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THE RISE IN THE MENINGOCOCCUS MENINGITIS RATE, 1926–1928[1]

The reported incidence of meningococcus meningitis in the United States this year has already reached proportions that will make the 1928 rate higher than that of any year since 1918. In a group of 28 States for which continuous reports to the United States Public Health Service are available since 1913, as shown in Figure 1, the relatively low level of about two cases per 100,000 population in the

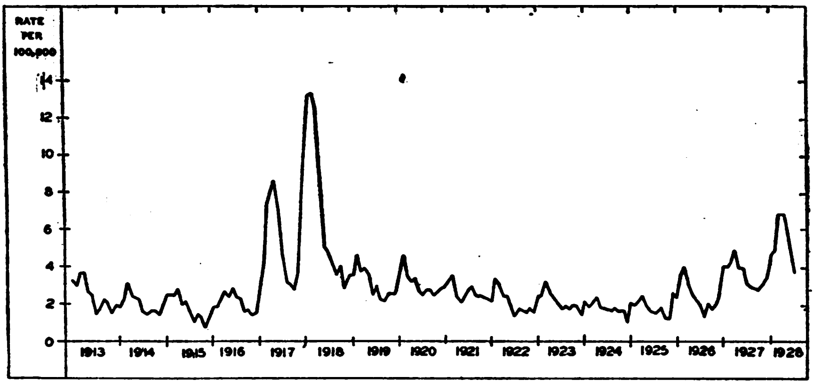

FIG. 1.—Incidence of meningococcus meningitis in a group of 23 States, by months, as reported to the United States Public Health Service by State departments of health, 1913–1928

four years prior to 1917 was followed by an extraordinarily high prevalence in 1917 and 1918. For five years the incidence of the disease apparently declined until it again reached the pre-war level. In 1926 there was some increase, which was followed by successively greater increases in 1927 and in 1928. The rate in the first half of the present year was much higher than that for the corresponding period in 1927 or 1926, and a chart (fig. 2) of its weekly course suggests a condition almost epidemic in character.

So far no marked recrudescence since the war has appeared in other parts of the world, except in certain parts of Africa south of the desert belt. "The stable condition of this disease in Europe,"

[1] From the Office of Statistical Investigations, United States Public Health Service.

to quote from the Epidemiological Report (1) of the League of Nations, "is shown by the aggregate number of cases reported in recent years (excluding Portugal, Rumania, Spain, and the Union of Socialistic Soviet Republics, but including the Ukraine): 4,530 in 1924, 5,006 in 1925, 4,933 in 1926, and 5,129 in 1927. The population of these countries being 339,120,000, the mean annual rate of cerebrospinal meningitis cases reported in Europe during these years was 1.4 per 100,000 inhabitants."

Differences in incidence in those countries where reporting may be regarded as fairly accurate are clearly evident. The annual rate per 100,000 inhabitants during the years 1924–1927 was 1.1 in England and Wales and Japan, 1.2 in Germany and Italy, 1.3 in France, 1.4 in the Netherlands, 1.5 in Australia, and 1.6 in Poland. Higher rates are shown for the United States (2.0), Sweden (2.2), New Zealand (2.4), the Ukraine (2.8), and Denmark (3.9). It is hardly possible to ascribe all of the differences in these rates to differences in accuracy and completeness of reporting. The mortality rates exhibit the same variations as are shown in the following table, taken from the League of Nations' Epidemiological Report already referred to:

Mortality attributed to cerebrospinal meningitis in certain countries, 1924–1927

Country	Period	Deaths	Annual death rate per 100,000 population	Country	Period	Deaths	Annual death rate per 100,000 population
England and Wales	1924–1926	1,020	0.87	Poland	1924–1927	897	0.80
Scotland	1925–1927	416	2.13	Italy	1924–1925	258	.32
Sweden	1924–1926	202	1.11	Canada	1924–1927	761	2.77
Denmark	1924–1926	259	2.52	United States [1]	1924–1926	3,472	1.13
Netherlands	1924–1927	224	.76	Australia	1924–1926	230	1.29
Germany	1924–1927	1,619	.64	Japan	1924–1927	2,075	.86

[1] Death registration area.

To discover the reason or reasons for these apparent differences would be an object of a useful epidemiological inquiry, as no adequate study of the kind has as yet been published. A similar inquiry into geographic and demographic differences within the United States is still to be made.

The recrudescence of the disease in the United States in the past three years naturally excites interest in its course prior to this time and in its previous epidemic manifestations. Before attempting to consider this phase of its epidemiology, however, it is necessary to know what was included under the term "meningococcus meningitis" as it has been reported.

Although epidemic cerebrospinal meningitis has been recognized as a disease entity since it was differentiated clinically by Vieusseau in 1805, it was confused with other forms of meningitis and even with typhoid and other fevers until the latter part of the nineteenth century, when, upon the discovery by Weichselbaum, in 1887, of the positive agent of cerebrospinal meningitis, accurate diagnosis was made possible. Thus, the earlier history of the disease is rather vague, because of inadequate records; and it may be regarded as certain that even now some of the cases reported as meningococcus meningitis, cerebrospinal fever, or epidemic meningitis are not of meningococcus origin. For example, recent investigations carried out under the League of Nations' epidemiological service at the Bacteriological Institute of the Berlin health department and at the Health Serum Institute of Denmark showed that between 30 and 35 per cent of

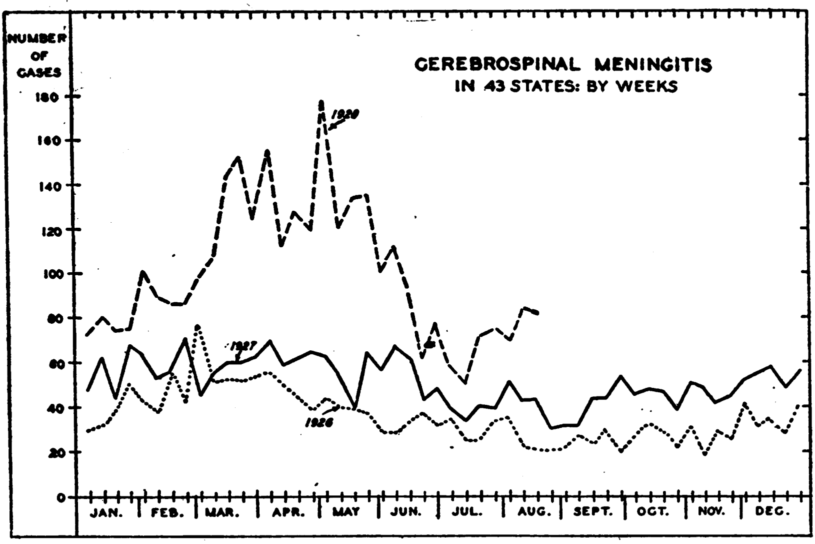

FIG. 2.—Incidence of cerebrospinal meningitis in 43 States, by weeks, as reported by telegraph to the United States Public Health Service by State departments of health, 1926–1928

the cases reported as meningococcal meningitis in Prussia and in Denmark in 1924 were erroneously diagnosed (1). On the other hand, a considerable number of meningococcus cases, in the United States at least, probably fail to be diagnosed as such, and a proportion of cases properly diagnosed are not reported. In fact, it may be regarded as certain that a number of cases are not reported unless their termination is fatal, and that some of these do not appear in the morbidity records at all. The value of our reports, even at the present time, is thus largely chronological, since they indicate the occurrence of epidemic conditions more accurately than they do the actual incidence of the disease.

That the disease has been more or less prevalent since modern medical records began seems to be a generally recognized fact. For example, Hirsch (2) asserted that "the earliest information on epidemic meningitis dates from 1805, in which year the disease was prevalent in Geneva, Switzerland," and he said that from 1805 to 1830 the disease occurred in isolated epidemics in various places in Europe, but was more general in the United States. It is more difficult to

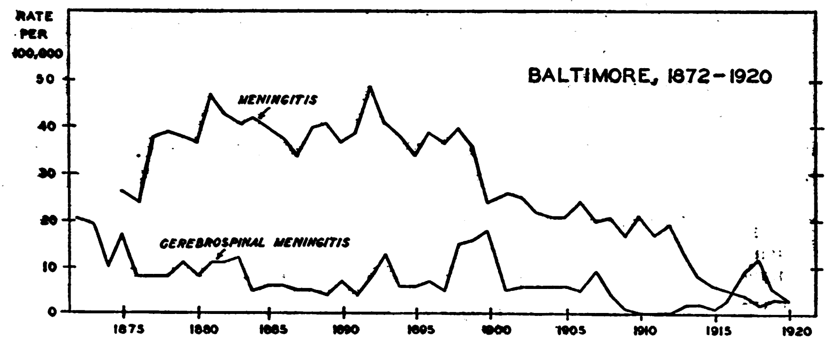

FIG. 3.—Mortality from meningitis and from cerebrospinal meningitis in Baltimore, by years, 1872-1920. (Data from Howard (3))

describe the general course of the disease or to mark its epidemic manifestations. Howard (3) has examined rather carefully the mortality records of Baltimore and points out that the rubric "cerebrospinal meningitis" first appeared in Baltimore's statistical nosology in 1872, "meningitis" and "tuberculous meningitis" being

Average rate of death per 100,000 living inhabitants, by five-year periods, from acute diseases of the central nervous system, from 1812 to 1920, inclusive, in Baltimore, Md.

Periods	Meningitis					Poliomyelitis	Dropsy in the head	Inflammation of the brain	Spinal affections and dropsy of the spine	Total, excluding tuberculous meningitis	Grand total
	Meningitis	Cerebrospinal	Total	Tuberculous	All forms						
1812-1815											
1816-1820							23	12		35	35
1821-1825							39	23		62	62
1826-1830							33	19		52	52
1831-1835							44	31		74	74
1836-1840							35	24		59	59
1841-1845							40	24		64	64
1846-1850							33	49	1	83	83
1851-1855							60	79	6	145	145
1856-1860							41	72	6	119	119
1861-1865							26	63	5	94	94
1866-1870							40	69	6	114	114
1871-1875		18	18	5	23		26	78	14	136	141
1876-1880	35	9	44	30	74		14	14	1	73	103
1881-1885	43	9	52	19	71		9	8		68	87
1886-1890	38	6	44	17	61		6	8		57	74
1891-1895	40	7	47	15	62		4	7		59	74
1896-1900	35	12	47	13	60		3	3		54	67
1901-1905	23	6	29	11	40			1		30	41
1906-1910	21	4	25	11	36			1		25	36
1911-1915	13	1	14	12	26			1		15	27
1916-1920	3	7	10	9	19	3		1		14	23

Data from Howard (3).

added in 1875. Before 1872 it is obviously impossible to say how much cerebrospinal meningitis actually occurred; but Howard's table showing the mean death rate for acute diseases of the central nervous system in Baltimore, for quinquennial periods from 1812, is especially interesting and is reproduced herewith. The fact that such terms as "dropsy in the head," "inflammation of the brain," and "cerebroinfection and dropsy of the spine" disappeared very soon after meningitis appeared in the statistical records gives ground for the rather interesting speculation that probably some, if not a good deal, of the high death rate from the diseases of the central nervous system prior to 1875, especially in the period 1850–1875, may have been cerebrospinal meningitis. However that may be,

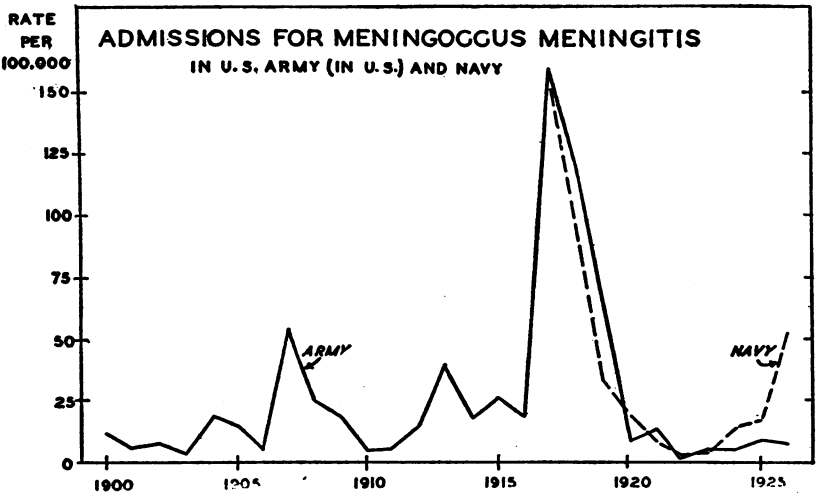

FIG. 4.—Mortality from meningitis in the 10 original registration States, 1910–1925, and from cerebrospinal fever, 1910–1925. (Data from Bureau of the Census, Mortality Statistics.)

the recorded mortality from cerebrospinal meningitis in Baltimore beginning with 1872, as shown in Figure 3, plotted from Howard's annual rates, indicated the occurrence of epidemic conditions in 1872–1875, 1881–1883, 1892–93, 1898–1900, 1907, 1917–18. While these occurrences suggest a periodicity of from 7 to 10 years, the data are not exact enough to serve for the drawing of any definite conclusions. Taking into account the developments in diagnosis, the records do suggest, however, that the trend of the disease has not been definitely upward or downward.

The mortality statistics issued by the Federal Bureau of the Census do not go back of 1900 and are not comparable since then. Prior to 1910, in accordance with the International List of Causes of Death, meningitis was used only as a single term, under which were included all diseases so designated. In 1910 a distinction was made so as to permit a classification of meningitis deaths under cerebrospinal fever or cerebrospinal meningitis and under simple meningitis. It was not until 1920 that meningococcus meningitis appeared in the classification, the other terms being "simple" and "nonepidemic cerebro-

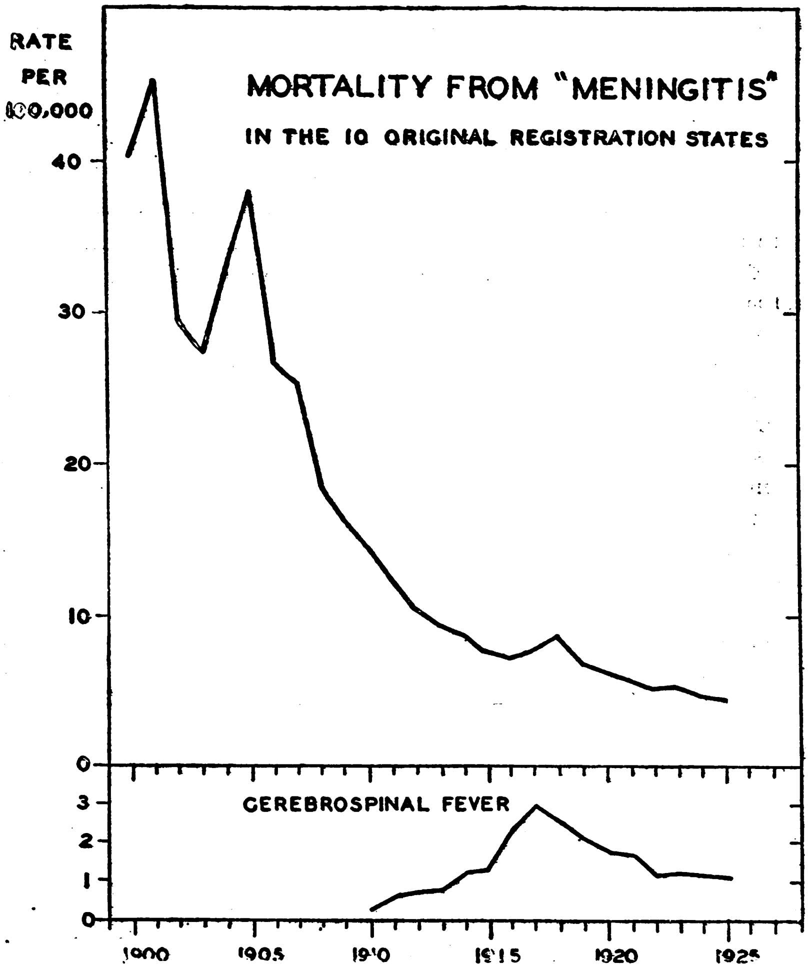

FIG. 5.—Admissions for meningococcus meningitis in the U. S. Army (in the United States), 1900–1926, and in the U. S. Navy, 1917–1926. (Data from Annual Reports of the Surgeons General of the Army and of the Navy, and from Siler (4).)

spinal meningitis"; and so if we take the total rate of meningitis for the registration area for 1900, as is done in Figure 4, it exhibits an extraordinary decline in the death rate from 40 or 45 per 100,000 to less than 5 per 100,000 in 1924 and 1925. This recorded decline appears to be spurious, for if the death rate from cerebrospinal fever alone beginning with 1910 is considered it is evident, as the lower graph in Figure 4 indicates, that there has been no downward trend in the mortality from the disease in the 15-year period.

The Army records of admissions for meningococcus meningitis are available since 1900 and constitute probably the most reliable chronological morbidity record of the disease in this country, for, as Siler has pointed out (4), "since the Spanish-American War the diagnosis of cerebrospinal meningitis has been more exact, and the records have included only cases in which the clinical diagnosis was confirmed by bacteriological examination." In Figure 5 there is reproduced the admission rate from Siler's chart, which has been carried through 1926, and on which has been plotted the Navy experience since 1917. Here it is shown that since 1900 there have been at least three fairly well defined epidemic periods—one in 1907, another in 1917 and 1918, and the present one, which is indicated by the civil morbidity reports.

To summarize this brief epidemiological review of some of the chronological phases of meningococcus meningitis—

A definite recrudescence in the incidence of the disease has been occurring in the United States since 1925, the recorded rate in the late spring of 1928 being the highest since 1918. This recrudescence has not yet appeared in other countries.

Apparently significant differences in the morbidity and mortality rates appear among countries where the disease is fairly accurately diagnosed.

Such earlier records of the disease in the United States as are available do not point to any marked upward or downward trend. They do indicate rather clearly the occurrence of epidemic-like rises in prevalence. That these epidemic conditions do not come oftener than about 10 years is suggested but not definitely shown.

REFERENCES

(1) Monthly Epidemiological Report of the Health Section of the League of Nations' Secretariat, Geneva, May 15, 1928, p. 7 (7th year, No. 5, p. 191).

(2) Hirsch: Hand Book of Geographical and Historical Pathology, vol. 3, quoted by Rawlings in "The Rise and Fall of Disease in Illinois," p. 56.

(3) Howard, W. T., jr.: Public Health Administration and the Natural History of Disease in Baltimore, Md., pp. 418–428.

(4) Siler, Joseph F.: The Medical Department of the United States Army in the World War, Vol. IX, Communicable and other diseases, p. 203.

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THE TREATMENT OF SEWAGE BY STREAM-FLOW AERATION[1]

By HARRY N. JENKS, *Sanitary Engineer*, and MAX LEVINE, *Bacteriologist, Engineering Experiment Station, Iowa State College, Ames, Iowa*

Following various preliminary conferences, an agreement was effected during March, 1927, between Jacob E. Decker & Sons, of Mason City, Iowa, and the engineering experiment station, Iowa State College, Ames, Iowa, whereby a cooperative industrial fellowship was established for conducting packing-house waste disposal investigations and research. The writers assumed active charge of the project, to collaborate in the solution of the biological and sanitary engineering problems that presented themselves. Mr. Frederick G. Nelson, sanitary engineering graduate of the University of California, was appointed research fellow, in charge of field work at Mason City. Dean Anson Marston, as director of the engineering experiment station, has general supervision of all projects undertaken by the station.

Some time previous to the initiation of this project, the Executive Council of Iowa had taken mandatory action to secure the abatement of gross nuisance resulting from the discharge of industrial wastes into Lime Creek, this action being based on the recommendations of the Iowa State Department of Health subsequent to a stream pollution survey completed by the division of sanitary engineering. The degree of treatment to be given the wastes was prescribed and a date fixed by which the Decker company, as one of the chief industries affected by the order, should comply with the new regulations. In order to determine by what means, if any, the proposed standard might be reached, either by a modification of the design and operation of the present activated sludge plant, or by some other process or combination of processes, the Decker company availed itself of the services which the engineering experiment station is in a position to render in such cases, through cooperative research in industrial wastes treatment.

During the course of their investigations relating to the Decker problem, the writers originated and studied experimentally a new means of sewage aeration, in an endeavor to ascertain the suitability of the activated sludge process under the best possible operating conditions. Because the new method simulates more closely than any other the basic phenomena responsible for the natural self-purification of sewage-polluted streams, it has seemed appropriate to designate it as a "stream-flow sewage treatment process." Systematic studies, both in the laboratory and in the field, have demonstrated

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[1] An account of this improvement in sewage treatment by the activated sludge method was first published by the authors in the Engineering News-Record, vol. 100, No. 21 (1928), under the title "A stream-flow sewage treatment process."

the fact that, in practical operation, the stream-flow principle gives promise of furnishing an improved means of treating sewage and other organic wastes, as viewed from the standpoints of efficiency and of decreased cost of construction and operation.

Contrasts and similarities in aerobic sewage treatment.—When sewage is treated aerobically, the chief purpose of whatever process may be adopted is to bring the sewage and oxygen into intimate contact with each other. The present high regard in which the trickling filter is held is due in large measure to the effectiveness of this treatment device in maintaining aerobic bichemical reactions resulting in a high degree of purification at relatively low operating cost. In the trickling filter the active biologic agents concerned in purification are in the form of a thin film which attaches itself to the filter material. As long as any given portion of this film remains in the filter bed it is stationary. This fact is responsible for a very important characteristic of trickling filters which manifests itself in the definite zoning of the biologic life within the filter. As the sewage passes downward through the bed, the decomposition products of each stage of purification are successively removed to lower portions of the filter, where these products encounter organisms particularly adapted to the fermentation of such substances. Each zone, therefore, is largely washed free of the end products produced therein, so that these do not interfere with the biologic activity.

In sharp contrast with the trickling filter, the activated sludge process has several inherent disadvantages arising primarily from the fact that the purifying agents must be circulated through the sewage, and, as ordinarily carried out, the process does not permit of an orderly biologic zoning, because of the promiscuous mixing of all the living forms that may be present in the activated sludge at any time. These organisms, upon which dependence is placed for the purification of the sewage, are continuously subjected to the inhibitory influences of their own end products until these products are decomposed by other microorganisms, and in each stage of the process the inactive organisms suffer considerable injury. Moreover, it is a difficult matter, when circulating the activated sludge through the sewage, to secure as intimate a contact with the organic matter to be adsorbed as is evidently so well effected by the stationary sludge (jelly) adhering to the rock of a trickling filter. Here, also, the active agents are in the form of a thin film, while in the activated sludge process, when the oxygen is brought into the sewage by means of diffused air bubbles, much of the efficiency of surface-film contact is lost.

Finally, when sewage enters a stream and is subjected to the treatment process as evidenced in the self-purification of streams, there succeeds an orderly sequence of stages of oxidation accomplished by the different groups of organisms adapted to the environment present throughout each of these stages. Furthermore, the rate of absorption of oxygen, as defined by the rate of reaeration of the stream, is proportional to the dissolved oxygen deficit, which, in turn, is a reflection of the oxygen demand exerted by the sewage from point to point along the course of flow. In contrast with this situation under natural conditions, the air supplied in the activated sludge process is ordinarily the same in amount from start to finish. The resultant tendency is toward an insufficient supply at the beginning and an excess near the end, or else a waste of air throughout the aeration period.

Conception of stream-flow aeration.—A critical review, such as has been outlined, of the advantages and shortcomings of the principal available methods of aerobic sewage treatment, leads to the conclusion that, in the final analysis, all so-called artificial treatment processes are simply adaptations of those found in nature. Further thought on this subject reveals the close analogy existing between the theory underlying the activated sludge process and the actual biochemical phenomena operative in stream flow.

Although the means which are employed to introduce the required oxygen into the zone of biochemical activity in the activated sludge process are strikingly dissimilar to the absorption of atmospheric oxygen in natural stream flow, yet this contrast is occasioned chiefly by difference in method rather than in principle. Moreover, the relatively short period of aeration, measured in hours, provided in the artificial process, is simply an acceleration of the process of decomposition, extending over a relatively prolonged period, measured in days, throughout which the oxygen demand is being exerted and finally satisfied, in a flowing stream. Taking the natural process as a basis of comparison, it is observed that the advantage lies with the artificial process in respect to the time factor of purification, a result attained by virtue of the presence of the artificially developed activated sludge. On the other hand, it is apparent that in the natural self-purification of streams the direct absorption of atmospheric oxygen without the employment of extraneous mechanical power other than an equivalent small loss of head, coupled with the absorption of such oxygen in proportion to the oxygen deficit only, is a manifestation of the economy of nature which the existing artificial process very imperfectly applies. The truly enormous weight of oxygen appropriated from the atmosphere by streams, through surface reaeration, comes as a surprise to engineers who are aware only in a general way of this phenomenon, and it can not fail to impress any one making the detailed computations required for studies of the oxygen balance in streams.

For some time past, the writers, in common with other workers in this field, have been impressed with the quite evident wastefulness of the present methods of introducing compressed air, through diffuser plates, into the body of sewage passing through the aeration tanks of an activated sludge plant. By waste of air is meant, in the present discussion, the use of air for other than its appropriation by the

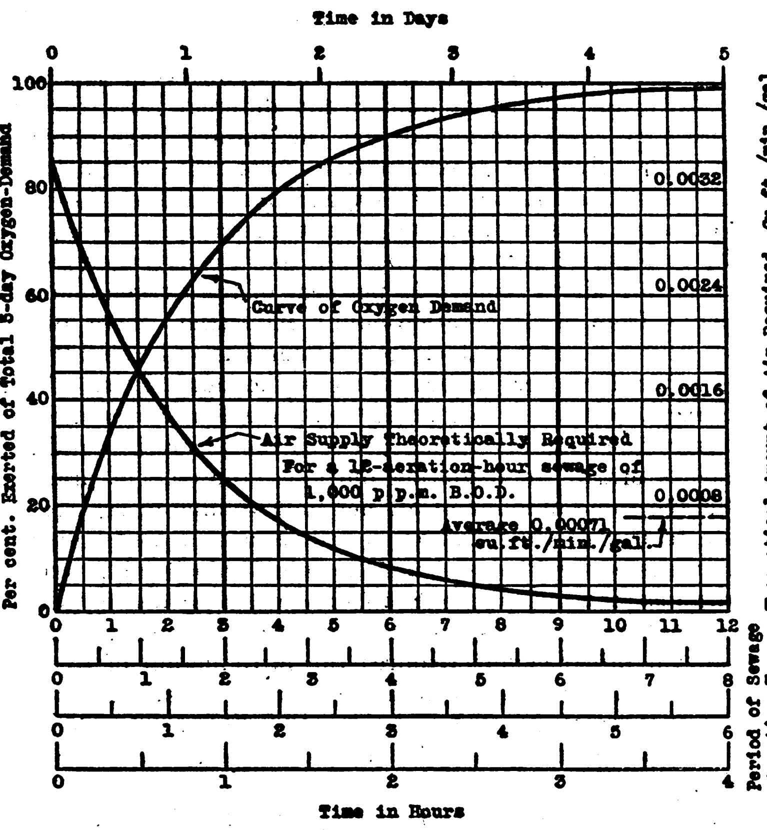

Fig.1— DIAGRAM SHOWING USE OF TYPICAL TIME-OXYGEN DEMAND CURVE FOR COMPUTING PROBABLE OXYGEN REQUIREMENTS THROUGHOUT A STREAM-FLOW SEWAGE TREATMENT PLANT, BY SUPERIMPOSING SCALE FOR GIVEN AERATION PERIOD

Based on the assumption that the oxygen demand exerted will follow the same law of variation within the foreshortened period of time represented by the total aeration-hours of treatment found necessary for practically complete satisfaction.

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aerobic organisms for the oxidation of the organic matter. That the amount of air, and consequently the expenditure of power, is greatly in excess of the theoretical requirements for the satisfaction of the oxygen demand is clearly indicated by Figure 1. On this diagram a curve is drawn showing the air supply theoretically required for an industrial sewage having an initial five-day oxygen demand of 1,000 p. p. m., and is based on the assumption that the rate of satisfaction of this demand will proceed substantially in conformity with the general course of the deoxygenation curve proposed by Phelps and later more fully confirmed by Theriault during the latter's studies on the pollution of the Ohio River.[1] Although deoxygenation in the presence of activated sludge, and the consequent need for oxygen to supply the resulting deficit, may doubtless be found, upon further study, to proceed at numerically different rates than those in the ordinary cases considered; yet the authors have determined that the typical five-day deoxygenation curve quite well defines the general relative magnitude of the oxygen demand during successive periods of time, measured, in the present instance, in hours of aeration. From Figure 1 it may be observed that the average theoretical requirement for air to remove 99 per cent of the oxygen-demanding constituents from a 12-aeration-hour[2] industrial waste of 1,000 p. p. m. initial biochemical oxygen demand is only slightly more than ½ cubic foot per gallon, whereas the normal use of air in practice might be from 4 to 6 cubic feet per gallon for such a waste.

Aside from the wide divergence between the theoretical and actual requirements for air for oxidation purposes, the current practice of supplying the same amount of air per unit volume of sewage, from beginning to end of the aeration period, is not in conformity with the fact expressed by Phelps that "the rate of biochemical oxidation of organic matter is proportional to the remaining concentration of unoxidized substance, measured in terms of oxidizability." To take this condition into account requires the introduction of oxygen at the maximum rate at the beginning of the process, followed by a gradual reduction of air supplied, corresponding to the decreasing oxygen demand exerted, until the completion of the aeration period is reached.

Engineering design on basis of stream-flow reaeration.—The theory of reaeration and its application to problems of stream pollution encountered in practice have had extensive treatment in current technical literature, notably by Streeter and Phelps,[3] in a classic contribution to our knowledge of the physical factors involved in

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[1] Phelps, E. B. (1909): The Disinfection of Sewage and Sewage Filter Effluents. U. S. Geological Survey Water Supply Paper 229, pp. 74–88.

Also Theriault, E. J. (1927): The Oxygen Demand of Polluted Waters. Pub. Health Bull. No. 173, p. 131 et seq.

[2] The term "aeration hours" refers here to the ascertained period of aeration needed to effect the maximum reduction of biochemical oxygen demand of which the process is economically capable when treating the sewage in question. Thus, a sewage requiring six hours' aeration for satisfactory treatment on this basis, may be referred to as a six-aeration-hour sewage.

[3] A Study of the Pollution and Natural Purification of the Ohio River. Public Health Bulletin No. 146, U. S. Public Health Service (1925).

the self-purification of natural streams. The definite, quantitative relationships discovered by these investigators and formulated mathematically for use in computing reaeration rates furnished valuable collateral evidence as to the correctness of the basic conception for the engineering design of a sewage-treatment plant on the stream-flow principle, presently to be described. In such a plant the oxygen requirements are met through surface reaeration of the sewage under optimum conditions as found in natural water courses.

Streeter's investigation showed that the rate of reaeration, designated by him by the symbol, K_2, is defined mainly by the temperature, oxygen saturation deficit, and the turbulence of the stream. In a sewage-treatment plant employing the stream-flow principle it was conceived that the factor of turbulence should be brought into play to the best possible advantage. Turbulence itself being an abstract characteristic, Streeter defined it in terms of velocity and depth, and determined empirically the validity of the following relationship:

$$K_2 = \frac{cV^n}{H^2}$$

where K_2 = coefficient defining the rate of reaeration;
V = velocity of the stream in feet per second;
H = mean depth of flow in feet;
c = constant depending chiefly upon irregularities in different stream stretches, producing turbulence; and
n = constant defining the variation in reaeration rates in the same river stretch for different flow conditions.

In analyzing the numerical values of (n), Streeter found that, when the channel conditions are such that a 5-foot increase in stage produces from 2 to 7 feet per second increase in mean velocity, little change in the value of (n) occurs, its actual value at the upper end of the velocity range being slightly greater than unity. In such a case the influence of the velocity itself predominates over that of turbulence.

Regarding the values of (c), it was concluded that the slope and irregularity of the channel are probably the governing factors. Available data on the Ohio River tend to show that the irregularity factor itself loses most of its effect when the slope approximates 2 feet per mile. With greater slopes than this, corresponding values of (c) increase at a much more rapid rate.

In concluding his analysis of the factors influencing the value of K_2, Streeter shows that there is a "tendency for K_2 to reach a maximum with increasing velocities of flow up to a certain point. * * * The velocity of flow coinciding with this maximum K_2 point varies in different river stretches studied, but in a majority of them it is reached at somewhere between 2 and 4 feet per second."

Holding in review the conclusions set forth by Streeter and his collaborators in relation to stream-flow aeration, it is apparent that this natural phenomenon can be directly applied to the treatment of organic wastes by providing an engineering design in which the maximum value of K_2 should be obtained. This object may be reached by means of a controlled section of stream channel in which the proper depth and velocity can be maintained. In natural streams the decomposition of the sewage proceeds over a long course of flow, many miles in length, so that it was recognized that within the physical limits of a treatment plant the necessary time element, in terms of distance traversed, could not be introduced in this way. Accordingly, recirculation of the sewage over the controlled section was decided upon and the design of the plant was made in accordance with the following basic assumptions:

(1) The rate of biochemical oxygen satisfaction will proceed, in the presence of activated sludge, substantially in accord with the deoxygenation curve as derived for flowing streams, except that the biochemical oxygen demand will be fully exerted and satisfied within a foreshortened period of time. (See fig. 1.)

(2) The effect of reaeration may be closely simulated by exposing the sewage flow in thin sheets to the atmosphere by recirculation over a reaeration surface comprising a controlled stream section distinctly separate from the zone of biologic activity wherein the oxygen so absorbed is utilized.

(3) The rates of recirculation of sewage over the reaeration surfaces at different points throughout the aeration period shall be adjusted to the actual biochemical oxygen demand correspondingly exerted.

The physical construction which a stream-flow plant thus assumes was seen to involve essentially a biochemical oxidation zone contained in a tank or basin through which the main body of sewage progresses and a separate reaeration or oxygen-absorbing zone, embodied in a paved surface adjacent to or over the tank, over which an independent and concomitant recirculation of the organic wastes is maintained. The sewage is withdrawn from the oxidation zone, discharged onto the reaeration surface, and allowed to flow down the slope of this surface, thence returning into the oxidation zone within the aeration tank.

In comparing the stream-flow plant design conditions with the relationship $K_2 = cV^n/H^2$, it will be noted that the minimizing effect of (H) may be practically eliminated by making the depth from 0.5 to 1 inch, thus presenting the maximum surface practicable for a given volume of sewage recirculated over the reaeration surface. The desirable velocity of flow over this surface to prevent deposition of sludge was assumed to lie between 2 and 3 feet per second, which corresponds closely with the range found by Streeter to be conducive of maximum values of the reaeration coefficient K_2. It has been determined that a slope of one-half inch per foot will give closely the desired velocity, even when transverse cleats are placed in the reaeration channel to induce riffling. As this slope is greatly in excess of the 2 feet per mile, above which point the value of (c) increases most rapidly, the effect of such a slope is very favorable to increased values of K_2. Finally, as regards (n), in a channel of the type under consideration the hydraulic radius increases rapidly with increased depth, so that the velocity effect itself predominates, with a value of (n) close to unity; this is also true on account of the negligible effect of the depth (H). The conditions of flow, therefore, in a stream-flow plant are the counterpart of a natural stream progressing through a long series of riffles and pools, a condition known to be most favorable to self-purification within a minimum distance, measured in time.

Installation of practical-scale stream-flow plant.—After the stream-flow idea had been given a thorough preliminary trial with the laboratory apparatus shown in Figure 2, operating on milk wastes up to 2 per cent concentration and yielding results presented at a later point in this article, a practical-scale field plant was constructed at the Decker packing plant. Figure 3 is a photograph of this installation, showing the general arrangement of the plant and types of pumping equipment employed for test purposes. Figure 4 is a view of the second aeration unit (tank B indicated in the flow sheet of fig. 5), taken to illustrate the realistic manner in which the recirculation of the sewage simulates the rills and riffles of a rapidly flowing shallow stream.

The structural features of a stream-flow plant, except for the aeration units, conform in essential particulars to the general design followed in the case of the activated sludge process. That is, a complete installation might comprise preliminary settling tanks, or screens, and final sludge settling tanks, together with appurtenances, in addition to the stream-flow aeration units themselves. As there is nothing in the aeration units to become clogged, whatever removal of suspended matter may be effected will be done to lessen the biochemical oxygen demand of the influent, or to recover such organic solids as may be utilized in the by-products department of the industrial plant producing the wastes. The provision of pretreatment by sedimentation thus becomes a matter of economics rather than one of necessity.

Effect of recirculation on retention period.—In practice, circumstances will dictate as to the position of the inlets and outlets of the various tanks or basins and of the recirculation piping. Because of the removal and return of the sewage flow as it passes through each of the oxidation tanks or the various compartments of a single tank, it is evident that there will be an indeterminate amount of short-circuiting of the tank contents from inlet to outlet. The crude or average retention period is computed on the actual displacement basis, although in fact the aeration period of successive volumes of flow is variable.

The situation with reference to effects of short-circuiting may be regarded as analogous to that which prevails in regard to the flowing-through period in mechanically operated mixing tanks. This matter was thoroughly investigated in connection with the design of the coagulation tanks for the Sacramento, Calif., filtration plant under the direction of Charles G. Hyde, chief consulting engineer, and based on the original research work of W. F. Langelier. Professor Langelier concluded from experiments[4] that the probable undertreatment due to short-circuiting may be expressed by the formula

$$X = 1 - [1 - (1 - R/Q)^{t/n}]n$$

Where Q = capacity of each tank in gallons;
R = flow of water (gallons per minute);
n = number of tanks;
t = minutes actual retention in n tanks;
X = proportion of water remaining in tanks t minutes (or longer).

The formula is based on the assumption of practically instantaneous diffusion of incoming water with tank contents.

Curves based on the foregoing expression show that when there are two or more tanks, short-circuiting is greatly reduced, the number of tanks having a much greater effect than their capacity in obviating undertreatment due to short-circuiting. From actual operating experience at the plant mentioned, Jenks found that the proportion of total flow escaping adequate coagulation, or its retention equivalent, is negligible when three or more tanks are operated in series. It is concluded that similar results are to be expected from the aeration units of a stream-flow plant.

Pumping equipment for reaeration.—The manner of maintaining the auxiliary recirculation of the organic wastes through the reaeration system, as the main body of sewage progresses through the oxidation tank, is a matter to be decided upon the basis of convenience and cost. It will be recognized that the pumping problem here is a most unusual one, involving as it does the discharge of relatively large volumes of sewage against an extraordinarily low static head,

[4] Coagulation of Water with Alum by Prolonged Agitation. Eng. News-Record, vol. 86, No. 22, pp. 924–928 (1921).

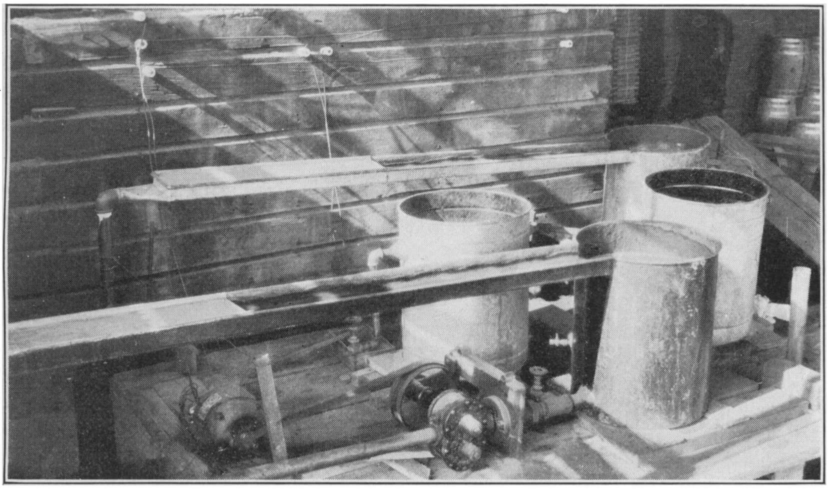

Fig. 2.—Laboratory stream-flow sewage treatment plant, showing method of recirculation of sewage over reaeration surfaces discharging into oxidation tanks. The apparatus is here arranged for biologic stage treatment

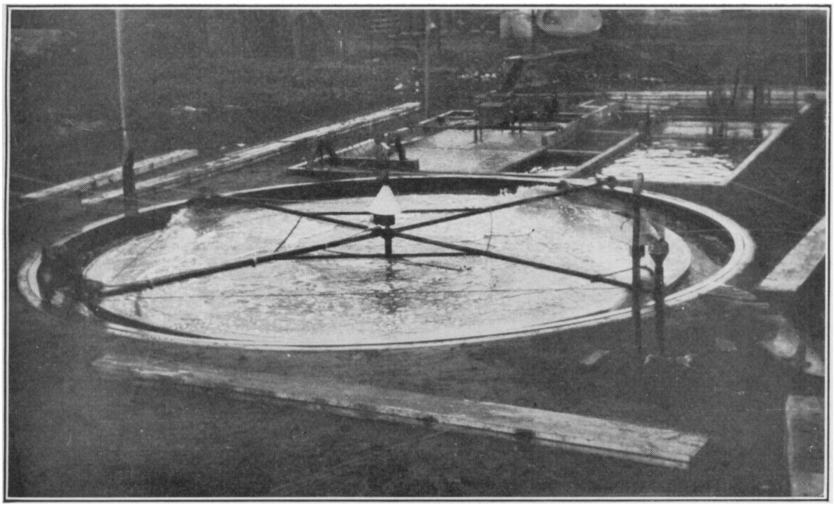

Fig. 3.—Practical scale field installation of stream-flow plant for treatment of packing-house wastes. General view of aeration units and the types of pumping equipment devised for test purposes

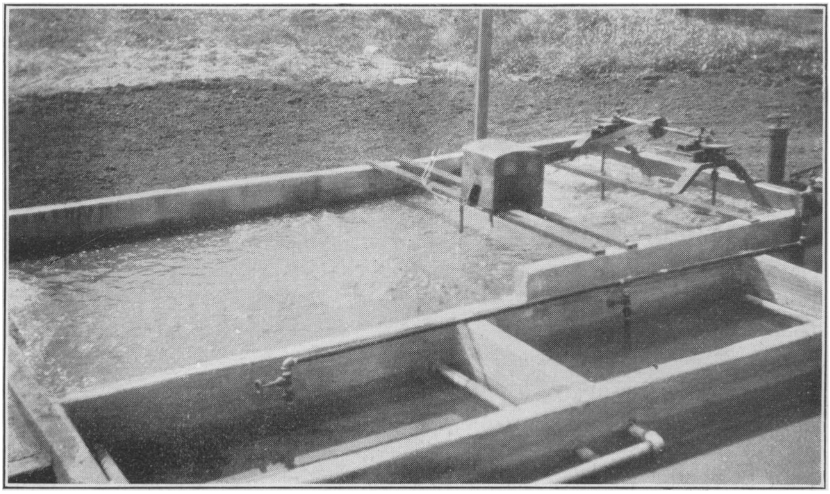

Fig. 4.—View of primary stage aeration unit of practical scale stream-flow sewage treatment plant, showing the realistic manner in which the recirculation of the sewage over the reaeration surface (to the right) simulates the rills and riffles of a rapidly flowing shallow stream. Photograph shows propeller blade pumps in operation in this unit

amounting to perhaps not more than 4 to 6 inches. Of the standard forms of pumps, the screw pump offers one of the best means of meeting these operating conditions at a reasonable efficiency. Such a pump might, however, be unduly expensive when designed specially for an extremely low head. Accordingly, three special pumping mechanisms, such as might be fabricated in a local machine shop, were devised for the Decker experimental field plant. Tank A was provided with a plow pump; tank B with a propeller pump; and tank C with a plunger box pump. The general view of the plant, shown in Figure 3, indicates these devices in operation. Their suitability for this service is being studied comparatively to determine which design might be used most advantageously.

PLANT-OPERATING DATA

The operating results obtained from the stream-flow plant are based on an extensive series of tests, with the laboratory-sized plant (fig. 2), on milk wastes, packing-house wastes, and sugar-beet wastes. The satisfactory treatment of these wastes from the standpoint of biochemical oxygen demand reduction, development and maintenance of an excellent activated sludge, and elimination of acid-producing constituents, led to the design and construction of a practical-scale field plant at the Decker packing plant. This installation enables a study to be made of the mechanical, hydraulic, and general engineering features of the new design.

Aeration efficiency.—The efficiency of the stream-flow principle of aeration has been shown to be consistently as good as that of diffused air when treating the industrial wastes already mentioned. Illustrative of the results obtained on packing-house wastes (Decker), Table 1 is presented, which shows the reduction in biochemical oxygen demand after various aeration periods. The data are based on six weeks' operation, and the results are listed in the order of their occurrence. It will be noted that although the wastes being treated may be considered a 12-aeration-hour sewage, yet a remarkable reduction in b. o. d. occurs after only 6 hours' aeration.

As to comparative efficiency of stream-flow aeration, it is believed that the continual exposure of the sewage to the atmosphere, as it flows over the reaeration surfaces in thin films, more closely approaches the optimum conditions for oxygen absorption than any design heretofore proposed.

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TABLE 1.—*Reduction in biochemical oxygen demand effected by laboratory stream-flow aeration unit, on packing-house wastes*

[Based on plant operation during period July 14–Aug. 27, 1927]

Biochemical oxygen demand p. p. m., raw wastes [1]	Biochemical oxygen demand p. p. m.,[2] after indicated aeration period, in hours			
	6	12	18	22
1,000	300	65	60	120
1,180	----------	115	95	90
700	80	40	40	50
1,100	43	18	20	28
820	56	33	33	30
925	44	25	26	26
600	32	98	70	45
650	38	30	30	50
550	52	13	34	----------
1,225	40	74	79	73
1,300	48	33	27	47
1,050	106	110	28	----------
2,000	132	69	56	----------
Median value, 1,000	50	40	34	55

APPARENT SATISFACTION OF INITIAL DEMAND, PER CENT [3]

	95	96	97	94

[1] Settling-tank effluent.
[2] 5-day biochemical oxygen demand at 20° C.
[3] Demand after various aeration periods taken on supernatant liquid; actual percentage satisfaction of demand should take into account transfer of oxygen-demanding substances to the activated sludge.

Effect of biologic staging.—The division of the treatment process into two or more stages, developing and maintaining a distinctly separate activated sludge for each stage, was conceived as a means of favoring increased biologic efficiency on the basis of the considerations relating to biologic zoning of trickling filters, as discussed at the beginning of this article. That this reasoning is essentially correct is evidenced in part by the results of stage treatment given in Table 2, showing that nitrification was secured by this means when treating 2 per cent milk waste by stream-flow aeration units. It may be noted that whether a primary stage of 6 hours was succeeded by a secondary stage of 18 hours, or the process reversed, nitrification for this type of waste ensued. In contrast with these results, Levine showed in previous research on the treatment of milk wastes that even with an unlimited supply of diffused air it was impossible to produce nitrates in single-stage treatment by the activated sludge process.[5]

Although the writers are aware that some engineers may be of the opinion that stage treatment does not commend itself on economic grounds for domestic sewage, yet they are convinced that biologic stage treatment merits serious consideration as an important aid in enhancing the efficiency of the activated sludge process where the more concentrated industrial wastes are concerned. This conception

[5] Iowa Engineering Experiment Station Bulletin No. 68, p. 27.

of the logical and proper method of operating an activated sludge plant is being given further study in the field stream-flow plant at Mason City. It appears that at least one important point that has heretofore not been adequately emphasized is the great advantage of removing as quickly as possible, from the aeration tanks, all excess sludge with its own high oxygen demanding characteristics gained by adsorption from the wastes being treated. This can be accomplished by intermediate settling between stages, and so lessen the oxygen demand of succeeding stages. To take advantage of this fact, the Decker practical-scale stream-flow plant provides stage treatment in accordance with the flow sheet shown in Figure 5.

TABLE 2.—*Changes in nitrogenous constituents obtained by aerating 2 per cent skim milk*

Aeration by diffused air, May 15 to June 7, 1922 [1]			Stream-flow aeration				
Constituent	Raw waste	Effluent after 21 to 45 hours' aeration	Raw waste, May 31 to July 5, 1927	23-hour continuous aeration	6-hour primary, 18-hour secondary	18-hour primary, 6-hour secondary	6-hour primary, 6-hour secondary
Org. N	102.5	9.08	72.6	19.7	7.55	10.65	11.25
NH_3	1.70	12.70	1.4	.35	13.12	12.08	1.75
NO_2	.05	.01	.044	.01	5.38	5.07	3.8
NO_3	1.38	.12	1.38	.50	2.39	2.03	2.6

[1] See Iowa Engineering Experiment Station Bulletin 68, p. 27.

NOTES.—23-hour continuous aeration based on tests, May 31 to June 2, 1927.
6-hour primary followed by 18-hour secondary, June 5 to June 24, 1927.
18-hour primary followed by 6-hour secondary, June 5 to June 24, 1927.
6-hour primary followed by 6 hour secondary, June 28, to July 5, 1927.

Power requirements for stream-flow aeration.—It can be shown by computations based on the deoxygenation curve described in a previous section of this article, and corroborated substantially by experiments, that a packing-house waste such as that found at the Decker plant and referred to in Table 1 can be treated by the stream-flow method through 12 hours' aeration, involving the recirculation of approximately 125 times the volume of sewage flow. Similar methods of computation applied to the case of a domestic sewage containing some industrial wastes, resulting in a biochemical oxygen demand of 350 p. p. m., should be successfully treated through six-hour stream-flow aeration of 50 times the volume of flow. For the latter case, assuming conservatively a lift of 4 inches and an over-all pumping efficiency of 25 per cent water level to water level, the required energy for aeration should not exceed 12 horsepower per m. g. d. treated.

It is realized that only actual operating experience with a full-sized installation can demonstrate the correctness of such a power estimate. Yet, the order of magnitude of the power required is such that a considerable factor of safety might be introduced without seriously detracting from the favorable comparison that can be drawn between the stream-flow plant and existing means of sewage aeration. In fact, if sufficient difference in elevation exists at the treatment-plant site, it is possible to design the plant in such a manner

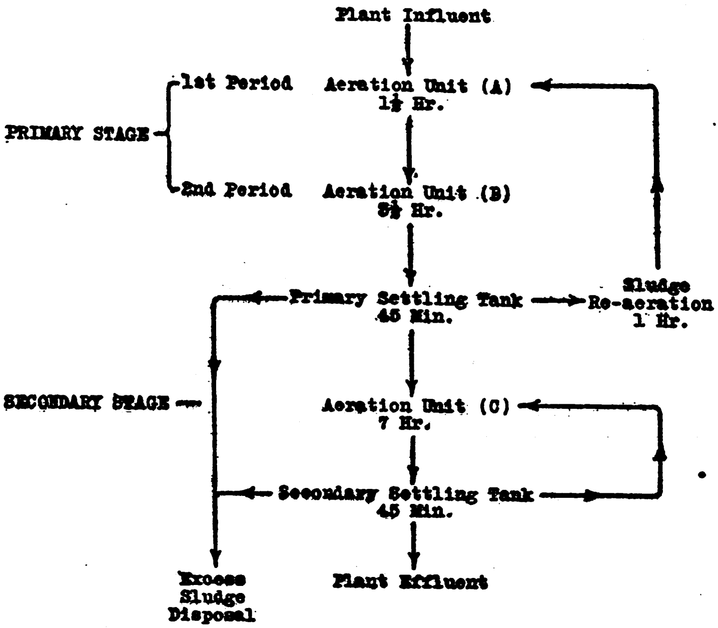

Fig. 5— TYPICAL FLOW SHEET THROUGH STREAM-FLOW SEWAGE TREATMENT PLANT, EMBODYING BIOLOGIC STAGE TREATMENT

Primary sludge is returned to primary stage after re-aeration, and excess is removed without allowing it to enter secondary stage. Secondary sludge is returned to secondary stage and excess combined with primary sludge excess, to be conveyed to point of sludge disposal.

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as to obviate a substantial part of the recirculation pumping through the utilization of this available head. In such an event the conditions of aeration would closely approximate those found throughout the course of a natural stream bed.

Cost of construction.—In the construction of a stream-flow plant it will be observed that it may be built so as to require relatively little excavation. In general, if excavation costs are high in comparison with the cost of area of land covered by the plant, then the tanks may be made quite shallow. For small plants it is suggested that the depth may be 4 to 6 feet. No dependence upon depth is required to provide a proper contact period of the air with the organic matter, which is a practical necessity in the diffused-air activated sludge aeration tank. The operation of the tanks entails the usual low loss of head resulting from flow through unbaffled basins at low velocities.

The stream-flow absorption of atmospheric oxygen insures an adequate oxygen supply without any expense for installation and operation of air piping and diffuser plates. Also, in comparison with air-washing and air-compressing equipment and machinery used in diffused-air plants, the extremely low-head pumping equipment and simple piping alone needed in the stream-flow plant is far less expensive, both in first cost and in operation.

It is suggested that for a plant to treat, say, 2 m. g. d., the first tanks might be provided with screw pumps discharging from 6,000 to 8,000 g. p. m. each. In the last tanks, where the recirculation rate is greatly reduced, plunger-box pumping units might be employed, operated by a common roller-bearing crank shaft, along each side of the tanks. In connection with studies of pumping requirements, an apparatus of unique design is being tested, by which advantage may be taken of the very low lift to utilize effectively the velocity head created by the pump impeller, operating on the vortex principle.

The reaeration surfaces may partly or wholly cover the aeration tanks or be laid as a pavement on natural ground along the edge of the structures. If the oxidation tanks are made of conventional depth, then the stream-flow aeration units will occupy very closely the same area as aeration tanks designed in the ordinary way. This is an important point which has been rightly emphasized by Streeter in discussing the relative economy of area required by various aeration devices typical of British sanitary engineering practice.[6] Experiments indicate that the reaeration surfaces should be from 6 to 10 feet in length, providing three to five seconds' exposure of the sewage film to the atmosphere at 2 feet per second velocity. A design factor will be determined empirically which will give the permissible recirculation rate in g. p. m. per square foot of reaeration surface. If required by severe weather conditions, the reaeration surfaces may be readily covered, air being admitted through suitably spaced ventilators.

It is not possible within the scope of this article to review the results obtained by other investigators in the field of sewage aeration

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[6] Streeter, H. W., in Pub. Health Bull. 166, pp. 28–29.

by mechanical agitation, in order to point out the essential similarities and differences between stream-flow aeration and that secured by other means. It is the authors' hope that, after they and others who will become interested in this subject have fully overcome the difficulties that will naturally be encountered in the practical application of so novel a form of sewage-treatment plant, it will become a fitting engineering counterpart of the notable advances made by British engineers in the use of mechanical aeration in the activated sludge process.

ACKNOWLEDGMENTS

It gives the authors pleasure to acknowledge at this time the very gratifying cooperation of the Jacob E. Decker & Sons organization, particularly on the part of Jay E. Decker, president, E. S. Selby, treasurer, and Elmer E. Dye, chemist of that company. Acknowledgment is also due all members of the engineering experiment station staff who have been interested in the furtherance of this project, among whom Harry E. Goresline, assistant bacteriologist, and George W. Burke, chemical engineer, have rendered valuable assistance in the laboratory work. Credit is also due Robley Winfrey, assistant director, for his helpfulness at all times in arranging the necessary financial and organization details of the project.

DEATH RATES IN A GROUP OF INSURED PERSONS

Rates for Principal Causes of Death for July, 1928

The accompanying table is taken from the Statistical Bulletin for August, 1928, issued by the Metropolitan Life Insurance Co., and presents the mortality record of the industrial insurance department of the company, by principal diseases, for July, 1928, as compared with June, 1928, and with July, 1927. The rates are based on a strength of more than 18,000,000 insured persons in the United States and Canada.

The Bulletin states:

> The death rate among the industrial populations of the United States and Canada during July was 8.1 per 1,000. While this exceeds somewhat the figure for the corresponding month of last year (7.9), it is nevertheless below the usual July mortality rate for American and Canadian wage earners. The cumulative death rate for 1928, up to the end of July, was lower than that for the corresponding period of all preceding years with only two exceptions. The July death rate is 14 per cent lower than that for the preceding month, and 22 per cent below that for May. These large drops reflect more than the usual seasonal improvement which we expect at this time of the year, and indicate that health conditions have adjusted themselves since the unusually high mortality rates recorded in May and April.
>
> With the exception of measles, the principal epidemic diseases of childhood recorded lower death rates than for July of last year.

Tuberculosis, after registering increases in both May and June, recorded a substantial drop in July. The cumulative death rate for tuberculosis, up to the week ending August 18, shows a 6 per cent drop as compared with the corresponding period of last year. As the August–October period is the one in which the lowest death rate for tuberculosis almost invariably occurs, there is every prospect that the death rate for tuberculous disease among American and Canadian wage earners will drop to at least 90 per 100,000 this year. This would be a new minimal figure and may be compared with 93.6 for 1927, 137.9 for 1920, 197.8 for 1915, and 224.6 for 1911. Assuming, then, this rate of 90 per 100,000 for the year 1928, the decline, as compared with the rate only 17 years ago, would amount to 60 per cent.

The mortality from influenza and pneumonia, although showing a large seasonal decline in July as compared with June, was nevertheless much higher than the figure for July, 1927. It was the increase for these diseases, coupled with higher rates for organic heart disease and cancer, which was chiefly responsible for the rise in the rate for all causes combined over that recorded for July a year ago.

The death rate for automobile fatalities is an encouraging item in the July mortality record of this large group of wage earners—16 per 100,000 as compared with 19.9 in July of 1927. The year-to-date death rate up to August 18, however, was only slightly lower than that for the like period of 1927, being 16 per 100,000 as compared with 16.1 for last year. If this improvement is maintained throughout the remainder of the year, 1928 will mark the first break in the continuously rising death rate which has occurred each successive year ever since records of these deaths have been recorded by the company.

Death rates (annual basis) per 100,000, for principal causes of death

[Industrial department, Metropolitan Life Insurance Co.]

Cause of death	Death rate per 100,000 lives exposed*			
	July, 1928	June, 1928	July, 1927	Year 1927
Total, all causes	809.0	943.6	790.5	887.9
Typhoid fever	2.8	2.5	5.2	4.6
Measles	5.0	10.2	2.7	4.1
Scarlet fever	2.0	3.1	2.2	3.1
Whooping cough	5.8	7.4	6.2	6.4
Diphtheria	7.0	10.8	7.9	10.6
Influenza	9.9	23.8	6.3	17.8
Tuberculosis (all forms)	83.3	102.6	91.7	93.6
Tuberculosis of respiratory system	72.9	87.8	79.9	81.9
Cancer	70.0	73.9	66.5	74.3
Diabetes mellitus	14.7	17.8	13.9	16.8
Cerebral hemorrhage	48.2	55.2	47.4	55.1
Organic diseases of heart	127.8	142.7	113.0	132.5
Pneumonia (all forms)	49.3	94.1	44.0	77.7
Other respiratory diseases	13.9	16.2	12.3	11.7
Diarrhea and enteritis	27.1	21.3	24.9	24.6
Bright's disease (chronic nephritis)	58.0	67.6	61.1	69.5
Puerperal state	13.0	14.4	13.6	15.5
Suicides	7.9	9.4	8.0	8.3
Homicides	6.1	5.8	6.8	7.3
Other external causes (excluding suicides and homicides)	71.3	61.1	77.8	63.9
Traumatism by automobiles	16.0	16.9	19.9	18.4
All other causes	186.5	203.8	179.4	190.5

*All figures include infants insured under 1 year of age.

COURT DECISION RELATING TO PUBLIC HEALTH

Power of State board of health regarding markets.—(Louisiana Supreme Court; State ex rel. Saint, Atty. Gen., et al. *v.* Mayor and Commission Council of New Orleans, 118 So. 30; decided July 2, 1928.) A suit was instituted by the attorney general and the president of the State board of health praying for a writ of mandamus commanding the commission council of the city of New Orleans to provide properly equipped and constructed sanitary markets in lieu of the 16 markets then owned and operated by the city. The judgment of the trial court directed the mayor and commission council to construct and properly equip sanitary public markets to take the place of certain enumerated markets. On appeal the supreme court reversed the judgment of the lower court and denied the application for mandamus. The conclusions reached by the appellate court are set forth in its opinion, as follows:

The law provides ample means, other than by mandamus, for correcting and preventing a recurrence of the conditions complained of by the relators. An injunction restraining the commission council from operating unsafe or unsanitary markets is an expeditious, effective, and proper procedure. It is a well-recognized rule that mandamus will not lie if there be other adequate legal remedy open to relators for the enforcement of his demands. * * *

In this case the respondent might well admit that the State board of health, under the constitution of 1921 (art. 6, sec. 11) and the jurisprudence of this State, has plenary power to enforce sanitary regulations in publicly operated city markets without injury to its cause, for the power of the board to regulate the use of the city markets does not include the power to control the discretion of the commission council to repair, or to discontinue the use of, or to demolish and rebuild, its markets. * * *

It seems clear to us that, while the State board of health has the power to restrain, by injunction, the use of any market, whether publicly or privately owned and operated, until its sanitary code is complied with, it has no power to control by mandamus, the di cretion of the commission council with respect to its disposition of municipally owned property. * * *

PUBLIC HEALTH ENGINEERING ABSTRACTS

Health and Housing. R. St. J. MacDonald. *The Public Health Journal*, vol. 19, No. 4, April, 1928, pp. 156–161. (Abstract by P. S. Fox.)

The writer describes bad housing and enumerates ten results of bad housing. The following points are taken up in detail: Lack of fresh air and sunshine, room overcrowding, dark rooms, inadequate water supply, want of open spaces around houses, lack of food stores, outside privies, and minor evils of bad housing.

In conclusion he states: "From the foregoing it may therefore be said that a healthful house should have: (1) A dry site, a good aspect; it should be weather-proof and damp proof; (2) clean surroundings and not be overcrowded by other houses; (3) every room of an adequate size, properly ventilated and lighted; (4) no room overcrowding; (5) proper sanitary appliances, water closet, sink, bath, and hot water available; (6) fly-proof, ventilated food and milk store; (7) proper heating and lighting arrangement; (8) proper water supply and satisfactory washing accommodation; (9) proper kitchen; (10) been built under a general town-planning scheme."

Ferric Salts as Coagulants for Activated Sludge Prior to Filtration. F. W. Mohlman and J. R. Palmer. *Engineering News-Record*, vol. 100, No. 4, January 26, 1928, pp. 147–150. (Abstract by C. C. Ruchhoft.)

Filter alum was formerly considered the most satisfactory coagulant for activated sludge at the Calumet sewage works of the sanitary district of Chicago. However, when acid wastes were received at the works from a paint factory, it was impossible to produce a satisfactory sludge cake on the Oliver filter with the customary doses of 7 to 10 lbs. of filter alum per 1,000 gallons of sludge, and it was necessary to increase the alum dosage to 17 lbs. This led to a search for a better coagulant, and it was found that ferric salts, particularly ferric chloride, have remarkable coagulative power and facilitate the filtration of activated sludge. Laboratory tests showed that five pounds of ferric chloride per 1,000 gallons was superior to 15 pounds of filter alum. The superiority of ferric chloride over filter alum is even greater with a poor quality of sludge than with a good sludge. Since ferric chloride costs six cents per pound, or over three times as much as filter alum, and is not produced on a large scale, a method for manufacturing a substitute product in sufficient quantities for large scale operation was worked out. A solution of copperas (ferrous sulphate) was chlorinated and a mixture of 71% ferric sulphate and 29% anhydrous ferric chloride was produced. A brief description of the plant for manufacturing chlorinated copperas is given.

Filtration tests on both the Calumet and the Des Plaines River sewage works sludge, with various amounts of filter alum and chlorinated copperas as coagulants, showed that chlorinated copperas was superior to filter alum. The optimum amount required on the Des Plaines sludge was double that required at Calumet. The optimum pH for filtration with iron salts is 4.3, but the coagulation is apparently primarily dependent upon the amount of iron added and the nature of the anion in combination with the ferric ion.

A Study of Factors Affecting the Efficiency and Design of Farm Septic Tanks. E. W. Lohmann, R. C. Kelleher, and A. M. Buswell. Bulletin No. 304. University of Illinois, Agricultural Experiment Station, April, 1928, pp. 299–339. (Abstract by W. L. Havens.)

Since 1922 the Illinois Experiment Station, in cooperation with the Illinois State Water Survey, has made a study of basic features affecting the design and efficiency of septic tanks for use as a means of sewage disposal on the farm. The following conclusions were reached as a result of this study: (1) Septic tanks should be designed for an average sewage flow of from 18 to 25 gallons per person daily; (2) ordinarily, the septic tank should be designed for a minimum of seven persons; (3) in a single-chamber tank, a 72-hour retention period should be provided; (4) in a two-chamber tank, a total retention period of 108 hours should be provided, the additional 36-hour capacity being provided in the second chamber; (5) when properly designed, the two-chamber tank is more efficient than the single-chamber tank.

The article describes the methods employed in making the study, together with the operation results obtained and suggestions and sketches showing the proper design of septic tanks.

Recent Sewage Studies at Houston, Tex. G. L. Fugate and W. S. Stanley. Proceedings of Tenth Texas Water Works Short School, pp. 199–201. (Abstract by Chester Cohen.)

Observations at the Houston activated sludge plant have shown that when the activated sludge in the lagoons falls below a pH of 7.0, crusting of the surface and highly offensive odors result. Persistent stirring and hosing alleviate the condition somewhat.

Experiments on dewatering and drying of the sludge, instead of lagooning, finally indicated that a vacuum disk filter would be the most economically efficient method of handling the sludge. For the successful filtration of activated sludge it is necessary that the sludge be conditioned to a pH of 5.4 (using chlorinated copperas as the conditioner), well aerated, and that there be as little agitation as possible after the addition of the conditioner.

So long as the moisture content was kept below 85%, no difficulty was presented in the drying of cake obtained by filtration.

The Jacksonville, Tex., Sewage Disposal Plant. H. L. Thackwell. Proceedings of Tenth Texas Water Works Short School, pp. 204–207. (Abstract by Chester Cohen.)

The new Jacksonville plant as designed and constructed treats 400,000 gallons of domestic sewage in 24 hours, and is estimated to serve a connected population of 6,000. The units of the treatment systems comprise a combined grit and screen chamber elevated above the ground; primary settling tanks with one hour retention; and a contact aerator with one hour retention, employing brushwood media on a Monel metal hammock over filtros plates in precast concrete containers. Air is applied in this last unit at the rate of 0.25 cubic foot per gallon of sewage. The coagulated sewage from this activation plant is then passed into a secondary settling tank of 15 minutes' detention period, and, after rising through a gravel filter supported on a Monel metal screen, the effluent falls over a step aerator into a dosing tank. The dosing chamber sprays the sewage under a nine and one-half foot head to a trickling filter bed rated at 500,000 gallons per acre-foot. The bed is six inches deep, with perforated tile underdrains. The effluent is chlorinated. The final effluent after chlorination is then run through a humus tank of the Imhoff type with a 20-minute retention period.

The sludge from the different units is cared for in a covered concrete sludge tank arranged for sludge digestion. The glassed-over sludge drying bed is provided for drying and removal of digested sludges.

The cost of operation of the plant is around $22 per million gallons, which includes the pumping costs of two lift stations located in different portions of the city. The total cost of the plant, land, pumping stations, etc., was $35,000. The grounds are parked with walks and shrubbery, and trees have been planted to protect from prevailing winds and to screen it from the view of a near-by highway.

The Need of Sewage Research in Texas. Willem Rudolfs. Proceedings of Tenth Texas Water Works Short School, January, 1928, pp. 179–182. (Abstract by Chester Cohen.)

"It appears, thus, that there are two factors which stand in the way of better sewage disposal: Our limited knowledge of (1) underlying principles and (2) environmental conditions." The author points out that the vast number of unsolved problems in biological sewage and waste disposal show that we have only scratched the surface. Recent observations have placed more emphasis upon the effects of temperature, of reaction of the material, and of certain industrial wastes upon the rate of solids destruction. The author explains that development of a comprehensive sewage research program would not mean a long drawn out study for every plant which is to be constructed, but that it would rather develop general underlying principles and the effect of environmental factors which could be applied to the general region in which the research was undertaken.

Filtering Materials for Sewage Work—Kind, Size, and Depth. N. T. Veatch, jr. **Proceedings** of Tenth Texas Water Works Short School, January, 1928, pp. 183–186. (Abstract by Chester Cohen.)

There are about 700 sewage disposal plants in this country using some kind of filtering material for secondary treatment. A recent report shows that 30.7% of the trickling filter plants showed disintegration of the filtering material and 37.4% showed clogging. Granite, trap rock, quartzite, and gravel have proved almost uniformly satisfactory. The size of materials used in trickling filters and contact beds ranges from a grading of ¼ inch to 2½ inches to one of 2 to 3 inches. A minimum size of not less than 1 inch is advisable. Where ample head is available, practice seems to have been to use a depth ranging from 6 feet to 9 feet for trickling filters, whereas contact beds usually employ a depth of from 4 to 6 feet.

Fine grained filtering materials usually consist of sand and appear to give the best results of all types of plants. About 300 such plants are in operation, with the majority of the beds ranging from 3 to 4 feet depth above the under drains. The majority of plants use a uniformity coefficient ranging from 2.5 to 3.5 and an effective size range of 0.25 to 0.50 mm.

Pollution of Tidal and Non-Tidal Waters. J. H. Coste. *The Surveyor*, vol. 73, No. 1897, June 1, 1928, p. 595. (Abstract by E. A. Reinke.)

The most common and oldest form of pollution of rivers is with domestic refuse, complicated with the waste product of trades. The acts providing for prevention of pollution in streams of Great Britain are referred to, particularly those having to do with the protection of fish. Standards of purity of wastes may be of two kinds—those defining quality or strength of effluent and those requiring merely that wastes be harmless to the river into which they are discharged.

"The following questions arose in each case of pollution: (1) Is it necessary that such a waste product or effluent should arise out of the operations of the undertaking concerned? (2) Can any useful product be extracted which will render the pollution innocuous or lessen the cost of treatment? Or, in the last resort, (3) What is the best practicable and available method of treating the polluting noxious or poisonous liquid so as to render it harmless?"

In discussing works management the author stated that conferences between chemists representing both parties would in many cases overcome difficulties, especially when it was made clear that they must be overcome and not merely debated with a view to making a fair show of action.

DEATHS DURING WEEK ENDED SEPTEMBER 15, 1928

Summary of information received by telegraph from industrial insurance companies for the week ended September 15, 1928, and corresponding week of 1927. (From the Weekly Health Index, September 19, 1928, issued by the Bureau of the Census, Department of Commerce)

	Week ended Sept. 15, 1928	Corresponding week, 1927
Policies in force	71, 368, 489	68, 711, 839
Number of death claims	12, 959	12, 180
Death claims per 1,000 policies in force, annual rate	9. 5	9. 2

Deaths from all causes in certain large cities of the United States during the week ended September 15, 1928, infant mortality, annual death rate, and comparison with corresponding week of 1927. (From the Weekly Health Index, September 19, 1928, issued by the Bureau of the Census, Department of Commerce)

City	Week ended Sept. 15, 1928		Annual death rate per 1,000 corresponding week 1927	Deaths under 1 year		Infant mortality rate, week ended Sept. 15, 1928 [2]
	Total deaths	Death rate [1]		Week ended Sept. 15, 1928	Corresponding week 1927	
Total (68 cities)	6,561	11.3	11.1	791	756	65
Akron	29	----------	----------	5	3	54
Albany [3]	29	12.6	14.4	7	4	143
Atlanta	79	16.2	15.9	8	15	----------
White	41	----------	13.4	5	7	----------
Colored	38	(4)	21.9	3	8	----------
Baltimore [3]	229	14.4	13.6	38	25	121
White	173	----------	11.6	27	16	108
Colored	56	(4)	24.7	11	9	172
Birmingham	70	16.5	15.1	12	8	103
White	32	----------	15.3	9	6	124
Colored	38	(4)	14.8	3	2	68
Boston	162	10.6	11.5	28	29	77
Bridgeport	27	----------	----------	4	4	73
Buffalo	111	10.4	10.0	22	16	94
Cambridge	24	10.0	8.0	3	3	53
Camden	21	8.1	11.4	4	3	64
Canton	18	8.1	7.4	3	2	71
Chicago [3]	602	10.0	10.8	60	79	51
Cincinnati	127	16.1	14.9	16	15	97
Cleveland	176	9.1	8.6	20	24	54
Columbus	69	12.1	14.9	12	11	112
Dallas	52	12.5	13.8	9	10	----------
White	41	----------	11.6	6	7	----------
Colored	11	(4)	28.5	3	3	----------
Denver	75	13.3	12.8	12	16	----------
Des Moines	33	11.4	11.9	3	2	50
Detroit	281	10.7	9.3	47	45	73
Duluth	26	11.6	9.5	6	2	140
El Paso	40	17.8	15.6	8	7	----------
Erie	30	----------	----------	2	2	41
Fall River [3]	30	11.7	10.2	7	7	120
Flint	32	11.2	11.3	14	8	179
Fort Worth	31	9.6	11.2	2	8	----------
White	27	----------	9.8	2	6	----------
Colored	4	(4)	21.3	0	2	----------
Grand Rapids	21	6.7	11.3	1	4	15
Houston	65	----------	----------	10	5	----------
White	42	----------	----------	8	4	----------
Colored	23	(4)	----------	2	1	----------
Indianapolis	103	14.1	14.1	14	8	107
White	86	----------	13.0	12	6	105
Colored	17	(4)	22.1	2	2	121
Jersey City	60	9.7	8.9	5	12	37
Kansas City, Kans	31	13.7	13.3	1	3	21
White	23	----------	14.1	0	1	0
Colored	8	(4)	9.8	1	2	145
Kansas City, Mo	98	13.1	13.7	10	8	71
Knoxville	15	7.4	14.8	2	6	43
White	10	----------	13.3	1	5	24
Colored	5	(4)	25.6	1	1	213
Los Angeles	193	----------	----------	19	18	54
Louisville	87	13.8	10.6	13	3	109
White	77	----------	9.0	13	3	124
Colored	10	(4)	19.2	0	0	0
Lowell	18	8.5	9.9	2	1	42
Lynn	12	5.9	13.4	1	1	25
Memphis	57	15.7	22.7	11	11	129
White	31	----------	21.2	7	8	131
Colored	26	(4)	25.5	4	3	125
Milwaukee	94	9.0	9.7	14	10	62
Minneapolis	74	8.5	9.1	1	9	6

[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] Deaths for week ended Friday, Sept. 14, 1928.
[4] 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, Ky., 17; Memphis, 38; Nashville, 30; New Orleans, 26; Richmond, 32; and Washington, D. C., 25.

Deaths from all causes in certain large cities of the United States during the week ended September 15, 1928, infant mortality, annual death rate, and comparison with corresponding week of 1927. (From the Weekly Health Index, September 19, 1928, issued by the Bureau of the Census, Department of Commerce)—Continued

City	Week ended Sept. 15, 1928		Annual death rate per 1,000 corresponding week 1927	Deaths under 1 year		Infant mortality rate, week ended Sept. 15, 1928
	Total deaths	Death rate		Week ended Sept. 15, 1928	Corresponding week 1927	
Nashville	53	20.0	15.9	6	3	94
White	27		13.7	4	2	85
Colored	26	(4)	21.4	2	1	120
New Bedford	17	7.4	9.2	5	1	108
New Haven	43	12.0	8.2	3	5	42
New Orleans	122	14.9	18.9	15	18	73
White	72		13.3	8	9	58
Colored	50	(4)	35.0	7	9	102
New York	1,262	11.0	10.5	151	122	61
Bronx Borough	171	9.4	8.1	11	9	33
Brooklyn Borough	421	9.5	9.1	57	50	57
Manhattan Borough	516	15.4	14.6	70	54	83
Queens Borough	111	6.8	7.4	11	8	44
Richmond Borough	43	14.9	13.2	2	1	36
Newark, N. J	92	10.2	9.0	16	10	82
Oakland	61	11.6	12.5	3	4	33
Oklahoma City	30			3	5	
Omaha	56	13.1	14.3	6	4	79
Paterson	24	8.7	9.4	3	1	52
Philadelphia	426	10.8	9.5	53	49	71
Pittsburgh	166	12.9	10.5	18	22	59
Portland, Oreg	43			5	4	54
Providence	63	11.5	9.8	7	7	61
Richmond	47	12.6	13.0	3	5	39
White	26		11.9	0	1	0
Colored	21	(4)	15.9	3	4	110
Rochester	75	11.9	10.6	10	10	81
St. Louis	182	11.2	13.4	16	17	53
St. Paul	41	8.5	11.3	3	2	29
Salt Lake City [3]	34	12.9	9.6	1	2	16
San Antonio	37	8.9	8.6	5	5	
San Diego	43	18.8	16.3	2	4	38
San Francisco	120	10.7	10.6	6	3	38
Schenectady	20	11.2	11.2	2	2	63
Seattle	65	8.9	9.7	2	2	21
Somerville	14	7.1	8.7	0	1	0
Spokane	42	20.1	13.4	1	0	26
Springfield, Mass	28	9.8	9.9	2	1	32
Syracuse	52	13.6	9.0	6	6	73
Tacoma	18	8.5	8.8	2	1	51
Toledo	58	9.7	13.5	2	7	19
Trenton	44	16.6	17.2	4	9	68
Washington, D. C	150	14.2	11.5	8	10	46
White	87		9.0	4	3	33
Colored	63	(4)	18.8	4	7	74
Waterbury	14			3	0	87
Wilmington, Del	33	13.4	8.7	5	2	132
Worcester	44	11.6	8.5	2	3	24
Yonkers	12	5.2	5.7	2	1	46
Youngstown	30	9.0	9.2	5	2	67

[3] Deaths for week ending Friday, Sept. 14, 1928.

[4] 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, Ky., 17; Memphis, 38; Nashvillle, 30; New Oreleans, 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 Weeks Ended September 15, 1928, and September 17, 1927

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended September 15, 1928, and September 17, 1927

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Sept. 15, 1928	Week ended Sept. 17, 1927	Week ended Sept. 15, 1928	Week ended Sept. 17, 1927	Week ended Sept. 15, 1928	Week ended Sept. 17, 1927	Week ended Sept. 15, 1928	Week ended Sept. 17, 1927
New England States:								
Maine	6	3	-	-	18	3	0	0
New Hampshire	1	-	2	-	114	-	0	-
Vermont	-	1	-	-	-	-	0	0
Massachusetts	42	62	4	9	34	29	1	2
Rhode Island	6	5	-	-	2	-	2	0
Connecticut	10	14	3	1	12	4	1	0
Middle Atlantic States:								
New York	89	168	[1] 9	[1] 3	65	21	36	5
New Jersey	59	52	3	2	14	3	0	1
Pennsylvania	94	120	-	-	74	51	11	2
East North Central States:								
Ohio	40	-	11	-	47	-	8	-
Indiana	13	11	14	8	10	2	0	0
Illinois	81	55	38	7	23	14	5	4
Michigan	55	45	-	-	25	7	5	0
Wisconsin	22	23	19	43	12	81	2	2
West North Central States:								
Minnesota	18	40	2	-	12	5	0	1
Iowa [2]	6	23	-	-	-	6	1	0
Missouri	35	52	2	2	2	8	1	2
North Dakota	6	6	8	-	2	5	1	0
South Dakota	1	-	-	-	-	2	0	0
Nebraska	7	4	1	-	2	1	0	0
Kansas	11	29	4	1	5	19	2	0
South Atlantic States:								
Delaware	-	-	-	-	2	-	0	0
Maryland [3]	26	35	3	5	6	3	1	2
District of Columbia	17	15	2	-	1	1	0	0
West Virginia	9	19	27	2	1	12	0	0
North Carolina	120	101	-	-	9	150	0	1
South Carolina	49	53	521	156	-	56	0	0
Georgia	20	45	95	17	2	2	0	0
Florida	8	21	2	-	-	4	0	1
East South Central States:								
Kentucky	4	-	-	-	-	-	0	-
Tennessee	34	19	6	9	2	22	0	2
Alabama	54	64	43	16	11	22	0	0
Mississippi	18	29	-	-	-	-	2	-
West South Central States:								
Arkansas	14	5	3	9	2	5	0	0
Louisiana	20	21	3	4	1	8	0	1
Oklahoma [4]	35	60	19	12	3	5	0	2
Texas	15	46	14	2	1	2	1	0
Mountain States:								
Montana	3	3	-	-	3	3	0	3
Idaho	-	1	-	-	-	3	0	0
Wyoming	7	2	-	-	-	-	0	0

[1] New York City only.
[2] Figures for 1927 are for week ended Friday.
[3] Week ended Friday.
[4] Figures for 1928 are exclusive of Oklahoma City and Tulsa, and for 1927 are exclusive of Tulsa.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended September 15, 1928, and September 17, 1927—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Sept. 15, 1928	Week ended Sept. 17, 1927	Week ended Sept. 15, 1928	Week ended Sept. 17, 1927	Week ended Sept. 15, 1928	Week ended Sept. 17, 1927	Week ended Sept. 15, 1928	Week ended Sept. 17, 1927
Mountain State—Continued								
Colorado	5	26	1		5	1	8	0
New Mexico	8	8			2	4	0	1
Arizona	1	3			11	4	1	4
Utah [3]	5	5		2	1	1	0	0
Pacific States:								
Washington	11	10			15	14	2	3
Oregon	9	2	6	14	3	13	2	1
California	34	87	9	10	20	31	1	4

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Sept. 15, 1928	Week ended Sept. 17, 1927	Week ended Sept. 15, 1928	Week ended Sept. 17, 1927	Week ended Sept. 15, 1928	Week ended Sept. 17, 1927	Week ended Sept. 15, 1928	Week ended Sept. 17, 1927
New England States:								
Maine	5	10	27	10	1	0	15	5
New Hampshire	2		10		0		0	
Vermont	5	0	1	4	0	0	0	0
Massachusetts	35	106	81	102	0	0	11	24
Rhode Island	1	4	8	17	0	0	1	3
Connecticut	4	19	6	16	0	0	4	5
Middle Atlantic States:								
New York	87	92	89	97	0	[5] 18	63	92
New Jersey	4	39	25	48	0	1	19	21
Pennsylvania	14	48	77	118	0	0	76	43
East North Central States:								
Ohio	15	89	75		2		51	
Indiana	1	4	31	27	2	12	18	37
Illinois	4	36	76	97	9	16	46	73
Michigan	9	18	64	75	4	16	15	22
Wisconsin	2	15	56	55	6	8	5	2
West North Central States:								
Minnesota	25	11	59	64	0	0	7	7
Iowa [2]	1	5	12	8	0	6	4	3
Missouri	1	17	22	23	4	11	32	32
North Dakota	5	1	32	15	0	0	6	2
South Dakota	2	5	1	7	1	0	2	5
Nebraska	1	4	12	13	2	7	2	9
Kansas	3	10	29	21	1	8	24	25
South Atlantic States:								
Delaware	1	0	4	3	0	0	1	4
Maryland [3]	26	0	10	14	0	0	56	23
District of Columbia	6	0	4	7	0	0	0	1
West Virginia	13	13	25	47	0	11	29	56
North Carolina	2	2	60	73	9	3	35	50
South Carolina	1	2	11	25	0	2	67	86
Georgia	0	0	8	28	0	0	37	30
Florida	0	1	4	8	0	11	6	11
East South Central States:								
Kentucky	2		26		8		43	
Tennessee	1	2	21	34	2	2	79	82
Alabama	3	1	31	23	2	2	45	49
Mississippi	1		20	16	0	3	25	19
West South Central States:								
Arkansas	1	3	7	9	2	0	51	26
Louisiana	0	1	5	2	3	3	25	26
Oklahoma [4]	1	10	12	24	3	35	74	101
Texas	0	16	15	31	2	0	13	33
Mountain States:								
Montana	5	0	3	3	2	1	3	2
Idaho	3	0	2	2	2	4	2	2
Wyoming	0	0	6	2	0	1	3	0
Colorado	7	2	5	10	0	0	10	16
New Mexico	0	11	2	7	5	2	18	19
Arizona	0	7	0	0	0	0	5	14
Utah [3]	0	6	3	7	1	2	4	3
Pacific States:								
Washington	29	15	27	10	13	13	14	4
Oregon	0	21	8	7	9	15	9	4
California	6	66	61	77	13	7	19	13

[2] Figures for 1927 are for week ended Friday.
[3] Week ended Friday.
[4] Figures for 1928 are exclusive of Oklahoma City and Tulsa, and for 1927 are exclusive of Tulsa.
[5] Includes delayed reports.

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	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
July, 1928										
Missouri	9	87	24	71	221	1	2	127	65	52
August, 1928										
Maine	0	6	2		125		4	33	1	15
Massachusetts	9	163	75	9	1,350	3	21	317	1	28
Michigan	0	239	5	6	185		3	267	0	65
New Hampshire	0	6	28				8	20	0	2
New Jersey	18	235	3		178		28	75	0	79
Tennessee	4	27	44	879	41	50	12	46	2	459
Vermont	0	3			12		0	16	1	1

	Cases
July, 1928	
Missouri:	
Chicken pox	46
Mumps	65
Ophthalmia neonatorum	2
Rabies in animals	2
Septic sore throat	22
Tetanus	2
Trachoma	5
Tularaemia	1
Whooping cough	231
August, 1928	
Chicken pox:	
Maine	8
Massachusetts	290
Michigan	79
New Jersey	46
Tennessee	6
Vermont	11
Dysentery:	
Massachusetts	2
Tennessee	53
German measles:	
Maine	3
Massachusetts	25
New Jersey	13
Hookworm disease:	
Tennessee	1
Lead poisoning:	
Massachusetts	2
New Jersey	4
Leprosy:	
New Jersey	1
Lethargic encephalitis:	
Maine	1
Massachusetts	5
Michigan	4
Mumps:	
Maine	16
Massachusetts	164
Michigan	99
***August, 1928*—Continued**	
Mumps:	
Tennessee	24
Vermont	8
Ophthalmia neonatorum:	
Massachusetts	157
New Jersey	2
Tennessee	1
Paratyphoid fever:	
Maine	2
Michigan	49
New Jersey	3
Tennessee	2
Rabies in man:	
Tennessee	3
Septic sore throat:	
Maine	1
Massachusetts	243
Michigan	25
Tennessee	2
Tetanus:	
Massachusetts	4
Tennessee	3
Trachoma:	
Massachusetts	1
New Jersey	1
Tennessee	7
Trichinosis:	
Massachusetts	1
Undulant fever:	
Michigan	1
Tennessee	1
Vincent's angina:	
Maine	8
Whooping cough:	
Maine	53
Massachusetts	405
Michigan	1,315
New Jersey	559
Tennessee	60
Vermont	67

RECIPROCAL NOTIFICATIONS

Notifications regarding communicable diseases sent during the month of July, 1928, by departments of health of the States named, to other State health departments

Disease	California	Illinois	Minnesota	New Jersey	New York
Dysentery (amebic)			1		
Paratyphoid fever		1			
Poliomyelitis		[1] 1			
Scarlet fever		2			1
Septic sore throat					1
Smallpox	1	1		1	1
Tuberculosis			89		
Tularaemia	1				
Typhoid fever	1				3
Whooping cough					1

[1] Suspect.

GENERAL CURRENT SUMMARY AND WEEKLY REPORTS FROM CITIES

The 96 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 31,315,000. The estimated population of the 90 cities reporting deaths is more than 30,620,000. The estimated expectancy is based on the experience of the last nine years, excluding epidemics.

Weeks ended September 8, 1928, and September 10, 1927

	1928	1927	Estimated expectancy
Cases reported			
Diphtheria:			
43 States	834	1,312	
96 cities	305	553	556
Measles:			
42 States	442	616	
96 cities	118	112	
Poliomyelitis: 43 States	336	595	
Scarlet fever:			
43 States	773	1,149	
96 cities	217	301	323
Smallpox:			
43 States	105	133	
96 cities	8	21	12
Typhoid fever:			
43 States	963	1,145	
96 cities	145	176	193
Deaths reported			
Influenza and pneumonia: 90 cities	351	386	
Smallpox: 90 cities	0	0	

City reports for week ended September 8, 1928

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

If the reports have not been received for the full nine years, data are used for as many years as possible, but no year earlier than 1919 is included. In obtaining the estimated expectancy, the figures are smoothed when necessary to avoid abrupt deviation from the usual trend. For some of the diseases given in the table the available data were not sufficient to make it practicable to compute the estimated expectancy.

Division, State, and city	Population July 1, 1926, 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	76,400	1	1	0	0	0	4	0	2
New Hampshire:									
Concord	[1] 22,546	0	0	0	0	0	0	0	0
Manchester	84,000	0	1	0	0	0	0	0	0
Vermont:									
Barre	[1] 10,008		0						
Burlington	[1] 24,089	0	0	0	0	0	0	0	0
Massachusetts:									
Boston	787,000	2	27	8	2	0	4	0	9
Fall River	131,000	0	1	1	0	0	0	0	0
Springfield	145,000	0	1	3	0	0	4	0	0
Worcester	193,000	2	3	1	0	0	2	0	1
Rhode Island:									
Pawtucket	71,000	0	0	0	0	0	0	0	1
Providence	275,000	0	4	2	0	0	9	0	1
Connecticut:									
Bridgeport	(2)	0	4	3	0	0	0	0	3
Hartford	164,000	0	3	1	0	0	1	1	1
New Haven	182,000		2						
MIDDLE ATLANTIC									
New York:									
Buffalo	544,000	6	11	7		0	0	1	6
New York	5,924,000	3	82	61	6	2	26	1	70
Rochester	321,000	0	4	0		0	1	0	0
Syracuse	185,000	1	2	0		0	1	0	1
New Jersey:									
Camden	131,000	1	2	0	0	0	0	0	1
Newark	459,000	3	6	12	2	0	1	3	7
Trenton	134,000	2	2	1	0	0	0	0	1
Pennsylvania:									
Philadelphia	2,008,000	4	33	12	0	2	7	1	18
Pittsburgh	637,000	3	14	8	0	0	1	4	11
Reading	114,000	1	2	0	0	0	0	0	0
EAST NORTH CENTRAL									
Ohio:									
Cincinnati	411,000	0	5	5	0	0	1	0	7
Cleveland	960,000	2	27	8	4	0	9	1	8
Columbus	285,000	0	3	3	1	0	0	0	2
Toledo	295,000	0	7	0	0	0	0	0	1
Indiana:									
Fort Wayne	99,900	0	2	2	0	0	0	0	2
Indianapolis	367,000	0	4	2	0	0	2	1	11
South Bend	81,700	1	1	0	0	0	0	0	2
Terre Haute	71,900	0	1	0	0	0	0	0	1
Illinois:									
Chicago	3,048,000	16	46	35	5	2	7	8	34
Springfield	64,700	0	1	0	0	0	0	1	1

[1] Estimated July 1, 1925. [2] No estimate made.

City reports for week ended September 8, 1928—Continued

Division, State, and city	Population July 1, 1926, estimated	Chicken pox, cases reported	Diphtheria: Cases, estimated expectancy	Diphtheria: Cases reported	Influenza: Cases reported	Influenza: Deaths reported	Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
EAST NORTH CENTRAL—continued									
Michigan:									
Detroit	[3] 1,242,044	1	35	17	0	1	8	4	12
Flint	136,000	1	5	1	0	0	1	0	3
Grand Rapids	156,000	0	2	0	0	0	0	0	0
Wisconsin:									
Kenosha	52,700	1	0	0	0	0	0	0	0
Milwaukee	517,000	10	8	3	0	0	9	1	9
Racine	69,400	0	1	0	0	0	0	0	0
Superior	[1] 39,671	0	1	2	0	0	0	0	0
WEST NORTH CENTRAL									
Minnesota:									
Duluth	113,000	0	0	1	0	0	0	0	2
Minneapolis	434,000	4	14	5	0	0	0	0	3
St. Paul	248,000	0	13	1	0	0	1	2	2
Iowa:									
Davenport	[1] 52,469	0	1	0	0		0	0	
Des Moines	146,000	0	2	0	0		0	0	
Sioux City	78,000	0	1	0	0		0	0	
Waterloo	36,900	0	0	1	0		0	2	
Missouri:									
Kansas City	375,000	0	3	3	0	1	0	0	0
St. Joseph	78,400	0	1	0	0	0	0	0	1
St. Louis	830,000	0	21	20	0	0	0	1	
North Dakota:									
Fargo	[1] 26,403		0						
Grand Forks	[1] 14,811	0	0	0	0		0	0	
South Dakota:									
Aberdeen	[1] 15,036	0	0	0	0		0	0	
Sioux Falls	[1] 30,127	0	0	0	0		0	0	
Nebraska:									
Omaha	216,000	0	9	5	0	0	0	0	1
Kansas:									
Topeka	56,500	0	0	0	1	0	0	1	0
Wichita	92,500	0	1	0	0	0	0	0	1
SOUTH ATLANTIC									
Delaware:									
Wilmington	124,000	0	1	0	0	0	0	0	0
Maryland:									
Baltimore	808,000	3	16	5	1	1	3	2	15
Cumberland	[1] 33,741	0	1	0	0	0	0	0	1
Frederick	[1] 12,035	0	0	0	0	0	0	0	0
District of Columbia:									
Washington	528,000	1	7	7	1	1	0	0	4
Virginia:									
Lynchburg	[3] 38,493	0	1	1	0	0	0	1	0
Norfolk	174,000	0	0	1	0	1	0	0	3
Richmond	189,000	0	11	5	0	0	0	0	2
Roanoke	61,900	0	3	0	0	0	0	2	0
West Virginia:									
Charleston	50,700	0	1	0	0	0	0	0	0
Wheeling	[1] 56,208	0	1	0	0	0	0	0	0
North Carolina:									
Raleigh	[1] 30,371	0	1	0	0	0	0	0	0
Wilmington	37,700	0	0	1	0	0	0	0	0
Winston-Salem	71,800		2						
South Carolina:									
Charleston	74,100	0	1	1	6	1	0	0	0
Columbia	41,800	0	1	0	0	0	0	1	1
Greenville	[1] 27,311		1						
Georgia:									
Atlanta	(2)	0	5	3	12	1	0	1	9
Brunswick	[1] 16,809	0	0	0	0	0	0	0	1
Savannah	94,900	0	1	0	0	0	0	0	1
Florida:									
Miami	[3] 131,286	0	3	0	0	0	0	1	2
St. Petersburg	[1] 26,847		0			0			0
Tampa	102,000	0	2	2	0	0	0	0	2

[1] Estimated, July 1, 1925. [2] No estimate made. [3] Special census.

City reports for week ended September 8, 1928—Continued

Division, State, and city	Population July 1, 1926, 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	58,500	0	1	0	0	2	0	0	0
Louisville	311,000	1	4	0	0	0	0	1	6
Tennessee:									
Memphis	177,000	0	3	0	0	0	0	0	4
Nashville	137,000	0	3	3	0	0	0	0	2
Alabama:									
Birmingham	211,000	0	4	1	0	0	0	2	3
Mobile	66,800	0	1	1	0	1	0	0	0
Montgomery	47,000	0	2	1	0		0	0	
WEST SOUTH CENTRAL									
Arkansas:									
Fort Smith	[1] 31,643	0	0	0	0		0	0	
Little Rock	75,900	0	0	0	0	0	0	0	2
Louisiana:									
New Orleans	419,000	0	6	4	1	1	1	0	5
Shreveport	59,500	0	1	0	0	0	0	0	1
Oklahoma:									
Oklahoma City	(2)	0	2	1	2	0	1	0	4
Texas:									
Dallas	203,000	0	4	7	0	0	0	0	1
Fort Worth	159,000	0	2	1	0	0	0	0	2
Galveston	49,100	0	0	0	0	0	0	0	1
Houston	[1] 164,954	0	2	6	1	1	0	0	2
San Antonio	205,000	0	1	2	0	0	0	0	2
MOUNTAIN									
Montana:									
Billings	[1] 17,971	0	0	0	0	0	0	0	0
Great Falls	[1] 29,883	0	0	0	0	0	1	0	0
Helena	[1] 12,037	0	0	0	0	0	0	0	0
Missoula	[1] 12,668	0	0	0	0	0	0	0	1
Idaho:									
Boise	[1] 23,042	0	0	0	0	0	0	0	0
Colorado:									
Denver	285,000	2	13	3		0	3	10	3
Pueblo	43,900	0	2	2	0	0	0	0	0
New Mexico:									
Albuquerque	[1] 21,000	0	0	0	0	0	0	1	0
Utah:									
Salt Lake City	133,000	5	3	1	0	0	0	4	1
Nevada:									
Reno	[1] 12,665	0	0	0	0	0	0	0	0
PACIFIC									
Washington:									
Seattle	(2)	3	3	3	0		0	0	
Spokane	109,000	1	1	0	0		7	0	
Tacoma	106,000	3	2	0	0	0	0	2	1
Oregon:									
Portland	[1] 282,383	5	4	4	1	0	0	1	1
California:									
Los Angeles	(2)	2	26	11	6	2	2	5	16
Sacramento	73,400	0	2	2	0	0	0	2	3
San Francisco	567,000	3	12	3	8	0	2	3	3

[1] Estimated, July 1, 1925.

[2] No estimate made.

City reports for week ended September 8, 1928—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	0	0	0	0	0	2	0	0	0	10
New Hampshire:											
Concord	0	0	0	0	0	0	0	0	0	0	3
Manchester	1	0	0	0	0	0	0	0	0	0	10
Vermont:											
Barre	0	-------	0	-------	-------	-------	0	-------	-------	-------	-------
Burlington	0	1	0	0	0	0	0	0	0	0	6
Massachusetts:											
Boston	15	12	0	0	0	11	4	2	0	16	173
Fall River	1	4	0	0	0	5	1	1	0	0	30
Springfield	2	1	0	0	0	0	0	0	0	3	21
Worcester	2	1	0	0	0	1	0	2	0	6	43
Rhode Island:											
Pawtucket	0	0	0	0	0	0	0	0	0	1	14
Providence	2	2	0	0	0	5	0	2	1	0	44
Connecticut:											
Bridgeport	2	0	0	0	0	2	0	0	0	2	28
Hartford	2	0	0	0	0	0	1	0	0	1	24
New Haven	1	-------	0	-------	-------	-------	3	-------	-------	-------	-------
MIDDLE ATLANTIC											
New York:											
Buffalo	6	3	0	0	0	6	2	1	1	44	108
New York	29	17	0	0	0	83	45	34	3	52	1,122
Rochester	2	1	0	0	0	3	1	0	0	3	52
Syracuse	3	0	0	0	0	2	1	0	0	16	39
New Jersey:											
Camden	1	0	0	0	0	0	1	0	0	1	22
Newark	4	0	0	0	0	8	2	1	0	18	103
Trenton	1	2	0	0	0	3	0	2	0	0	46
Pennsylvania:											
Philadelphia	22	12	1	0	0	24	12	10	1	81	406
Pittsburgh	12	2	0	0	0	5	3	4	1	28	126
Reading	0	0	0	0	0	0	1	0	0	17	23
EAST NORTH CENTRAL											
Ohio:											
Cincinnati	4	1	0	1	0	6	2	3	0	7	108
Cleveland	12	4	0	0	0	15	4	6	0	41	143
Columbus	3	2	0	0	0	4	1	0	0	6	77
Toledo	4	6	0	0	0	4	2	1	0	18	57
Indiana:											
Fort Wayne	1	0	0	0	0	3	1	2	0	1	24
Indianapolis	3	4	0	0	0	3	1	3	0	2	82
South Bend	1	0	0	0	0	0	0	0	0	2	15
Terre Haute	1	1	0	0	0	0	0	0	0	0	18
Illinois:											
Chicago	30	20	1	0	0	44	8	3	0	70	562
Springfield	1	1	0	0	0	1	1	0	0	3	17
Michigan:											
Detroit	28	19	0	0	0	35	6	2	0	74	244
Flint	5	0	0	1	0	1	1	0	0	10	39
Grand Rapids	4	2	0	0	0	2	0	0	0	3	25
Wisconsin:											
Kenosha	0	0	1	0	0	0	0	0	0	5	-------
Milwaukee	9	13	0	0	0	2	0	0	0	79	93
Racine	2	0	0	0	0	0	1	1	0	4	-------
Superior	1	1	0	0	0	0	0	0	0	0	7
WEST NORTH CENTRAL											
Minnesota:											
Duluth	3	0	0	0	0	2	0	0	0	0	26
Minneapolis	14	3	1	0	0	0	1	2	0	9	70
St. Paul	6	3	1	0	0	1	2	0	0	11	51
Iowa:											
Davenport	0	1	0	0	-------	-------	0	0	-------	0	-------
Des Moines	3	1	0	0	-------	-------	0	0	-------	0	28
Sioux City	0	2	0	1	-------	-------	1	0	-------	4	-------
Waterloo	0	0	0	0	-------	-------	0	0	-------	0	-------

City reports for week ended September 8, 1928—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											
Missouri:											
Kansas City	3	0	0	1	0	11	2	3	0	2	103
St. Joseph	0	1	0	0	0	0	1	0	0	0	32
St. Louis	11	5	0	0	0	17	7	3	0	7	186
North Dakota:											
Fargo	0	0	0	---	---	---	1	---	---	---	---
Grand Forks	1	0	0	0	---	---	0	0	---	0	---
South Dakota:											
Aberdeen	0	0	0	0	---	---	0	0	---	1	---
Sioux Falls	1	0	0	0	---	---	0	0	---	0	5
Nebraska:											
Omaha	2	0	0	0	0	1	1	1	0	1	34
Kansas:											
Topeka	1	3	0	0	0	1	0	0	0	9	13
Wichita	2	0	0	0	0	0	2	1	0	5	26
SOUTH ATLANTIC											
Delaware:											
Wilmington	1	0	0	0	0	0	0	0	0	0	22
Maryland:											
Baltimore	6	1	0	0	0	16	10	8	0	82	186
Cumberland	0	1	0	0	0	0	0	0	0	0	11
Frederick	0	0	0	0	0	0	0	0	0	0	2
District of Columbia:											
Washington	5	2	0	0	0	3	4	3	1	11	95
Virginia:											
Lynchburg	0	0	0	0	0	1	1	0	0	0	12
Norfolk	0	1	0	0	0	0	2	0	0	0	---
Richmond	3	1	0	0	0	5	2	1	0	0	42
Roanoke	1	4	0	0	0	1	1	0	0	0	22
West Virginia:											
Charleston	1	4	0	0	0	0	2	0	0	0	10
Wheeling	2	0	0	0	0	4	1	1	0	1	20
North Carolina:											
Raleigh	0	0	0	0	0	1	0	1	0	0	12
Wilmington	0	0	0	0	0	0	0	0	0	0	7
Winston-Salem	1	---	0	---	---	---	2	---	---	---	---
South Carolina:											
Charleston	0	2	0	0	0	1	2	1	0	1	18
Columbia	0	0	0	0	0	2	1	1	0	0	8
Greenville	0	---	0	---	---	---	0	---	---	---	---
Georgia:											
Atlanta	5	7	0	0	0	3	4	3	0	1	70
Brunswick	0	0	0	0	0	1	0	0	0	0	3
Savannah	0	0	0	0	0	3	1	0	0	0	35
Florida:											
Miami	0	0	0	0	0	1	1	1	0	0	25
St. Petersburg	0	---	0	---	0	0	0	---	0	---	5
Tampa	0	0	0	0	0	0	0	0	0	0	26
EAST SOUTH CENTRAL											
Kentucky:											
Covington	1	3	0	0	0	1	0	0	0	0	25
Louisville	2	2	0	0	0	4	5	1	0	6	68
Tennessee:											
Memphis	1	4	0	0	0	4	5	6	2	21	59
Nashville	2	2	0	0	0	2	6	2	0	1	31
Alabama:											
Birmingham	3	1	1	0	0	3	5	5	0	7	71
Mobile	1	0	0	0	0	0	0	1	0	0	8
Montgomery	0	0	0	0	---	---	1	1	---	0	---
WEST SOUTH CENTRAL											
Arkansas:											
Fort Smith	1	0	0	0	---	---	0	3	---	0	---
Little Rock	1	0	0	0	0	1	2	0	0	0	---
Louisiana:											
New Orleans	1	4	0	0	0	14	4	2	1	0	136
Shreveport	1	3	0	0	0	0	1	2	0	0	23
Oklahoma:											
Oklahoma City	1	2	1	0	0	1	1	7	1	0	28

City reports for week ended September 8, 1928—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—continued											
Texas:											
Dallas	2	5	0	0	0	2	3	0	0	7	37
Fort Worth	1	3	0	1	0	2	2	1	1	0	35
Galveston	0	0	0	0	0	0	0	0	0	0	13
Houston	0	1	0	0	0	4	1	0	1	0	46
San Antonio	1	1	0	0	0	7	0	0	0	0	40
MOUNTAIN											
Montana:											
Billings	0	0	0	0	0	0	0	0	0	0	7
Great Falls	0	0	0	0	0	0	0	0	0	1	9
Helena	0	0	0	0	0	0	0	0	0	1	2
Missoula	0	0	0	0	0	0	0	0	0	0	6
Idaho:											
Boise	0	1	0	0	0	0	0	0	0	0	5
Colorado:											
Denver	4	1	0	0	0	6	2	1	0	12	84
Pueblo	0	0	0	0	0	0	1	0	0	0	4
New Mexico:											
Albuquerque	0	1	0	0	0	4	1	1	0	0	12
Utah:											
Salt Lake City	1	1	0	1	0	3	1	[1] 8	0	5	23
Nevada:											
Reno	0	0	0	0	0	0	0	0	0	0	5
PACIFIC											
Washington:											
Seattle	4	1	0	1	-------	-------	3	2	-------	7	-------
Spokane	3	4	1	1	-------	-------	0	0	-------	1	-------
Tacoma	1	0	1	0	0	0	1	3	0	0	21
Oregon:											
Portland	3	5	4	7	0	2	0	2	0	1	52
California:											
Los Angeles	8	6	2	0	0	15	4	0	0	22	205
Sacramento	0	6	1	0	0	1	1	0	0	0	32
San Francisco	5	6	1	1	0	9	1	0	0	3	129

Division, State, and city	Meningococcus meningitis: Cases	Meningococcus 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	1	0	0	0	3	15	0
Fall River	0	0	0	0	0	0	1	1	0
Springfield	0	0	0	0	0	0	0	1	1
Worcester	0	0	1	1	0	0	0	0	0
Rhode Island:									
Providence	0	0	1	1	0	0	1	0	0
Connecticut:									
Hartford	0	0	0	0	4	0	1	0	0
MIDDLE ATLANTIC									
New York:									
Buffalo	0	0	0	0	0	0	1	5	2
New York	14	8	1	1	0	0	13	43	11
Syracuse	0	0	0	0	0	0	1	1	0
New Jersey:									
Newark	1	1	1	0	0	0	1	0	0
Pennsylvania:									
Philadelphia	6	4	1	0	0	0	1	1	0
Pittsburgh	0	0	1	1	0	0	1	1	0

[1] 5 nonresidents.

City reports for week ended September 8, 1928—Continued

Division, State, and city	Meningococcus meningitis		Lethargic encephalitis		Pellagra		Poliomyelitis (infantile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, estimated expectancy	Cases	Deaths
EAST NORTH CENTRAL									
Ohio:									
Cincinnati	1	1	0	0	0	0	0	0	0
Cleveland	4	3	0	0	0	0	1	9	0
Columbus	1	1	0	0	0	0	1	1	0
Toledo	1	0	0	0	0	0	1	0	0
Indiana:									
Indianapolis	1	0	0	0	0	0	0	0	0
Illinois:									
Chicago	6	0	0	0	2	2	4	2	0
Michigan:									
Detroit	3	0	0	0	0	0	1	2	0
Wisconsin:									
Milwaukee	1	0	0	0	0	0	1	1	0
WEST NORTH CENTRAL									
Minnesota:									
Minneapolis	0	0	0	0	0	0	1	3	0
St. Paul	1	0	0	1	0	0	0	1	0
SOUTH ATLANTIC [1]									
Maryland:									
Baltimore	1	0	1	0	0	0	2	16	0
District of Columbia:									
Washington	0	0	0	0	0	0	0	2	0
West Virginia:									
Charleston	0	0	0	0	0	0	0	1	0
North Carolina:									
Raleigh	0	0	0	0	0	1	0	0	0
South Carolina:									
Charleston [1] [2]	0	0	0	0	0	1	0	0	0
Georgia:									
Savannah [1]	0	0	0	0	3	2	0	0	0
Florida:									
Tampa [1]	1	0	0	0	0	0	0	0	0
EAST SOUTH CENTRAL									
Tennessee:									
Memphis	0	1	0	0	1	2	0	0	0
Alabama: [1]									
Birmingham	0	0	1	0	2	3	0	1	1
WEST SOUTH CENTRAL									
Arkansas:									
Fort Smith	0	0	0	0	0	0	0	1	0
Louisiana:									
New Orleans	0	0	0	0	4	2	0	0	0
Shreveport	0	0	0	0	0	2	0	0	0
Texas:									
Fort Worth	0	0	0	0	0	4	0	0	0
Houston	0	0	1	0	0	0	0	0	0
MOUNTAIN									
Montana:									
Billings	0	0	0	0	0	0	0	0	1
Missoula	1	0	0	0	0	0	0	0	0
Colorado:									
Denver	5	0	0	0	0	0	0	1	0
PACIFIC									
Washington:									
Seattle	0	0	0	0	0	0	1	10	0
Tacoma	0	0	0	0	0	0	1	2	0
Oregon:									
Portland	0	0	0	0	0	0	0	1	1
California:									
Los Angeles	0	0	0	0	1	0	1	2	0
Sacramento	0	0	0	0	0	1	0	0	0
San Francisco	1	0	1	1	0	0	1	1	1

[1] Typhus fever: 6 cases; 1 case at Richmond, Va.; 1 case at Charleston, S. C.; 2 cases at Savannah, Ga.; 1 case at Tampa, Fla.; and 1 case at Mobile, Ala.
[2] Dengue: 3 cases at Charleston, S. C.

The following table gives the rates per 100,000 population for 101 cities for the five-week period ended September 8, 1928, compared with those for a like period ended September 10, 1927. The population figures used in computing the rates are approximate estimates as of July 1, 1928 and 1927, respectively, authoritative figures for many of the cities not being available. The 101 cities reporting cases had estimated aggregated populations of approixmately 31,657,000 in 1928 and 31,050,000 in 1927. The 95 cities reporting deaths had nearly 30,961,000 estimated population in 1928 and nearly 30,370,000 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, August 5 to September 8, 1928—Annual rates per 100,000 population compared with rates for the corresponding period of 1927 [1]

DIPHTHERIA CASE RATES

	Week ended—									
	Aug. 11, 1928	Aug. 13, 1927	Aug. 18, 1928	Aug. 20, 1927	Aug. 25, 1928	Aug. 27, 1927	Sept. 1, 1928	Sept. 3, 1927	Sept. 8, 1928	Sept. 10, 1927
101 cities	60	90	54	80	64	81	[2] 56	[3] 84	[4] 51	94
New England	60	70	48	112	62	86	37	88	[5] 35	93
Middle Atlantic	60	97	55	94	66	78	58	77	49	90
East North Central	73	94	60	85	67	81	[2] 61	87	51	90
West North Central	58	67	57	44	64	53	51	69	[6] 71	63
South Atlantic	49	81	63	61	79	88	67	[3] 89	[7] 47	108
East South Central	10	25	40	51	35	61	40	51	30	106
West South Central	52	91	44	74	64	95	100	161	76	149
Mountain	35	179	27	54	44	134	44	117	53	152
Pacific	69	107	46	60	41	94	20	73	49	91

MEASLES CASE RATES

	Aug. 11, 1928	Aug. 13, 1927	Aug. 18, 1928	Aug. 20, 1927	Aug. 25, 1928	Aug. 27, 1927	Sept. 1, 1928	Sept. 3, 1927	Sept. 8, 1928	Sept. 10, 1927
101 cities	58	28	36	32	28	25	[2] 21	[3] 21	[4] 20	20
New England	248	63	64	84	85	58	90	58	[5] 60	63
Middle Atlantic	51	28	40	34	21	24	16	18	18	16
East North Central	63	19	39	13	31	13	[2] 28	11	24	15
West North Central	18	22	21	22	16	16	4	16	[6] 2	10
South Atlantic	23	14	30	27	33	31	4	[3] 18	[7] 5	14
East South Central	25	15	20	5	10	25	10	10	0	10
West South Central	4	21	28	41	0	17	0	41	4	17
Mountain	44	36	44	18	9	27	18	9	35	36
Pacific	20	60	8	71	31	52	13	42	28	34

SCARLET FEVER CASE RATES

	Aug. 11, 1928	Aug. 13, 1927	Aug. 18, 1928	Aug. 20, 1927	Aug. 25, 1928	Aug. 27, 1927	Sept. 1, 1928	Sept. 3, 1927	Sept. 8, 1928	Sept. 10, 1927
101 cities	36	57	30	50	33	54	[2] 32	[3] 57	[4] 36	52
New England	67	93	39	51	30	81	64	60	[5] 50	53
Middle Atlantic	21	39	20	31	18	37	14	38	18	30
East North Central	42	73	37	78	44	61	[2] 32	81	44	65
West North Central	68	75	60	68	49	61	55	69	[6] 33	91
South Atlantic	26	32	19	41	32	63	30	[3] 60	[7] 42	60
East South Central	35	35	25	20	45	86	95	76	60	96
West South Central	36	58	16	50	52	58	44	58	56	45
Mountain	18	117	27	81	62	63	35	63	27	54
Pacific	38	63	36	42	33	37	31	34	89	81

[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, 1928 and 1927, respectively.
[2] South Bend, Ind., not included.
[3] Greenville, S. C., not included.
[4] Barre, Vt., New Haven, Conn., Fargo, N. Dak., Winston-Salem, N. C., and Greenville, S. C., not included.
[5] Barre, Vt., and New Haven, Conn., not included.
[6] Fargo, N. Dak., not included.
[7] Winston-Salem, N. C., and Greenville, S. C., not included.

Summary of weekly reports from cities, August 5 to September 8, 1928—Annual rates per 100,000 population compared with rates for the corresponding period of 1927—Continued

SMALLPOX CASE RATES

	Week ended—									
	Aug. 11, 1928	Aug. 13, 1927	Aug. 18, 1928	Aug. 20, 1927	Aug. 25, 1928	Aug. 27, 1927	Sept. 1, 1928	Sept. 3, 1927	Sept. 8, 1928	Sept. 10, 1927
101 cities	1	4	0	5	2	5	[2] 0	[3] 4	[4] 1	4
New England	0	0	0	0	0	0	0	0	[5] 0	0
Middle Atlantic	0	0	0	0	0	0	0	0	0	0
East North Central	1	5	1	7	5	6	[2] 1	7	1	3
West North Central	2	4	0	10	0	4	0	2	[6] 4	12
South Atlantic	2	5	0	4	0	0	0	[3] 0	[7] 0	2
East South Central	0	0	0	25	0	25	0	0	0	10
West South Central	0	0	0	4	0	0	0	0	0	4
Mountain	0	9	0	18	9	27	0	36	9	9
Pacific	8	24	3	13	0	31	5	18	8	13

TYPHOID FEVER CASE RATES

	Aug. 11, 1928	Aug. 13, 1927	Aug. 18, 1928	Aug. 20, 1927	Aug. 25, 1928	Aug. 27, 1927	Sept. 1, 1928	Sept. 3, 1927	Sept. 8, 1928	Sept. 10, 1927
101 cities	27	25	27	37	31	31	[2] 29	[3] 32	[4] 24	30
New England	16	30	16	30	16	33	23	21	[5] 18	40
Middle Atlantic	15	15	17	20	23	21	18	28	25	27
East North Central	14	14	18	19	18	11	[2] 15	15	13	7
West North Central	25	22	41	38	25	20	39	10	[6] 20	32
South Atlantic	53	45	33	81	51	58	44	[3] 71	[7] 35	58
East South Central	175	96	95	218	165	203	135	183	80	112
West South Central	72	87	96	79	52	74	72	54	28	74
Mountain	9	36	35	27	62	45	44	54	80	63
Pacific	15	10	26	31	26	21	26	8	13	8

INFLUENZA DEATH RATES

	Aug. 11, 1928	Aug. 13, 1927	Aug. 18, 1928	Aug. 20, 1927	Aug. 25, 1928	Aug. 27, 1927	Sept. 1, 1928	Sept. 3, 1927	Sept. 8, 1928	Sept. 10, 1927
95 cities	5	3	3	4	4	5	[2] 3	[3] 4	[4] 3	4
New England	0	2	2	2	2	2	0	2	[5] 0	5
Middle Atlantic	5	2	0	2	3	2	3	3	2	3
East North Central	1	2	4	2	3	3	[2] 3	5	2	4
West North Central	4	6	0	0	0	2	2	4	[6] 2	0
South Atlantic	7	4	0	5	9	11	4	[3] 7	[7] 9	5
East South Central	10	5	0	11	0	16	5	5	16	11
West South Central	29	13	29	30	16	21	4	13	8	13
Mountain	9	0	0	0	0	9	18	18	0	9
Pacific	0	3	10	6	3	7	3	0	7	7

PNEUMONIA DEATH RATES

	Aug. 11, 1928	Aug. 13, 1927	Aug. 18, 1928	Aug. 20, 1927	Aug. 25, 1928	Aug. 27, 1927	Sept. 1, 1928	Sept. 3, 1927	Sept. 8, 1928	Sept. 10, 1927
95 cities	61	55	55	45	56	46	[2] 55	[3] 56	[4] 57	62
New England	48	77	37	49	44	51	32	49	[5] 45	65
Middle Atlantic	72	57	66	47	68	55	60	72	56	66
East North Central	33	41	43	35	41	34	[2] 50	51	60	59
West North Central	53	43	31	25	35	31	31	23	[6] 21	43
South Atlantic	58	70	54	52	60	36	72	[3] 42	[7] 71	49
East South Central	110	69	115	69	84	69	105	48	78	117
West South Central	107	55	57	68	86	64	66	81	87	64
Mountain	71	63	62	36	44	36	53	54	44	90
Pacific	57	55	61	72	51	62	41	55	78	52

[2] South Bend, Ind., not included.
[3] Greenville, S. C., not included.
[4] Barre, Vt., New Haven, Conn., Fargo, N. Dak., Winston-Salem, N. C., and Greenville, S. C., not included.
[5] Barre, Vt., and New Haven, Conn., not included.
[6] Fargo, N. Dak., not included.
[7] Winston-Salem, N. C., and Greenville, S. C., not included.

Number of cities included in summary of weekly reports, and aggregate population of cities of each group, approximated as of July 1, 1928 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	
			1928	1927	1928	1927
Total	101	95	31,657,000	31,050,800	30,960,700	30,369,500
New England	12	12	2,274,400	2,242,700	2,274,400	2,242,700
Middle Atlantic	10	10	10,732,400	10,594,700	10,732,400	10,594,700
East North Central	16	16	7,991,400	7,820,700	7,991,400	7,820,700
West North Central	12	10	2,683,500	2,634,500	2,566,400	2,518,500
South Atlantic	21	21	2,981,900	2,890,700	2,981,900	2,890,700
East South Central	7	6	1,048,300	1,028,300	1,000,100	980,700
West South Central	8	7	1,307,600	1,260,700	1,274,100	1,227,800
Mountain	9	9	591,100	581,600	591,100	581,600
Pacific	6	4	2,046,400	1,996,400	1,548,900	1,512,100

FOREIGN AND INSULAR

THE FAR EAST

Report for the week ended September 1, 1928.--The following report for the week ended September 1, 1928, was 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.

Plague, cholera, or smallpox was reported at the following ports:

PLAGUE

Ceylon.—Colombo.
India.—Bassein, Rangoon.
Indo-China.—Pnompenh.

CHOLERA

India.—Bombay, Calcutta, Madras, Vizagapatam.
French India.—Pondicherry.
Siam.—Bangkok.
Indo-China.—Pnompenh.
China.—Shanghai.

SMALLPOX

India.—Bombay, Calcutta, Madras, Negapatam, Moulmein.
French India.—Pondicherry.
Indo-China.—Pnompenh.
China.—Hong Kong, Shanghai.
Dutch East Indies.—Pontianak.

CANADA

Provinces—Communicable diseases—Two weeks ended September 8, 1928.—The Canadian Ministry of Health reports cases of certain communicable diseases from seven Provinces of Canada for the two weeks ended September 8, 1928, as follows:

WEEK ENDED SEPTEMBER 1, 1928

Disease	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	Total
Influenza	10							10
Lethargic encephalitis	3							3
Poliomyelitis			2	1	52		8	63
Smallpox			9	1			6	16
Typhoid fever	1	2	34	5	1		2	45

WEEK ENDED SEPTEMBER 8, 1928

Disease	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	Total
Cerebrospinal fever				1			3	4
Influenza	4							4
Lethargic encephalitis	1							1
Poliomyelitis			4	5	76	3	4	92
Smallpox			7	2		3		12
Typhoid fever		7	16	25	2	6	1	57

MacKenzie River—Influenza.—An Edmonton, Alberta, dispatch appearing in the August 25 issue of the Nechako Chronicle, published at Vanderhoof, British Columbia, reports an influenza epidemic which is said to have existed for sometime along the MacKenzie River in the northern part of Canada. Approximately 300 deaths have been reported among the natives. The following table shows the numbers of deaths reported at different places along the MacKenzie River:

Place	Deaths	Place	Deaths
Fort Goodhope	26	Fort Rae	33
Fort McPherson	21	Fort Resolute	50
Fort Norman	28	Fort Simpson	53

GREECE

Dengue.—An incomplete census showed that there had been 239,000 cases of dengue in Athens, Greece, to September 4, 1928.

In Athens 1,268 deaths were registered in August, of which 413 were certified as due to dengue. At Piræus during August 592 deaths were registered, and 176 of these were caused by dengue.

Of 20 officers and employees of the American consulate general at Athens, only one escaped the fever.

Information regarding the spread of the epidemic in the country, in provincial towns, and on the islands is fragmentary, partly because only a small proportion of the cases is seen by physicians.

Dengue has not been reported in epidemic form from other Mediterranean countries except Rhodes.

Eight cases of dengue were reported September 21, at Fetieh, Smyrna, Turkey.

JAMAICA

Smallpox (alastrim)—July 1–August 25, 1928.—During the eight weeks ended August 25, 1928, smallpox, reported as alastrim, was notified in the Island of Jamaica as follows: For the island outside of Kingston city and parish, 1 case for week ended July 7 and 1 case for week ended August 25, 1928.

Cases of communicable diseases reported in Jamaica, eight weeks ended August 25, 1928

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis		1	Ophthalmia neonatorum		1
Chicken pox	9	57	Poliomyelitis		1
Dysentery	8	10	Puerperal fever		1
Erysipelas		1	Tuberculosis	75	89
Leprosy		1	Typhoid fever	29	141

VIRGIN ISLANDS

Communicable diseases—August, 1928.—During the month of August, 1928, cases of communicable diseases were reported in the Virgin Islands, as follows:

St. Thomas and St. John:	Cases	St. Croix:	Cases
Chancroid	1	Gonorrhea	2
Dengue	1	Malaria, tertian	1
Gonorrhea	2	Syphilis (secondary)	4
Mumps	1	Tuberculosis	1
Syphilis	4	Uncinariasis	17
Tuberculosis	1		

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

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

CHOLERA

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

Place		Jan. 15–Feb. 11, 1928	Feb. 12–Mar. 10, 1928	Mar. 11–Apr. 7, 1928	Apr. 8–May 5, 1928	May 6–June 2, 1928	June 3–30, 1928	Week ended— July, 1928: 7	July, 1928: 14	July, 1928: 21	July, 1928: 28	August, 1928: 4	August, 1928: 11	August, 1928: 18	August, 1928: 25	Sept. 1, 1928
Ceylon: Colombo	C							1								
	D							1								
China:																
Canton	C			2		1	2	2	2	1	3		2	2		
	D			2		1	2	2	2	1	3		1	1		
Shanghai	C											2	1	P		1
Swatow	C						3	7								
Dutch East Indies:																
Java—Batavia	C													1		
India	C	12,391	13,236	21,279	32,564	30,177	31,346	9,840	11,184							
	D	6,750	7,282	11,877	20,432	20,162	20,114	5,468	6,005							
Bassein	D	1	2	51	41	40	8									
Bombay	C	1	1	3		1		4		2		2				
	D		1	3				3		2	6		1	2	2	2
Calcutta	C	203	341	664	446	552	462	65	62	48	31	14				
	D	112	241	442	428	410	328	45	42	26	20	8	11	18	14	2
Madras	C	2	14	10	22	27	29	13	4	10	45	111	216	118		
	D	4	18	4	18	16	21	5	3	6	17	56	99	66	50	34
Madras Presidency	C	4,681	2,961	1,483		1,314	878									
	D	2,600	1,618	812		675	460									
Negapatam	C	4	4													
	D	6	4		2		13						1		2	
Rangoon	C	6	29	22	23	7	14			1		8	1			
	D	2	18	16	15	5	9			1		5	2	1		
Tuticorin	C			10	110								1			
	D			9	71											
Vizagapatam	D								4	1	2	6	12	13		5
India (French):																
Chandernagor	C	6	5	7							2	1	3	3		
	D	1	5	6							1	1	1	1		
Karikal	C	32	6		1							1	6	11		
	D	19	5		1							1	4	10		

Pondicherry	C	12	33	1	8				1		2	8	17	44		
	D	10	19	1	6				1		2	6	11	25	2	2
Indo-China (see also table below):																
Pnompenh	C							1	2	1	1			1	1	1
	D							1	2	1	1			1	1	1
Saigon	C	4	16	96	116	15	6			2						
	D	1	8	59	76	9	1			1						
Tourane	C						1									
	D						1									
Kwangchow-Wan (see table below).																
Persian Gulf:																
Island of Henjam	C									1						
Jask	C										1					
Philippine Islands:																
Bulacan Province—																
Malolos	C										1					
Paombong	C													1		
Cagayan Province	C												1			
	D												2			
Ballesteros	C									1						
	D									1						
Pamplona	C						1									
	D						1									
Sanchez-Mira	C						4									
	D						2									
Cebu (port)	C										1					
Ilocos Norte Province	C							1								
	D							1								
Manila	C								4			1				
Pangasinan Province—																
Bayambang	C								1							
	D								1							
Surigao Province—																
Surigao	C										1		1	2		
	D										1		1	1		
Siam	C	200	295	291	349	202	203	58	35	10	60	9				
	D	139	214	218	234	127	144	39	29	7	48	4				
Ayudhaya	C						2					1	15	2	11	
	D						1						16	2	8	
Bangkok	C	161	60	60	74	50	7	3	5	1		1	1	1	1	1
	D	66	35	38	35	26	4		2	1						
Trad	C						1									
Straits Settlements: Singapore	C	8		2	1											
	D	1		2	1											
On vessel:																
S. S. Hawaii Maru at Singapore from Saigon, French Indo-China	C			11												
	D			7												
S. S. Kambangan at Batavia from Jeddah via Sabang and Palembang	C													1		
S. S. Tairea at Penang from Madras via Nagapatam	C														P	

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

CHOLERA—Continued

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

Place		January-March, 1928	April, 1928	May, 1928			June, 1928			July, 1928			August, 1928	
				1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20
Indo-China (French) (see also table above):														
Annam	C	389	46	4	26	13	22	8	9	8	5	8		4
Cambodia	C	312	196	34	47	20	28	82	111	92	25	38		19
Cochin-China	C	1,407	933	140	139	125	143	109	77	65	55	33		13
Laos	C													
Tonkin	C	1	6	9	1	16	8	2	1	5	1	1		2
Kwangchow-Wan	C				16						1			

PLAGUE

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

Place		Jan. 15-Feb. 11, 1928	Feb. 12-Mar. 10, 1928	Mar. 11-Apr. 7, 1928	Apr. 8-May 5, 1928	May 6-June 2, 1928	June 3-30, 1928	Week ended—July, 1928				August, 1928				September, 1928	
								7	14	21	28	4	11	18	25	1	8
Algeria (see also table below):																	
Algiers	C				1												
Oran	C					1	2										
Arabia: Aden	C	178	343	651	224	7	1										
	D	104	206	529	191	9	1										
Plague-infected rats		P	P														
Argentina:																	
Avellaneda	C					1											
	D					1											
Buenos Aires	C	2				6	1										
	D					3	2										
Cordoba Province	C				5												
Entre Rios	C						5										
Loreto	C					3											

Rosario	C	4	1			1		1									
Santa Fe	C						9	1									
Santiago del Estero	C		1				10	1									
Suardi	C					2											
Azores: St. Michaels Island	C	8	3	3	5	1	1										
	D	4	1	2	2	1	1										
Bolivia: Valle Grande	C											P					
Brazil:																	
Bahia	C	5	24	28	6	3											
	D	4	19	21	6	3											
Porto Alegre	C		1														
Rio de Janeiro	C	4	3	3													
	D	1	2	3													
Plague-infected rats		1															
British East Africa (see also table below):																	
Tanganyiki	C	2	3							4	2						
	D	2	3		10			24		3	2						
Uganda	C	23	13			84	105										
	D	18	10			70	85										
Canary Islands:																	
Arrecife	C					1											
	D					1											
Lanzarote Village	C					1											
Las Palmas	C	1	1	4													
	D	1	1														
Palma Island	C														7		
	D														3		
Teneriffe	C		10														5
	D		4														3
Ceylon: Colombo	C	3	11	7	1	4	2									1	
	D	2	6	5	1	2	2									1	
Plague-infected rats		5	6														
China:																	
Amoy	C					5			P								
Hong Kong	C				2		1				1						
	D						1										
Mongolia—Urga [1]	C																
Dutch East Indies:																	
Celebes—Makassar	C	5	1														
	D	5	1														
Java	D	737	454														
Batavia and West Java	C	137	103	80	47	65	61	6	7	10	9	10					
	D	135	103	80	47	65	61	6	7	10	9	10					
Plague-infected rats				3	7	9	4			1	1			2			
East Java and Madura	C	7		4	4			1									
	D	7		4	4			1									
Kedoe Residency	C				4			P									
Surabaya Residency	C		1	1	1												
	D			1	1												
Ecuador (see also table below):																	
Alausi	C					1											

[1] Plague was reported as present in Urga, Mongolia, Sept. 15, 1928.

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

PLAGUE—Continued

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

Place		Jan. 15–Feb. 11, 1928	Feb. 12–Mar. 10, 1928	Mar. 11–Apr. 7, 1928	Apr. 8–May 5, 1928	May 6–June 2, 1928	June 3–30, 1928	Week ended— July, 1928: 7	14	21	28	August, 1928: 4	11	18	25	September, 1928: 1	8
Egypt:																	
Alexandria	C	2	1			1		2				1	1			1	
	D	2	1			2											1
Amrieh District	C													13	13	4	1
	D															2	2
Assiout Province	C								1	1						1	
	D									1						1	
Beheira	C											1	1				3
Beni-Suef	C				12	79	25	11	3	5	6	1	1	1	3	5	6
	D				3	27	9		1	1	3				2	1	4
Girga	C															1	3
	D															1	3
Maghagha District	C				1												
	D				1												
Menufia	C					11											
	D					2											
Minieh Province	C				48	76	76	1	11		1						
	D				9	17	24	1	2								
Port Said	C										1	1					
	D															1	
Sidi Barani	C							10	1		1	10					
	D								7		1	1	1				
Suez	C	4	13	14	5	3											
	D	2	9		13	1											
Plague-infected rats				2													
Tanta	C					1		1			1	1	1				
	D					1											
Greece:																	
Corfu	C						15					1					
	D						3										
Patras	C										1		1				
	D								1								

Hawaii Territory: Hawaii—																	
Hamakua District—																	
Hamakua	D		1														
Plague-infected rats						1							1				
Honokaa—Plague-infected rats						1											
Kukuihaele	D												1				
Plague-infected rats										1							
Kukaiau—Plague-infected rats													3				
Paauilo	D										1		1				
India	C	12,652	23,174	26,079	18,518	3,272	367	79	110								
	D	8,521	16,998	20,907	17,074	3,183	345	50	72								
Bassein	D	8	12	22	13	8	14		1	2						1	
Bombay	C	14	33	69	43	39	14				1	2					
	D	9	33	61	69	38	8				1	2	2	1	1		
Calcutta	D	1		2										2			
Madras Presidency	C	452	271	62	21	12	54	14	21	38	50						
	D	256	212	48	12	6	25	9	12	20	10						
Rangoon	C	35	48	30	16	14	31	9	12	11	11	7					
	D	30	43	26	14	15	28	10	11	10	8	7	8	6		3	
Vizagapatam	D						1										
Indo-China (see also table below):																	
Pnompenh	C							3		1				1		1	
	D							3		1				1		1	
Saigon	C						5								1		
	D						1								1		
Plague-infected rats							2										
Iraq:																	
Baghdad	C	4	2	5	11	13	9				1						
	D	2	2	5	6	3	4										
Plague-infected rats					4	3											
Dulaim Liwa	C	1			1												
Kwangchow-Wan (see table below).																	
Madagascar (see also table below):																	
Tamatave	C					1	20	3					4	1	1		
	D						8	3		4							
Nigeria (see also table below):																	
Lagos	C	10	8	7	17	28	43	15	14	14	10	14	12	15	10		
	D	11	8	6	18	28	42	15	14	14	9	15	11	16	10		
Plague-infected rats					8	55	57	23									
Paraguay: Asuncion	C						5										
	D						2	2									
Peru (see table below).																	
Portugal: Lisbon	C						1										
Senegal (see also table below):																	
Thies and vicinity	C			8		72	52										
	D			4		40	40										
Siam	C	20	42	33	27	15	6	3	6	1							
	D	12	36	30	13	11	7	2	5	1							
Ayudhaya	C						2	2									
	D						1	2									
Bangkok	C	2	1	1	4												
	D	2	1	1	2												
Nagara	C					1	2										

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

PLAGUE—Continued

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

Place		Jan. 15–Feb. 11, 1928	Feb. 12–Mar. 10, 1928	Mar. 11–Apr. 7, 1928	Apr. 8–May 5, 1928	May 6–June 2, 1928	June 3–30, 1928	Week ended— July, 1928				August, 1928				September, 1928	
								7	14	21	28	4	11	18	25	1	8
Straits Settlements: Singapore	C	1	3	1													
	D	1	2	1													
Syria (see also table below):																	
Beirut	C						1	2	1	1	1						
Tunisia: Bengardane region	C			8													
	D			6													
Turkey: Adalia	C										1						
Union of South Africa:																	
Cape Province	C	1															
	D	1															
Orange Free State	C	5	5	5				P									
	D	4	1	5													
Union of Socialist Soviet Republics:																	
Astrakhan—																	
Axary District	C						3										
	D						2										
Krasnoiarsk District	D															1	
Chita District	C																1
Venezuela: State of Miranda—Tacata and Cua	C		P														
On vessel: S. S. Tymeric, at Barbados, from New Orleans	C					1											

Place		October-December, 1927	January-March, 1928	April, 1928	May, 1928	June, 1928	July, 1928	August, 1928
Algeria (see also table above).								
Algiers	C				1			
Angola	C	3						
British East Africa (see also table above):								
Kenya	C	62	65	17	11	58	97	37
	D			5				34
Ecuador: Guayaquil	C	18	20		1	5		
	D	5	8			2		
Plague-infected rats		31	75		1	4	7	
Indo-China (see also table above)	C	10	12	9	16	11	7	2
Kwangchow-Wan	C		18	17	10			
Madagascar (see also table above)	C	692	940	95		104		45
	D	605	864	90		94		40
Ambositra Province	C	25	202	25	13			
	D	17	191	25	10			
Antisirabe Province	C	109	281	35	14	19		
	D	108	279	34	14	19		
Itasy Province	C	104	55	1				
	D	94	49	1				
Moramanga Province	C	95	56					
	D	83	55					
Madagascar—Continued.								
Tamatave	C				1	7	22	
	D					7	14	
Tananarive Province	C	408	348	34	20	17		
	D	354	292	30	30	17	4	
Nigeria (see also table above)	C	63	41	18	30			
	D	61	41	17	30			
Peru	C	34	93		20	5		
	D	11	23		4	2		
Callao	D	3						
Lima	C	7	6		4			
	D	3			2			
Senegal (see also table above)	C		30	81	216	151	230	
	D		17	40	115	91	164	
Rufisque	C				17	29	18	8
	D				9	22	7	
Thies	C			30	72	248	103	123
	D			23	40	174	64	97
Tivaouane	C			51	105	169	84	9
	D			28	57	90	70	
Syria: Beirut (see also table above)	C	2				1	4	

PLAGUE RATS ON VESSELS

S. S. *Gydevore* at Landskrona, Sweden, from Rosario via Canary Islands, January 22, 1928.
S. S. *Dryden* at Liverpool from La Plata River ports, January 20, 1928.
S. S. *Sicily* at Liverpool from Buenos Aires and Rosario, June 8, 1928, 7 plague-infected rats.

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

SMALLPOX

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

Place		Jan. 15–Feb. 11, 1928	Feb. 12–Mar. 10, 1928	Mar. 11–Apr. 7, 1928	Apr. 8–May 5, 1928	May 6–June 2, 1928	June 3–30, 1928	Week ended— July, 1928: 7	14	21	28	August, 1928: 4	11	18	25	September, 1928: 1	8	15
Algeria (see also table below)	C	71	72	3	12													
Algiers	C	15	10	5	4	5	18	1		2				2				
Oran	C	11	5	12	17	5	4			5	3	5						
Angola (see table below).																		
Arabia: Aden	C		1				11					1						
	D											1						
Brazil (see also table below):																		
Pernambuco	D					1												
Rio de Janeiro	C			1				1										
	D			1														
British East Africa (see also table below):																		
Kenya—Mombasa	C			2	1													
Tanganyiki	D	5																
British South Africa:																		
Northern Rhodesia	C	233	297	67	628	195	15	4	44			53						
	D	23	42	9	51	17	1		3	2		2						
Southern Rhodesia	C	3	7	7	24	13	36		1	2	19							
	D		1		10		4				4							
Canada:																		
Alberta	C	27	27	47	12	44	9			1	2			4	21			
Calgary	C			1														
Edmonton	C	2	9	7	3				1	1	2							
British Columbia—Vancouver	C	26	10	17	24	11	4	3	2	2	4							
Manitoba	C	1			7	4	10				4							
Winnipeg	C	2																
New Brunswick	C		1			1	7					1	2	2				
Ontario	C	248	147	83	50	41	33			6	5	2		1	2			
Kingston	C	1			3					2					1			
Ottawa	C	68	22	26	4	6	1								1	1	5	
Toronto	C	20	14	9	11	12	3				1							
Quebec	C	26	54	112	83	78	81	21	16	12	13	5	9	5	8	9		
Montreal	C	8	9	9	9	3	11	3	1	1				2		6	2	
Quebec	C	16	13	10	23	47	52	21	9	7	7	4	3	4	1	3	2	5
Sherbrooke	C			3			4											

Saskatchewan	C	97	22	33	52	28	16					4	1		1			
Moose Jaw	C	11	13	7	3	1		1										
Regina	C			3	8	1	1											
Saskatoon	C	15	2															
Ceylon: Colombo	C	4	6	1														
	D	1		1														
China:																		
Amoy	C		1	6	9	3												
Antung	C				3													
Canton	C		2	7	2	2												
Chefoo	C			P		P	P	P										
	D		1															
Foochow	C	P	P	P	P		P		P				P					
Hong Kong	C	2	7	32	25	30	14	3	3	1	4	6	3	6	4	2		
	D	2	4	10	26	23	19	2	2		1	5	1	5	5	1		
Manchuria—																		
Changchun	C	4			4	6					1							
Fushun	C						6		1			1	1					
	D								1									
Harbin	C	5	7	7	10	27	31	7	2	2								
Kwantung	C						14					1						
	D											1						
Dairen	C	15	13	15	16	35	48	4	11	3	3			1				
	D	8	7	8			20	4	4	3	1			1				
Port Arthur	C								1			1						
	D											1						
Mukden	C	4	21	1	4	3	6											
	D						1											
Pensihu	C						1											
	D						1											
South Manchuria Railway Zone	C						5											
Shanghai—																		
Foreigners only	C	5	6	7	3	11	7	1	1			1	1			1		
Including natives	D	11	19	9	9	19	11	6	4			1		1				
Tientsin	C	48	20	13	17	9	14		1									
Chosen (see table below).																		
Curacao (alastrim)	C	2	3															
Dominican Republic: Santo Domingo	C			2	1													
Dutch East Indies:																		
Balikpapan	C							7										
	D							2										
Belawan Deli	C						11		2		2	5	1	2	1			
	D						3		1			2	1					
Borneo—Pontianak	C		1									3		1	1	1		
	D												1		1			
Java—																		
Batavia and West Java	C	4	2	5	1	2					2	2						
East Java and Madura	C	2	9		2		2				3							
	D		1		2						3							
Surabaya	C											1	3	2				
	D											1						

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

SMALLPOX—Continued

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

Place		Jan. 15–Feb. 11, 1928	Feb. 12–Mar. 10, 1928	Mar. 11–Apr. 7, 1928	Apr. 8–May 5, 1928	May 6–June 2, 1928	June 3–30, 1928	Week ended— July, 1928 7	July 14	July 21	July 28	August, 1928 4	Aug. 11	Aug. 18	Aug. 25	September, 1928 1	Sept. 8	Sept. 15
Dutch East Indies—Continued.																		
Sumatra—																		
Medan	C	23	14	7	2	10	4		2	1	2	5	1					
	D	11	2	5	3	5			1	1		2	1					
Palembang	C								1									
Ecuador (see table below).																		
Egypt	C	1	2	52	12	1												
	D			33	7	1												
Behera Province	C								1									
Cairo	C	1																
France (see table below).																		
Gold Coast (see table below).																		
Great Britain:																		
England and Wales	C	1,530	1,473	1,341	1,344	1,199	1,146	182	177	173	149	126	111	114	141	102		
Birmingham	C	44	3	1	1		2		1									
Bradford	C	24	12	19	14	17	10	2										
Bristol	C	3	4	12	17	10	2								2			
Cardiff	C			5	3	2												
Castleford	C		4	36	69	24	18	2	5	4	3	6	2	1	1	1		
Hull	C						1	1	20	3		6	2	3	4	6		
Leeds	C	3	9	14	1		8		1			1				4		
Liverpool	C		1															
London	C	4	14	17	42	25	96	4	3	9	3	3		5	1			
Manchester	C	25	8	14	8	5	1											
Newcastle-on-Tyne	C	27	12	9	4	12	6		28				1		1			
Nottingham	C	27	11	13	17	20	3	2	1		3		3	5	2	1		
Plymouth	C													6		1		
Sheffield	C	8	6	1	14	4	2	1			1			1				
Stoke-on-Trent	C	1	15	12	32	24	14		3		2	4	4					
Weymouth	C								1									
Scotland—Arbroath	C												1	3				
Greece (see table below).																		
Hedjaz	C	35	115			6	14	8		5	5							
	D	23	46			2	1	1		2	3							

India	C	17,777	18,850	28,034	30,436	21,489	13,497	3,106	2,536									
	D	3,709	3,826	5,540	6,673	5,046	3,700	859	730									
Bassein	C	1			1													
Bombay	C	61	149	218	200	136	71	17	27	11	12	19	13	3	3	4		
	D	24	73	120	118	78	46	6	16	6	5	9	8	2	2	3		
Calcutta	C	58	71	134	171	130	61	19	15	11	7	10	3	3	6	4		
	D	34	50	104	130	101	50	13	10	8	4	9	1	3	4	3		
Karachi	C		1	1	2	3			2		1							
	D		1		1	1			1		1							
Madras	C	74	100	183	169	59	35	10	11	8	10	9	11	13	10	19		
	D	8	19	29	38	18	10	3	4	6	5	2	2	5	1	5		
Moulmein	C						1		2	2	5		3	3	3	9		
	D						1		1	1	4			2	2	1		
Negapatam	C	8	3		7	8	19		2	8	16	4	13	8	10	7		
	D	3			3	1	7		1	1	2		1	4	4	3		
Rangoon	C	275	377	320	167	36	30	2	1	4		1	1					
	D	64	104	102	79	13	6	1	1	1	1	1						
Tuticorin	C					3												
Vizagapatam	C	10	2	3	2	8	8		2	1				1				
	D	8				1	3		1	2				1				
India (French):																		
Chandernagor	C			5	5						1		2					
	D			1	1						1		1					
Pondicherry	C	47	9	18	36	32	18		3	5	4	4	13	13				
	D	47	9	18	36	23	13		3	5	4	4	11	2	6	3		
Indo-China (see also table below):																		
Pnompenh	C													2		4		
	D													2		3		
Saigon	C		3															
Iraq:																		
Baghdad	C	19	7	5	5	16	16	7	10	2	5		4	2	1	5	7	
	D	11	4	4	3	6	10	3	6	2	4		1	1		2	5	
Basra	C	1	7	5	4	3	2	6							2		1	
	D			2	2	3	2	2							1		1	
Italy:																		
Leghorn	C		1	1														
Palermo	C			5	10	6	10			4		6						
Rome and vicinity	C	3																
Ivory Coast (see table below).																		
Jamaica (outside Kingston (alastrim))	C	5	10	13	4	2	3	1							1	1		
Japan:																		
Kobe	C					11												
Nagoya	C				6	2					1							
Osaka	C						4											
Tokyo City	C	4	4	15	8	2												
	D	1	2	1	1													
Tokyo prefecture (outside city)	C			24	1	1												
	D			1	2													
Yokohama	C				2	3												
	D					1												

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

SMALLPOX—Continued

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

Place		Jan. 15–Feb. 11, 1928	Feb. 12–Mar. 10, 1928	Mar. 11–Apr. 7, 1928	Apr. 8–May 5, 1928	May 6–June 2, 1928	June 3–30, 1928	Week ended— July, 1928: 7	14	21	28	August, 1928: 4	11	18	25	September, 1928: 1	8	15
Latvia (see table below).																		
Mauretania	C		P															
Mexico (see also table below):																		
Acapulco	C					2												
	D					2												
Jalisco (State)	C		P	P	P		21											
Guadalajara	D		1	2	12	13	10	1	1	3	4	1	4		2	1		
Manzanillo	D			1														
Mazatlan	D					3	2							3				
Mexico City and surrounding territory	C	2	1		1	2		1	2					1				
	D						1							1				
Reynosa	C									1								
Saltillo	D					2	2											
Tampico	C		1															
Morocco (see table below).																		
Nigeria (see also table below):																		
Lagos	C			1			1											
Southern Provinces	C		7	93			51											
	D			35			12											
Palestine: Jerusalem	C	1																
	D	1																
Persia (see table below).																		
Poland	C	3	1	1	9	1	3			2								
	D				1													
Portugal (see also table below):																		
Lisbon	C	12	20	5	6	7	7	3	1	1	3							
	D		1								1		1					
Oporto	C				1													
Senegal (see also table below): Dakar	C		34	29	16	29	8											
	D			20	8	7												
Siam	C	35	12	28	10	8	3	1				3						
	D	4	3	4	3	1	1					2						
Bangkok	C				1													
	D					1												
Spain (see also table below): Valencia	C		1	2														
Straits Settlements: Singapore	C	1	1	1	3		1											

Sudan (Anglo-Egyptian)	C	85	109	332	160	168	206	32	63		49	31	78	78	65	56	35	
	D	48	27	100	32	20	37	5	18		12	9	6	6	13	7	6	
Sudan (French) (see table below).																		
Syria (see table below).																		
Taiwan: Keelung	C						1											
Tunisia: Tunis	C	3	14	4	6	3	2	5		1		4		1				
Union of South Africa:																		
Cape Province	C	P																
Natal	C	P	P	P			1											
Orange Free State	C	P		P		P	P	P										
Transvaal	C				P	P	P											
Union of Socialist Soviet Republics (see table below).																		
Upper Volta	C		5	2	9								33					
	D												8					
Venezuela: Maracaibo	C	1																
	D	1	1										1					
On vessel:																		
S. S. Arendskerk at Singapore, from Amoy, China	C			P														
S. S. Kashgar at Kobe, from Shanghai	C				P													
S. S. Ronna at Penang, from Negapatam	C					P												
S. S. Theseus, from Jeddah to Penang	C								1									
S. S. Tjileboct at Hong Kong, from Shanghai	C				P													
S. S. Yarmouth at Kingston, Jamaica, from Habana, Cuba	C			1														
S. S. Victoria at Nome, Alaska	C						8											

Place		October-December, 1927	January-March, 1928	April, 1928	May, 1928			June, 1928			July, 1928			August, 1928	
					1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20
Algeria (see also table above)	C	682													
Oran	C	11													
Indo-China (French) (see also table above)	C	97	428	35	36	6	37	47		36	8	3	15	44	21
Ivory Coast	C					7						4	5		
	D												2		
Senegal (see also table above)	C			51			20	23	14	2					
	D			7			9								
Dakar	C			11	12	7	5	4	1	3					
	D			8	4	3									
Sudan (French)	C		15	4	30	P	P	20				17			
	D				6										
Syria:															
Aleppo	C	1	1						1	2					4
Beirut	C	2	75	9	2	8	2	1	7	2	4	1			
	D		2												
Damascus	C	47	14												

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

SMALLPOX—Continued

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

Place		October-December, 1927	January-March, 1928	April, 1928	May, 1928	June, 1928	July, 1928
Angola	C	151	47	7	1		
	D	2					
Congo	C	77	36				
Cuanza-Norte	C		1				
Cuanza-Sul	C	9	10				
Zaire	C	5					
Brazil (see also table above): Porto Alegre	C	5	1				
British East Africa (see also table above): Zanzibar	C	2					
	D	1					
Chosen	C	4	48	20	152	49	
	D	1	16	6	38	21	
Seoul	C		1				
Ecuador: Guayaquil	C	6	35	19	31	11	35
	D		1				
France	C	25	34	6	15	10	10
Gold Coast	C	4	4				

Place		October-December, 1927	January-March, 1928	April, 1928	May, 1928	June, 1928	July, 1928
Greece	C	9	36	1	22	31	9
	D		4		1	2	1
Latvia	C	2	1				
Mexico (see also table above)	D	346	256				
Morocco	C	622	132	19	25	10	55
Nigeria (see also table above)	C	316	592	173	194		
	D	81	84	46	53		
Persia	D	2	7				
Portugal (see also table above)	C		258		98	74	
	D		30		9	3	
Spain (see also table above): Madrid	D	1					
Union of Socialist Soviet Republics:							
Railways, etc.	C	33	59				
Other territories in Europe	C	1,255	1,717				
Transcaucasus, Siberia, and Central Asia	C	81	25				
Ukraine	C	48	27				

TYPHUS FEVER

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

Place		Jan. 15–Feb. 11, 1928	Feb. 12–Mar. 10, 1928	Mar. 11–Apr. 7, 1928	Apr. 8–May 5, 1928	May 6–June 2, 1928	June 3–30	Week ended— July, 1928: 7	July, 1928: 14	July, 1928: 21	July, 1928: 28	August, 1928: 4	August, 1928: 11	August, 1928: 18	August, 1928: 25	September, 1928: 1	September, 1928: 8
Algeria (see also table below):																	
Algiers	C	1	3	9	4	13	32	1		2		1	4	3			
	D		1		2		6										
Oran	C	2	10	4	11	4	7	2	6	6	2	1	1	1			
	D				1		1										
Austria: Vienna	C	1															
Bulgaria	C	13	18		26		16			P	P	P		3	5		
	D	1	4				2							2			
Sofia	C	1		20	1	20	14	1									
	D						6										
Chile:																	
Iquique	C										1						
	D									1							
Talcahuano	D			1													
Valparaiso	C		1				1			2							
	D						3										
China (see also table below):																	
Manchuria—																	
Harbin	C				2	16	23										
Kwantung	C				17	293	539		213	138		60					
South Manchuria Railway Zone	C						10		5	1							
Tientsin	C					2	2										
Chosen (see table below).																	
Czechoslovakia (see table below).																	
Egypt	C	9	17	2	3	11	7										
	D	2	8	1	1	2	3										
Alexandria	C								1			1					
Assiuot Province	C						2	1	1								
Assouan Province	C						2										
Behera Province	C			20	32	43	7	2									
	D				7	7	2										
Cairo	C			2	4				1								
	D			1	4				1								
Dakalieh	C						1	1									
Gharbieh Province	C			23	14	5	4		1								
	D				5		3										

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

TYPHUS FEVER—Continued

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

Place		Jan. 15–Feb. 11, 1928	Feb. 12–Mar. 10, 1928	Mar. 11–Apr. 7, 1928	Apr. 8–May 5, 1928	May 6–June 2, 1928	June 3-30	Week ended— July, 1928: 7	July, 1928: 14	July, 1928: 21	July, 1928: 28	August, 1928: 4	August, 1928: 11	August, 1928: 18	August, 1928: 25	September, 1928: 1	September, 1928: 8
Egypt—Continued.																	
Keneh Province	C			5	38		1										
	D				7		1										
Menoufieh Province	C				28	9	5										
	D				3	3	2										
Port Said	C								1	1			4	3	1		
Suez	C					1			1	1	2	1	1	1	1		1
	D					1											
Great Britain: London County	C						2										
Greece: Piræus	C						1										
Hungary: Budapest	D						2				2						
Ireland:																	
Belfast	C					2	1										
	D						1										
Irish Free State	C	1			1	4											
Cork County	C				1												
Dublin	C																3
Galway County—Oughterard	C										10						
Kerry County—Cahirciveen	C											1					
Japan (see table below):																	
Hiogo	C						1										
Yamagata	C					2	2		1	1							
Latvia (see table below).																	
Lithuania (see table below).																	
Mexico (see also table below):																	
Durango	D							1									
Guadalajara	D					1											
Mexico City, including municipalities in Federal District	C	5	8	12	8	19	14	6	2	1	1	4	2		4		
	D		4	3	1	2		2		1		2			1		
Monterey	D			1													
Morocco (see also table below)	C	1,051	316	748	591	280	214	40	50	49	14	39	2	2	1		
Palestine	C	5	10	7	6	4	8	1	3	5		5	3	3	2	2	2

Peru (see table below).																	
Poland	C	346	265	382	144	226	134	25	30	15	26	7	19	11			
	D	19	26	25	12	17	6	1		2	2						
Portugal (see also table below): Oporto	C	1						1									
Rumania	C	39	68	141	142	99	80	8	8	8	9	8	1				
	D	9	5	11	12	8	11		1			1					
Syria (see also table below): Aleppo	C						2							1			
Tunisia	C	4	1	18	19	7	7										
Union of South Africa:																	
Cape Province	C	4	P		P	P	P	P	P	P	P						
Natal	C	1	2		P	3	P	P	P	P	P						
Orange Free State	C	P			P	P	P	P	P	P	P						
Transvaal	C					1					P						
Union of Socialist Soviet Republics (see table below).																	
Yugoslavia (see table below).																	
On vessel S. S. Gaika at Durban, Natal, from Mauritius	C		1														

Place		January-March, 1928	April, 1928	May, 1928	June, 1928	July, 1928	August, 1928
Chosen	C	896	210	241	182		
	D	88	19	32	24		
Chemulpo	C	2		2			
Gensan	C	1					
	D	1					
Seoul	C	10	28	18			
	D	1	2	4			
Czechoslovakia	C	25					
Greece: Athens	C	4	13	11	9	6	
	D		2	2	1	1	
Japan	C			21			
Latvia	C	27	4	65	2		
Lithuania	C	223	66	64	32	8	11
	D	22	3	3	1		

Place		January-March, 1928	April, 1928	May, 1928	June, 1928	July, 1928	August, 1928
Mexico (see also table above)	D	46					
Peru:							
Arequipa	D	2	1				
La Oroya	C	P.					
Turkey	C	17		7	2	6	9
	D	1		1			
Union of Socialist Soviet Republics:							
Railways, etc	C	199					
Transcaucasus, Siberia, and Central Asia	C	17					
Ukraine	C	1,476					
Other territories in Europe	C	5,167					
Yugoslavia	C	34	10	19	16	12	
	D	3	1	3	1	8	

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

YELLOW FEVER

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

Place		Jan. 15–Feb. 11, 1928	Feb. 12–Mar. 10, 1928	Mar. 11–Apr. 7, 1928	Apr. 8–May 5, 1928	May 6–June 2, 1928	June 3–30, 1928	Week ended— July, 1928: 7	July, 1928: 14	July, 1928: 21	July, 1928: 28	August, 1928: 4	August, 1928: 11	August, 1928: 18	August, 1928: 25	September, 1928: 1	September, 1928: 8	September, 1928: 15	September, 1928: 22
Belgian Congo:																			
Matadi	C	14	1		2	2													
	D	13																	
Brazil:																			
Aracaju	D					2													
Bahia	C						4												
	D													1			1		
Estancia	C		1														1		
Pernambuco	C						1												
Rio de Janeiro	C					2	48	10	12	10	8	6	4	4			4		1
	D					2	15	5	7	9									
Sao Felix	C						P												
Dahomey: Grand Popo	C						3												
	D						2												
Gold Coast	C					2													
Ivory Coast	C						1												
	D						1												
Abidjan	C						1	1											
Ferkes-Sedougou	D											1							

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