6	71.8	70.8	74.9	71.2	66.5	69.6	95.0
Puerperal state, total	9.4	10.7	11.9	12.3	13.8	14.2	15.7	15.6	16.9	17.2	17.9	19.8
Total external causes	72.0	71.8	78.0	79.4	80.6	77.8	79.8	77.2	78.3	76.9	77.8	97.9
Suicides	10.1	10.8	10.2	10.0	8.7	8.5	8.4	7.8	7.0	7.3	7.4	13.3
Homicides	6.3	6.2	7.1	6.8	6.7	6.8	7.4	7.2	7.4	7.2	7.3	7.2
Accidents—total	55.6	54.8	60.7	62.6	65.2	62.5	63.9	62.3	63.9	62.4	63.0	77.4
Accidental burns	3.3	3.7	3.8	4.5	4.9	5.3	5.3	6.1	6.1	6.4	6.3	8.8
Accidental drowning	6.1	6.0	6.5	6.3	6.5	7.1	6.8	6.3	6.5	7.3	6.7	10.2
Accidental traumatism by fall	10.4	10.2	10.1	9.7	9.1	8.0	8.5	7.9	8.1	7.7	8.4	13.2
Accidental traumatism by machines	.8	.8	1.0	1.3	1.6	1.2	1.4	1.4	1.3	1.3	1.7	1.8
Railroad accidents	2.9	2.8	2.8	3.0	3.9	3.9	4.1	4.2	4.0	4.0	4.9	9.5
Automobile accidents	20.0	19.2	22.3	21.2	21.3	18.7	18.7	17.0	16.8	15.9	15.4	2.3
All other accidents	12.1	12.1	14.4	16.6	17.8	18.3	19.1	19.4	21.2	19.7	19.5	31.6
Other diseases and conditions	187.9	183.1	185.9	185.3	191.5	188.3	181.0	183.6	183.4	180.9	181.7	283.5

[1] All 1933 death rates subject to slight correction, since they are based on provisional estimates of lives exposed to risk.

[2] Rates for 1930, 1931, 1932, and 1933 not comparable with those for other years, due to changes in classification procedure.

[3] Excluding pericarditis, acute endocarditis, acute myocarditis, and angina pectoris.

MILK-SANITATION RATINGS OF CITIES

Cities for Which Milk-Sanitation Ratings of 90 Percent or More Were Reported by State Milk-Sanitation Authorities During the Month of January 1934

In accordance with the policy announced in the Public Health Reports of January 26, 1934, giving the first publication of the list of cities for which milk sanitation ratings of 90 percent or more had been reported, additional supplementary lists of such ratings will be published monthly. A table is presented herewith showing the cities for which ratings of 90 percent or more were reported during the month of January 1934.

The rules governing inclusion in these lists and the significance of the milk-sanitation ratings made in accordance with the Public Health Service rating methods were presented in the Public Health Reports of January 26, 1934.

Cities included in this and the previous list are again advised to bring their milk sanitation status to the level required by the 1933 edition of the Public Health Service Milk Ordinance and Code, since this edition will be used for ratings made in 1934. Cities which are not now on the lists should improve their milk supplies as much as possible and then request the State milk control authority to determine their ratings.

State milk control authorities are urged to equip themselves to make milk sanitation ratings of their cities as soon as possible in fairness to their cities. States already equipped for this work should not permit ratings of their cities to lapse, as no rating more than 2 years old will be included in the complete semiannual revision of the list to be published next July.

Cities having ratings of 90 percent or more according to reports received during January 1934

City	Pasteurized milk rating	Raw milk rating	Percentage of milk pasteurized	Date of rating
Big Spring, Tex.	95	90	23	Oct. 19, 1933.
Bryan, Tex.	----------	98	0	October 1933.
El Paso, Tex.	95	97	65	Oct. 14, 1933.

COURT DECISION ON PUBLIC HEALTH

School medical inspector held to be an employee and not a public officer.—(Pennsylvania Superior Court; *Kosek* v. *Wilkes-Barre Tp. School Dist.*, 168 A. 518; decided Oct. 2, 1933.) The plaintiff was appointed medical inspector by the board of directors of the defendant school district for a period of 10 months. After performing his duties for about 3 months the plaintiff, without notice or cause, was dismissed from service pursuant to a resolution of the board of school

directors. He held himself in readiness to perform his duties during the remaining period of his contract, and afterward brought action to recover the salary for the remainder of the term for which he had been appointed. The case was tried without a jury and, at the conclusion of the plaintiff's testimony, the defendant rested, moving for judgment upon the ground that under the law the plaintiff was an appointed officer removable at the pleasure of the appointing power. The conclusion reached by the trial court was that the plaintiff was not an "appointed public officer" removable at pleasure under article 6, section 4, of the State constitution and that judgment should be entered for the plaintiff. From the trial court's judgment an appeal was taken to the superior court, which affirmed the judgment. The superior court quoted at length from the opinion of the lower court, wherein the distinction between an office and an employment was dwelt upon, and then proceeded to state, in part, as follows:

* * * In the present case the status of the medical inspector arises directly from a contract of hiring between him and the school district. The salary of the medical inspector is fixed by the employer, no commission is issued, no oath is taken, and the appointment is made, at the discretion of the board, of either a legally qualified physician having at least 2 years' experience in the practice of his profession or a health officer of a municipality. True it is that the duties of the medical inspector involve judgment, intelligence, discretion, and technical and "medical knowledge"; but they involve no relationship to the exercise on his part of what is ordinarily designated as a governmental function. Undoubtedly the care of public health, particularly the health of school children, is a subject matter of general concern and is the exercise of a governmental function just as the fighting of fires through fire departments and the protection of life and property through police departments, yet we are not convinced that one charged with medical inspections is other than an employee of the political division that employs him.

DEATHS DURING WEEK ENDED FEB. 3, 1934

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

	Week ended Feb. 3, 1934	Corresponding week, 1933
Data from 86 large cities of the United States:		
Total deaths	8,806	8,696
Deaths per 1,000 population, annual basis	12.3	12.1
Deaths under 1 year of age	625	696
Deaths under 1 year of age per 1,000 estimated live births	58	[1] 59
Deaths per 1,000 population, annual basis, first 5 weeks of year	12.5	12.9
Data from industrial insurance companies:		
Policies in force	67,435,280	69,100,292
Number of death claims	14,546	15,663
Death claims per 1,000 policies in force, annual rate	11.2	11.8
Death claims per 1,000 policies, first 5 weeks of year, annual rate	11.1	11.8

[1] Data for 81 cities.

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 Feb. 10, 1934, and Feb. 11, 1933

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Feb. 10, 1934, and Feb. 11, 1933

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Feb. 10, 1934	Week ended Feb. 11, 1933	Week ended Feb. 10, 1934	Week ended Feb. 11, 1933	Week ended Feb. 10, 1934	Week ended Feb. 11, 1933	Week ended Feb. 10, 1934	Week ended Feb. 11, 1933
New England States:								
Maine	----	4	6	228	----	----	0	1
New Hampshire	----	----	----	----	181	----	0	0
Vermont	1	1	----	----	75	5	0	0
Massachusetts	9	25	----	40	1,906	201	1	0
Rhode Island	2	1	----	11	6	----	0	0
Connecticut	8	3	18	87	33	148	0	2
Middle Atlantic States:								
New York	31	65	[1] 30	[1] 56	860	1,997	4	6
New Jersey	20	24	17	83	226	631	2	2
Pennsylvania	56	85	----	----	1,835	970	2	3
East North Central States:								
Ohio	33	28	14	40	407	709	3	0
Indiana	38	43	45	175	405	9	3	2
Illinois	29	42	48	74	436	169	8	18
Michigan	12	28	8	35	64	741	0	4
Wisconsin	6	6	121	341	865	316	1	1
West North Central States:								
Minnesota	5	4	----	3	177	644	0	0
Iowa [2]	17	10	14	----	119	----	1	1
Missouri	----	31	26	18	980	159	1	4
North Dakota	7	----	38	28	203	73	0	1
South Dakota	----	3	4	----	459	13	0	0
Nebraska	6	13	11	----	86	4	0	0
Kansas	10	8	4	65	84	205	2	2
South Atlantic States:								
Delaware	1	2	----	3	136	----	0	0
Maryland [2]	13	10	45	132	173	4	0	0
District of Columbia	6	9	4	5	324	1	1	3
Virginia	37	24	----	----	785	414	2	3
West Virginia	18	9	55	481	32	456	0	1
North Carolina [2]	23	13	67	270	2,375	278	1	2
South Carolina	21	10	591	2,097	495	21	0	9
Georgia [2]	23	5	177	414	2,122	4	0	0
Florida	8	12	4	184	55	11	0	0

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Feb. 10, 1934, and Feb. 11, 1933—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Feb. 10, 1934	Week ended Feb. 11, 1933	Week ended Feb. 10, 1934	Week ended Feb. 11, 1933	Week ended Feb. 10, 1934	Week ended Feb. 11, 1933	Week ended Feb. 10, 1934	Week ended Feb. 11, 1933
East South Central States:								
Kentucky	33	22	31	161	183	79	0	0
Tennessee	15	3	207	201	794	86	1	0
Alabama [3]	24	32	288	298	579	1	0	2
Mississippi	14	5	----	----	----	----	0	1
West South Central States:								
Arkansas	8	11	123	347	529	19	0	0
Louisiana [3]	26	17	19	16	89	14	0	2
Oklahoma [4]	12	9	156	273	300	10	0	1
Texas [3]	133	72	493	470	878	502	8	5
Mountain States:								
Montana	4	----	34	185	27	149	0	0
Idaho	----	----	1	3	63	25	0	0
Wyoming	2	----	----	----	12	30	0	0
Colorado	17	4	----	73	64	10	3	2
New Mexico	7	10	10	9	114	14	1	1
Arizona	7	7	26	40	14	----	0	1
Utah [3]	----	4	----	----	939	1	0	1
Pacific States:								
Washington	1	3	----	----	765	25	1	0
Oregon	2	5	50	175	53	140	0	0
California	40	64	34	183	1,187	363	2	2
Total	785	786	2,819	7,304	22,494	9,651	48	83

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Feb. 10, 1934	Week ended Feb. 11, 1933	Week ended Feb. 10, 1934	Week ended Feb. 11, 1933	Week ended Feb. 10, 1934	Week ended Feb. 11, 1933	Week ended Feb. 10, 1934	Week ended Feb. 11, 1933
New England States:								
Maine	0	0	16	35	0	0	1	1
New Hampshire	0	0	24	50	0	0	0	0
Vermont	0	0	10	13	0	0	1	0
Massachusetts	0	0	245	383	0	0	2	0
Rhode Island	0	0	17	32	0	0	0	0
Connecticut	0	0	58	98	0	2	2	2
Middle Atlantic States:								
New York	2	1	692	783	0	0	7	8
New Jersey	0	0	203	334	0	0	3	3
Pennsylvania	0	0	695	846	0	0	10	1
East North Central States:								
Ohio	0	0	528	355	1	5	7	3
Indiana	1	0	235	129	2	0	2	5
Illinois	1	1	600	393	2	9	4	3
Michigan	2	1	597	527	0	0	6	4
Wisconsin	0	0	199	122	32	8	2	2
West North Central States:								
Minnesota	0	0	76	83	11	0	2	1
Iowa [3]	2	0	84	38	6	51	1	0
Missouri	0	1	121	77	12	0	2	2
North Dakota	0	0	45	8	0	0	0	0
South Dakota	0	0	16	11	4	2	1	0
Nebraska	0	0	17	23	3	3	0	0
Kansas	0	0	112	59	9	0	1	1
South Atlantic States:								
Delaware	0	0	4	8	0	0	0	0
Maryland [3]	0	0	72	97	0	0	3	3
District of Columbia	0	0	19	11	0	0	0	0
Virginia	1	0	70	42	0	0	11	4
West Virginia	0	4	52	38	0	0	3	5
North Carolina [3]	0	1	64	48	0	1	1	2
South Carolina	1	0	9	5	4	0	18	0
Georgia [3]	0	0	10	10	0	0	4	2
Florida	0	0	5	14	0	0	1	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Feb. 10, 1934, and Feb. 11, 1933—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Feb. 10, 1934	Week ended Feb. 11, 1933	Week ended Feb. 10, 1934	Week ended Feb. 11, 1933	Week ended Feb. 10, 1934	Week ended Feb. 11, 1933	Week ended Feb. 10, 1934	Week ended Feb. 11, 1933
East South Central States:								
Kentucky	1	0	68	40	3	0	7	6
Tennessee	0	0	45	26	2	0	4	3
Alabama [2]	0	2	34	23	0	0	2	4
Mississippi	0	0	26	11	2	2	5	0
West South Central States:								
Arkansas	0	1	11	17	1	10	1	1
Louisiana [2]	0	2	25	12	1	2	4	5
Oklahoma [4]	0	1	27	23	1	7	1	2
Texas [2]	0	2	142	48	20	45	22	9
Mountain States:								
Montana	0	0	25	13	0	1	3	0
Idaho	0	0	4	1	4	8	3	0
Wyoming	1	0	6	4	0	0	0	0
Colorado	1	0	52	26	2	0	1	1
New Mexico	0	0	38	11	0	0	3	2
Arizona	0	0	44	25	0	0	2	2
Utah [2]	0	0	9	8	0	0	0	0
Pacific States:								
Washington	0	0	46	42	5	6	2	4
Oregon	1	0	58	27	7	2	1	0
California	9	1	266	195	5	39	13	5
Total	23	18	5,821	5,224	139	203	169	105

[1] New York City only.
[2] Week ended earlier than Saturday.
[3] Typhus fever, week ended Feb. 10, 1934, 18 cases, as follows: North Carolina, 2; Georgia, 8; Alabama, 3; Louisiana, 1; Texas, 4.
[4] 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
January 1934										
Arkansas	2	39	143	46	1,614	9	0	44	28	13
Georgia	6	56	473	53	4,014	12	0	61	5	24
Maine	1	3	34	----	17	----	3	59	0	2
Missouri	3	263	72	1	2,254	----	1	644	38	15
Nebraska	----	47	23	----	177	----	1	130	13	2
North Carolina	4	185	278	----	8,116	13	4	415	1	16
North Dakota	2	14	6	----	429	----	0	98	----	----
South Carolina	5	299	2,915	710	1,398	155	9	57	3	30
Vermont	----	4	----	----	240	----	0	82	0	10
Wyoming	----	1	----	----	249	----	0	38	14	1

January 1934

Chicken pox:	Cases
Arkansas	94
Georgia	232
Maine	381
Missouri	536
Nebraska	330
North Carolina	808
North Dakota	79
South Carolina	215
Vermont	200
Wyoming	171

Conjunctivitis:	Cases
Georgia	15
Dengue:	
Georgia	1
South Carolina	1
Diarrhea:	
South Carolina	483
Dysentery:	
Georgia (amebic)	2
Georgia (bacillary)	3
Missouri	7
Nebraska (amebic)	5
North Dakota	1

German measles:	Cases
Maine	154
North Carolina	23
Hookworm disease:	
Arkansas	9
Georgia	471
South Carolina	171
Lethargic encephalitis:	
Georgia	2
Missouri	7
North Dakota	1
South Carolina	12

Mumps:	Cases
Arkansas	24
Georgia	95
Maine	10
Missouri	150
Nebraska	69
North Dakota	1
South Carolina	170
Vermont	50
Wyoming	12
Ophthalmia neonatorum:	
North Carolina	1
South Carolina	42
Paratyphoid fever:	
Georgia	1
South Carolina	3
Rabies in animals:	
Maine	6
Missouri	16
South Carolina	24

Rocky Mountain spotted fever:	Cases
North Carolina	2
Septic sore throat:	
Georgia	41
Missouri	14
Nebraska	8
North Carolina	15
Tetanus:	
South Carolina	2
Tularemia:	
Arkansas	1
Georgia	12
Maine	1
Missouri	12
North Carolina	4
South Carolina	12
Typhus fever:	
Georgia	38
North Carolina	4
South Carolina	3

Undulant fever:	Cases
Georgia	2
Maine	4
Missouri	1
North Dakota	1
South Carolina	4
Vermont	3
Vincent's infection:	
Maine	1
North Dakota	5
Whooping cough:	
Arkansas	53
Georgia	231
Maine	276
Missouri	275
Nebraska	256
North Carolina	1,529
North Dakota	30
South Carolina	505
Vermont	187
Wyoming	43

WEEKLY REPORTS FROM CITIES

City reports for week ended Feb. 3, 1934

[This table summarizes the reports received regularly from a selected list of 121 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table. Weekly reports are received from about 700 cities, from which the data are tabulated and filed for reference]

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	1		0	0	5	0	0	1	1	2	20
New Hampshire:											
Concord	0		0	14	0	0	0	0	0	0	12
Manchester	0		1	0	1	0	0	1	0	0	21
Nashua	0		0	1	0	6	0	0	0	0	
Vermont:											
Barre	0		0	0	0	0	0	0	0	0	2
Burlington	0		0	1	0	3	0	0	0	13	7
Massachusetts:											
Boston	1		1	415	28	59	0	10	1	81	248
Fall River	1		0	0	4	4	0	2	0	4	32
Springfield	0		0	1	3	0	0	1	0	10	38
Worcester	0		0	69	6	5	0	1	0	5	48
Rhode Island:											
Pawtucket	0		0	0	0	0	0	0	0	0	18
Providence	0		0	0	7	12	0	3	0	13	62
Connecticut:											
Bridgeport	0		0	4	4	15	0	0	0	1	35
Hartford	3	1	0	1	3	12	0	0	0	2	28
New Haven	0		0	1	7	2	0	0	0	5	58
New York:											
Buffalo	4		0	274	22	29	0	7	0	23	158
New York	31	24	10	34	172	220	0	83	1	93	1,536
Rochester	1		0	1	2	30	0	0	0	8	81
Syracuse	0		0	1	9	3	0	0	0	33	56
New Jersey:											
Camden	0	1	1	26	1	13	0	0	0	5	30
Newark	0	7	1	4	10	13	0	5	0	17	119
Trenton	0	1	2	10	5	20	0	3	0	3	47
Pennsylvania:											
Philadelphia	9	9	4	970	46	92	0	22	1	56	524
Pittsburgh	11	9	4	23	19	36	0	6	0	35	145
Reading	0		2	2	1	6	0	0	0	7	28
Scranton	0		0	0	0	9	0	0	0	1	
Ohio:											
Cincinnati	2		1	275	16	22	0	9	0	24	151
Cleveland	7	32	0	5	22	84	0	10	1	79	177
Columbus	2	2	2	3	6	29	0	4	0	8	92
Toledo	0	2	2	60	9	41	0	6	0	51	79
Indiana:											
Fort Wayne	12		0	3	0	15	0	1	0	0	21
Indianapolis	1		0	186	18	19	0	3	1	17	
South Bend	0		0	0	2	3	0	0	0	0	21
Terre Haute	0		1	43	6	2	0	2	0	0	21

City reports for week ended Feb. 3, 1934—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Illinois:											
Chicago	1	3	0	31	73	217	0	40	1	166	736
Springfield	1	1	0	3	3	4	0	1	0	12	20
Michigan:											
Detroit	7	8	3	4	30	100	0	25	0	98	313
Flint	1	------	0	5	6	60	0	1	0	11	26
Grand Rapids	0	------	0	2	1	3	0	0	0	0	39
Wisconsin:											
Kenosha	0	------	0	1	0	25	0	0	0	6	14
Madison	0	------	------	2	------	6	0	------	0	23	19
Milwaukee	1	3	2	3	8	43	0	4	0	78	117
Racine	1	------	0	0	1	8	0	0	0	1	10
Superior	0	------	1	1	0	0	0	0	0	4	13
Minnesota:											
Duluth	0	------	0	0	1	0	0	0	0	0	21
Minneapolis	4	------	1	3	10	26	0	3	0	10	109
St. Paul	0	------	0	1	15	10	0	2	0	1	70
Iowa:											
Des Moines	2	------	------	0	------	12	0	------	0	0	21
Sioux City	2	------	------	5	------	0	0	------	0	1	------
Waterloo	1	------	------	0	------	1	0	------	0	4	------
Missouri:											
Kansas City	6	0	2	1	17	26	0	3	0	5	129
St. Joseph	0	------	0	1	5	0	0	0	0	1	20
St. Louis	27	2	------	733	17	32	1	15	0	39	234
North Dakota:											
Fargo	0	------	0	66	0	0	0	0	0	1	4
Grand Forks	0	------	0	1	0	0	0	0	0	1	------
South Dakota:											
Aberdeen	0	------	0	2	0	1	0	0	0	0	------
Sioux Falls	0	------	0	26	0	0	0	0	0	0	7
Nebraska:											
Omaha	2	------	0	65	7	5	1	3	0	6	58
Kansas:											
Topeka	0	------	0	0	0	10	0	0	0	8	5
Wichita	0	------	0	2	3	4	0	1	0	3	36
Delaware:											
Wilmington	3	------	0	31	2	5	0	0	0	3	29
Maryland:											
Baltimore	4	2	2	87	23	28	0	13	0	116	214
Cumberland	0	1	0	4	0	5	0	0	0	3	13
Frederick	------	------	------	------	------	------	------	------	------	------	------
District of Columbia:											
Washington	13	1	1	215	19	14	0	10	0	27	180
Virginia:											
Lynchburg	1	------	0	0	1	0	0	0	0	0	7
Richmond	2	2	2	3	5	5	0	2	0	1	53
Roanoke	1	0	2	1	7	3	0	3	0	0	26
West Virginia:											
Charleston	1	------	0	0	4	0	0	0	0	0	17
Huntington	1	------	0	0	0	3	0	0	0	0	------
Wheeling	0	------	0	1	2	3	0	0	0	8	18
North Carolina:											
Raleigh	0	------	0	5	2	0	0	1	0	8	14
Wilmington	0	------	0	0	4	0	0	0	0	1	14
Winston-Salem	1	2	0	198	4	2	0	1	0	4	21
South Carolina:											
Charleston	0	39	0	2	4	0	0	1	0	0	32
Columbia	0	------	1	0	5	0	0	0	0	0	17
Greenville	0	------	0	11	2	1	0	0	0	4	17
Georgia:											
Atlanta	6	17	2	158	14	2	0	5	1	6	86
Brunswick	0	1	1	44	0	0	0	0	0	5	7
Savannah	1	29	2	44	3	0	0	0	1	0	35
Florida:											
Miami	1	------	0	0	2	1	0	1	0	0	33
Tampa	4	1	1	1	2	2	0	2	0	0	27
Kentucky:											
Ashland	2	1	------	0	------	1	0	------	1	3	------
Lexington	1	------	0	2	3	0	0	0	0	7	21
Louisville	2	2	0	0	13	27	0	1	0	2	75

City reports for week ended Feb. 3, 1934—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Tennessee:											
Memphis	1		5	156	12	8	1	4	0	5	96
Nashville	0		1	107	6	2	0	0	0	7	41
Alabama:											
Birmingham	4	6	2	3	11	5	0	1	1	0	73
Mobile	1		0	0	1	1	0	2	0	0	19
Montgomery	0			4		2	0		0	3	
Arkansas:											
Fort Smith	0			74		3	1		0	0	
Little Rock	0		0	51	2	0	0	2	0	0	4
Louisiana:											
New Orleans	13	4	4	8	9	15	1	11	6	0	156
Shreveport	1		0	2	4	1	0	2	0	3	39
Oklahoma:											
Tulsa	0			19		2	0		0	1	
Texas:											
Dallas	3	2	1	0	11	2	0	1	0	0	61
Fort Worth	0		1	0	9	6	0	2	1	0	39
Galveston	2		0	0	2	6	0	2	0	0	15
Houston	11		0	0	14	7	2	7	0	1	75
San Antonio	2		3	2	10	15	0	4	0	0	52
Montana:											
Billings	0		0	0	0	0	0	0	0	3	14
Great Falls	0		0	4	1	0	0	0	0	1	8
Helena	0		0	0	0	0	0	0	1	0	4
Missoula	0		0	0	0	0	0	0	0	0	3
Idaho:											
Boise	0		0	1	1	0	0	0	0	0	8
Colorado:											
Denver	1	27	2	31	8	12	0	7	0	88	88
Pueblo	0		2	0	1	1	0	0	0	9	10
New Mexico:											
Albuquerque	1		0	2	1	0	0	7	0	5	15
Utah:											
Salt Lake City	0		0	644	4	7	0	0	0	34	49
Nevada:											
Reno	0		0	0	0	0	0	0	0	0	3
Washington:											
Seattle	0		1	1	9	12	0	3	0	63	88
Spokane	0	1	1	371	3	0	0		2	15	33
Tacoma	0		1	2	4	2	0	2	2	22	32
Oregon:											
Portland	0	2	2	15	5	20	5	2	0	1	72
Salem	0		0	0	0	1	0	0	0	4	
California:											
Los Angeles	18	30	1	45	19	79	0	23	1	48	321
Sacramento	0	2	0	4	3	5	0	1	0	3	29
San Francisco	0	1	1	29	20	18	0	14	0	10	174

State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths	
New York:			
New York	2	1	0
Pennsylvania:			
Philadelphia	1	0	1
Ohio:			
Cleveland	1	0	0
Toledo	1	0	0
Illinois:			
Chicago	2	1	0
Wisconsin:			
Milwaukee	1	0	0
Iowa:			
Des Moines	1	0	0
Missouri:			
Kansas City	1	0	0
St. Joseph	1	0	0
Georgia:			
Atlanta	2	0	0
Tennessee:			
Memphis	1	0	0
California:			
Los Angeles	2	1	2

Lethargic encephalitis.—Cases: New York, 1; Pittsburgh, 1; Columbus, 1; Racine, 1; St. Louis, 2; Birmingham, 2; Spokane, 1.

Pellagra.—Cases: Philadelphia, 1; Raleigh, 2; Atlanta, 2; Savannah, 1; Louisville, 1; New Orleans, 1; Dallas, 1.

Typhus fever.—Cases: New York, 1; Charleston, S.C., 1; Mobile, 1; Montgomery, 2.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—2 weeks ended January 27, 1934.—During the 2 weeks ended January 27, 1934, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba [1]	Saskatchewan	Alberta [2]	British Columbia	Total
Cerebrospinal meningitis		1								1
Chicken pox		6	2	397	615	70	70	3	73	1,236
Diphtheria	5	5	1	36	22	14	2		1	86
Erysipelas				15	12	1			1	29
Influenza		34		13	15	1			20	83
Measles			2	51	149	33	15	4	9	263
Mumps					204		1		92	297
Paratyphoid fever							1			1
Pneumonia		6			32		1		9	48
Poliomyelitis				1					1	2
Scarlet fever		21	15	179	331	16	34	6	192	794
Smallpox					1					1
Trachoma									2	2
Tuberculosis	1	3	21	121	76	3	4	2	32	263
Typhoid fever				31	9					40
Undulant fever				2	3					5
Whooping cough		8	1	372	178	14	5	2	29	609

[1] No report was received from Manitoba for week ended Jan. 20, 1934.
[2] No report was received from Alberta for week ended Jan. 27, 1934.

Ontario Province—Communicable diseases—Years 1933 and 1932, comparative.—The Department of Health of the Province of Ontario, Canada, reports certain communicable diseases for the years 1933 and 1932, as follows:

Disease	1933		1932	
	Cases	Deaths	Cases	Deaths
Actinomycosis	3		3	
Cerebrospinal meningitis	48	32	46	28
Chancroid			8	
Chicken pox	10,415	2	9,168	
Conjunctivitis	2		52	
Diphtheria	529	26	1,496	72
Dysentery	37	4		12
Encephalitis	13	9	21	12
Erysipelas	114	6	126	13
Gonorrhea	2,479		2,825	1
German measles	211		342	
Influenza	4,017	141	3,922	171
Jaundice	16		45	
Leprosy			2	
Malignant edema	1			
Measles	6,779	24	32,245	37
Mumps	5,914		7,541	1
Paratyphoid fever	135	2	78	
Pneumonia		1,528		1,630
Poliomyelitis	53	1	175	12
Puerperal septicemia		6		13
Scarlet fever	3,753	15	3,438	21
Septic sore throat	138	6	95	13
Smallpox	15		91	
Syphilis	2,246	9	2,110	14
Tetanus	7	7	2	1
Trachoma	51	2	3	
Trench mouth	7		21	
Trichinosis	1			
Tuberculosis	2,141	520	2,330	599
Tularaemia	9		9	
Undulant fever	152		82	
Whooping cough	5,280	31	5,647	41

JAMAICA

Communicable diseases—4 weeks ended January 27, 1934.—During the 4 weeks ended January 27, 1934, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chicken pox		23	Leprosy		1
Diphtheria	2	2	Puerperal fever		2
Dysentery	15	15	Tuberculosis	36	80
Erysipelas		2	Typhoid fever	23	58

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

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

CHOLERA

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

Place		June 25–July 29, 1933	July 30–Aug. 26, 1933	Aug. 27–Sept. 30, 1933	Oct. 1–28, 1933	Week ended— November 1933 4	11	18	25	December 1933 2	9	16	23	30	January 1934 6	13	20	27	Feb. 3, 1934
China:																			
Canton	C	1																	
Hankow	C	2	1	1															
Tientsin	C	4																	
India	C	6,881	7,695	14,422	9,939	2,306	1,934	1,624	1,707	1,944	1,999	1,584	1,364						
	D	3,047	3,237	6,654	4,846	1,155	1,038	890	840	957	906	700	613						
Bombay Presidency	C	3,869	3,604	3,111	1,376	352	234	239	275	383	370	184	129	138	138				
	D	1,609	1,436	1,412	634	175	147	129	143	188	201	105	76	69	65				
Bombay	C	6	1	5	4	1				4					1				
Calcutta	C	77	59	93	68	13	11	13	18	10	13	12	6	22	15	14	29	20	
Chittagong	C		1		1					1		1	2			2			
Madras Presidency	C	276	923	1,058	727	347	263	190	239	346		739	905						
	D	74	338	444	292	138	111	97	107	153		263	335						
Madras	C				4	1		2	3	61	25	6	20	9	4	4	6	2	
	D				1	2			2	26	11	4	9	6	2	2		2	
Rangoon	C	2																	
Vizagapatam	C	4			1														
India (French):																			
Chandernagor	D			2															
Karikal	C			1								1	1						
Pondichery	C		2																
Indo-China (see also table below): Saigon and Cholon	C	8	2																
Philippine Islands: [1]																			
Antique Province	C				17	2			6	8									
	D				16	1			5	6									
Bohol Province	C		1	6	87	35	31	39	68	51	23	22	11	33	78	63	93	58	30
	D			3	47	21	14	25	41	25	16	16	10	27	59	37	66	38	21
Cebu Province	C	90	26	39	63	23	18	7	23	15	10	1	6	43	12	12	6	4	1
	D	39	20	28	36	16	12	4	13	10	9	1	3	31	8	12	7	3	1
Cebu	C		1	9	21	1	11	4	1								1		1
	D		1	7	8	1	6	1									1		1

Naga	C					9	1	1	7	4						2				
	D					6	1	1	1	3						1				
Iloilo Province	C	1			12	1			1							1				
	D	1			11	2			1							1				
Iloilo	C	1				1			1											
	D	1				2			1											
Leyte Province	C		2	1																
	D		2	1																
Occidental Negros Province	C	6	1							2	2			5	8		9	10		
	D	7	1							1	2			3	5		10	8		
Oriental Negros Province	C										1	4	1		23	21	37	15	13	
	D										1	4	1		14	9	21	8	10	
Samar Province	C		31	[2] 32	[3] 20															
	D		20	[2] 20	[3] 14															
Siam	C	1																		1

Place		May 1933			June 1933			July 1933			August 1933			September 1933			October 1933	
		1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20
Indo-China (French) (see also table above):																		
Cambodia [4]	C	11	14	17	23	31	14	3	1			1						
	D	8	10	9	12	17	6	3	1			1						
Cochin-China [4]	C	5	9	6	4	8	5	6	2	12	3	2	1	1	2	2	5	5
	D	4	8	6	4	8	4	5	2	3	3	2	1	1	2	2	5	3

[1] During the week ended Feb. 10, 1934, cholera was reported in the Philippine Islands as follows: Bohol Province—Balilihan, 1 case, 1 death; Calape, 3 cases, 3 deaths; Clarin 15 cases, 7 deaths; Cortes, 2 cases, 2 deaths; Loon, 2 cases 1 death; Tagbilaran, 1 case; Tubigon, 5 cases, 5 deaths. Occidental Negros Province—Calatraba, 7 cases, 4 deaths. Oriental Negros Province—Ayuquitan, 1 case, 1 death; Tanjay, 3 cases, 1 death.

[2] For 2 weeks.

[3] For the month of October.

[4] Reports incomplete.

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

PLAGUE[1]

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

Place		June 25–July 29, 1933	July 30–Aug. 26, 1933	Aug. 27–Sept. 30 1933	Oct. 1–28, 1933	Week ended— November 1933 4	11	18	25	December 1933 2	9	16	23	30	January 1934 6	13	20	27
Argentina. (See table below.)																		
Azores:																		
Fayal	C			1														
St. Michaels	C			7														
Bolivia. (See table below.)																		
British East Africa (see also table below):																		
Kenya	C	7	13	30	18	8	26	3		4	4	2						
Tanganyika	D					1												
Uganda	C	58	77	113	63	27	18	21	15	19	25							
	D	58	77	109	61	27	17	21	14	16	23							
Ceylon: Colombo	C	2		1	1					1								1
	D	2		1	1					1								1
Plague-infected rats		4	1								1						1	2
China: Manchuria.[2]																		
Dutch East Indies: West Java	C	1,434	899	1,465	[3] 816	433	449	336										
	D	1,428	898	1,463	[3] 814	428	446	336										
Ecuador. (See table below.)																		
Egypt:																		
Alexandria	C	4	1											1				
Asyut	C																1	
Faiyum	C	4		2	1												1	
Gharbiya	C			3	2												1	
	D			2	3												1	
Girga	C	2																
Minya	C	1		1														
Qena	C		1															
Luxor	C		2															
France: Marseille	C		8															
	D		3															
Plague-infected rats		3	2				1											
Hawaii Territory: Hawaii Island—Hamakua—																		
Plague-infected rats				1			2			1		2	1	1		1		

India	C	3,869	6,209	13,642	11,755	2,316	3,189	2,743	2,789	3,194	2,487	2,540	2,244					
	D	2,616	3,560	7,971	6,430	1,216	1,637	1,524	1,544	1,749	1,361	1,535	1,450					
Bassein	C	11	7	3							1				2	2	1	
Plague-infected rats		2	1									1	1					
Bombay Presidency	C	2,448	3,971	8,069	4,922	1,598	1,565	1,421	1,215	1,342	1,196	966	830	1,167	1,328			
	D	1,493	2,313	5,117	2,928	992	873	947	809	850	810	659	547	689	856			
Bombay	C	1	1	7	3		1							1		1		
Plague-infected rats		5	5	3	1	3	3	1	1			1						
Poona	C				475	61												
	D				527	53												
Calcutta	C											[4]1						
	D											[4]1						
Madras Presidency	C	372	867	1,181	521	120	137	122	158	144		136	123					
	D	148	395	547	294	65	55	61	76	56		62	54					
Rangoon	C			2	1				1									
Plague-infected rats		3	1	2				1	1		1	1	1		1			
Indo-China (see also table below):																		
Pnom-Penh	D	2	3	2	2							1					1	
Saigon and Cholon	C	2	3															
Iraq:																		
Baghdad	C	7		3	1	1	1				1		2	2		1		
Basra	C	3																
Libya	C			10							9			2				
	D			3							5			1				
Madagascar (see also table below): Tamatave	C		1															
Morocco	C	8																
Peru. (See table below.)																		
Senegal. (See table below.)																		
Siam	C		1															
South-West Africa.[6]																		
Syria: Beirut	C	2																
Union of South Africa:																		
Cape Province	C					5	10	3				3						
Orange Free State	C												1					
Transvaal	C									1								
United States: California:																		
San Benito County—Plague-infected ground squirrels			8															
Santa Clara County—Plague-infected ground squirrels										1								
Whittier	C		1															
	D		1															
On vessel: S.S. Angkor at Beirut from Marseille	C				1													

[1] Including plague in the United States and its possessions.
[3] A report dated Nov. 13, 1933, states that plague was reported in Manchuria, China, as follows: Fengtien Province, 249 cases; Hsingan Province, 200 cases; Jehol Province, 81 cases; Kirin Province, 479 cases.
[5] For 2 weeks.
[4] Imported.
[6] 116 cases of plague with 5 deaths were reported in Ovamboland, South-West Africa from Jan. 1 to Dec. 2, 1933. Antiplague measures have been taken.

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

PLAGUE—Continued

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

Place		July 1933	August 1933	September 1933	October 1933	November 1933	December 1933
Argentina	C	7	------	------	6	4	------
	D	3	------	------	2	1	------
Bolivia	C	25	1	------	------	5	------
British East Africa (see also table above):							
Kenya	C	3	13	26	20	36	14
Uganda	C	47	91	97	71	83	------
Ecuador	C	------	------	3	------	------	------
Indo-China (see also table above):							
Cambodia	D	3	6	16	8	2	1
Cochin-China	C	2	5	1	------	------	1
Madagascar	C	133	100	77	------	------	------
	D	132	92	73	------	------	------
Peru	C	6	7	8	18	19	12
Callao	C	------	------	1	7	------	------
Senegal:							
Dakar [6]	C	57	------	5	4	15	3
	D	39	------	3	9	10	3
Medina [6]	C	31	------	------	1	1	1
	D	23	------	------	1	1	1
Tivaouane [6]	C	------	5	2	------	------	------

[6] Incomplete reports.

SMALLPOX

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

Place		June 25–July 29, 1933	July 30–Aug. 26, 1933	Aug. 27–Sept. 30, 1933	Oct. 1–28, 1933	Week ended— November 1933				December 1933					January 1934				Feb. 3, 1934
						4	11	18	25	2	9	16	23	30	6	13	20	27	
Algeria:																			
Algiers Department	C	2	------	------	------	------	1	------	------	------	------	------	------	------	------	------	------	------	------
Constantine Department	C	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Angola. (See table below.)																			
Belgian Congo	C	5	------	4	------	------	------	------	------	------	------	------	------	------	4	------	------	------	------
Bolivia. (See table below.)																			
Brazil:																			
Porto Alegre (alastrim)	C	1	1	12	5	1	------	------	------	1	------	------	------	------	------	------	------	------	------
Santos	C	------	------	------	------	------	------	------	------	------	------	------	------	4	------	2	------	------	------
British East Africa: Tanganyika	C	6	21	30	52	26	33	132	11	6	22	14	16	------	------	------	------	------	------

British South Africa:																			
Northern Rhodesia	C	1	1		16														
Southern Rhodesia	C	1		2															
Canada.																			
Alberta	C													1					
Manitoba	C		1																
Ontario	C							1											
Prince Edward Island	C									[1] 1									
Quebec	C									1						1			
Saskatchewan	C			1															
Ceylon:																			
Colombo	C	6	9				1												
Galle	C	1																	
China:																			
Canton	C					1		1		1	1	1	2	1	5	5	3		
Dairen [2]	C	3		1	3	2	3	7	5	35	28	18							
Foochow	C	P																	
Hangchow	C	3	1						1			1	1						
Hankow	C			3						1	1								
Hong Kong	C	3	1						1			1	1				1	2	
Nanking	C	2								1									
Shanghai	C	22	10	5	3	4	1	6	6	3	6	10	17	21	12	29	27	40	
Swatow	C				2	1													
Tientsin	C	2												1					
Chosen. (See table below.)																			
Colombia: Buenaventura	D	1																	
Costa Rica. (See table below.)																			
Dahomey. (See table below.)																			
Ecuador. (See table below.)																			
Egypt:																			
Alexandria	C					1	2							1	1		2	1	
Asyut	C	112	109	43	40		1		6	11		9	9	1		3			
Beni-Suef	C			31	13														
Cairo	C	1		1									1						
Dakahliya	C	4	1									1	32	24		7			
Faiyum	C	44	18	3	1				13			3							
Gharbiya	C	83	39	5	2		4	3		3		4	1						
Girga	C	2	2		9					16		4				6			
Minya	C												10	22		48			
Qena	C	9	25	4	25		6	2	20	7		11	5	1		5			
Provinces	C	499	297	150	95	25		38	105	65	55	39	58	48	117	77			
Great Britain:																			
England and Wales	C	55	32	20	10	1	1	1	6	3	9	4	9	2	3	13	7	9	
London	C	40	28	14	10	1	1	1	6	3	9	4	9	2	3	13	7	8	
London and Great Towns	C	49	31	15	10	1	1	1	6	3	9	4	9	2	3	13	7	9	
Greece (see also table below): Salonika	C	8		9															

[1] For 2 weeks.

[2] A report dated Feb. 3, 1934, states that 300 cases of smallpox with 100 deaths have occurred in Dairen, Manchuria, China, since November 1933.

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

SMALLPOX—Continued

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

Place		June 25–July 29, 1933	July 30–Aug. 26, 1933	Aug. 27–Sept. 30, 1933	Oct. 1–28, 1933	Week ended— November 1933 4	11	18	25	December 1933 2	9	16	23	30	January 1934 6	13	20	27	Feb. 3, 1934
India	C	14,599	7,069	7,052	4,699	1,218	1,254	1,317	1,888	2,047	1,978	2,077	2,048	------	------	------	------	------	------
	D	4,256	1,768	1,625	1,079	281	269	299	383	500	424	497	522	------	------	------	------	------	------
Bassein	C	9	10	19	12	5	3	2	2	4	1	10	1	17	9	11	7	18	------
	D	8	6	6	7	1	1	3	1	3	------	3	2	3	8	3	1	8	------
Bombay Presidency	C	1,942	1,029	873	599	121	161	117	274	232	227	273	328	325	411	------	------	------	------
	D	376	186	160	91	22	43	15	35	40	35	60	80	71	74	------	------	------	------
Bombay	C	34	14	1	4	------	2	------	2	3	2	2	5	8	4	6	8	13	------
	D	25	8	1	4	------	2	------	1	3	2	1	2	5	1	2	4	4	------
Calcutta	C	59	18	10	8	1	8	------	4	9	8	9	6	43	31	42	46	62	------
	D	49	8	3	3	1	1	------	3	1	5	6	4	26	20	24	34	37	------
Cochin	C	4	------	2	1	------	------	------	------	------	------	------	------	------	------	5	6	1	------
Karachi	C	16	5	------	2	------	------	1	------	------	2	------	1	1	3	4	4	4	------
Madras Presidency	C	3,571	2,851	2,944	2,432	697	545	533	704	637	------	611	617	------	------	------	------	------	------
	D	726	587	513	507	121	99	111	116	110	------	101	75	------	------	------	------	------	------
Madras	C	234	223	209	81	13	7	7	14	14	17	13	11	28	20	22	51	20	------
Negapatam	C	12	21	8	9	7	------	3	7	8	5	3	3	1	------	------	3	1	------
Rangoon	C	4	1	4	1	------	1	------	1	2	1	2	3	1	4	5	1	4	------
Tuticorin	C	------	2	------	1	5	------	------	1	------	------	------	------	------	------	------	4	------	------
Vizagapatam	C	14	11	2	1	1	------	------	1	------	1	1	1	------	------	1	1	2	------
India (French):																			
Chandernagor	D	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Karikal	C	------	------	1	1	------	------	1	2	3	------	1	6	1	------	------	------	------	------
	D	------	------	1	1	------	------	1	2	1	------	1	3	1	------	------	------	------	------
Pondichery	C	139	181	210	101	15	22	19	15	26	10	14	18	25	------	------	------	------	------
	D	73	70	104	63	7	10	9	6	12	8	10	9	11	------	------	------	------	------
Indo-China (see also table below): Saigon and Cholon	C	1	------	1	------	------	------	------	------	------	------	1	------	------	------	------	------	------	------
Iraq	C	17	22	8	36	10	2	10	113	3	28	3	------	------	10	7	------	------	------
Baghdad	C	------	------	------	2	------	------	1	2	1	1	1	------	------	1	------	1	------	------
Basra	C	------	------	4	------	3	------	------	------	------	------	1	------	------	------	------	------	------	------
Japan:																			
Kobe	C	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Tokyo	C	45	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

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Mexico (see also table below):																			
Juarez.[1]																			
Mexico, D.F.	C	1	12																
Monterrey	C		1			1							1						
	D												1	1					
Saltillo	D																		
San Luis Potosi	D	9	8													1			
Tampico	C														1	1			
	D																		
Torreon	C			1	2														
Vera Cruz	C				1		1												
Morocco. (See table below.)																			
Nigeria	C	675	361	113	166	268	103		[1] 138	57			127						
Nyasaland. (See table below.)																			
Palestine	C	13																	
Paraguay: Asuncion	D	3																	
Persia	C	26	20	10	45			6	6	6	3	16							
	D	9	7	11	5	2		2	1	1	1								
Teheran	C	21	17	3	11		2	3	3		1	2							
	D	8	5	1	4	2					1	1							
Peru. (See table below.)																			
Poland	C	1			1		1												
Portugal (see also table below.)																			
Lisbon	C	5	3	3					1						4		1		
Oporto	C	3	1		2	1	1												
Siam	D	5	1																
Sierra Leone	C	45	6	250	534		[1] 530		[1] 48		[1] 84		[2] 172						
Spain	C	59	29	16	11	27	13								3	7			
Sudan (Anglo-Egyptian)	C	5		1				14	1		15	5	1	40	17		8	9	13
Syria:																			
Beirut	C	14	21										12	8	12	20	19	10	12
Provinces	C	9	11	7	34	2	19	14		6	18		19	1	11	10	11	30	
Turkey. (See table below.)																			
On vessels:																			
S.S. Arracan at Newport	C		1																
S.S. Clan Macquarrie at Suez	C			1															
S.S. Sikh at Madras	C		1																
S.S. Lichtenfels at Suez from Calcutta	C			1															
S.S. Shahjehan at Madras	C			1															
S.S. Rohna at Penang from Madras	C					1													
S.S. Enterprise at Karachi	C										1								
S.S. Jaldurga at Rangoon from Gogalpore	C										1								
S.S. Pembrokeshire at Hong Kong	C											P							
S.S. Cremer at Singapore from Penang and Belawan	D													1					

[1] Dec. 18, 1933: 90 cases of smallpox were reported in Juarez, Mexico, with 18 deaths occurring from Dec. 1 to 16, 1933.
[2] For 2 weeks.

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

SMALLPOX—Continued

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

Place		July 1933	August 1933			September 1933			October 1933			November 1933			December 1933
			1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20	21-30	1-10
Dahomey	C	3	6	1	1	20	6	1	2	8	15	9	9	5	----
	D	1	----	1	1	5	1	----	----	6	----	6	6	----	----
Indo-China (see also table above)	C	105	20	38	21	----	44	37	39	20	78	24	22	11	54
	D	37	5	15	3	----	19	13	15	5	18	10	8	----	10

Place		July 1933	August 1933	September 1933	October 1933	November 1933	December 1933
Angola	C	----	----	4	----	----	----
Bolivia	C	10	12	15	34	39	21
Chosen	C	3	----	----	----	----	----
Costa Rica	C	----	2	----	----	3	----
Ecuador	C	12	1	----	----	----	----
Greece (see also table above)	C	----	1	----	1	2	----
Mexico (see also table above)	C	9	31	18	----	----	----

Place		July 1933	August 1933	September 1933	October 1933	November 1933	December 1933
Morocco	C	8	1	2	3	16	----
Nyasaland	C	336	347	318	289	----	----
Peru	C	84	56	90	23	21	----
Portugal (see also table above)	C	----	89	105	214	323	----
	D	----	16	27	31	21	----
Turkey	C	----	8	56	----	12	17

TYPHUS FEVER

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

Place		June 25–July 29, 1933	July 30–Aug. 26, 1933	Aug. 27–Sept. 30, 1933	Week ended— October 1933 7	14	21	28	November 1933 4	11	18	25	December 1933 2	9	16	23	30	January 1934 6	13	20
Algeria:																				
Algiers Department	C	7	2			1							9							
Constantine Department	C	66	21	16	1		4				1	7	1	2	3		1	2	6	1
Bone	C	1	1						1									1	1	
Oran Department	C	2		2				1					1							
Basutoland. (See table below.)																				
Bolivia. (See table below.)																				
British East Africa: Uganda	C	4	4	11		1	1		1	1										
Bulgaria	C	2	3	1			3		1		1	1	3			5				
Chile	C		1,028	2,588				[1] 2,620												
Antofagasta	C																4			
San Pedro.[2]																				
Santiago	C	1,112	392	1,071	224	292	343	300	244	335	335	297	262	286	200	213	195			
Valparaiso	C	7	13	34	4	8	22	9	5	12	24	13	11	8	17	11	11	4	5	
China:																				
Hangchow	C		5																	
Hankow	C			1								1	1							
Harbin	C		11	1																
Nanking	C	1	1		1															
Shanghai	C	1	1	1				1	1				2				1			
Tientsin	C	1																		
Chosen. (See table below.)																				
Czechoslovakia. (See table below.)																				
Egypt:																				
Alexandria	C	18	1	1												1	1			
Asyut	C		2									1			1					
Beheira	C	257	61	18	8	5	2	9	9		10	24	1	25	28	20	39		28	
Cairo	C	9	4	1																
Dakahliya	C	82	42	14						2	2	3	5		1	6	2		12	
Damietta	C	3	1	1												1				
Gharbiya	C	310	79	41	1	1	8			3	5	12	14	6	25	16	44		64	
Minufiya	C	52	36	6	3	5	2	2	2	3				5	6	5	10		8	
Qena	C			9			3			3	2	1	2							
Provinces	C	785	226	107	13	12	15	12	14	29	20	45	27	38	62	49	102	110	116	

[1] For 4 weeks.

[2] Incomplete reports from San Pedro, Chile, for the month of November 1933 show 113 cases of typhus fever.

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

TYPHUS FEVER—Continued

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

Place		June 25–July 29, 1933	July 30–Aug. 26, 1933	Aug. 27–Sept. 30, 1933	Week ended— October 1933				November 1933				December 1933					January 1934		
						7	14	21	28	4	11	18	25	2	9	16	23	30	6	13
Greece. (See table below.)																				
Guatemala. (See table below.)																				
Hungary	C						5		10											
Iraq:																				
Amara	C			1			4													
Baghdad	C	2	1																	
Ireland, Northern: Londonderry	C																1			
Irish Free State:																				
Kerry County—Dingle	C					4			4											
Waterford County—Lismore	C		1																	
Japan:																				
Kobe	C							1												
Osaka	C										1									
Latvia. (See table below.)																				
Lithuania	C	1	11										12	3	9		9			
Mexico (see also table below):																				
Mexico, D.F	C	6	1	16	5	3	6		14	15	10	7	6	8	13	19				
San Luis Potosi	D			1	1														1	
Torreon	C		1	2						1		2								
Morocco	C	14	12	2	1	1								2			5	1	2	1
Palestine	C	20	3	3				4	4							2				
Persia	C	21	15	24	8	5	6	1	5	5	1						3			
Peru. (See table below.)																				
Poland	C	196	66	51	17	8	23	18	34	41	21	24	51	47	64	93	79	97	99	
	D	11	6	1	2	1		2	3		2	5	4	4	4	4	3	6	6	
Rumania. (See table below.)																				
Spain: Madrid	C			2	1															
Syria	C	1	2												15					
Trans-Jordan	C	2																		
Tunisia:																				
Tunis	C			1		2													1	1
Provinces	C	36																		
Turkey. (See table below.)																				
Union of South Africa. (See table below.)																				
Yugoslavia. (See table below.)																				

Place		July 1933	August 1933	September 1933	October 1933	November 1933	December 1933
Basutoland	C	208	279	259	-------	366	-------
Bolivia	C	36	34	99	129	39	88
Chosen	C	59	-------	-------	3	8	-------
Czechoslovakia	C	6	1	-------	1	12	-------
Greece	C	5	4	4	3	5	-------
Guatemala	C	1	4	5	-------	6	5
Latvia	C	-------	1	-------	-------	-------	-------
Mexico (see also table above)	C	12	19	42	-------	-------	-------
Peru	C	20	60	84	55	341	-------
Rumania	C	57	22	13	28	35	-------
Turkey	C	5	7	9	20	23	27
Union of South Africa:							
Cape Province	C	195	135	141	166	-------	-------
Natal	C	23	18	43	42	-------	-------
Orange Free State	C	61	140	180	183	-------	-------
Transvaal	C	5	3	103	24	-------	-------
Yugoslavia	C	89	33	5	38	13	66

YELLOW FEVER

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

Place		June 25–July 29, 1933	July 30–Aug. 26, 1933	Aug. 27–Sept. 30, 1933	Week ended— October 1933				November 1933				December 1933					January 1934	
					7	14	21	28	4	11	18	25	2	9	16	23	30	6	13
Brazil:																			
Ceara State: St. Mathew	C	-------	1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
	D	-------	1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Pernambuco State:																			
Granito	C	2	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
	D	2	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Novo Exu [1]	C	1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
	D	1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
French West Africa:																			
Guinea	C	-------	-------	[3] 1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	2	-------	-------	2	-------
Niger Territory	C	-------	2	3	1	-------	-------	1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
	D	-------	2	2	[3] 2	-------	-------	1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

See footnotes at end of table.

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

YELLOW FEVER—Continued

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

Place		June 25–July 29, 1933	July 30–Aug. 26, 1933	Aug. 27–Sept. 30, 1933	Week ended— October 1933 7	14	21	28	November 1933 4	11	18	25	December 1933 2	9	16	23	30	January 1934 6	13
Gold Coast:																			
Dunkwa	C																		1
	D																		1
Keta	C																	1	
N'Kaw Kaw	C												1						
Togoland	C			[2] 1		[2] 1				1									
	D			[2] 1						1									
Ivory Coast: Abengourou	C															1			
	D															1			
Nigeria: Kano	C								1										
	D								1										
Senegal:																			
Bakel	C			2		1													
	D			2		1													
Birkelane	C												2						
	D												1						
Dakar	C										1								
	D										1								
Kaffrine	C					1													1
	D					1													1
Kaolak	C												1						
	D												1						
St. Louis	C	[4] 1																	
Sebikotane	C										1			1					
	D										1			1					

[1] 2 cases of yellow fever with 2 deaths were reported in Novo Exu, Pernambuco State, Brazil, during the month of June 1933.
[2] Suspected.
[3] Includes 1 suspected death.
[4] Imported.