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EXPERIMENTAL STUDIES OF WATER PURIFICATION

III. DISCUSSION OF B. COLI RESULTS OBTAINED FROM PRIMARY SERIES OF EXPERIMENTS

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In two previous papers,[1] a description has been given of an experimental water purification plant constructed and under operation by the Public Health Service at Cincinnati, Ohio, and a review of the results obtained from the primary series of experiments, which was begun on October 1, 1924, and extended to December 31, 1925. In the present article, the third of the series, it is proposed to discuss more fully the results of this series of experiments which bear more especially on the *B. coli* relationships.

The experiments in question, as stated in one of the papers above noted, indicated that the maximum *B. coli* index [2] of the raw water, consistent with producing an *unchlorinated* filter effluent conforming to the present United States Treasury Department *B. coli* Standard,[3] was about 100 per 100 c. c., and that the maximum raw water index consistent with producing a *chlorinated* filter effluent meeting the same standard was about 6,000 per 100 c. c. These findings confirmed closely the results obtained previously from a survey of 16 municipal water purification plants made under conditions of routine operation,[4] the results having indicated that the maximum raw water *B. coli* indices, respectively, consistent with producing unchlorinated and chlorinated effluents meeting the revised Treasury Department Standard, were 60 and 5,000 per 100 c. c.

In the foregoing paper the *B. coli* data were considered only in respect to the relations observed as between the *B. coli* content of the raw water, expressed in terms of the ordinary *B. coli* index, and the corresponding content of the effluents from various stages of treatment. In the present paper it is proposed to discuss the *B. coli* data from the following viewpoints:

1. The numerical interpretation of the results of individual *B. coli* tests.

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[1] Public Health Reports, vol. 41, No. 40, Oct. 1, 1926, pp. 2121-2146. (Reprint No. 1114.)
[2] Expressed in terms of the usual *B. coli* index, originated by Prof. Earle B. Phelps.
[3] Public Health Reports, vol. 40, No. 15, Apr. 10, 1925, pp. 693-722. (Reprint No. 1029.)
[4] The results of this survey have been set forth in a detailed report soon to be published.

2. The effects on the relationships above noted resulting from the conversion of the *B. coli* data from terms of the *B. coli* index to those of the "most probable numbers" of *B. coli*.

3. The relations between the indicated average *B. coli* densities in the unchlorinated and chlorinated filter effluents resulting from calculations based on two different systems of sample dilutions.

4. The results of a parallel comparison of *B. coli* enumerations based on fermentation tube tests and of the acid-colony count obtained from direct platings of samples on the Ayers-Rupp medium.

THE NUMERICAL INTERPRETATION OF INDIVIDUAL B. COLI TESTS

In the routine tests for *B. coli* which have been made in connection with the experimental work, two main objectives have been kept in mind, namely, (*a*) to provide a basis for *B. coli* enumerations such that the results obtained on samples of the raw water and of the effluents from various stages of treatment would be strictly comparable with each other, and (*b*) to determine the conditions of raw water pollution under which the unchlorinated or the chlorinated filter effluent would conform, or fail to conform, to some designated standard of limiting *B. coli* density, such as, for example, the original or the revised United States Treasury Department Standard.

To satisfy the requirement (*a*) it was necessary to use a parallel system of dilutions of the sample for inoculation into the lactose broth tubes. To satisfy requirement (*b*) it was essential that samples of the unchlorinated and chlorinated filter effluents be examined in accordance with the usual standard procedure recommended for use in testing conformance of samples to the Treasury Department Standard, namely, inoculation of five 10 c. c. portions into separate lactose broth fermentation tubes. Inasmuch as the samples of prefiltered water, including the raw water, were inoculated in single portions forming a geometric series of dilutions (in accordance with the usual practice), it was necessary to provide a corresponding series for the post-filter effluents, for the sake of consistency. Accordingly, the following system of dilutions was adopted, the figures showing the number of portions of specified quantity inoculated:

	0.0001 c. c.	0.001 c. c.	0.01 c. c.	0.1 c. c.	1.0 c. c.	10.0 c. c.
Raw water	1	1	1	1	1	
Applied water [1]	1	1	1	1	1	
Filtered-unchlorinated				1	1	5
Filtered-chlorinated				1	1	5

[1] Coagulated-settled water as applied to filters.

Ordinarily not more than three portions of prefilter samples were inoculated for a given test, the series being stepped up or down according to variations in the character of the water. In general, however, a special effort was made to carry out the dilutions of the sample to an extent sufficient always to give a negative presumptive test for *B. coli* in the smallest portion tested. This condition is essential to a determinate enumeration of *B. coli* from fermentation tests.

The determination of *B. coli* in all samples was based on the "completely confirmed test," as defined in the latest Standard Methods [5] of the American Public Health Association. The differentiation between *B. coli* and *B. aerogenes* was omitted from the routine work, though a series of such tests was made during the early portion of the studies.

Although the bacteriological results obtained from the series of experiments discussed in this paper were given statistical analysis largely in the form of averages, it was necessary, as a basis of averaging, to assign a definite result to each individual determination. For the *B. coli* results, this was a fairly simple procedure in considerably over 95 per cent of the cases, in which the result of the individual test was consistent as between the various dilutions of the sample inoculated. In a very small proportion of the cases, however, an anomalous result or a "skip" was obtained; that is, a negative result was observed in a portion larger (usually the next larger) than the smallest one giving a positive result. In testing samples of the unchlorinated and chlorinated filter effluents negative results ordinarily were obtained in the single portions, 0.1 c. c. or 1.0 c. c., coincidently with less than five positive results in the five 10 c. c. portions. Occasionally, however, a positive result would be observed in one of the two smaller sample portions under these same circumstances, giving another type of "skip." In all of these instances the procedure followed was that of "banking" the positive result into the next lower dilution giving a negative result; for example, if the results as observed were as follows:

0.01 c. c.	0.1 c. c.	1.0 c. c.
+	−	+

the results would be "banked" thus:

0.01 c. c.	0.1 c. c.	1.0 c. c.
−	+	+

A subsequent analysis of data given by Reed [6] on the interpretation of *B. coli* fermentation tests from a standpoint of the theory of probability has indicated that the method of "banking" anomalous

[5] Standard Methods for the Examination of Water and Sewage. American Public Health Association, Sixth Edition, 1925, pp. 103–110.

[6] Public Health Reports, vol. 40, No. 15, Apr. 10, 1925, Appendix III. (Reprint No. 1029.) Also, Manual of American Water Works Practice, 1925, pp. 136–145.

results, as above described, gives results approximating very closely the most probable numbers of *B. coli*. This point will be made more clear in the discussion which immediately follows.

EXPRESSION OF B. COLI RESULTS IN TERMS OF THE "MOST PROBABLE NUMBERS"

The method of enumerating *B. coli* most commonly followed in this country in connection with water works practice is based on the *B. coli* index, which is calculated as the reciprocal of the highest dilution, expressed as a fraction or multiple of a cubic centimeter, giving a positive test for *B. coli*. Thus, if the highest positive dilution be 0.01 c. c., the *B. coli* index is computed as being 100 per cubic centimeter, or 10,000 per 100 c. c.

The numerical results given by the index method, as applied to individual tests, fail to give even a close approximation of the true result as indicated by the theory of probability, as was originally brought out by McCrady,[7] and later amplified by Stein,[8] Wolman and Weaver,[9] Yule and Greenwood,[10] and Reed,[11] who endeavored, by various devices, to simplify the treatment so as to facilitate the calculation of the "most probable numbers" of *B. coli* from a given combination of fermentation-tube results. The treatment given by Reed, which is in some respects, at least, the most satisfactory one thus far developed, has established a definite basis for calculating, within clearly defined limits of precision, the most probable numbers of *B. coli* from a given combination of results in a series of sample dilutions. As an example of such a calculation, the following tabulation of results given by him, in the article above cited, is inserted:

	100 c. c.	10 c. c.	1 c. c.	0.1 c. c.	0.01 c. c.	Most probable number (M.P.N.) per 100 c. c.	*B. coli* index per 100 c. c.
(*a*)	+	–	–	–	–	2.3	1.0
(*b*)	+	–	+	–	–	9.4	10.0
(*c*)	+	+	–	–	–	23.0	10.0
(*d*)	+	+	–	+	–	94.4	100.0
(*e*)	+	+	+	–	–	231.2	100.0

Reference to cases (*a*), (*c*), and (*e*) in the tabulation shows that, when the results are not anomalous (i. e., when no "skips" exist), the "most probable numbers" of *B. coli* are equal approximately to

[7] Journal of Infectious Diseases, vol. 17, No. 1, July, 1915.

[8] Stein, M. F.: The Interpretation of *B. coli* Test Results on a Numerical and Comparative Basis. Jour. of Bact., vol. 4, No. 3, May, 1919.

[9] Wolman, A., and Weaver, H. L.: A Modification of the McCrady Method of the Numerical Interpretation of Fermentation-Tube Results. Jour. of Infec. Dis., vol. 21, No. 3, May, 1919.

[10] Greenwood, J., jr., and Yule, G. U.: On the Statistical Interpretation of Some Bacteriological Methods Employed in Water Analysis. Jour. of Hyg., vol. 16, No. 1, July, 1917.

[11] Loc. cit., p. 6.

two and three-tenths times the corresponding *B. coli* index. Where a "skip" is observed, as in cases (*b*) and (*d*), the most probable numbers are very closely equivalent to the *B. coli* index obtained by "banking" the results as above described.

In enumerating *B. coli* from tests made in five 10 c. c. portions of the same sample, Reed has given a table of the most probable numbers obtained from each result. In the following tabulation these results are given, together with the corresponding *B. coli* index, as ordinarily computed:

	(−)	(+)	*B. coli* per 100 c. c.	
			M. P. N.	*B. coli* index
(*a*)	5	0	0	0
(*b*)	4	1	2.2	2
(*c*)	3	2	5.1	4
(*d*)	2	3	9.2	6
(*e*)	1	4	16.1	8
(*f*)	0	5	([1])	10+

[1] Indeterminate.

It will be noted that, in this instance, the ratio between the two series of results is not constant, as in the preceding case, where single portions in geometric progression were tested, and that the series above given does not cover anomalous cases, in which single 0.1 c. c. or 1 c. c. portions of a sample, tested in addition to the five 10 c. c. portions, may give a positive result coincident with fewer than five positive results in the 10 c. c. portions of the same sample. For cases of this kind, the theory of probability, which is the basis of the "most probable number" calculation, provides a clear-cut mathematical solution, each anomaly representing a definite probability incidental to random sampling. The contrary is true of the *B. coli* "index" calculation, which accords no solution of anomalous results other than some procedure such as that of "banking," previously described.

Using the formulae developed by Reed, Sanitary Engineer J. K. Hoskins, of the Public Health Service, has made an extensive series of calculations of the "most probable numbers" of *B. coli* corresponding to test results obtained in various combinations of sample dilutions. Through his courtesy, Tables 1 and 2, in which are summarized the results of his calculations, are herewith presented. In Table 1 are given the "most probable numbers" of *B. coli* as derived from each one of the six possible combinations of test results obtainable in three sample dilutions forming a geometric series. The dilutions are shown in six different stages, ranging from 10 c. c. to 0.000001 c. c. of the sample. All of the results except those in lines (*a*) and (*c*), reading horizontally, are derived from anomalous cases involving a "skip" between a positive and a negative result in adjacent dilutions.

TABLE 1.—*Most probable numbers of B. coli per 100 c. c.*

[Three dilutions in geometric series]

	Result	Dilution					
		10 1 0.1	1.0 0.1 0.01	0.1 0.01 0.001	0.01 0.001 0.0001	0.001 0.0001 0.00001	0.0001 0.00001 0.000001
(a)	+ + −	240	2,400	24,000	240,000	2,400,000	24,000,000
(b)	+ − +	95	955	9,550	95,500	955,000	9,550,000
(c)	+ − −	23	231	2,310	23,100	231,000	2,310,000
(d)	− + +	19	190	1,900	19,000	190,000	1,900,000
(e)	− + −	9	94	940	9,400	94,000	940,000
(f)	− − +	9	90	900	9,000	90,000	900,000

TABLE 2.—*Most probable numbers of B. Coli per 100 c. c. of water*

[When the analysis of a water is based on the examination of five portions of 10 c. c., one of 1 c. c., and one of 0.1 c. c.]

	Number of 10 c. c. tubes		One 1 c. c. tube	One 0.1 c. c. tube	Most probable number of *B. coli* per 100 c. c. of water		Number of 10 c. c. tubes		One 1 c. c. tube	One 0.1 c. c. tube	Most probable number of *B. coli* per 100 c. c. of water
	Positive	Negative					Positive	Negative			
(a)	5	0	+	+	(1)	(d)	2	3	+	+	10.3
	5	0	+	−	240.0		2	3	+	−	7.6
	5	0	−	+	95.7		2	3	−	+	7.5
	5	0	−	−	38.4		2	3	−	−	5.0
(b)	4	1	+	+	26.6	(e)	1	4	+	+	6.7
	4	1	+	−	20.7		1	4	+	−	4.4
	4	1	−	+	20.2		1	4	−	+	4.4
	4	1	−	−	15.3		1	4	−	−	2.2
(c)	3	2	+	+	15.8	(f)	0	5	+	+	4.0
	3	2	+	−	12.3		0	5	+	−	2.0
	3	2	−	+	12.1		0	5	−	+	2.0
	3	2	−	−	8.8		0	5	−	−	0

[1] Indeterminate.

In Table 2 are tabulated the "most probable numbers" of *B. coli* as derived by Mr. Hoskins from various combinations of results obtained from tests of samples in single 0.1 c. c. and 1 c. c. portions and five 10 c. c. portions. A study of this table will show that every possible combination of results in the portions given has been covered, including both the consistent and the anomalous cases. It is of interest to note that a positive result in 0.1 c. c., coincident with a negative result in 1 c. c. and one or more negative results in 10 c. c. gives a "most probable number" figure only slightly higher than that obtained when the results in the two single portions are reversed. In the former case the probability of occurrence of the result indicated is sufficiently remote to have little influence on the calculated figure.

COMPARISON OF B. COLI DATA EXPRESSED IN TERMS OF THE PHELPS INDEX AND IN TERMS OF THE MOST PROBABLE NUMBERS

In the preceding paper of this series,[12] a table was given showing the relationship observed between the *B. coli* index of the raw water and that of the effluents from successive stages of treatment. In Table 3, below, is given a reproduction of these figures, together with a parallel tabulation of the same data expressed in terms of the "most probable numbers" of *B. coli* derived by averaging individual results obtained as in Tables 1 and 2.

TABLE 3.—*Comparative numbers of B. coli as measured, respectively, in terms of the B. coli index and the "most probable numbers," observed in the raw water and in the effluents from successive stages of treatment, coincidently with averages of raw water numbers falling within specified corresponding ranges*

Method of count [1]	Corresponding raw water *B. coli* ranges (per 100 c. c.)	No. of items	Average turbidity p. p. m.	Average *B. coli* (per 100 c. c.)			
				Raw	Applied	Filtered	Chlorinated
Ind.	0- 5,000	67	77	2,450	1,050	10.9	0.48
M. P. N.	0- 11,500			5,680	2,650	23.0	.60
Ind.	5,001- 10,000	102	78	7,690	3,020	29.9	1.1
M. P. N.	11,501- 24,000			18,000	6,920	58.0	2.1
Ind.	10,001- 50,000	76	93	33,100	7,980	108.0	3.1
M. P. N.	24,001-115,000			76,700	18,700	245.0	5.2
Ind.	50,001-100,000	39	105	68,800	14,400	158.0	6.7
M. P. N.	115,001-240,000			160,000	33,500	371.0	19.7
Ind.	Over 100,000	36	175	898,000	90,800	455.0	54.3
M. P. N.	Over 240,000			2,170,000	189,000	1,060.0	126.0

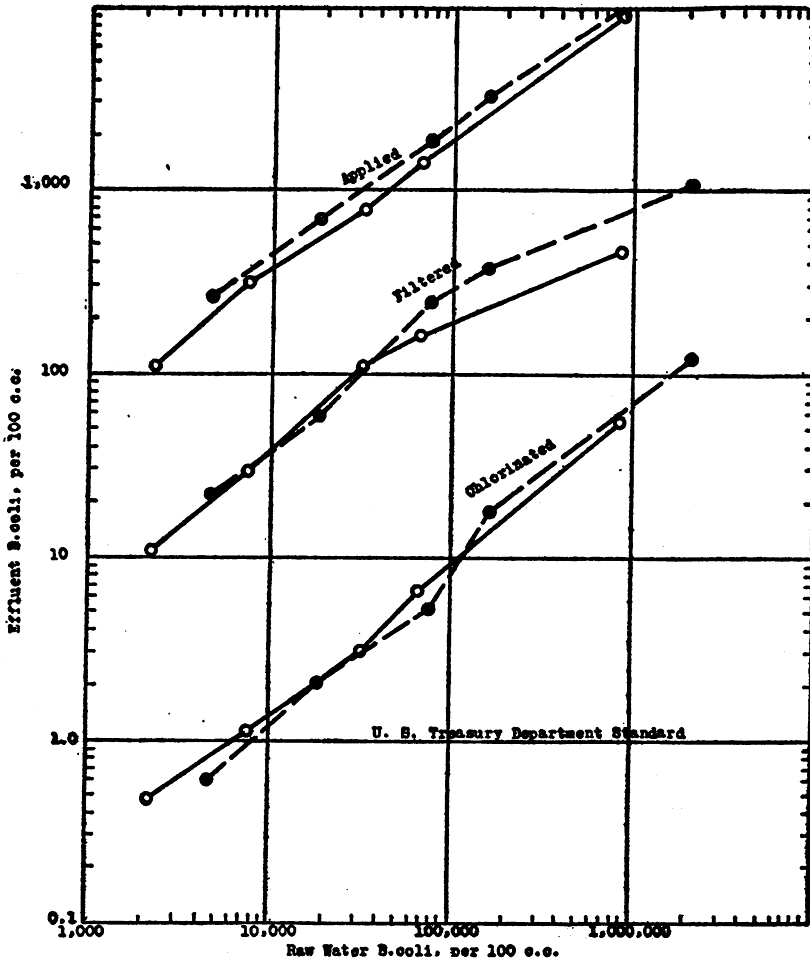
Method of count [1]	Residual per cent of raw water			Residual per cent of influent water		
	Applied	Filtered	Chlorinated	Applied	Filtered	Chlorinated
Ind.	42.9	0.44	0.020	42.9	1.00	4.4
M. P. N.	46.6	.40	.011	46.6	.87	2.6
Ind.	39.3	.39	.014	39.3	.99	3.7
M. P. N.	38.5	.32	.012	38.5	.84	3.6
Ind.	24.1	.33	.009	24.1	1.35	2.9
M. P. N.	24.4	.32	.007	24.4	1.31	2.1
Ind.	20.9	.23	.010	20.9	1.10	4.2
M. P. N.	20.9	.23	.012	20.9	1.11	5.3
Ind.	10.1	.05	.006	10.0	.50	11.9
M. P. N.	8.7	.05	.006	8.7	.56	11.9

[1] Ind.=Phelps index. M. P. N.=most probable numbers.

A comparison of these two tabulations and of graphs constructed from them, as illustrated in Figure 1, shows that the relationship between the raw water and the several effluents in respect to their *B. coli* content is not materially altered by conversion of the results into terms of the "most probable numbers." This is brought out, further, by the fact that the residual percentages of *B. coli*, as derived from numbers expressed in the two respective terms, falling into corresponding raw water ranges, are very nearly equivalent to each

[12] Public Health Reports, vol. 41, No. 40, Oct. 1, 1926, Pt II, Table 1. (Reprint No. 1114.)

other, though the actual respective numbers of *B. coli* on which they are based in each instance are divergent. The close accordance of the two series of relationships is due largely to the fact that, in the given series of samples, the ratio of the "most probable numbers" of *B. coli* to the corresponding numbers, as expressed in terms of the *B. coli* index, remains very nearly constant for various densities of



Legend: O——O *B. coli* index. ⊗--⊗ *B. coli* "most probable numbers"

FIG. 1.—Comparative plots of *B. coli* relationships as derived from results expressed in terms of the *B. coli* index and of the "most probable numbers" of *B. coli*. (Plot of data given in Table 3)

B. coli, being modified only by corrections applied to anomalous results and by a slight variation of the ratio in samples of the filtered and chlorinated effluents tested in five 10 c. c. portions.

The same indications as above noted are given further in Table 4, in which the relationships between the numbers of *B. coli* observed in the raw water and coincidentally in the several effluents have been derived from the same data, classified, first, according to seasonal periods, and second, according to corresponding ranges in the numbers of raw water *B. coli*, as expressed in the two terms. In Table 5 a similar procedure has been followed, except that raw water turbidity, rather than season, is the basis of primary classification of the data. The *B. coli* index figures given in these two tables have been reproduced from tabulations given in the preceding paper [13] of this series.

TABLE 4.—*Comparative numbers of B. coli, expressed, respectively, in terms of the B. coli index and the "most probable numbers," as derived from parallel groupings of the B. coli data according to season and raw water B. coli content*

	Average *B. coli* (per 100 c. c.)				Per cent of raw water			Per cent of influent water		
	Raw	Applied	Filtered	Chlorinated	Applied	Filtered	Chlorinated	Applied	Filtered	Chlorinated
Winter season average:										
Index [1]	342,000	31,400	216	24.9	9.2	0.063	0.007	9.2	0.69	11.5
M. P. N.[1]	839,000	76,500	518.8	58.4	9.1	0.062	0.007	9.1	0.68	11.3
Mid-season average:										
Index	47,800	15,100	38.0	3.5	31.6	0.079	0.007	31.6	0.25	9.2
M. P. N	116,000	25,900	86.7	7.7	22.3	0.075	0.007	22.3	0.33	9.0
Summer season average:										
Index	65,900	7,890	177	4.0	12.0	0.27	0.006	12.0	2.2	2.3
M. P. N	154,000	19,350	402.5	8.7	12.6	0.26	0.006	12.6	2.1	2.2
Winter season—Subgrouping:										
Index (0-5000)	3,140	914	4.9	0.44	29.1	0.15	0.014	29.1	0.54	9.0
M. P. N. (0-11500)	7,260	2,070	9.5	0.30	28.5	0.13	0.004	28.5	0.46	3.2
Index (5001-10000)	7,770	2,180	10.2	0.95	28.1	0.13	0.012	28.1	0.47	9.3
M. P. N. (11501-24000)	18,100	5,570	21.8	1.48	30.7	0.12	0.008	30.7	0.39	6.8
Index (10001-50000)	33,100	3,920	209.0	4.8	11.8	0.63	0.014	11.8	5.3	2.3
M. P. N. (24001-115000)	74,000	8,170	484.0	6.39	11.0	0.65	0.009	11.0	5.9	1.3
Index (50001-100000)	74,600	29,600	172.0	29.0	39.8	0.23	0.039	39.8	0.58	16.9
M. P. N. (115001-240000)	170,900	69,600	410.0	67.6	40.7	0.24	0.040	40.7	0.59	16.5
Index (over 100000)	1,080,000	86,600	519.0	66.0	8.0	0.048	0.006	8.0	0.60	12.7
M. P. N. (over 240000)	2,700,000	215,000	129.0	162.0	8.0	0.048	0.006	8.0	0.60	12.6
Mid-season—Subgrouping:										
Index (0-5000)	3,510	1,480	6.2	0.56	42.4	0.18	0.016	42.2	0.42	9.0
M. P. N. (0-11500)	7,980	3,660	12.3	0.66	45.8	0.15	0.008	45.8	0.34	5.4
Index (5001-10000)	7,810	3,320	26.6	0.76	42.5	0.34	0.001	42.5	0.80	2.9
M. P. N. (11501-24000)	23,800	7,470	62.3	1.42	31.3	0.26	0.006	31.3	0.83	2.3
Index (10001-50000)	32,500	10,200	41.9	1.8	31.4	0.13	0.006	31.4	0.41	4.3
M. P. N. (24001-115000)	76,800	23,200	94.3	3.19	30.2	0.12	0.004	30.2	0.41	3.4
Index (50001-100000)	72,100	13,900	24.3	1.3	19.3	0.034	0.002	19.3	0.17	5.3
M. P. N. (115001-240000)	160,500	31,980	43.0	1.9	19.9	0.027	0.001	19.2	0.13	4.4
Index (over 100000)	1,000,000	316,000	390.0	52.0	31.6	0.039	0.005	31.6	0.12	13.3
M. P. N. (over 240000)	2,400,000	442,000	936.0	123.0	18.4	0.039	0.005	18.4	0.21	13.2
Summer season—subgrouping:										
Index (0-5000)	2,170	(2)	73.8	0.63	(2)	3.4	0.029	(2)	(2)	0.86
M. P. N. (0-11500)	4,510	(2)	168.6	0.85	(2)	3.7	0.019	(2)	(2)	0.51
Index (5001-10000)	8,490	4,960	127.0	2.7	58.4	1.5	0.032	58.4	2.6	2.1
M. P. N. (11501-24000)	18,680	11,460	197.0	5.88	61.3	1.05	0.032	61.3	1.7	2.9
Index (10001-50000)	34,090	8,609	195.0	3.1	25.3	0.57	0.009	25.3	2.3	1.6
M. P. N. (24001-115000)	67,200	20,300	455.0	6.01	30.2	0.68	0.009	30.2	2.2	1.3
Index (50001-100000)	65,300	8,400	193.0	5.4	12.9	0.30	0.008	12.9	2.3	2.8
M. P. N. (115001-240000)	153,800	19,900	457.0	11.62	12.9	0.30	0.008	12.9	2.3	2.6
Index (over 100000)	283,000	11,000	200.0	7.6	3.9	0.071	0.003	3.9	1.8	3.8
M. P. N. (over 240000)	668,000	26,090	476.0	18.2	3.9	0.071	0.003	3.9	1.8	3.8

[1] Index=*B. coli* index; M. P. N.=most probable number.
[2] Only one result available; omitted.
[13] Public Health Reports, vol. 41, No. 40, Oct. 1, 1926, II, Tables 3 and 5. (Reprint No. 1114.)

TABLE 5.—*Comparative numbers of B. coli, expressed, respectively, in terms of the B. coli index and the "most probable numbers," as derived from parallel groupings of the B. coli data according to raw water turbidity and B. coli content*

	Average *B. coli* (per 100 c. c.)				Per cent of raw water			Per cent of influent water		
	Raw	Applied	Filtered	Chlorinated	Applied	Filtered	Chlorinated	Applied	Filtered	Chlorinated
AVERAGES—ALL B. COLI RANGES										
Turbidity=0-10:										
Index	34,600	7,100	37	1.8	20.5	0.11	0.0052	20.5	0.52	4.9
M. P. N	79.800	16,700	53.8	2.8	19.7	.07	.0035	19.7	.34	5.2
Turbidity=11-100:										
Index	84,500	12,800	84	3.6	15.1	.099	.0043	15.1	.66	4.3
M. P. N	200,000	31,300	191	7.2	15.7	.096	.0036	15.7	.61	3.8
Turbidity=over 100:										
Index	285,000	30,600	227	24.0	10.7	.080	.0084	10.7	.74	10.6
M. P. N	698,000	63,100	539	57.2	9.0	.077	.0082	9.0	.85	10.6
AVERAGES—B. COLI SUB-RANGES										
Turbidity=0-10:										
Index (0-5000)	3,000	3,840	7.8	1.3	100+	.26	.043	100+	.2	16.6
M. P. N. (0-11500)	5,432	10,200	16.2	1.5	100+	.30	.028	100+	.16	9.3
Index (5001-10000)	8,300	3,940	47.0	.5	47.5	.57	.006	47.5	1.2	1.1
M. P. N. (11501-24000)	19,200	8,790	60.7	.6	45.8	.32	.003	45.8	.69	1.0
Index (10001-50000)	35,800	11,100	20.0	3.4	31.0	.056	.009	31.0	.18	17.0
M. P. N. (24001-115000)	81,600	24,100	32.5	5.1	29.5	.040	.006	29.5	.14	15.7
Index (50001-100000)	69,700	13,300	29.0	1.1	19.1	.042	.002	19.1	.22	3.8
M. P. N. (115001-240000)	157,000	30,800	47.9	1.7	19.6	.031	.001	19.6	.16	3.6
Index (over 100000)	505,000	10,000	100.0	5.0	2.0	.020	.001	2.0	1.0	5.0
M. P. N. (over 240000)	1,200,000	24,000	240.0	11.5	2.0	.020	.001	2.0	1.0	5.0
Turbidity=11-100:										
Index (0-5000)	3,120	1,550	25.0	.7	49.7	.80	.022	49.7	1.6	2.8
M. P. N. (0-11500)	7,020	3,640	60.7	.8	51.9	.86	.011	51.9	1.7	1.3
Index (5001-10000)	7,660	3,610	19.0	1.2	47.1	.25	.016	47.1	.53	6.3
M. P. N. (11501-24000)	17,300	8,790	28.4	2.2	50.8	.16	.013	50.8	.32	7.8
Index (10001-50000)	33,200	9,210	91.0	1.3	27.7	.27	.004	27.7	.99	1.4
M. P. N. (24001-115000)	77,800	21,500	218.0	2.0	27.6	.28	.003	27.6	1.01	0.9
Index (50001-100000)	65,200	12,000	121.0	4.9	18.4	.19	.008	18.4	1.01	4.0
M. P. N. (115001-240000)	150,000	31,800	258.0	10.5	21.2	.17	.007	21.2	.81	4.1
Index (over 100000)	723,000	71,500	270.0	22.0	9.9	.04	.003	9.9	.38	8.1
M. P. N. (over 240000)	1,729,000	174,000	642.0	51.7	10.1	.04	.003	10.1	.37	8.1
Turbidity=over 100:										
Index (0-5000)	3,340	864	6.5	.4	25.9	.19	.012	25.9	.75	6.2
M. P. N. (0-11500)	7,880	1,620	13.7	.32	20.6	.17	.004	20.6	.85	2.3
Index (5001-10000)	7,790	2,020	46.0	1.2	25.9	.59	.015	25.9	2.3	2.6
M. P. N. (11501-24000)	17,600	4,620	107.0	2.24	26.2	.61	.013	26.2	2.3	2.1
Index (10001-50000)	32,300	3,530	217.0	8.6	10.9	.67	.027	10.9	6.1	4.0
M. P. N. (24001-115000)	70,700	7,660	472.0	15.4	10.9	.67	.022	10.9	6.2	3.3
Index (50001-100000)	75,000	18,200	313.0	30.0	24.3	.42	.040	24.3	1.7	9.6
M. P. N. (115001-240000)	166,000	41,590	737.0	70.8	25.2	.44	.043	25.2	1.8	9.6
Index (over 100000)	949,000	94,900	506.0	66.0	10.0	.05	.007	10.0	.53	13.0
M. P. N. (over 240000)	2,380,000	198,000	1,230.0	161.0	18.3	.05	.007	8.3	.62	13.1

From the foregoing comparisons it is fairly evident that in so far as the basic relationships involved in these studies are concerned, the expression of *B. coli* results in terms of the *B. coli* index leads to substantially the same results as does their derivation in terms of "most probable numbers," the only notable difference being in the indicated maximum *B. coli* content of the raw water consistent with producing an effluent conforming to the revised Treasury Department

Standard. Expressed in terms of the "most probable numbers," this maximum is 9,000 rather than 6,000 per 100 c. c. (See fig. 1.) There appears to be little or no indication in the data, moreover, that either one of the two systems of enumeration gives a smoother series of correlations than does the other. There is little doubt, however, that the expression of the results in terms of the "most probable numbers" gives a closer approximation to the true density of *B. coli* in a given water. It is for this reason, and because this newer method of enumeration is likely to be more widely used in the future, that the *B. coli* data given in Tables 3, 4, and 5 have been compared, as shown in terms of the two respective measures.

INFLUENCE OF SYSTEM OF TEST DILUTIONS UPON INDICATED RELATIONS EXISTING BETWEEN NUMBERS OF B. COLI IN RAW WATER AND CORRESPONDING NUMBERS IN EFFLUENTS

In the preceding article [14] of this series a comparison was given of the baterial efficiency of the experimental water purification plant used for these experiments and the corresponding efficiency of five municipal Ohio River plants, under similar conditions of raw water pollution. In this connection it was stated: "In order to make a proper comparison of the *B. coli* data, it has been necessary to reduce the experimental results obtained from tests of the unchlorinated and chlorinated effluents to a basis of those derived from tests only of five 10-c. c. portions of each sample, owing to the fact that this method was followed at the five Ohio River plants during the year covered by the averages. This procedure involved recalculating in the experimental series, the *B. coli* index for each individual sample, after eliminating all results of tests of 1 c. c. and 0.1 c. c. portions, and reaveraging, on this basis, the results falling within the raw water range stated."

In view of the fact that it is the usual practice at a considerable number of municipal water purification plant laboratories to test only five 10-c. c. portions of the filtered and chlorinated effluents for the presence of *B. coli*, it may be of interest to show the comparative results obtained by including and by excluding from such results all tests for *B. coli* made in additional portions of 1 c. c. and 0.1 c. c. of samples of the two kinds of effluents specified. In Table 6 is given a parallel tabulation of the average numbers of *B. coli*, expressed in terms of the *B. coli* index, derived, first, as in Table 3, in which the results obtained from 1 c. c. and 0.1 c. c. portions of the filtered and chlorinated waters have been included in the group averages given for these two effluents, and, next, by excluding from these results all tests made in such portions, basing them only on tests of five 10-c. c. portions of each sample. In Table 6, however, both tabulations are

[14] Loc. cit., p. 22.

based on observations extending over a period of only 12 months (October, 1924, to September, 1925, inclusive), whereas in Table 3 the observations extended over 15 months, including the additional three months, October–December, 1925.

TABLE 6.[1]—*Comparison between average B. coli indices observed in filtered and chlorinated effluents, corresponding to averages of raw water indices falling within specified ranges, as determined from the same data. (A) By basing results on tests of samples in single 1 c. c. and 0.1 c. c. portions and five 10-c. c. portions, and (B) by excluding all results obtained in the 1 c. c. and 0.1 c. c. portions and including only those obtained in the five 10-c. c. portions*

Raw water *B. coli* range, index per 100 c. c.		Average *B. coli* index per 100 c. c.				Residual per cent of raw water		Residual per cent of influent water	
		Raw	Applied	Filtered	Chlorinated	Filtered	Chlorinated	Filtered	Chlorinated
0–5,000	A	3,210	1,350	16.0	0.52	0.50	0.016	1.2	3.2
	B	3,210	1,350	4.0	0.50	0.12	0.015	0.3	12.5
5,001–10,000	A	7,890	3,200	35.6	1.14	0.45	0.014	1.1	3.2
	B	7,890	3,200	5.7	0.81	0.07	0.010	0.2	14.2
10,001–50,000	A	33,300	8,250	111.0	3.1	0.33	0.009	1.4	2.8
	B	33,300	8,250	7.9	1.9	0.024	0.006	0.09	24.1
50,001–100,000	A	69,000	14,600	160.0	6.7	0.23	0.010	1.1	4.2
	B	69,000	14,600	9.0	3.1	0.013	0.004	0.06	34.4
Over 100,000	A	878,000	86,800	431.0	52.1	0.049	0.006	0.50	12.1
	B	878,000	86,800	8.8	5.0	0.001	0.0006	0.01	57.0

[1] Based on data covering the period Oct. 1, 1924, to Sept. 30, 1925.

On referring to Table 6 it is noted that the indicated *B. coli* indices of the filtered and chlorinated waters are much higher throughout the entire series "A," in which the results of tests of 1 c. c. and 0.1 c. c. portions of all samples were included, than in series "B," in which they were excluded [15] and the results based only on tests of five 10-c. c. portions. The corresponding residual percentages also are proportionately higher in the former case.

In Figure 2 is shown a comparative plot of the series "A" and "B" figures, respectively, as given in Table 4. For further comparison with these graphs, a plot is shown of the relationship between the *B. coli* index of the raw water and of the water applied to the filters, as derived from the same series of observations, and, in this instance, from tests made in single portions of each sample forming a geometric series progression. On referring to the chart it will be noted, first, that the slopes of the series "B" graphs are much flatter than those of series "A," owing to the fact that the *B. coli* index, as determined in series "B," is based on tests of only the five 10-c. c. portions of each sample and therefore can not have a maximum exceeding 10 per 100 c. c. It also will be noted that the graphs of series "A," based on the combined tests of five 10-c. c. portions, and, in addition, single

[15] The divergence is notably less, however, in the extreme lower ranges of *B. coli* density, bordering on that of the Treasury Department Standard.

1 c. c. and 0.1 c. c. portions, have slopes much more consistent with that of the raw: applied water graph than do those of series "B."

From these indications, it would appear that the inclusion of tests of 1 c. c. and 0.1 c. c. portions in all *B. coli* determinations on unchlorinated and chlorinated filter effluent samples gives results which are more consistent with those obtained by the geometric series

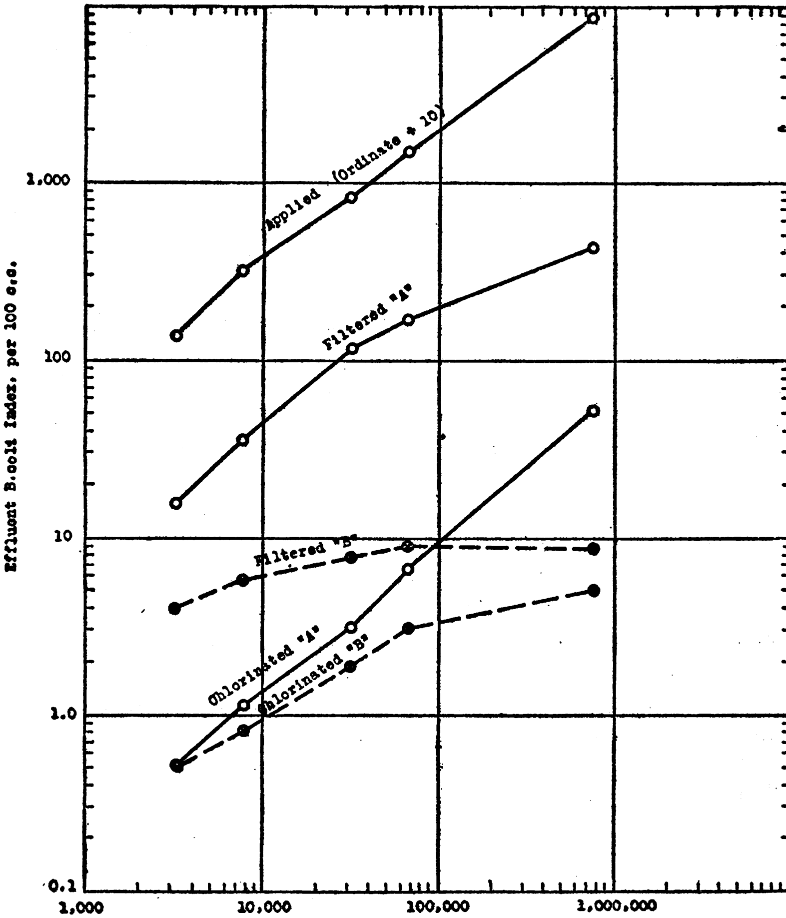


FIG. 2.—Comparative plot of data given in Table 6

"A" = Results based on tests of five 10-c. c. portions and of additional single 0.1-c. c. and 1.0-c. c. portions of all samples

"B" = Results based on tests of only five 10-c. c. portions of all samples

dilution method on parallel samples of the raw and applied waters. They should afford, therefore, a more reliable measure of the true relationship existing between the *B. coli* content of the raw water and that of the filtered and chlorinated waters named. These results indicate, furthermore, that the occasional appearance of *B. coli* in portions of these effluents smaller in volume than 10 c. c. may exert, if detected, a very decided effect on the average numbers of *B. coli* as shown in such effluents over a given period, whether measured in terms of the *B. coli* index, as in the case at hand, or in those of the "most probable numbers," which readily can be shown to be similarly affected. It possibly might be contended that the effect thus shown, as in Table 6, gives an undue weight to merely occasional lapses in the quality of effluents of this type, which ordinarily may contain numbers of *B. coli* falling well within the range of tests of five·10-c. c. portions. It should be borne in mind, however, that the weight given to such results in this instance is exactly the same as is given to similar lapses in the quality of raw and settled waters when tested for *B. coli* according to the usual method, namely, that of geometric series dilutions. For these reasons, the procedure by which the series "A" data have been derived as in Table 6, consisting of tests of single 1 c. c. and 0.1 c. c. portions in addition to the five 10-c. c. portions, has been followed consistently in all routine tests of the filtered and chlorinated effluents in the experiments described in these papers.

RELATION BETWEEN INDICATED NUMBERS OF B. COLI AND BACTERIAL COUNTS ON AYERS-RUPP MEDIUM, AS OBSERVED IN THE SAME SAMPLES OF RAW AND TREATED WATERS

Owing to the recognized mathematical difficulties involved in enumerating organisms of the *B. coli* group by the usual fermentation test method, bacteriologists have searched for a solid differential culture medium which could be utilized for making direct plate counts of the *B. coli* and closely allied groups. The acid colony count on litmus lactose agar, developed in the early days of water and sewage bacteriology, has been and still is used with this purpose in view, though the chief disadvantage of this and other similar culture media has been their tendency to permit the growth of bacteria other than *B. coli* and having no definite sanitary significance.

A solid differential medium of the kind above mentioned has been developed recently by Ayers and Rupp,[16] who incorporated in it ingredients somewhat similar to those which form the basis of Endo's medium. In view of the encouraging results secured by means of the Ayers-Rupp medium in quantitative studies of *B. coli* in sewage and feces, it was considered desirable, in connection with the studies described in this paper, to observe the results obtained in routine examinations of the raw and treated waters by using this medium in comparison with quantitative tests of the same samples for *B. coli*, following the standard fermentation tube procedure.

The comparison in question was made during the period October 1 to December 4, 1925, in which the bacterial quality of the raw

[16] Ayers, S. Henry, and Rupp, Phillip: Jour. Bact., vol. III, p. 433 (1918).

water, as delivered to the experimental plant, was varied over a wide range. Observations were made on 48 test days during this period, and parallel tests were made on 540 samples of water for *B. coli* in accordance with the usual fermentation tube procedure and for the count of characteristic red colonies appearing on Ayers-Rupp medium after 40 to 48 hours' incubation of the plate cultures at 37° C. The samples were collected at four different points in the experimental plant, their number being equally divided among these four sources.

The results of the tests were first reduced to daily averages and these averages arranged in the order of magnitude of the *B. coli* content, as indicated by the daily mean index or by the "most probable numbers." These and the corresponding Ayers-Rupp counts were then divided into quartiles and the quartiles averaged, with results as shown in Table 5, in which all of the figures, including the Ayers-Rupp counts, have been expressed in terms of the bacterial numbers per 100 cubic centimeters, in order to make them directly comparable with each other. On referring to Table 7, it will be noted that the "most probable numbers" of *B. coli* approach closely the Ayers-Rupp counts in the upper ranges of magnitude, but diverge from them considerably in the lower ranges. The *B. coli* index is shown to be almost uniformly lower than the Ayers-Rupp count.

TABLE 7.—*Summary of quartile averages derived from daily mean results of parallel tests for B. coli and for plate counts on Ayers-Rupp medium, made in the same samples of water from designated sources*

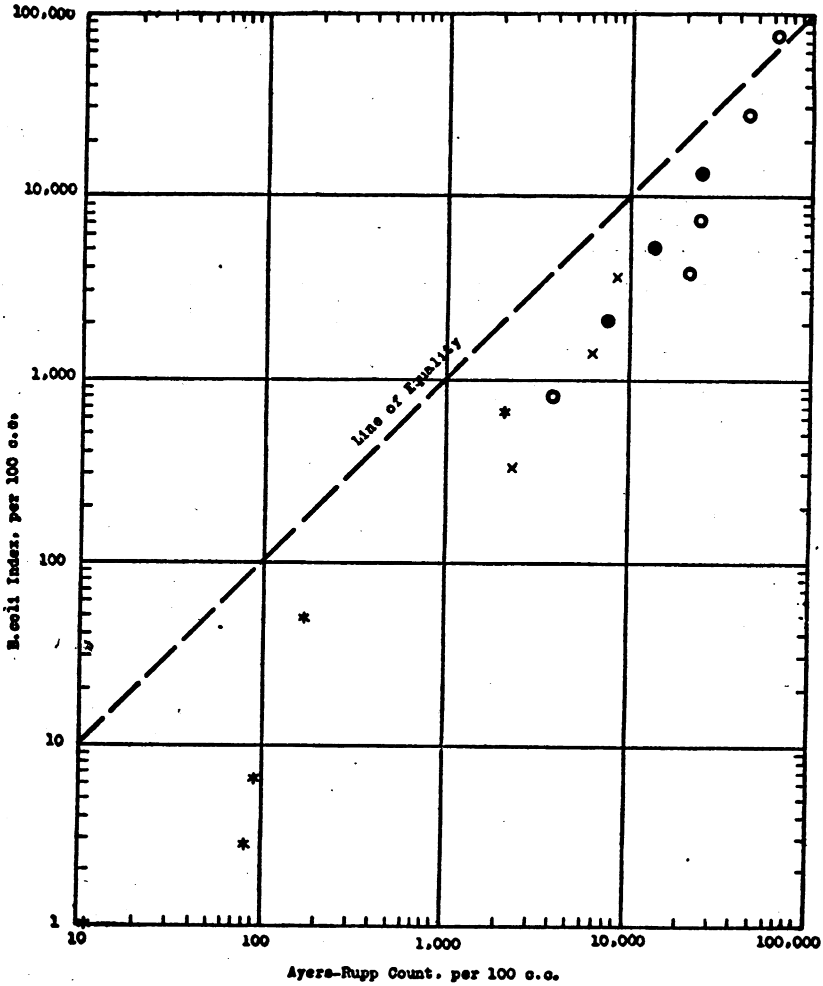
(Results in terms of numbers per 100 c. c.)

Number of test days	River water, undiluted			River water, diluted			Water applied to filters			Filtered, unchlorinated		
	B. coli		Ayers-Rupp count	*B. coli*		Ayers-Rupp count	*B. coli*		Ayers-Rupp count	*B. coli*		Ayers-Rupp count
	Index [1]	M. P. N. [2]		Index	M. P. N.		Index	M. P. N.		Index	M. P. N.	
12	3,880	8,500	21,400	803	1,860	3,900	325	771	2,400	1.0	2.0	11
12	7,560	17,400	29,100	2,030	4,820	7,700	668	1,610	2,100	2.8	3.9	83
12	28,270	58,900	45,900	5,290	12,300	14,200	1,490	3,870	6,200	6.5	12.5	93
12	78,900	189,000	63,600	16,100	38,500	24,600	3,960	9,530	8,600	50.0	131.0	170

[1] Phelps index. [2] Most probable numbers.

The data given in Table 7 are illustrated graphically in Figures 3 and 4, in which the quartile averages of the Ayers-Rupp counts have been plotted, against the corresponding *B. coli* figures expressed, respectively, in terms of the Phelps index and of the "most probable numbers." In each chart the "line of equality" shows the positions of equal values of the two variables.

On referring to these two charts, it will be noted that, with the exception of the points representing the quartile averages obtained from the tests of the filter effluent, each individual series of plotted results follows a definite trend, approaching closely a line having a slope slightly steeper than that of the "line of equality."[17] Considering the several series of points as a whole, they follow, in both instances, with the single exception noted, a fairly well-defined



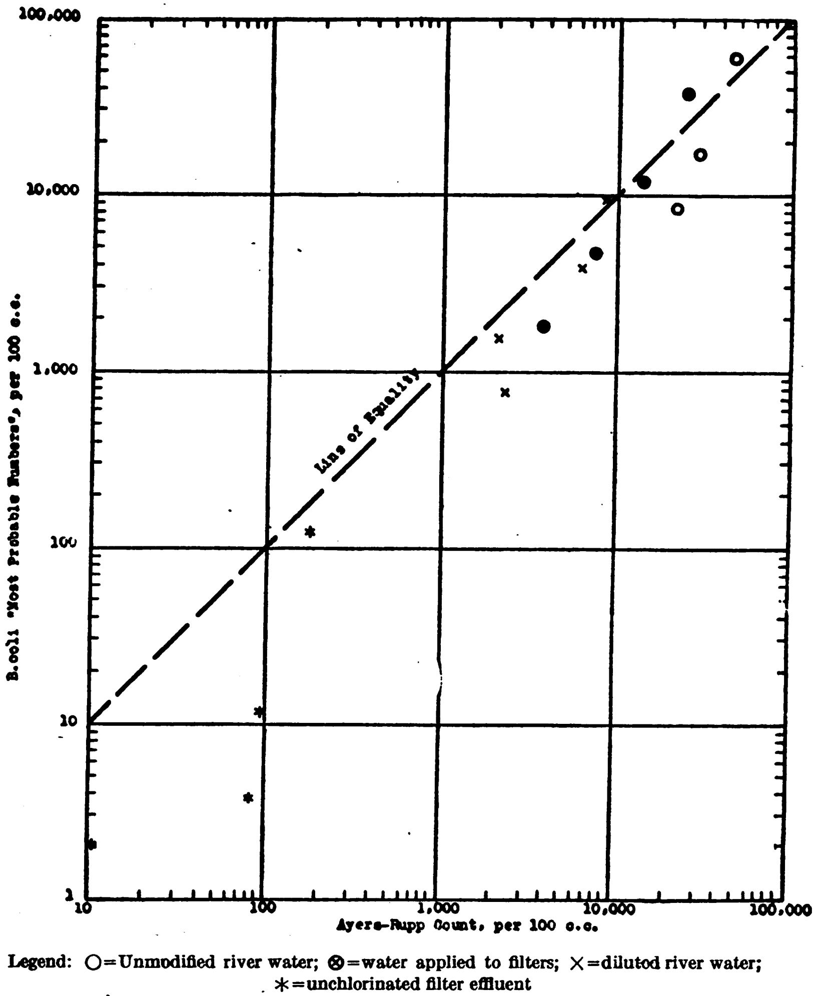
Legend: O = Unmodified raw water; ⊗ = diluted raw water; X = water applied to filters; ✱ = unchlorinated filter effluent

FIG. 3.—Relation between the Ayers-Rupp count and the *B. coli* index, as determined in identical samples of water. (Plot of data given in Table 7)

trend, also slightly steeper than the "line of equality." It thus is indicated that in the higher range of bacterial densities, a fairly close correlation exists between the average density as expressed in

[17] The trend of these plots, though approximating a straight line on the logarithmic scales used, would be a curved line on a linear scale, convex toward the lower horizontal axis.

terms of the Ayers-Rupp count and as given in terms both of the *B. coli* index and of the "most probable numbers" of this organism. The general trend of the points shows that in the lower ranges of magnitude, the Ayers-Rupp count tends to exceed both the *B. coli* index and the "most probable numbers," but that in the higher ranges the corresponding values of each pair of variables tend to



Legend: ○=Unmodified river water; ⊗=water applied to filters; ×=diluted river water; ✱=unchlorinated filter effluent

FIG. 4.—Relation between the Ayers-Rupp count and the "most probable numbers" of *B. coli*, as determined in identical samples of water. (Plot of data given in Table 7)

approach each other more closely. The wide departure of the plotted points in the extreme lower range—i. e., for densities less than 100 per 100 c. c.—both from a well-defined trend among themselves and from the "line of equality," is difficult to explain satisfactorily. It probably is due in part, however, to the fact that the

Ayers-Rupp count in this range, representing an average of less than a single acid colony per plate, is so low that it is subject to a much wider degree of error than in the higher ranges.

CONCLUSIONS

From the foregoing studies of *B. coli* relationships, made in connection with the studies of water purification described in the present series of brief papers, the following conclusions may be stated:

1. That the quantitative expression of the results of routine *B. coli* tests in terms of the "most probable numbers" yields average figures which, though more nearly representative of the true density of *B. coli* in a given water than are those based on the ordinary *B. coli* index, do not alter materially the basic relationship between the raw water and the various effluents in this respect, on which the main conclusions to be derived from the primary series of experiments depend.
2. That the indicated maximum "most probable numbers" of *B. coli* in the raw water consistent with producing a chlorinated filter effluent conforming to the revised U. S. Treasury Department Standard approximates 9,000 per 100 c. c., the corresponding maximum, as expressed in terms of the Phelps index, being 6,000 per 100 c. c. The maximum raw water *B. coli* content consistent with producing an unchlorinated effluent meeting the same standard is indicated as being approximately 100 per 100 c. c., as expressed in terms both of the *B. coli* index and the "most probable numbers."
3. The inclusion of tests of filter effluents, both unchlorinated and chlorinated, in portions of samples less in volume than 10 cubic centimeters, (*a*) gives decidedly higher average indicated densities of *B. coli* in these effluents, and (*b*) yields results which appear to be more consistent with those obtained from geometric-series dilutions than does the exclusion of such tests.
4. For bacterial densities falling within the range of the ordinary plate count, the acid-colony count on the Ayers-Rupp medium gives results which are of the same general order of magnitude numerically as the "most probable numbers" of *B. coli*, as determined by the fermentation-tube test.

Perhaps the most significant of the foregoing conclusions is that which is concerned with the "most probable numbers" of *B. coli*. In spite of the fact that the basic relationships involved in these studies are altered to a very small extent by conversion of the *B. coli* data to these terms, striking experimental evidence is found from the comparison with the Ayers-Rupp counts that the density of *B. coli*, as given by the "most probable numbers," approaches more nearly the expected order of magnitude than when expressed in terms of the ordinary *B. coli* index. The correspondence between these two quantities throughout a large portion of the entire range of their variation was consistently too close to be regarded as fortuitous.

In routine filtration plant control work the *B. coli* index should yield average results, when converted to terms of bacterial efficiency, which are fairly consistent with those given by the corresponding "most probable numbers" of *B. coli*. In such work, however, as well as in the research field, it is often of primary importance to determine, from a given series of tests, the closest possible approximation to the actual density of *B. coli* in the raw water or effluent. This object can be accomplished with far more precision and with little, if any, greater effort, by converting the result of each individual test to terms of the "most probable numbers" of *B. coli*. The figures thus obtained may be averaged, or treated statistically in any other manner, like the *B. coli* index or the ordinary plate count of bacteria. Although the *B. coli* index doubtless will continue to be used generally in routine plant control work for some time to come, the improved method of enumeration represented by the "most probable numbers" of *B. coli* will gain rapidly in favor with a wider understanding of its greater precision and relative simplicity, when reduced to a tabular system of results as obtained from individual tests.

NOTIFIABLE DISEASES IN LARGE CITIES, 1926

The annual summary of the reports of notifiable diseases in large cities of the United States for the year 1926 will soon be issued as Supplement No. 63 to the Public Health Reports. It is printed in the same form as the summary for the year 1925 (Public Health Reports, vol. 41, No. 38, September 17, 1926), and includes cities having over 100,000 population.

Authoritative estimates of population are not available for some of the cities, but the publication gives case and death rates for most of the cities. The "estimated expectancy," based upon the experience of the preceding seven years, is given for the principal diseases.

The diseases which are included are listed in the following table, which gives some totals taken from the tables of the supplement.

Number of cases of certain communicable diseases reported for 1926 by health officers of cities of over 100,000 population, with estimated expectancy and number of deaths

Disease	Number of cities included	Cases		Deaths, 1926
		Estimated expectancy	1926	
Anthrax	17		52	7
Chicken pox	80	61,323	71,080	29
Dengue	5		8	0
Diphtheria	83	59,492	44,000	3,113
Influenza	79			7,423
Lethargic encephalitis	70			577
Malaria	38			79
Measles	83	79,386	243,358	2,543
Meningococcus meningitis	46	719	714	417
Mumps	76	23,105	23,535	25
Pellagra	33			321
Pneumonia (all forms)	83			46,088
Poliomyelitis	62	679	791	177
Rabies	8			15
Scarlet fever	83	54,998	69,291	755
Septic sore throat	35			174
Smallpox	83	5,465	6,497	217
Tuberculosis (all forms)	81			29,242
Tuberculosis (respiratory system)	72			23,940
Typhoid fever	82	5,966	5,352	916
Typhus fever	9		37	4
Whooping cough	67	44,884	55,832	1,854

The following table gives a comparison of the rates for some of the principal communicable diseases in the large cities of the United States for the years 1922, 1923, 1924, 1925, and 1926:

	Cases		Deaths	
	Number of cities	Cases per 1,000 population	Number of cities	Deaths per 1,000 population
Chicken pox:				
1922	68	1.69	68	0.001
1923	77	2.02	77	.001
1924	82	2.45	82	.001
1925	69	1.89	69	.001
1926	68	2.24	68	.001
Diphtheria:				
1922	73	2.25	73	.16
1923	77	1.97	77	.13
1924	82	1.67	83	.11
1925	69	1.39	69	.10
1926	70	1.33	70	.10
Influenza:				
1922			70	.16
1923			77	.21
1924			80	.10
1925			66	.15
1926			66	.24
Lethargic encephalitis:				
1924			68	.02
1925			58	.02
1926			59	.02
Measles:				
1922	72	5.26	72	.08
1923	77	7.11	77	.08
1924	80	4.36	83	.05
1925	69	3.32	69	.03
1926	70	7.92	70	.08
Mumps:				
1922	66	.72	66	.0005
1923	69	.75	69	.0005
1924	75	1.66	76	.0006
1925	66	.67	66	.0006
1926	63	.76	63	.0009

	Cases		Deaths	
	Number of cities	Cases per 1,000 population	Number of cities	Deaths per 1,000 population
Pneumonia (all forms):				
1922			74	1.36
1923			75	1.51
1924			83	1.35
1925			68	1.33
1926			69	1.45
Poliomyelitis:				
1924	66	.07	72	.01
1925	63	.05	63	.01
1926	62	.03	62	.01
Scarlet fever:				
1922	73	1.80	73	.03
1923	77	2.07	77	.04
1924	82	2.15	82	.03
1925	68	2.26	68	.03
1926	70	2.13	70	.02
Smallpox:				
1922	75	.17	75	.0119
1923	78	.18	78	.0014
1924	83	.50	83	.0165
1925	69	.25	69	.0139
1926	70	.16	70	.0009
Tuberculosis (all forms):				
1922			72	1.01
1923			77	.98
1924			82	.96
1925			69	.93
1926			69	.90
Tuberculosis (respiratory system):				
1922			64	.87
1923			67	.85
1924			70	.82
1925			60	.79
1926			61	.78
Typhoid fever:				
1922	73	.19	73	.0329
1923	77	.19	77	.0327
1924	81	.22	83	.0341
1925	68	.21	69	.0348
1926	69	.16	69	.0277
Whooping cough:				
1923	76	1.67	76	.06
1924	77	1.56	81	.05
1925	65	1.68	68	.06
1926	67	1.92	67	.06

COURT DECISIONS RELATING TO PUBLIC HEALTH

Milk ordinance upheld.—(Alabama Supreme Court; Walker *v.* City of Birmingham et al., 112 So. 823; decided March 31, 1927.) The plaintiff brought suit to restrain and enjoin the city of Birmingham and the local health authorities from interfering with his business by refusing to grant him a license to sell milk in the city. The ordinance gave to the board of health power to refuse a permit when, in its judgment, the applicant was not a proper person, and also made provision for a hearing. In upholding this power, the supreme court said:

We think there can be no serious objection to the bill on the ground that the ordinance governing the sale of milk in the city of Birmingham is void as involving the unwarranted delegation of legislative power. The act of August 20, 1915, section 6, armed the city with the full and complete power to adopt ordinances and regulations, not inconsistent with the laws of the State or the State and Federal Constitutions, providing for the safety and preserving the health of its inhabitants. Acts 1915, page 294, et seq. The administration of such an ordinance may be committed to subordinate officers—necessarily must be—without offense against any principle of constitutional law. * * * Nor is the ordinance objectionable as committing to an officer or officers the power to decide, according to their own notion in each particular case, the question of issuing or withholding a license, and thus deciding according to their unregulated discretion who may, and who may not, engage in a legitimate and useful—even, we may say, necessary—business, for, while it confers upon the board of health the right to refuse a permit "when in its judgment the applicant for such permit is not a proper person to be granted such permit," the further provision is that in every case the applicant shall have the right to be heard in person or by counsel, or both, with the right to introduce competent evidence in support of his application, and the right of the board to revoke licenses is safeguarded in like manner * * *. * * * the ordinance in this case made ample provision for a hearing.

Law authorizing establishment of county tuberculosis hospitals held constitutional and section construed.—(Pennsylvania Supreme Court; Commonwealth ex rel. James et al. *v.* Woodring et al., Commissioners of Northampton County; petition of Montgomery County Medical Society; petition of Diller et al.; 137 A. 635; decided May 9, 1927.) The act of March 23, 1925, authorizing the establishment of county tuberculosis hospitals, was attacked as being unconstitutional on the following grounds:

(1) That, because it required the vote of a majority of the electors of each county in favor of the establishment of a hospital, it was special legislation in violation of a constitutional provision that "the general assembly shall not pass any local or special law: * * * regulating the affairs of counties, cities, townships, wards, boroughs or school districts."

(2) That, because it required the court to appoint an advisory board to aid in the management and operation of each hospital, it violated a constitutional provision that "the general assembly shall not delegate to any special commission * * * any power to make, supervise or interfere with any municipal improvement, * * * or to levy taxes or perform any municipal function whatever."

(3) That the legislature was without power by a subsequent enactment to validate elections in favor of the establishment of county tuberculosis hospitals held under a previous 1921 law which had been declared unconstitutional.

(4) That the members of the advisory board provided for were county officers, and as such were required, pursuant to a constitutional provision, to be elected and not appointed.

The supreme court decided against each of the above contentions and held the act to be constitutional.

Section 12 of the act validated proceedings and elections, held under the 1921 law, for the establishment of county tuberculosis hospitals, and stated that "such proceedings and hospital may be completed, and the said hospital may thereafter be managed and operated in accordance with the provisions of this act." The court construed the word "may" as being permissive rather than mandatory, saying:

> * * * the legislature evidently intended to say that, where proceedings had been taken under the prior unconstitutional act, the public authorities are given permission to complete such proceedings and erect a hospital, if, in their good judgment, that course ought to be pursued.

PUBLIC HEALTH ENGINEERING ABSTRACTS

Camp Sanitation. Charles R. Cox, division of sanitation, New York State health department. *Public Health News*, New Jersey State department of health, vol. 12, No. 5, April, 1927, pp. 114–117. (Abstract by E. C. Sullivan.)

This article, which is part of a paper read before a meeting of the New Jersey Sanitary Association on December 3, 1926, states that 33 States have enacted special rules and regulations governing the sanitary conditions in summer camps. There is a growing realization that the detailed problems of the supervision of summer camps by public health authorities is a local matter; but as many of the problems of camp sanitation are of a sanitary engineering nature, it is essential that the sanitary engineering divisions of State departments of health should cooperate with the local health authorities for the supervision of such summer camps. In the State of New York, such cooperation is provided through special provisions in the New York State Sanitary Code.

Various phases of camp sanitation are outlined in the paper, such as the importance of a well-drained camp site, the necessity for an adequate supply of pure water, proper provisions for the disposal of liquid wastes and sewage, provisions for proper garbage disposal, and for the providing of a safe milk supply. Mention is made of the necessity for taking suitable precautions to prevent the importation of infectious diseases into camps.

Summer and Tourist Camp Sanitation. (Committee report presented at the Conference of State Sanitary Engineers, June, 1926.) *Engineering and Contracting*, vol. 65, No. 9, September, 1926, pp. 436–438. (Abstract by C. C. Ruchhoft.)

Camp sanitation is demanding greater attention owing to the increasing auto travel. In 35 States there were 3,000 camps having sanitary inspection, and it is estimated that these camps were used by 2,000,000 people in the camping season of 1925. It is therefore important to establish safe water supplies along highways and in tourist camps to limit the spread of water-borne disease. Thirty States have enacted special rules and regulations to govern outdoor camps. In most States special engineers or sanitary inspectors are employed during the summer months to suprevise camp sanitation. A decentralized program of cooperation between the State and local officials seems best for handling the administration of the regulations governing camps. The general specifications for regulations of camp sanitation of several States have a general agreement and include the following points: (1) Definition of a camp; (2) submission of plans and issuance of a permit; (3) safe water supply; (4) safe sewage disposal; (5) sanitary garbage disposal; (6) proper drainage; (7) capable management; (8) penalty clause. Certification of highway and camp water supplies has been found practical and has been taken up by many States.

Garbage Collection and Disposal in Belmont, Mass. Dana M. Wood. *Water Works*, vol. 66, No. 5, May, 1927, pp. 193–195. (Abstract by W. M. Olson.)

This article, by a member of the Belmont Board of Health, begins with a brief general discussion of the problems of garbage collection and disposal. Board of health regulations are referred to with the comment that their customary inadequacy is due to the lack of established standards. Then follow local history and definite data.

"For many years the accepted practice was to place a contract for the collection and disposal of garbage, the contractor to collect with his own equipment and remove all garbage from the town. Invariably the garbage has been used for hog feed on adjoining farms." A table shows the cost of collection and disposal under this arrangement for the years 1898 to 1919, the average cost per capita per year being about 10 cents.

Because of poor service by the contractor in 1921, the town changed to a system of municipal collections in 1922. This method reduced the number of complaints, but by 1924 was found to be costing too much. A table shows how the cost per capita per year rose from $0.078 in 1920 to $0.900 in 1924. The town thereupon changed back to the contract method of payment. Instead of being paid on a lump-sum basis, the contractor receives 8½ cents per cubic foot collected and removed from the town. The contractor, in turn, pays his men on a piecework basis by allowing them one day's pay for one load collected. The men may start as early as they wish and are free as soon as one load has been collected and hauled. There must be at least one collection per week from November to May and two per week from June to October. Under this arrangement excellent service has been obtained.

The contractor uses six vehicles, with a total capacity of 729 cubic feet, to serve the 16,400 people. "The most efficient collecting vehicle was found to be one having a capacity of about 8 cord-feet, drawn by a pair of horses, with one collector having the care and feeding of his team." (Frequent use is made of an unusual unit, the cord-foot, equal to 16 cubic feet.) A table shows unit weights of garbage as determined by 16 tests distributed over nearly two years, the average weight being 40 pounds per cubic foot. A fourth table shows by months the amount and cost of garbage collected and removed from May, 1925, to December, 1926. The garbage collected from an estimated population of 16,400, amounted to 594 cubic feet per working-day (303 days), or to 1,203 pounds per day per 1,000 population (365 days).

The total cost of collection and disposal was $15,282.46, or 8½ cents per cubic foot, or $0.93 per capita per year. A table shows by months the number of service complaints received during 1925 and 1926. For the last eight months of those years complaints were reduced from 396 in 1925 to 290 in 1926. A final table presents details of costs from 1922 to 1925.

In a discussion of hog feeding of garbage the author notes the following advantages: (1) Food values in garbage are utilized; (2) fluctuations in the amount of garbage can be compensated for by varying the size of the herd, thereby keeping to a minimum the capital invested; and (3) refuse may be buried to form a compost for fertilizing purposes. Disadvantages are: (1) Incomplete consumption; (2) difficulty of delivering garbage in fresh condition; (3) nuisances; (4) injury to herd by cholera or foreign materials in garbage. "One hundred hogs will consume about 1 ton of garbage per day." Hog-feed garbage is worth from 1.6 cents to 2.1 cents per cubic foot.

"The service rendered has greatly improved at decreased costs by returning to the contract basis of collection." The unit cost contract is fair to both contracting parties and has resulted in a notable increase in the amount of garbage collected. (The actual per capita cost in 1926 was higher than the previous maximum in 1924, but better service and the removal of a greater volume of garbage was obtained.)

Plant Disposes of Noncombustible Rubbish at Los Angeles. Anon. *Engineering News Record*, vol. 98, No. 13, March 31, 1927, pp. 526–28. (Abstract by H. B. Hommon.)

This article, together with the one published in the *Engineering News Record*, August 6, 1925, page 108, on the operation of the Fontana hog farm, gives a very complete and interesting description of how the city of Los Angeles, with a population of around 1,000,000, is disposing of its refuse and garbage.

A city ordinance requires that each householder keep two containers and that one be used only for food waste (garbage) and the other for all other waste. The garbage is collected by the city and dumped into tank cars and hauled to the Fontana hog farm. The refuse, also collected by the city, is sold to the Los Angeles By-Products Co. for $502 per month. The average collection of refuse per working-day over a period of six months was 528 cubic yards. The maximum collection for one day in December was 691 cubic yards.

From a monthly average of 13,500 cubic yards of refuse there were reclaimed: (1) 600 tons of tin cans; (2) 175 tons of miscellaneous metal that had been lightly burned to remove combustible material; (3) 15,000 salable bottles; (4) 85 tons of salable broken glass; (5) 1½ tons of rags; and (6) 8½ tons of scrap metal, tires, and rubber. There were counted 167 different combustible items in one day.

Seven men stationed along the conveyor belt from the dump pick out and segregate the different kinds of material in the refuse. All the metal, except the tin cans from which tin is recovered, and granite-iron, which can not be salvaged, is loaded into metal cars, burned, and baled. The bales, 20 by 24 inches, are made by a 600-pound weight dropping 7 feet on the metal in a chamber at a rate of 25 blows per minute.

The tin cans are removed at the ends of the two conveyor belts by magnetic pulleys that hold the tin cans to them until they get around and beyond the point where other material is thrown off. The tin cans, separated from all other material, are lightly burned to remove labels, etc., and then delivered to the de-tinning plant, where the tin is removed by a chemical process. Paper labels on cans interfere with efficiency of operation, and the labels are very difficult to remove. Investigation of this problem is under way. About 20 pounds of tin are recovered per ton of cans.

The de-tinned cans are baled in hydraulic presses. When baled to a density of 11 per cent of the density of pig iron, they are sold to copper mills for use as precipitate, and when pressed to 50 per cent they are sold to steel mills for remelting. In addition to the 600 tons of cans delivered by the city, monthly, the company purchases 400 tons of cans and scrap-tinned metal each month from near-by cities in order to keep the plant busy.

Pure, clear glass that can not be salvaged whole at the plant is broken and a part ground so that the bulk does not exceed 40 cubic feet per ton, and is then shipped to China.

Garbage Incineration for Small Cities. H. V. Pedersen. *American City*, vol. 36, No. 5, May, 1927, pp. 629–630. (Abstract by D. W. Evans.)

The majority of cities in Iowa of 15,000 inhabitants make some pretense of collecting and disposing of garbage. The manner of collection is practically the same in all cases, but the method of paying for the services usually differs.

Four outstanding methods of disposing of garbage have been worked out with various degrees of success: (1) The "sanitary fill," or disposal by burial, has found favor in many cities where sites for this method are available. Strict supervision is needed when this method is used to prevent formation of nuisances; (2) incineration or destruction of garbage entirely by fire; (3) reduction or conversion into by-products; (4) feeding to hogs.

Most cities of less than 15,000 people have sanitary regulations covering disposal of garbage, but they are seldom carried out. The objection to municipally owned system of collection and disposal of garbage has been the cost. The proper disposal of garbage has been given less consideration than any other civic problem.

The article is concluded by a brief description of a portable incinerator, newly developed particularly for small towns. This incinerator employs two movable conveyors for drying the garbage and one movable grate for destruction to ash. The ash is dumped into cans at the rear of the truck. The fuel used is oil supplied through burners, and the speed of the conveyors can be regulated. Demonstrations have shown that 5 tons per day of 8 hours can be burned to ash without nuisances resulting.

International Health Year Book, 1925, Report of the League of Nations Health Organization. 638 pages. Housing. (Abstract by A. L. Dopmeyer.)

Czechoslovakia.—A law was passed on March 25, 1925, for the protection of tenants, marking a gradual return of the right to the free disposal of accommodations in pre-war premises, and allowing a gradual increase in rents of from 50 to 100 per cent over pre-war prices. The effects of the law expire on March 31, 1928.

Germany.—There was an increase in building operations in 1925 over 1924. In the 86 communities of 50,000 population or more there was an increase of 62 per cent in total buildings and 78 per cent in dwelling houses. The proportion of dwelling houses to the total number of buildings rose from 53 per cent to 61 per cent. The number of sets of apartments showed an increase of 86 per cent.

Hungary.—During 1925, the Government concentrated its efforts on the city of Budapest. Four tenement houses and 240 apartments were begun in 1924. At the end of 1925, six buildings, with a total capacity of 150 flats, were begun. The ministry of social welfare makes loans up to 60 per cent of the value of the buildings to encourage building.

Netherlands.—It is stated that, on the whole, the housing crisis is at an end in the Netherlands. In Amsterdam alone, 3,079 dwelling houses were vacant on December 31, 1925. The cyclone of August 10, 1925, showed the advantage of strict enforcement of sound building regulations, as the houses built in recent years were the least affected.

Union of Socialist Soviet Republics.—There are special committees in all of the Governments of the Union for this purpose. There is a central committee with headquarters at Moscow for promoting the construction of workmen's dwellings. The housing conditions in the Union are still extremely unsatisfactory, but there is some recent improvement.

United States of North America.—During the year, 86 additional cities adopted zoning ordinances, bringing the total up to 422.

Swimming Pools in 1926. Anon. *Weekly Health Review*, Detroit department of health, series 8, No. 6, February 5, 1927. 3 pages. (Abstract by I. W. Mendelsohn.)

Data are given regarding the sanitary ratings of the 37 swimming pools in Detroit in 1926. Eight new pools were installed in the year. Seven of the pools did not comply with the department's standards in 1926.

The bacterial standards adopted by the department for swimming pool water are: (1) A median monthly total bacterial count of not over 2,000 per c.c.; (2) not over 50 per cent of the samples during any given month shall show the presence of colon bacilli; (3) not over 20 per cent of the samples during any given month shall show a colon count of over 10 per c. c.

Swimming Pool and Bath House, London. E. V. Buchanan, general manager, Public Utilities Commission, London, Ontario. *Canadian Engineer*, vol. 51, No. 17, October 26, 1926, pp. 575–578. (Abstract by R. E. Thompson.)

This is an illustrated description of the 80 by 188 feet open-air swimming pool completed by the playgrounds department, London, Ontario, in August, last. The pool was commenced five years ago. It was constructed in three sections, owing to the limited appropriation for playgrounds purposes. Equipment provided includes a modern bathhouse, with lavatories, shower baths, filter plant, scum gutter, concrete runways, bleachers with seating capacity of 800 people, and electric flood lighting for night bathing. On the way from the dressing room to the pool there are lavatories and shower baths, and all bathers must wade through a sump before entering the pool. The recirculated water, after addition of alum, is passed through mechanical filters and is chlorinated before being returned to the pool. In addition, bleaching powder is mixed directly into the pool water every morning, about 5 pounds being used for approximately 400,000 gallons of water in the pool. The total cost of the plant was approximately $30,000. Children up to 16 years of age are admitted free, but a rental of 10 cents for bathing suits is charged for all bathers. Adults are admitted for 25 cents or with a season's ticket costing $5.

1926 Annual Swimming Pool Report. Department of public health and welfare, Cleveland, Ohio. 2 pages. (Abstract by I. W. Mendelsohn.)

The sanitary ratings for 1926 of the 26 swimming pools of Cleveland are given. Nine of the pools are new. The method of scoring provides for three points for each water sample collected; a deduction of one point for insufficient chlorinations where the bacterial count is over 1,000 without confirming colon group; deduction of two points for improper operation where colon organisms are confirmed; and a deduction of three points for extreme negligence where colon organisms are confirmed and the bacterial count is over 1,000. The averages are calculated by dividing the total score obtained by the total possible score.

Some of California's Municipal Swimming Pools. George W. Braden, western representative of the Playground and Recreation Association of America. *American City*, vol. 36, No. 5, May, 1927, pp. 591–594. (Abstract by D. W. Evans.)

Great strides have been made in municipal development of swimming pools in both large and small cities in California during the past three years. The author attributes this to the mild climate prevailing most of the year and the smaller proportion of natural waterways than exist elsewhere.

A brief statement is made of the type of pool and of their construction, operation, and equipment in the cities of Pasadena, Glendale, Richmond, Los Angeles, Stockton, and San Francisco.

DEATHS DURING WEEK ENDED JULY 2, 1927

Summary of information received by telegraph from industrial insurance companies for week ended July 2, 1927, and corresponding week of 1926. (From the Weekly Health Index, July 7, 1927, issued by the Bureau of the Census, Department of Commerce)

	Week ended July 2, 1927	Corresponding week 1926
Policies in force	68, 033, 479	64, 897, 122
Number of death claims	11, 306	10, 930
Death claims per 1,000 policies in force, annual rate	8. 7	8. 8

Deaths from all causes in certain large cities of the United States during the week ended July 2, 1927, infant mortality, annual death rate, and comparison with corresponding week of 1926. (From the Weekly Health Index, July 7, 1927, issued by the Bureau of the Census, Department of Commerce)

City	Week ended July 2, 1927		Annual death rate per 1,000 corresponding week 1926	Deaths under 1 year		Infant mortality rate, week ended July 2, 1927 [2]
	Total deaths	Death rate [1]		Week ended July 2, 1927	Corresponding week 1926	
Total (68 cities)	6,631	11.7	[3] 11.7	663	[3] 699	[4] 55
Akron	50			11	6	119
Albany [5]	32	13.9	15.3	1	5	21
Atlanta	66			8	13	
White	30			2	3	
Colored	36	(6)		6	10	
Baltimore [5]	202	12.9	12.8	18	20	56
White	140		10.7	13	12	50
Colored	62	(6)	25.0	5	8	78
Birmingham	55	13.3	13.3	8	9	
White	25		9.4	3	3	
Colored	30	(6)	19.5	5	6	
Boston	178	11.7	12.3	23	26	64
Bridgeport	27			1	4	19
Buffalo	118	11.2	12.9	15	12	63
Cambridge	19	8.0	10.3	2	6	36
Camden	28	11.0	11.9	2	2	34
Canton	18	8.3	8.5	3	4	71
Chicago [5]	655	11.0	10.6	66	68	57
Cincinnati	142	18.0	15.2	13	12	81
Cleveland	170	9.0	9.0	14	20	37
Columbus	86	15.4	13.2	5	8	47
Dallas	52	13.0	11.3	8	4	
White	34		11.0	5	4	
Colored	18	(6)	13.5	3	0	
Dayton	39	11.3	11.8	2	3	33
Denver	70	12.6	13.0	3	7	
Des Moines	29	10.1	10.0	2	2	33
Detroit	305	11.9	11.6	43	43	68
Duluth	22	10.0	4.6	1	0	22
El Paso	33	15.1	13.4	8	9	
Erie	18			1	0	29
Fall River [5]	21	8.2	13.1	2	5	35
Flint	21	7.7	8.1	4	3	65
Fort Worth	44	14.0	10.2	4	7	
White	35		10.4	3	6	
Colored	9	(6)	8.2	1	1	
Grand Rapids	32	10.5	11.7	4	3	59
Houston	64			7	5	
White	44			6	3	
Colored	20			1	2	
Indianapolis	110	15.3	11.2	4	6	31
White	91		10.8	3	6	27
Colored	19	(6)	14.2	1	0	61
Jersey City	51	8.3	10.0	7	4	52
Kansas City, Kans	28	12.5	15.6	4	5	78
White	22		13.0	4	4	89
Colored	6	(6)	28.0	0	1	0
Kansas City, Mo	86	11.7	10.6	7	7	
Knoxville	36	18.4		6		
White	31			5		
Colored	5	(6)		1		
Los Angeles	238			34	16	97
Louisville	81	13.2	16.4	0	12	0
White	67		13.6	0	9	0
Colored	14	(6)	32.2	0	3	0
Lowell	18	8.5	14.7	4	3	77
Lynn	19	9.4	8.5	0	0	0
Memphis	63	18.4	19.1	8	4	
White	25		15.6	5	1	
Colored	38	(6)	25.7	3	3	
Milwaukee	124	12.2	9.2	20	7	93
Minneapolis	97	11.4	10.9	4	5	23
Nashville [5]	57	21.5	18.6	3	5	
White	42		13.3	3	3	
Colored	15	(6)	32.1	0	2	
New Bedford	26	11.3	12.6	1	10	17
New Haven	37	10.4	12.0	1	1	14

(See footnotes at end of table)

Deaths from all causes in certain large cities of the United States during the week ended July 2, 1927, infant mortality, annual death rate, and comparison with corresponding week of 1926. (From the Weekly Health Index, July 7, 1927, issued by the Bureau of the Census, Department of Commerce)—Continued

City	Week ended July 2, 1927		Annual death rate per 1,000 corresponding week 1926	Deaths under 1 year		Infant mortality rate, week ended July 2, 1927 [2]
	Total deaths	Death rate [1]		Week ended July 2, 1927	Corresponding week 1926	
New Orleans	154	18.9	16.9	15	12	----------
White	89	----------	12.4	8	2	----------
Colored	65	(6)	29.7	7	10	----------
New York	1,172	10.2	10.7	118	127	49
Bronx Borough	145	8.2	9.0	15	12	48
Brooklyn Borough	395	9.1	9.7	41	52	42
Manhattan Borough	462	13.3	13.7	48	49	56
Queens Borough	124	8.0	7.8	11	11	47
Richmond Borough	46	16.3	12.4	3	3	56
Newark, N. J	74	8.3	10.8	6	8	30
Oakland	58	11.3	9.6	5	3	59
Oklahoma City	28	----------	----------	4	2	----------
Omaha	48	11.4	13.8	7	4	78
Paterson	30	10.9	9.1	2	2	35
Philadelphia	424	10.9	11.5	32	43	43
Pittsburgh	157	12.7	13.4	23	23	80
Portland, Oreg	60	----------	----------	5	3	53
Providence	48	8.9	12.3	5	8	42
Richmond	53	14.4	14.1	4	8	53
White	27	----------	10.9	2	2	40
Colored	26	(6)	21.8	2	6	76
Rochester	79	12.7	9.6	7	2	59
St. Louis	238	14.8	14.7	20	23	----------
St. Paul	61	12.7	10.7	7	6	64
Salt Lake City [5]	42	16.1	10.6	7	2	106
San Antonio	61	15.1	13.7	13	15	----------
San Diego	40	18.1	12.3	5	1	106
San Francisco	161	14.6	14.4	12	5	75
Schenectady	38	21.3	9.0	5	1	149
Somerville	20	10.2	7.3	2	1	72
Spokane	14	6.7	15.3	2	3	50
Springfield, Mass	27	9.6	14.7	1	5	15
Syracuse	40	10.6	12.1	6	7	77
Tacoma	25	12.2	9.3	2	2	47
Toledo	96	16.5	12.0	8	9	77
Trenton	22	8.4	14.8	3	3	52
Utica	25	12.7	12.1	2	0	46
Washington, D. C	100	9.7	13.0	11	15	64
White	52	----------	11.0	5	5	42
Colored	48	(6)	19.1	6	10	110
Waterbury	26	----------	----------	5	1	118
Wilmington, Del	33	13.7	10.1	3	1	74
Worcester	41	11.0	10.0	3	5	36
Yonkers	13	5.7	7.2	3	1	68
Youngstown	33	10.2	10.1	4	7	56

1 Annual rate per 1,000 population.
2 Deaths under 1 year per 1,000 births. Cities left blank are not in the registration area for births.
3 Data for 67 cities.
4 Data for 62 cities.
5 Deaths for week ended Friday, July 1, 1927.
6 In the cities for which deaths are shown by color, the colored population in 1920 constituted the following percentages of the total population: Atlanta, 31; Baltimore, 15; Birmingham, 39; Dallas, 15; Fort Worth, 14; Houston, 25; Indianapolis, 11; Kansas City, Kans., 14; Knoxville, 15; Louisville, 17; Memphis 38; Nashville, 30; New Orleans, 26; Richmond, 32; and Washington, D. C., 25.

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 Week Ended July 9, 1927

DIPHTHERIA

	Cases
Alabama	12
Arizona	3
California	64
Colorado	26
Connecticut	13
Delaware	1
Florida	5
Georgia	3
Illinois	99
Indiana	26
Kansas	12
Louisiana	5
Maine	3
Maryland [1]	44
Massachusetts	58
Michigan	66
Minnesota	14
Mississippi	4
Missouri	16
Montana	1
Nebraska	4
New Jersey	64
New Mexico	2
New York [2]	73
North Carolina	11
Oklahoma [3]	7
Oregon	9
Pennsylvania	162
South Carolina	9
Tennessee	8
Texas	14
Utah [1]	6
Vermont	4
Washington	10
West Virginia	12
Wisconsin	21

INFLUENZA

	Cases
Alabama	4
Arkansas	4
California	9
Connecticut	2
Florida	1
Georgia	20
Illinois	3
Maryland [1]	2
Massachusetts	2
Michigan	2
Minnesota	1
New Jersey	1
Oklahoma [3]	7
Oregon	15
South Carolina	138
South Dakota	2
Tennessee	20
Texas	21
Utah [1]	3
West Virginia	2
Wisconsin	14

MEASLES

	Cases
Alabama	60
Arizona	66
Arkansas	42
California	198
Colorado	52
Connecticut	30
Delaware	4
Florida	19
Georgia	32
Idaho	5
Illinois	177
Indiana	50
Kansas	89

[1] Week ended Friday.

[2] Exclusive of New York City.

[3] Exclusive of Oklahoma City and Tulsa.

MEASLES—continued

	Cases
Louisiana	43
Maine	13
Maryland [1]	14
Massachusetts	235
Michigan	129
Minnesota	18
Missouri	36
Montana	7
Nebraska	14
New Jersey	27
New Mexico	17
New York [2]	498
North Carolina	397
Oklahoma [3]	77
Oregon	59
Pennsylvania	418
South Carolina	144
South Dakota	26
Tennessee	5
Texas	34
Utah [1]	3
Vermont	41
Washington	233
West Virginia	68
Wisconsin	446
Wyoming	18

MENINGOCOCCUS MENINGITIS

California	8
Connecticut	1
Illinois	5
Kansas	1
Michigan	1
Minnesota	2
New Jersey	3
New York [2]	4
Pennsylvania	2
Utah [1]	1
Washington	1
West Virginia	2
Wisconsin	7

POLIOMYELITIS

Arizona	5
California	27
Florida	1
Georgia	2
Illinois	4
Indiana	1
Kansas	4
Louisiana	6
Massachusetts	4
Mississippi	1
New Jersey	2
New Mexico	10
New York [2]	2
Oklahoma [3]	1
Pennsylvania	1
South Carolina	2
Tennessee	3
Texas	3
Utah [1]	1

SCARLET FEVER

	Cases
Alabama	8
Arizona	1
California	53
Colorado	71
Connecticut	40
Delaware	2
Florida	5
Georgia	7
Idaho	2
Illinois	97
Indiana	33
Kansas	26
Louisiana	2
Maine	10
Maryland [1]	26
Massachusetts	190
Michigan	133
Minnesota	68
Mississippi	4
Missouri	27
Montana	20
Nebraska	19
New Jersey	104
New Mexico	11
New York [2]	115
North Carolina	14
Oklahoma [3]	10
Oregon	3
Pennsylvania	226
South Carolina	5
South Dakota	24
Tennessee	9
Texas	4
Utah [1]	11
Vermont	1
Washington	21
West Virginia	26
Wisconsin	69
Wyoming	11

SMALLPOX

Alabama	24
California	9
Colorado	15
Florida	14
Georgia	7
Idaho	6
Illinois	26
Indiana	91
Kansas	21
Louisiana	2
Michigan	22
Minnesota	1
Mississippi	6
Missouri	19
Montana	9
Nebraska	13
New York [2]	3
North Carolina	15
Oklahoma [3]	29
Oregon	15
South Carolina	19

[1] Week ended Friday.
[2] Exclusive of New York City.
[3] Exclusive of Oklahoma City and Tulsa.

SMALLPOX—continued

	Cases
South Dakota	6
Tennessee	5
Texas	8
Utah [1]	6
Virginia	6
Washington	43
West Virginia	59
Wisconsin	1
Wyoming	10

TYPHOID FEVER

	Cases
Alabama	84
Arizona	2
Arkansas	18
California	12
Colorado	4
Connecticut	1
Florida	12
Georgia	89
Illinois	22
Indiana	12
Kansas	8
Louisiana	33

TYPHOID FEVER—continued

	Cases
Maine	2
Maryland [1]	4
Massachusetts	4
Michigan	9
Minnesota	5
Mississippi	33
Missouri	8
Nebraska	2
New Jersey	6
New Mexico	3
New York [2]	17
North Carolina	70
Oklahoma [3]	70
Oregon	9
Pennsylvania	18
South Carolina	127
South Dakota	2
Tennessee	165
Texas	15
Utah [1]	2
Washington	1
West Virginia	18
Wisconsin	2

Reports for Week Ended July 2, 1927

DIPHTHERIA

	Cases
District of Columbia	11
North Dakota	4

MEASLES

	Cases
District of Columbia	2
North Dakota	19

SCARLET FEVER

	Cases
District of Columbia	16
North Dakota	20

SMALLPOX

	Cases
District of Columbia	6
North Dakota	7

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of monthly State reports is published weekly and covers only those States from which reports are received during the current week:

State	Cerebrospinal meningitis	Dipththeria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
May, 1927										
District of Columbia	0	79	5		34	0	0	81	9	3
Hawaii Territory	7	21	7		140		0	10	0	12
Montana	11	11	26		71		0	102	23	10
June, 1927										
Arizona	1	16	2		162		12	30	0	17
Connecticut	4	138	9	5	252		1	277	0	5
Nebraska		37			317		1	74	38	5

May, 1927

	Cases
Chicken pox:	
District of Columbia	134
Hawaii Territory	29
Montana	66
Conjunctivitis:	
Hawaii Territory	18
Montana	2

May, 1927—Continued

	Cases
Dysentery:	
Hawaii Territory	2
German measles:	
Montana	2
Leprosy:	
Hawaii Territory	3

[1] Week ended Friday. [2] Exclusive of New York City. [3] Exclusive of Oklahoma City and Tulsa.

May, 1927—Continued

	Cases
Lethargic encephalitis:	
Montana	1
Mumps:	
Montana	5
Paratyphoid fever:	
Hawaii Territory	1
Plague:	
Hawaii Territory	2
Rocky Mountain spotted or tick fever:	
Montana	12
Tetanus:	
Hawaii Territory	6
Trachoma:	
Hawaii Territory	2
Montana	5
Whooping cough:	
District of Columbia	48
Hawaii Territory	23
Montana	26

June, 1927

	Cases
Chicken pox:	
Arizona	5
Connecticut	469
Nebraska	49
German measles:	
Connecticut	25
Nebraska	92
Leprosy:	
Connecticut	1

June, 1927—Continued

	Cases
Lethargic encephalitis:	
Arizona	1
Connecticut	4
Malta fever:	
Arizona	1
Mumps:	
Arizona	32
Connecticut	167
Nebraska	66
Opthalmia neonatorum:	
Connecticut	2
Paratyphoid fever:	
Connecticut	1
Nebraska	1
Septic sore throat:	
Connecticut	17
Tetanus:	
Nebraska	2
Trachoma:	
Arizona	2
Connecticut	1
Typhus fever:	
Connecticut	1
Whooping cough:	
Arizona	9
Connecticut	98
Nebraska	35

GENERAL CURRENT SUMMARY AND WEEKLY REPORTS FROM CITIES

The 100 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 30,950,000. The estimated population of the 94 cities reporting deaths is more than 30,280,000. The estimated expectancy is based on the experience of the last nine years, excluding epidemics.

Weeks ended June 25, 1927, and June 26, 1926

	1927	1926	Estimated expectancy
Cases reported			
Diphtheria:			
41 States	1,480	1,218	
100 cities	959	760	718
Measles:			
40 States	6,274	11,787	
100 cities	1,793	3,613	
Poliomyelitis:			
40 States	65	22	
Scarlet fever:			
41 States	2,549	2,442	
100 cities	1,126	1,236	601
Smallpox:			
41 States	484	335	
100 cities	95	93	84
Typhoid fever:			
41 States	579	485	
100 cities	65	68	103
Deaths reported			
Influenza and pneumonia:			
94 cities	471	448	
Smallpox:			
94 cities	0	0	

City reports for week ended June 25, 1927

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 week 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 non-epidemic years.

If reports have not been received for the full nine years, data are used for as many years as possible, but no year earlier than 1918 is included. In obtaining the estimated expectancy, the figures are smoothed when necessary to avoid abrupt deviations from the usual trend. For some of the diseases given in the table the avoidable data were not sufficient to make it practicable to compute the estimated expectancy.

Division, State, and city	Population July 1, 1925, estimated	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
			Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
NEW ENGLAND									
Maine:									
Portland	75,333	0	1	0	1	0	1	1	2
New Hampshire:									
Concord	22,546	0	0	0	0	0	1	0	1
Manchester	83,097	0	1	0	0	0	4	0	0
Vermont:									
Barre	10,008	0	0	1	0	0	0	0	1
Burlington	24,089	0	1	0	0	0	11	1	0
Massachusetts:									
Boston	779,620	57	45	22	1	0	110	26	17
Fall River	128,993	10	3	2	0	0	10	1	1
Springfield	142,065	19	2	7	1	1	3	1	1
Worcester	190,757	13	3	2	0	0	1	1	4
Rhode Island:									
Pawtucket	69,760	13	0	0	0	0	0	0	0
Providence	267,918	0	6	8	0	0	1	0	3
Connecticut:									
Bridgeport	(1)	3	4	7	0	0	0	2	2
Hartford	160,197	1	4	1	0	0	3	2	1
New Haven	178,927	9	1	0	0	1	11	2	4
MIDDLE ATLANTIC									
New York:									
Buffalo	538,016	13	9	19	--------	1	14	6	0
New York	5,873,356	228	202	415	9	7	66	132	100
Rochester	316,786	9	8	9	--------	0	3	2	3
Syracuse	182,003	11	4	0	--------	0	220	3	5
New Jersey:									
Camden	128,642	6	4	7	0	0	0	0	4
Newark	452,513	95	11	9	2	0	11	90	3
Trenton	132,020	0	3	3	0	1	0	0	3
Pennsylvania:									
Philadelphia	1,979,364	97	56	56	--------	3	--------	116	41
Pittsburgh	631,563	38	13	28	--------	1	110	4	14
Reading	112,707	3	2	1	--------	0	77	12	0
EAST NORTH CENTRAL									
Ohio:									
Cincinnati	409,333	7	6	10	0	0	4	5	6
Cleveland	936,485	47	18	41	1	2	3	72	17
Columbus	279,836	5	2	4	0	0	3	0	1
Toledo	287,380	43	5	4	0	0	22	2	4
Indiana:									
Fort Wayne	97,846	2	2	1	0	0	1	0	2
Indianapolis	358,819	10	3	8	0	0	2	26	9
South Bend	80,091	0	1	1	0	0	6	0	1
Terre Haute	71,071	1	0	2	0	0	4	0	0
Illinois:									
Chicago	2,995,239	99	70	69	2	2	66	122	40
Springfield	63,923	6	0	0	1	1	0	1	1

[1] No estimate made.

City reports for week ended June 25, 1927—Continued

Division, State, and city	Population July 1, 1925, estimated	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
			Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
EAST NORTH CENTRAL—continued									
Michigan:									
Detroit	1,245,824	24	40	44	2	1	9	62	21
Flint	130,316	1	2	1	0	1	15	0	0
Grand Rapids	153,698	3	2	0	0	0	26	0	1
Wisconsin:									
Kenosha	50,891	7	1	0	0	0	0	17	0
Madison	46,385	6	0	0	0	0	0	0	0
Milwaukee	509,192	52	11	16	0	0	176	54	8
Racine	67,707	12	1	1	0	0	4	6	0
Superior	39,671	0	1	0	0	0	1	0	1
WEST NORTH CENTRAL									
Minnesota:									
Duluth	110,502	6	1	1	0	0	7	0	0
Minneapolis	425,435	98	11	3	0	1	7	0	6
St. Paul	246,001	17	11	1	0	1	19	0	7
Iowa:									
Sioux City	76,411	3	1	0	0	--------	10	0	--------
Waterloo	36,771	0	0	0	0	--------	0	0	--------
Missouri:									
Kansas City	367,481	8	3	4	0	3	9	4	3
St. Joseph	78,342	0	1	0	0	0	5	0	1
St. Louis	821,543	12	28	12	0	0	17	52	--------
North Dakota:									
Fargo	26,403	0	0	0	0	0	3	1	0
Grand Forks	14,811	0	0	0	0	--------	0	0	--------
South Dakota:									
Aberdeen	15,036	1	0	0	0	--------	0	0	--------
Sioux Falls	30,127	3	1	0	0	--------	30	0	--------
Nebraska:									
Lincoln	60,941	1	1	4	0	0	17	4	1
Omaha	211,768	1	2	0	0	0	2	3	2
Kansas:									
Topeka	55,411	6	1	1	0	0	22	1	1
Wichita	88,367	4	0	1	0	0	8	0	5
SOUTH ATLANTIC									
Delaware:									
Wilmington	122,049	2	1	1	0	0	0	0	0
Maryland:									
Baltimore	796,296	42	13	41	0	0	3	6	7
Cumberland	33,741	0	0	0	0	0	3	0	0
Frederick	12,035	0	0	1	0	0	0	0	0
District of Columbia:									
Washington	497,906	11	7	6	0	0	8	0	6
Virginia:									
Lynchburg	30,395	4	0	0	0	0	16	0	0
Norfolk	(1)	1	0	0	0	0	7	0	2
Richmond	186,403	2	1	5	0	0	29	1	4
Roanoke	58,208	1	1	0	0	0	0	0	1
West Virginia:									
Charleston	49,019	0	1	1	0	0	8	0	0
Wheeling	56,208	2	0	0	0	0	2	0	1
North Carolina:									
Raleigh	30,371	1	0	1	0	0	45	0	1
Wilmington	37,061	0	0	0	0	0	28	1	0
Winston-Salem	69,031	1	1	0	0	0	82	8	0
South Carolina:									
Charleston	73,125	1	0	0	2	0	1	0	1
Columbia	41,225	0	0	0	0	--------	29	1	2
Greenville	27,311	0	0	1	0	0	0	0	0
Georgia:									
Atlanta	(1)	0	0	1	5	1	6	0	2
Brunswick	16,809	0	0	0	0	0	0	12	0
Savannah	93,134	0	0	0	1	0	11	0	0
Florida:									
Miami	69,754	0	1	2	0	0	0	0	1
St. Petersburg	26,847	--------	0	--------	--------	0	--------	--------	0
Tampa	94,743	0	1	1	0	0	15	0	0

[1] No estimate made.

City reports for week ended June 25, 1927—Continued

Division, State, and city	Population July 1, 1925, estimated	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
			Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
EAST SOUTH CENTRAL									
Kentucky:									
Covington	58,309	0	1	1	0	0	0	0	2
Louisville	305,935	0	2	0	2	0	0	7	2
Tennessee:									
Memphis	174,533	1	1	0	0	0	5	0	3
Nashville	136,220	2	0	1	0	2	0	0	2
Alabama:									
Birmingham	205,670	2	1	5	1	2	16	1	2
Mobile	65,955	0	0	0	0	1	0	0	0
Montgomery	46,481	0	0	0	0	0	5	0	0
WEST SOUTH CENTRAL									
Arkansas:									
Fort Smith	31,643	0	0	1	0	-------	0	0	-------
Little Rock	74,216	0	0	0	0	0	18	0	0
Louisiana:									
New Orleans	414,493	0	4	6	3	0	1	0	6
Shreveport	57,857	0	0	0	0	0	0	1	0
Oklahoma:									
Oklahoma City	(1)	0	0	0	3	1	21	0	6
Tulsa	124,478	2	-------	1	0	-------	1	3	-------
Texas:									
Dallas	194,450	0	2	3	0	0	8	0	1
Galveston	48,375	0	0	0	0	0	0	0	0
Houston	164,954	0	2	3	0	0	1	0	2
San Antonio	198,069	0	1	3	0	1	3	1	1
MOUNTAIN									
Montana:									
Billings	17,971	0	0	0	0	0	0	0	1
Great Falls	29,883	1	0	0	0	0	3	0	0
Helena	12,037	0	0	0	0	0	0	0	0
Missoula	12,668	0	0	0	0	0	1	0	1
Idaho:									
Boise	23,042	2	0	0	0	0	0	2	0
Colorado:									
Denver	280,911	8	10	9	-------	3	28	0	1
Pueblo	43,787	1	1	2	0	0	15	0	2
New Mexico:									
Albuquerque	21,000	1	0	0	0	0	5	5	0
Utah:									
Salt Lake City	130,948	41	3	6	0	0	1	2	1
Nevada:									
Reno	12,665	0	0	0	0	0	2	0	0
PACIFIC									
Washington:									
Seattle	(1)	16	4	1	0	-------	225	5	-------
Spokane	108,897	13	2	0	0	-------	3	0	-------
Tacoma	104,455	9	2	0	0	0	16	0	1
Oregon:									
Portland	282,383	6	6	2	0	0	38	2	4
California:									
Los Angeles	(1)	33	36	31	7	3	46	11	29
Sacramento	72,260	3	3	1	0	0	2	0	5
San Francisco	557,530	22	17	10	0	0	30	28	3

[1] No estimate made.

City reports for week ended June 25, 1927—Continued

Division, State, and city	Scarlet fever: Cases, estimated expectancy	Scarlet fever: Cases reported	Smallpox: Cases, estimated expectancy	Smallpox: Cases reported	Smallpox: Deaths reported	Tuberculosis, deaths reported	Typhoid fever: Cases, estimated expectancy	Typhoid fever: Cases reported	Typhoid fever: Deaths reported	Whooping cough, cases reported	Deaths, all causes
NEW ENGLAND											
Maine:											
Portland	1	1	0	0	0	0	1	0	0	5	19
New Hampshire:											
Concord	0	1	0	0	0	0	0	0	0	0	8
Manchester	1	2	0	0	0	1	0	0	0	0	9
Vermont:											
Barre	0	0	0	0	0	0	0	0	0	0	3
Burlington	0	1	0	0	0	0	0	0	0	0	5
Massachusetts:											
Boston	34	71	0	0	0	12	2	0	0	19	173
Fall River	1	3	0	0	0	1	1	1	0	0	25
Springfield	3	0	0	0	0	0	0	0	0	6	31
Worcester	5	7	0	0	0	3	0	0	0	6	46
Rhode Island:											
Pawtucket	1	0	0	0	0	1	0	0	0	0	11
Providence	4	8	0	0	0	4	0	0	0	6	56
Connecticut:											
Bridgeport	5	5	0	0	0	1	1	0	0	0	22
Hartford	2	4	0	0	0	3	1	0	0	5	29
New Haven	2	2	0	0	0	3	1	0	0	0	38
MIDDLE ATLANTIC											
New York:											
Buffalo	14	19	0	0	0	12	1	0	0	17	127
New York	106	271	0	0	0	[1] 88	14	3	1	121	1,253
Rochester	8	11	0	0	0	3	0	0	0	2	64
Syracuse	5	3	0	0	0	0	0	0	--------	1	46
New Jersey:											
Camden	2	4	0	0	0	2	1	0	0	0	31
Newark	13	28	0	0	0	9	0	2	0	34	85
Trenton	2	1	1	0	0	4	1	0	0	0	47
Pennsylvania:											
Philadelphia	50	92	0	0	0	38	5	3	2	27	404
Pittsburgh	19	19	0	0	0	7	0	0	0	17	152
Reading	1	3	0	0	0	1	1	0	0	4	15
EAST NORTH CENTRAL											
Ohio:											
Cincinnati	6	29	2	1	0	11	2	0	0	2	111
Cleveland	18	20	1	0	0	14	2	3	1	28	177
Columbus	4	6	1	1	0	3	1	0	0	8	78
Toledo	8	17	1	0	0	6	0	0	0	15	66
Indiana:											
Fort Wayne	1	0	1	0	0	0	0	0	0	2	25
Indianapolis	5	7	6	9	0	5	0	0	0	13	101
South Bend	1	0	0	1	0	1	0	0	0	1	18
Terre Haute	1	0	1	0	0	1	0	0	0	0	14
Illinois:											
Chicago	63	94	2	1	0	34	3	3	0	101	671
Springfield	1	1	0	0	0	0	0	0	0	0	26
Michigan:											
Detroit	45	85	3	1	0	21	3	0	0	102	251
Flint	3	23	1	3	0	0	0	0	0	4	17
Grand Rapids	4	10	0	1	0	2	0	1	0	8	28
Wisconsin:											
Kenosha	0	6	1	0	0	0	0	2	1	1	11
Madison	0	5	0	0	0	0	0	0	0	8	6
Milwaukee	15	26	1	0	0	12	1	0	0	29	110
Racine	2	1	0	0	0	1	0	0	0	2	10
Superior	2	5	2	0	0	2	0	0	0	0	18
WEST NORTH CENTRAL											
Minnesota:											
Duluth	4	6	3	0	0	1	0	1	0	0	26
Minneapolis	18	35	6	0	0	3	1	0	0	5	90
St. Paul	13	13	2	1	0	7	1	0	0	1	61

[1] Pulmonary tuberculosis only.

City reports for week ended June 25, 1927—Continued

Division, State, and city	Scarlet fever: Cases, estimated expectancy	Scarlet fever: Cases reported	Smallpox: Cases, estimated expectancy	Smallpox: Cases reported	Smallpox: Deaths reported	Tuberculosis, deaths reported	Typhoid fever: Cases, estimated expectancy	Typhoid fever: Cases reported	Typhoid fever: Deaths reported	Whooping cough, cases reported	Deaths, all causes
WEST NORTH CENTRAL—continued											
Iowa:											
Sioux City	1	1	2	3	-------	-------	0	0	-------	5	-------
Waterloo	0	0	1	0	-------	-------	0	0	-------	0	-------
Missouri:											
Kansas City	3	3	1	2	0	5	1	0	0	27	93
St. Joseph	0	3	0	13	0	2	0	0	0	3	32
St. Louis	14	10	2	7	0	3	3	2	0	52	180
North Dakota:											
Fargo	1	1	0	0	0	0	0	0	0	0	4
Grand Forks	0	1	0	0	-------	-------	0	0	-------	0	-------
South Dakota:											
Aberdeen	1	0	0	0	-------	-------	0	0	-------	2	-------
Sioux Falls	0	0	0	0	-------	-------	0	0	-------	0	-------
Nebraska:											
Lincoln	1	0	0	0	0	0	0	1	0	3	18
Omaha	2	4	4	1	0	7	1	0	0	1	42
Kansas:											
Topeka	0	3	1	2	-------	0	1	0	0	23	19
Wichita	1	1	3	0	0	2	1	0	0	16	37
SOUTH ATLANTIC											
Delaware:											
Wilmington	2	0	0	0	0	1	0	1	1	2	29
Maryland:											
Baltimore	15	23	0	0	0	16	3	2	0	74	185
Cumberland	0	0	0	0	0	1	1	0	0	0	11
Frederick	0	0	0	0	0	0	0	0	0	0	0
District of Columbia:											
Washington	10	14	1	10	0	10	2	1	0	2	101
Virginia:											
Lynchburg	1	1	1	0	0	1	1	4	0	3	11
Norfolk	0	1	0	0	0	4	1	0	0	0	-------
Richmond	1	1	1	0	0	4	1	0	0	5	53
Roanoke	0	3	0	3	0	0	1	0	0	3	13
West Virginia:											
Charleston	1	0	1	0	0	1	1	1	0	0	11
Wheeling	2	1	0	0	0	0	1	0	0	4	14
North Carolina:											
Raleigh	0	0	0	0	0	1	1	0	0	7	7
Wilmington	0	1	0	0	0	1	0	0	1	10	12
Winston-Salem	0	0	1	0	0	3	1	1	1	21	17
South Carolina:											
Charleston	0	0	1	1	0	0	1	3	1	3	18
Columbia	0	0	0	0	-------	-------	1	1	-------	15	15
Greenville	0	0	0	0	0	0	1	1	0	4	2
Georgia:											
Atlanta	2	6	3	2	0	6	2	7	1	11	65
Brunswick	0	0	0	0	0	1	0	0	1	0	6
Savannah	0	0	0	0	0	2	1	0	1	0	29
Florida:											
Miami	0	0	-------	0	0	0	1	0	0	11	33
St. Petersburg	0	0	0	0	0	1	0	0	0	0	8
Tampa	0	2	0	0	0	3	1	0	0	0	33
EAST SOUTH CENTRAL											
Kentucky:											
Covington	0	2	0	0	0	0	0	-------	0	0	21
Louisville	3	9	0	1	0	1	3	0	0	10	64
Tennessee:											
Memphis	1	3	1	8	0	8	2	4	1	6	66
Nashville	1	0	1	0	0	3	2	6	0	0	41
Alabama:											
Birmingham	1	2	2	2	0	6	3	1	0	7	62
Mobile	1	0	1	0	0	1	2	1	1	0	19
Montgomery	1	0	0	0	0	0	1	0	0	3	-------

City reports for week ended June 25, 1927—Continued

Division, State, and city	Scarlet fever: Cases, estimated expectancy	Scarlet fever: Cases reported	Smallpox: Cases, estimated expectancy	Smallpox: Cases reported	Smallpox: Deaths reported	Tuberculosis, deaths reported	Typhoid fever: Cases, estimated expectancy	Typhoid fever: Cases reported	Typhoid fever: Deaths reported	Whooping cough, cases reported	Deaths, all causes
WEST SOUTH CENTRAL											
Arkansas:											
Fort Smith	0	0	0	0			0	1		2	
Little Rock	0	0	0	0	0	1	2	0	0	3	
Louisiana:											
New Orleans	2	3	0	0	0	13	4	1	2	19	128
Shreveport	0	0	0	1	0	0	1	0	0	1	22
Oklahoma:											
Oklahoma City	0	0	3	0	0	1	1	2	0	0	45
Tulsa		0		0				1		1	
Texas:											
Dallas	1	3	1	2	0	1	3	0	0	3	47
Galveston	0	0	0	0	0	4	0	2	0	0	19
Houston	1	3	1	0	0	3	1	0	0	0	46
San Antonio	0	0	0	0	0	9	2	1	0	0	51
MOUNTAIN											
Montana:											
Billings	0	0	0	0	0	0	0	0	0	12	8
Great Falls	1	0	1	3	0	0	0	0	0	0	9
Helena	0	0	0	3	0	0	0	0	0	0	6
Missoula	0	1	0	0	0	0	0	1	0	0	8
Idaho:											
Boise	0	0	1	0	0	0	0	0	0	0	5
Colorado:											
Denver	7	21	0	1	0	5	0	0	0	3	65
Pueblo	1	20	0	0	0	0	0	1	0	0	10
New Mexico:											
Albuquerque	1	2	0	0	0	5	0	0	0	0	13
Utah:											
Salt Lake City	2	6	1	3	0	2	0	0	0	20	24
Nevada:											
Reno	0	1	0	0	0	0	0	0	0	0	3
PACIFIC											
Washington:											
Seattle	8	13	4	1			2	0		14	
Spokane	4	4	3	6			0	0		2	
Tacoma	2	2	2	0	0	0	0	0	0	3	20
Oregon:											
Portland	5	2	6	5	0	2	1	0	0	2	69
California:											
Los Angeles	15	24	5	0	0	33	3	1	0	19	262
Sacramento	0	0	1	1	0	3	1	0	0	1	25
San Francisco	9	10	2	0	0	8	0	2	1	18	128

Division, State, and city	Cerebrospinal meningitis: Cases	Cerebrospinal meningitis: Deaths	Lethargic encephalitis: Cases	Lethargic encephalitis: Deaths	Pellagra: Cases	Pellagra: Deaths	Poliomyelitis (infantile paralysis): Cases, estimated expectancy	Poliomyelitis (infantile paralysis): Cases	Poliomyelitis (infantile paralysis): Deaths
NEW ENGLAND									
Massachusetts:									
Boston	0	0	0	0	0	0	0	2	1
MIDDLE ATLANTIC									
New York:									
New York	4	3	5	7	0	0	2	5	1
New Jersey:									
Newark	1	0	0	0	0	0	0	0	0
Pennsylvania:									
Philadelphia	0	0	1	0	1	1	0	0	0

City reports for week ended June 25, 1927—Continued

Division, State, and city	Cerebrospinal meningitis		Lethargic encephalitis		Pellagra		Poliomyelitis (infantile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, estimated expectancy	Cases	Deaths
EAST NORTH CENTRAL									
Ohio:									
Cincinnati	0	0	0	1	0	0	0	0	0
Illinois:									
Chicago	6	3	0	0	0	0	0	0	0
Springfield	0	0	0	0	1	1	0	0	0
Michigan:									
Detroit	2	0	2	0	0	0	0	0	0
Flint	2	0	0	1	0	0	0	0	0
Wisconsin:									
Milwaukee	1	2	0	0	0	0	0	0	0
Racine	2	1	0	0	0	0	0	0	0
WEST NORTH CENTRAL									
Minnesota:									
Minneapolis	0	1	0	0	0	0	0	0	0
St. Paul	1	1	0	0	0	0	0	1	0
SOUTH ATLANTIC [1]									
Maryland:									
Baltimore	0	0	1	0	0	0	1	0	0
District of Columbia:									
Washington	0	0	0	0	1	1	0	0	0
North Carolina:									
Winston-Salem	0	0	0	0	1	0	0	0	0
Georgia: [2]									
Atlanta	1	0	0	0	1	1	0	1	0
EAST SOUTH CENTRAL									
Tennessee:									
Memphis	0	0	0	1	2	1	0	0	0
Nashville	0	0	0	0	1	0	0	0	0
Alabama:									
Birmingham	0	0	0	0	2	0	0	0	0
WEST SOUTH CENTRAL									
Louisiana:									
New Orleans	0	0	2	2	1	1	0	0	0
Oklahoma:									
Oklahoma City	0	0	0	1	0	0	0	0	0
Texas:									
Dallas	0	0	0	0	0	1	0	1	1
MOUNTAIN									
Montana:									
Great Falls	1	1	0	0	0	0	0	0	0
PACIFIC									
Washington:									
Seattle	1		0		0		0	0	
Spokane	2		0		0		0	0	
Oregon:									
Portland	2	2	0	1	0	0	0	0	0
California:									
Los Angeles	0	0	0	0	0	0	0	4	0
San Francisco	1	0	0	0	0	0	0	2	0

[1] Dengue: 1 case at Charleston, S. C.

[2] Typhus fever: 1 case and 1 death at Savannah, Ga.

The following table gives the rates per 100,000 population for 101 cities for the five-week period ended June 25, 1927, compared with those for a like period ended June 26, 1926. The population figures used in computing the rates are approximate estimates as of July 1, 1926 and 1927, respectively, authoritative figures for many of the cities not being available. The 101 cities reporting cases had estimated aggregate populations of approximately 30,445,000 in 1926 and 30,966,000 in 1927. The 95 cities reporting deaths had nearly 29,785,000 estimated population in 1926 and nearly 30,296,000 in 1927. The number of cities included in each group and the estimated aggregate populations are shown in a separate table below.

Summary of weekly reports from cities, May 22 to June 25, 1927—Annual rates per 100,000 population, compared with rates for the corresponding period of 1926 [1]

DIPHTHERIA CASE RATES

	Week ended—									
	May 29, 1926	May 28, 1927	June 5, 1926	June 4, 1927	June 12, 1926	June 11, 1927	June 19, 1926	June 18, 1927	June 26, 1926	June 25, 1927
101 cities	122	171	117	158	136	[2] 162	113	151	130	[3] 162
New England	80	160	78	169	68	132	78	118	59	[3] 114
Middle Atlantic	145	234	135	235	156	248	125	217	152	270
East North Central	108	145	119	124	146	126	131	142	162	132
West North Central	165	91	210	81	234	81	169	79	192	46
South Atlantic	95	145	47	127	60	[2] 124	67	118	45	107
East South Central	41	97	16	61	26	20	16	41	10	36
West South Central	64	84	56	67	47	46	43	55	43	67
Mountain	128	144	109	180	128	369	146	207	118	153
Pacific	158	196	131	128	158	126	102	115	131	113

MEASLES CASE RATES

101 cities	1,266	550	1,005	448	930	[2] 426	749	361	619	[3] 302
New England	1,061	434	726	313	658	457	493	406	425	[3] 329
Middle Atlantic	957	366	752	282	708	299	586	281	477	247
East North Central	1,189	373	1,067	324	1,026	296	1,003	261	838	214
West North Central	3,686	655	2,231	461	2,051	373	1,264	248	942	216
South Atlantic	1,529	1,364	1,203	1,005	1,093	[2] 851	818	694	695	531
East South Central	2,368	321	1,655	382	1,391	158	693	132	610	132
West South Central	112	466	86	503	125	424	77	268	95	130
Mountain	1,303	1,052	1,249	620	921	566	702	342	793	450
Pacific	798	1,063	691	1,097	589	1,139	597	971	482	843

SCARLET FEVER CASE RATES

101 cities	274	295	230	220	260	[2] 241	233	198	212	[3] 190
New England	257	365	248	288	255	323	203	265	236	[3] 238
Middle Atlantic	212	364	209	256	195	287	222	224	210	223
East North Central	337	302	245	212	333	247	273	216	251	209
West North Central	700	246	419	236	627	195	484	163	357	159
South Atlantic	158	121	188	78	158	[2] 110	130	82	151	96
East South Central	171	138	124	102	78	66	47	71	47	82
West South Central	116	25	163	21	86	34	69	8	30	38
Mountain	100	899	219	782	118	719	128	665	118	441
Pacific	179	209	169	186	236	204	214	181	158	139

SMALLPOX CASE RATES

101 cities	19	29	15	22	16	[2] 20	11	19	16	[3] 16
New England	0	0	0	0	0	0	0	0	0	[3] 0
Middle Atlantic	1	0	0	0	0	0	0	0	0	0
East North Central	13	49	9	33	12	21	10	21	14	12
West North Central	44	42	40	24	28	32	32	30	44	58
South Atlantic	28	40	34	33	37	[2] 20	30	36	26	29
East South Central	62	61	83	92	52	107	10	56	88	56
West South Central	99	29	43	17	34	8	26	13	17	13
Mountain	36	27	27	36	46	27	27	54	18	90
Pacific	32	84	24	60	54	92	24	65	32	21

[1] 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, 1926 and 1927, respectively.

[2] Greenville, S. C., not included.

[3] Barre, Vt., not included.

Summary of weekly reports from cities, May 22 to June 25, 1927—Annual rates per 100,000 population, compared with rates for the corresponding period of 1926—Continued

TYPHOID FEVER CASE RATES

	Week ended—									
	May 29, 1926	May 28, 1927	June 5, 1926	June 4, 1927	June 12, 1926	June 11, 1927	June 19, 1926	June 18, 1927	June 26, 1926	June 25, 1927
101 cities	10	9	9	13	12	[2] 11	11	13	12	[3] 11
New England	7	9	0	9	17	5	19	12	9	[3] 2
Middle Atlantic	5	6	9	5	6	6	9	6	10	4
East North Central	9	7	5	7	4	7	3	8	4	6
West North Central	4	4	8	12	6	14	10	6	4	6
South Atlantic	26	18	32	29	26	[2] 18	28	27	30	40
East South Central	31	31	10	61	57	41	21	82	36	61
West South Central	13	25	9	38	52	34	30	38	30	21
Mountain	0	18	9	9	9	0	0	18	0	18
Pacific	11	8	8	26	13	21	8	8	16	8

INFLUENZA DEATH RATES

	May 29, 1926	May 28, 1927	June 5, 1926	June 4, 1927	June 12, 1926	June 11, 1927	June 19, 1926	June 18, 1927	June 26, 1926	June 25, 1927
95 cities	12	9	8	7	10	[2] 6	7	6	5	[3] 7
New England	9	9	2	2	12	0	9	2	0	[3] 5
Middle Atlantic	11	8	6	9	9	5	9	5	6	6
East North Central	11	4	8	4	10	4	3	5	3	5
West North Central	13	12	8	6	4	4	4	2	6	10
South Atlantic	11	13	8	17	6	[2] 9	4	9	6	2
East South Central	26	25	36	5	36	10	16	5	5	25
West South Central	9	26	13	17	18	26	22	17	22	4
Mountain	9	9	18	0	9	9	0	9	0	27
Pacific	11	3	4	3	0	7	4	0	0	10

PNEUMONIA DEATH RATES

	May 29, 1926	May 28, 1927	June 5, 1926	June 4, 1927	June 12, 1926	June 11, 1927	June 19, 1926	June 18, 1927	June 26, 1926	June 25, 1927
95 cities	119	100	105	93	95	[2] 94	87	87	73	[3] 74
New England	123	144	116	116	101	88	87	107	68	[3] 84
Middle Atlantic	145	116	131	108	110	112	95	95	83	85
East North Central	107	85	98	79	87	93	74	86	60	71
West North Central	84	87	51	58	59	50	74	48	44	52
South Atlantic	110	86	79	110	96	[2] 65	112	61	95	46
East South Central	171	61	124	51	124	112	98	71	124	56
West South Central	102	90	93	82	88	103	66	95	71	43
Mountain	91	36	146	72	82	90	100	153	109	54
Pacific	64	100	67	97	67	83	74	100	42	131

[2] Greenville, S. C., not included. [3] Barre, Vt., not included.

Number of cities included in summary of weekly reports, and aggregate population of cities in each group, approximated as of July 1, 1926 and 1927, respectively

Group of cities	Number of cities reporting cases	Number of cities reporting deaths	Aggregate population of cities reporting cases		Aggregate population of cities reporting deaths	
			1926	1927	1926	1927
Total	101	95	30,443,800	30,966,700	29,783,700	30,295,900
New England	12	12	2,211,000	2,245,900	2,211,000	2,245,900
Middle Atlantic	10	10	10,457,000	10,567,000	10,457,000	10,567,000
East North Central	16	16	7,650,200	7,810,600	7,650,200	7,810,600
West North Central	12	10	2,585,500	2,626,600	2,470,600	2,510,000
South Atlantic	21	20	2,799,500	2,878,100	2,757,700	2,835,700
East South Central	7	7	1,008,300	1,023,500	1,008,300	1,023,500
West South Central	8	7	1,213,800	1,243,300	1,181,500	1,210,400
Mountain	9	9	572,100	580,000	572,100	580,000
Pacific	6	4	1,946,400	1,991,700	1,475,300	1,512,800

FOREIGN AND INSULAR

THE FAR EAST

Reports for weeks ended June 11 and June 18, 1927.—The following reports for the weeks ended June 11 and June 18, 1927, were transmitted by the eastern bureau of the health section of the secretariat of the League of Nations, located at Singapore, to the headquarters at Geneva:

Week ended June 11, 1927

Maritime towns	Plague		Cholera		Smallpox		Maratime towns	Plague		Cholera		Smallpox	
	Cases	Deaths	Cases	Deaths	Cases	Deaths		Cases	Deaths	Cases	Deaths	Cases	Deaths
Ceylon: Colombo	2	2	0	0	0	0	French Indo-China:						
British India:							Saigon and Cholon	0	0	2	1	0	0
Bombay	----	3	----	0	44	24	Tourane	0	0	1	0	0	0
Calcutta	----	0	----	22	44	35	Haiphong	0	0	23	24	0	0
Madras	----	0	----	0	3	1	China:						
Bassein	----	4	----	1	0	0	Canton	0	0	1	1	0	0
Rangoon	----	5	----	1	8	4	Hong Kong	0	0	0	0	1	1
Dutch East Indies:							Manchuria:						
Belawan Deli	0	0	0	0	2	0	Mukden	0	0	0	0	1	0
Banjermasin	0	0	0	0	1	0	Changchun	0	0	0	0	2	0
Siam: Bangkok	1	0	3	2	0	0	Egypt: Alexandria	----	0	0	0	1	0

Telegraphic reports from the following maritime towns indicated that no case of plague, cholera, or smallpox was reported during the week:

ASIA

Arabia.—Jeddah, Perim, Kamaran, Aden.

Iraq.—Basra.

Persia.—Mohammerah, Bender-Abbas, Bushire, Lingah.

British India.—Karachi, Chittagong, Cochin, Tuticorin, Negapatam, Vizagapatam, Moulmein.

Portuguese India.—Nova Goa.

Federated Malay States.—Port Swettenham.

Straits Settlements.—Penang, Singapore.

Dutch East Indies.—Batavia, Sabang, Pontianak, Semarang, Menado, Cheribon, Makassar, Balikpapan, Padang, Palembang, Surabaya.

Sarawak.—Kuching.

British North Borneo.—Sandakan, Jesselton, Kudat, Tawao.

Portuguese Timor.—Dilly.

Philippine Islands.—Manila, Iloilo, Jolo, Cebu. Zamboanga.

China.—Amoy, Shanghai, Tientsin, Tsingtao.

Macao.

Formosa.—Keelung, Takao.

Chosen.—Chemulpo, Fusan.

Manchuria.—Yingkow, Antung, Harbin.

Kwantung.—Port Arthur, Dairen.

Japan.—Yokohama, Nagasaki, Niigata, Shimonoseki, Moji, Tsuruga, Kobe, Osaka, Hakodate.

AUSTRALASIA AND OCEANIA

Australia.—Adelaide, Melbourne, Sydney, Brisbane, Rockhampton, Townsville, Port Darwin, Broome, Fremantle, Carnarvon, Thursday Island, Cairns.

AUSTRALIA AND OCEANIA—continued

New Guinea.—Port Moresby.

New Britain Mandated Territory.—Rabaul and Kokopo.

New Caledonia.—Noumea.

New Zealand.—Auckland, Wellington, Christchurch, Invercargill, Dunedin.

Samoa.—Apia.

Fiji.—Suva.

Hawaii.—Honolulu.

Society Islands.—Papeete.

AFRICA

Egypt.—Port Said, Suez.

Anglo-Egyptian Sudan.—Port Sudan, Suakin.

Eritrea.—Massaua.

French Somaliland.—Djibouti.

British Somaliland.—Berbera.

Italian Somaliland.—Mogadiscio.

Zanzibar.—Zanzibar.

Kenya.—Mombasa.

Tanganyika.—Dar-es-Salaam.

Seychelles.—Victoria.

Portuguese East Africa.—Mozambique, Beira, Lourenco-Marques.

Union of South Africa.—East London, Port Elizabeth, Cape Town, Durban.

Reunion.—St. Denis.

Mauritius.—Port Louis.

Madagascar.—Majunga, Tamatave, Diego-Suarez.

AMERICA

Panama.—Colon, Panama.

Reports had not been received in time for publication from:

Dutch East Indies.—Samarinda, Tarakan.
Union of Socialist Soviet Republics.—Vladivostok.

Belated information:

Week ended June 4.—*Pondicherry*, 2 fatal smallpox cases; *Karikal*, nil.
Week ended May 28.—*Pondicherry* and *Karikal*, nil.

Week ended June 18, 1927

Maritime towns	Plague Cases	Plague Deaths	Cholera Cases	Cholera Deaths	Smallpox Cases	Smallpox Deaths
British India:						
Bombay	----	2	----	0	24	19
Negapatam	----	0	----	0	2	1
Madras	----	0	----	0	1	0
Vizagapatam	----	0	----	0	2	1
Calcutta	----	0	----	43	32	24
Bassein	----	9	----	2	0	0
Rangoon	----	1	----	0	14	5
Dutch East Indies:						
Banjermasin	0	0	0	0	1	0
Straits Settlements:						
Singapore	0	0	0	0	3	0
Siam: Bangkok	0	0	3	2	1	1
French Indo-China:						
Saigon and Cholon	0	0	2	2	0	0
Haiphong	0	0	11	11	0	0
China:						
Shanghai	0	0	1	0	0	0
Hong Kong	0	0	0	0	1	1
Manchuria: Mukden	0	0	0	0	1	0
Egypt: Alexandria	0	0	0	0	1	0

Telegraphic reports from the following maritime towns indicated that no case of plague, cholera, or smallpox was reported during the week:

ASIA

Arabia.—Jeddah, Perim, Aden.
Iraq.—Basra.
Persia.—Mohammerah, Bender-Abbas, Bushire, Lingah.
Ceylon.—Colombo.
British India.—Karachi, Chittagong, Cochin, Tuticorin, Moulmein.
Portuguese India.—Nova Goa.
Federated Malay States.—Port Swettenham.
Straits Settlements.—Penang.
Dutch East Indies.—Batavia, Sabang, Pontianak, Semarang, Menado, Cheribon, Makassar, Balikpapan, Padang, Palembang, Surabaya, Tarakan, Belawan-Deli.
Sarawak.—Kuching.
British North Borneo.—Sandakan, Jesselton, Kudat, Tawao.
French Indo-China.—Tourane.
Portuguese Timor.—Dilly.
Philippine Islands.—Manila, Iloilo, Jolo, Cebu, Zamboanga.
China.—Amoy, Tientsin, Tsingtao.
Macao.
Formosa.—Keelung, Takao.
Chosen.—Chemulpo, Fusan.
Manchuria.—Yingkow, Antung, Harbin.
Kwantung.—Port Arthur, Dairen, Changchun.
Japan.—Yokohama, Nagasaki, Niigata, Shimonoseki, Moji, Tsuruga, Kobe, Osaka, Hakodate.

AUSTRALASIA AND OCEANIA

Australia.—Adelaide, Melbourne, Sydney, Brisbane, Rockhampton, Townsville, Port Darwin, Broome, Fremantle, Carnarvon, Thursday Island, Cairns.
New Guinea.—Port Moresby.
New Britain Mandated Territory.—Rabaul and Kokopo.
New Zealand.—Auckland, Wellington, Christchurch, Invercargill, Dunedin.
Samoa.—Apia.
New Caledonia.—Noumia.
Fiji.—Suva.
Hawaii.—Honolulu.
Society Islands.—Papeete.

AFRICA

Egypt.—Port Said, Suez.
Anglo-Egyptian Sudan.—Port Sudan, Suakin.
Eritrea.—Massaua.
French Somaliland.—Djibouti.
British Somaliland.—Berbera.
Italian Somaliland.—Mogadiscio.
Zanzibar.—Zanzibar.
Kenya.—Mombasa.
Tanganyika.—Dar-es-Salaam.
Seychelles.—Victoria.
Portuguese East Africa.—Mozambique, Beira, Lourenço-Marques.
Union of South Africa.—East London, Port Elizabeth, Cape Town, Durban.
Reunion.—Saint Denis.
Mauritius.—Port Louis.
Madagascar.—Majunga, Tamatave, Diégo-Suarez.

AMERICA

Panama.—Colon, Panama.

Reports had not been received in time for publication from:

Arabia.—Kamaran.
Dutch East Indies.—Samarinda.
China.—Canton.
Union of Socialist Soviet Republics.—Vladivostok.

Belated information.

Week ended June 11: *Pondicherry* and *Karikal*, nil.

Movement of infected ships:

Singapore.—*Steamship Hatipara* has arrived from *Calcutta* infected with cholera.
Steamship Talamba has arrived from *Hong Kong* infected with smallpox.

Other epidemiological information:

Samoa.—Apia, 4 dysentery cases and 1 death were reported during the week ended June 18.
Solomon Islands.—One measles case has been reported during the same week.

CANADA

Communicable diseases—Quebec—Weeks ended June 18 and 25, 1927.—The Bureau of Health of the Province of Quebec reports cases of certain communicable diseases for the weeks ended June 18 and 25, 1927, as follows:

WEEK ENDED JUNE 18, 1927

Disease	Cases	Disease	Cases
Chicken pox	5	Scarlet fever	49
Diphtheria	45	Tuberculosis	25
German measles	25	Typhoid fever	106
Measles	50	Whooping cough	10

WEEK ENDED JUNE 25, 1927

Disease	Cases	Disease	Cases
Chicken pox	7	Scarlet fever	57
Diphtheria	49	Smallpox	1
German measles	7	Tuberculosis	67
Influenza	3	Typhoid fever	91
Measles	50	Whooping cough	8

Vital statistics—Nova Scotia—1916–1926.—The following table portrays the trends and fluctuations in the vital statistics of Nova Scotia, Canada, from 1916 to 1926, inclusive:

Year	Births	Deaths	Marriages	Divorces
1916	12,270	8,052	3,726	14
1917	12,382	7,583	3,421	8
1918	12,421	9,125	3,611	24
1919	12,508	9,200	3,585	36
1920	13,346	7,439	4,482	45
1921	12,793	6,573	3,780	41
1922	13,164	6,628	3,169	35
1923	11,856	6,900	3,246	22
1924	11,698	6,564	2,999	42
1925	11,596	6,078	2,964	30
1926	11,605	6,424	(1)	(1)

1 Figures not available.

The infant mortality rate in Nova Scotia has shown a marked reduction in the last five years. The Department of Public Health states that in 1925 and 1926 the death rate of infants under 1 year of age was between 70 and 80 per thousand births.

Typhoid fever—Montreal—January 2–July 2, 1927.—The following table gives the cases of typhoid fever and deaths from this disease reported at Montreal, Quebec, Canada, since January 1, 1927:

Week ended—	Cases	Deaths	Week ended—	Cases	Deaths
Jan. 8, 1927	3	1	Apr. 9, 1927	386	40
Jan. 15, 1927	4	3	Apr. 16, 1927	175	38
Jan. 22, 1927	1	2	Apr. 23, 1927	125	43
Jan. 29, 1927	3	1	Apr. 30, 1927	105	23
Feb. 5, 1927	1	0	May 7, 1927	106	19
Feb. 12, 1927	0	0	May 14, 1927	367	16
Feb. 19, 1927	1	2	May 21, 1927	770	26
Feb. 26, 1927	1	1	May 28, 1927	353	38
Mar. 5, 1927	9	1	June 4, 1927	239	37
Mar. 12, 1927	203	4	June 11, 1927	128	36
Mar. 19, 1927	383	14	June 18, 1927	86	
Mar. 26, 1927	568	22	June 25, 1927	75	23
Apr. 2, 1927	649	48	July 2, 1927	66	21

CHILE

Typhoid fever—March 16–31,[1] *1927—April 1–15, 1927.*—Typhoid fever has been reported in Chile as follows: March 16–31, 1927, 64 cases, of which 14 cases occurred at Santiago (population, 553,498), and 10 at Valparaiso (population, 182,498); April 1–15, 1927, 44 cases, at Santiago, 13 cases; at Valparaiso, 1 case. For the first named period one fatality was reported, occurring at Coquimbo, and for the second period, four fatalities, of which two were at Santiago and one was at Valparaiso.

Typhus fever.—During the period March 16–31, 1927, two cases of typhus fever were reported, occurring at Ligua (population, 2,999).

CUBA

Communicable diseases—Habana—June, 1927.—During the month of June, 1927, communicable diseases were reported in Habana, Cuba, as follows:

Disease	New cases	Deaths	Remaining under treatment June 30, 1927	Disease	New cases	Deaths	Remaining under treatment June 30, 1927
Cerebrospinal meningitis	1	1		Malaria [1]	51		47
Chicken pox	18		42	Measles	39		54
Diphtheria	5		2	Scarlet fever	1		1
Filariasis			1	Typhoid fever [1]	54	11	49
Leprosy	1		13				

[1] Many of these cases from the interior.

CURAÇAO (WEST INDIES)

Smallpox (alastrim).—During the week ended June 4, 1927, a case of smallpox, reported as alastrim, was notified in Curaçao.

[1] Public Health Reports, May 13, 1927, p. 1341.

LATVIA

Communicable diseases—April, 1927.—During the month of April, 1927, communicable diseases were reported in the Republic of Latvia as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	3	Puerperal fever	3
Diphtheria	53	Scarlet fever	321
Erysipelas	21	Smallpox	1
Influenza	482	Trachoma	18
Malaria	1	Typhoid fever	45
Measles	723	Typhus fever	12
Mumps	7	Whooping cough	93
Paratyphoid fever	2		

Estimated population: 1,900,000.

LIBERIA

Yellow fever—Monrovia—May 29-June 4, 1927.—During the week ended June 4, 1927, one case of yellow fever with one death was reported at Monrovia, Liberia.

NEW ZEALAND

Communicable diseases—April 13-May 9, 1927.—During the four weeks from April 13 to May 9, 1927, communicable diseases were reported in New Zealand, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	3	1	Poliomyelitis (infantile paralysis)	5	
Diphtheria	139	8	Puerperal fever	17	5
Influenza	5		Scarlet fever	163	2
Lethargic encephalitis	4	2	Trachoma	1	
Ophthalmia neonatorum	2		Tuberculosis	89	34
Pneumonia	44	8	Typhoid fever	22	

PERU

Plague—April, 1927.—During the month of April, 1927, 15 cases of plague with 5 deaths were reported in Peru. The occurrence was distributed by Departments as follows: Ica, 1 case; Lambayeque, 1 case; Libertad, 6 cases; Lima, 7 cases, including 5 with 1 death in the city of Lima.

SENEGAL

Plague—June 2-8, 1927.—During the week ended June 8, 1927, plague was reported in Senegal, West Africa, as follows: Baol (region)—cases, 2; Guindel, a suburb of Rufisque—cases, 6; Thies—cases, 5; Tivaouane—1 case; total, 14 cases.

Yellow fever.—During the same period 5 fatal cases of yellow fever were reported in Senegal, of which 1 case occurred at M'Bour, 1 at Ouakam, a suburb of Dakar, and 3 cases at Tivaouane. The occurrence was in Europeans.

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

The reports contained in the following tables must not be considered as complete or final as regards either the lists of countries included or the figures for the particular countries for which reports are given.

Reports Received During Week Ended July 15, 1927 [1]

CHOLERA

Place	Date	Cases	Deaths	Remarks
China:				
Swatow	May 22-28	2	5	
French Settlements in India	Mar. 20-Apr. 30	4	2	
India				May 8-14, 1927: Cases, 8,856; deaths, 3,981.
Calcutta	May 15-21	96	49	
Rangoon	May 15-28	5	2	
Siam				May 15-21, 1927: Cases, 11; deaths, 6. Apr. 1-May 21, 1927: Cases, 456; deaths, 313.
Bangkok	May 15-21	5	3	

PLAGUE

Place	Date	Cases	Deaths	Remarks
Argentina:				
Formosa	Reported July 6	3		
British East Africa:				
Kenya	Apr. 24-May 7	7	14	
Tanganyika	Mar. 29-May 7		36	
Uganda	Jan. 1-31	89	83	
Do	Feb. 1-28	49	38	
Do	Mar. 27-May 14	72	57	
Ceylon:				
Colombo	May 15-21	3	3	One plague rodent.
Greece:				
Patras	June 5-9	2		
India				May 8-14, 1927: Cases, 693; deaths, 543.
Bombay	May 15-28	29	28	
Madras	May 1-14	10	7	Presidency.
Rangoon	May 15-28	8	6	
Indo-China (French)	Apr. 1-May 10	7		
Iraq:				
Baghdad	Apr. 8-16	3	1	
Java:				
Batavia	May 15-21	14	15	Province.
Surabaya	May 1-7	3	3	
Peru				April, 1927: Cases, 15; deaths, 5.
Departments—				
Ica	Apr. 1-30	1		At Ica.
Lambayeque	do	1		At Chiclayo.
Libertad	do	6	3	At Pacasmayo and in Trujillo Province.
Lima	do	7	2	At Huacho, 1 case; Chosica, 1 case, 1 death.
Lima City	do	5	1	
Senegal				June 2-8, 1927: Cases, 14.
Baol	June 2-8	2		Region.
Guindel	do	6		Suburb of Rufisque.
Thies	do	5		
Tivaouane	do	1		
Siam				Apr. 1-May 21, 1927: Cases, 8; deaths, 7.

SMALLPOX

Place	Date	Cases	Deaths	Remarks
Algeria	Apr. 21-May 10	168		
British East Africa:				
Kenya	Apr. 24-May 14	7	14	
Tanganyika	Mar. 29-May 7		22	Territory.
Canada:				
Alberta—				
Calgary	June 19-25	2		
Quebec	June 19-25	1		
Ceylon				May 1-7, 1927: Cases, 3; deaths, 1.
China:				
Manchuria—				
Anshan	May 22-28	1		
Changchun	May 15-28	2		
Fushun	do	5		
Mukden	May 22-28	2		

[1] From medical officers of the Public Health Service, American consuls, and other sources.

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

Reports Received During Week Ended July 15, 1927—Continued

SMALLPOX—Continued

Place	Date	Cases	Deaths	Remarks
Chosen	Feb. 1-Apr. 30	354	84	
Curaçao				May 29-June 4, 1927: One case (alastrim).
France				April, 1927: Cases, 66.
French Settlements in India	Mar. 20-Apr. 30	96	59	
Gold Coast				March, 1927: Cases, 18; deaths 4.
Great Britain:				
England and Wales	June 5-18			Cases, 462.
Bradford	May 29-June 11	2		
Newcastle on Tyne	June 12-18	1		
India				May 8-14, 1927: Cases, 7,406; deaths, 1,780.
Bombay	May 15-28	98	64	
Calcutta	May 15-21	55	41	
Madras	May 22-June 4	3	1	
Rangoon	May 15-28	30	7	
Indo-China (French)	Mar. 21-Apr. 10	190		
Iraq:				
Baghdad	Apr. 10-16	2		
Basra	do	1		
Italy	Apr. 10-May 7	5		
Japan	Apr. 3-May 7	19		
Latvia				Apr. 1-30, 1927: One case.
Mexico				Feb. 1-28, 1927: Deaths, 151.
San Luis Potosi	June 12-18		3	
Morocco	Apr. 1-30	55		
Poland				Apr. 17-23, 1927: Cases, 2.
Portugal:				
Lisbon	June 5-11	2		
Siam				May 15-21, 1927: Cases, 2; deaths, 2. Apr. 1-May 21, 1927: Cases, 57; deaths, 19.
Bangkok	May 15-21	1	1	
Straits Settlements:				
Singapore	May 1-7	2	1	
Tunisia				Apr. 1-May 10, 1927: Cases, 5.
Tunis	June 1-10	1		

TYPHUS FEVER

Place	Date	Cases	Deaths	Remarks
Algeria				Apr. 21-May 10, 1927: Cases, 109; deaths; 16.
Algiers	May 15-June 10	12		
Oran	June 1-10	6		
Bulgaria				March, 1927: Cases, 58; deaths, 6.
Sofia	June 4-10	1		
Chile:				
Ligua	Mar. 16-31	2		
Chosen				Feb. 1-Apr. 30, 1927: Cases, 330; deaths, 30.
Iraq:				
Baghdad	Apr. 24-30	1		
Latvia				April, 1927: Cases, 12.
Mexico				Feb. 1-28, 1927: Deaths, 26.
Mexico City	June 5-11	2		Including municipalities in Federal District.
Morocco	Apr. 1-May 7	249		
Poland	Apr. 10-30	398	33	
Rumania	Apr. 3-May 7	583	41	
Tunisia	Apr. 21-May 10	78		
Union of South Africa:				
Cape Province—				
East London	May 22-28	1		

YELLOW FEVER

Place	Date	Cases	Deaths	Remarks
Liberia:				
Monrovia	May 29-June 4	1	1	
Senegal:				
M'Bour	June 2-8	1	1	
Ouakam	do	1	1	
Tivaouane	do	3	3	

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

Reports Received from June 25 to July 8, 1927 [1]

CHOLERA

Place	Date	Cases	Deaths	Remarks
China:				
Swatow	May 15-21	5	3	
India				Apr. 17-23, 1927: Cases, 5,949; deaths, 3, 226.
Bombay	May 8-14	1		
Calcutta	do	119	85	
Rangoon	May 8-14	2	1	
Indo-China (French):				
Saigon	Apr. 30-May 6	54	37	Including Cholon.
Siam				May 1-14, 1927: Cases, 51; deaths, 27.
Bangkok	May 1-14	13	2	

PLAGUE

Place	Date	Cases	Deaths	Remarks
Ceylon:				
Colombo	May 1-14	3	1	Plague rats, 3.
Egypt				May 21-27, 1927: Cases, 1. Total from Jan. 1-May 27, 1927: Cases, 40; corresponding period, 1926: Cases, 43.
Tanta District	May 21-27	1		
Greece:				
Patras	May 30-June 11	2		
India				Apr. 17-May 7, 1927: Cases, 4,891; deaths, 3,578.
Bombay	May 8-14	25	23	
Rangoon	do	2	3	
Java:				
Batavia	May 1-14	34	34	Province.
East Java and Madura—				
Pasoeroean Residency	May 9			Outbreak reported at Ngadiwono.
Surabaya	Apr. 17-30	21	21	
Madagascar				Mar. 16-31, 1927: Cases, 96; deaths, 86. Bubonic, 42; pneumonic, 21; septicemic, 33 cases.
Province—				
Ambositra	Mar. 16-31	15	10	Bubonic, 11; pneumonic, 1; septicemic, 3.
Antisirabe	do	1	1	Septicemic.
Miarinarivo (Itasy)	do	27	27	Bubonic, 3; pneumonic, 9; septicemic, 15.
Moramanga	do	6	6	Bubonic, 3; septicemic, 3.
Tananarive	do	43	38	Bubonic, 24; pneumonic, 11; septicemic, 8.
Tananarive Town	do	4	4	Bubonic, 1; septicemic, 3.
Senegal	May 23-29			Cases, 25; deaths, 10.
Rufisque	do	23	10	
Thies District	do	2		
Siam				Apr. 1-May 14, 1927: Cases, 8; deaths, 7.
Bangkok	May 8-14	1	1	
Tunisia	Reported May 20	15		In districts of Sfax and Susa.
Turkey:				
Constantinople	May 13-19	1		
Union of South Africa:				
Cape Province—				
Maraisburg District	May 1-14	2	2	Native.

SMALLPOX

Place	Date	Cases	Deaths	Remarks
Algeria:				
Algiers	May 11-20	4		
Oran	May 21-31	15		
Brazil:				
Rio de Janeiro	May 22-28	1		
British South Africa:				
Northern Rhodesia	Apr. 30-May 6	1		Native.

[1] From medical officers of the Public Health Service, American consuls, and other sources. For reports received from January 2 to June 24, 1927, see Public Health Reports for June 24, 1927. The tables of epidemic diseases are terminated semiannually and new tables begun.

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

Reports Received from June 25 to July 8, 1927—Continued

SMALLPOX—Continued

Place	Date	Cases	Deaths	Remarks
Canada	June 5-18			Cases, 68.
Alberta	June 12-18	15		
Calgary	do	3		
British Columbia—				
Vancouver	May 23-29	2		
Manitoba	June 5-18			Cases, 6.
Winnipeg	June 12-24	5		
Ontario	June 5-18			Cases, 34.
Ottawa	June 12-25	10		
Sasketchewan	June 12-18	13		
China:				
Amoy	May 8-14	1		
Chefoo	do			Present.
Foochow	do			Do.
Hong Kong	do	4	2	
Manchuria—				
Dairen	May 2-8	3	3	
Ssupingkai	May 8-14	1		
Tientsin	May 8-21	7		
Chosen:				
Chinnampo	Apr. 1-30	1		
Fusan	do	1		
Seishin	do	1		
Egypt:				
Alexandria	May 21-27	3	1	
Great Britain:				
England and Wales	May 22-June 4			Cases, 520.
London	May 15-21	1		
Scotland—				
Dundee	May 29-June 4	3		
India				Apr. 17-May 7, 1927: Cases, 25,-220; deaths, 5,961.
Bombay	May 8-14	58	33	
Calcutta	do	64	47	
Karachi	May 15-28	4	3	
Rangoon	May 8-14	14	5	
Java:				
Batavia	do	1		
East Java and Madura	Apr. 24-30	1		
Latvia	Apr. 1-30	1		
Mexico:				
San Luis Potosi	May 29-June 4		2	
Tampico	June 1-10	1	1	
Netherlands India:				
Borneo—				
Holoe Soengei	Apr. 21			Epidemic in two localities.
Persia:				
Teheran	Feb. 21-Mar. 21		1	
Poland	Apr. 10-16	1		
Portugal:				
Lisbon	May 29-June 4	3		
Siam				May 1-14, 1927: Cases 17, deaths, 5.
Bangkok	May 1-14	4	3	
Spain:				
Valencia	May 29-June 4	2		
Union of South Africa:				
Transvaal—				
Barberton District	May 1-7			Outbreaks.

TYPHUS FEVER

Algeria:				
Algiers	May 11-20	9		
Oran	May 21-31	4		
Chosen:				
Seoul	Apr. 1-30	1		
Czechoslovakia				Apr. 1-30, 1927: Cases, 21.
Egypt:				
Alexandria	May 21-27	1		
Estonia				Apr. 1-30, 1927: Case, 1.
Latvia	Apr. 1-30	12		

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

Reports Received from June 25 to July 8, 1927—Continued

TYPHUS FEVER—Continued

Place	Date	Cases	Deaths	Remarks
Mexico:				
Mexico City	May 29-June 4	2		Including municipalities in Federal District.
Palestine	May 24-June 6			Cases, 3.
Haifa	do	2		
Mahnaim	May 17-23	1		In Safad District.
Safad	May 17-30	2		
Portugal:				
Lisbon	May 29-June 4	1		
Turkey:				
Constantinople	May 13-19		2	
Union of South Africa	Apr. 1-30			Cases, 55; deaths, 8. Native. In Europeans, cases, 2.
Cape Province	do	42	5	
Glen Grey District	May 1-7			Outbreaks.
Qumbu District	do			Do.
Natal	Apr. 1-30	7	3	
Orange Free State	do	5		
Transvaal	do	1		
Yugoslavia	May 1-31			Cases, 4.

YELLOW FEVER

Place	Date	Cases	Deaths	Remarks
Senegal	May 27			Cases, 3.
M'Bour	do	1	1	
Tivaouane	do	2	2	

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