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EPIDEMIC CEREBROSPINAL MENINGITIS.

A REVIEW OF ITS ETIOLOGY, TRANSMISSION, AND SPECIFIC THERAPY, WITH REFERENCE TO PUBLIC MEASURES FOR ITS CONTROL.

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The recently reported epidemic outbreaks of cerebrospinal meningitis in various localities in the southern and southwestern portions of the United States have lent to the questions of the etiology, epidemiology, prophylaxis, and treatment of the disease a vital present interest. In response to numerous inquiries received from public-health authorities this paper is prepared, by direction of the Surgeon General, to present in a review, as briefly as possible, such facts and deductions concerning the disease as may be of special interest to health officers.

According to Netter and Debré,[1] from whose most excellent monograph the following historical sketch is abstracted, the first clearly recognized epidemic of cerebrospinal meningitis occurred in Geneva, Switzerland, in the spring of 1805, followed during the years 1806–1814 by a number of scattered outbreaks in widely separated localities of France and Germany. Coincident with this first series of epidemics in Europe occurred a similar series in America, beginning with an outbreak at Medfield, Mass., in 1806 and continuing until 1819, visiting during this period many localities in the United States, and reaching Canada.

The history of the disease since that time, shows, according to these authors, periods of epidemic or pandemic prevalence, alternating with periods of comparative rarity.

From 1836 to 1850 epidemics reappeared in Europe in France, Germany, Austria, Italy, Spain, Ireland, and Denmark; and in Algeria. In America, also, there was a succession of outbreaks from 1842 to 1850.

In its third period of prevalence, from 1850 to 1860, the disease visited chiefly the Scandinavian Peninsula, hitherto spared, causing there over 4,000 deaths from 1854 to 1861.

In 1861–62 epidemics occurred in various sections of Germany and in Russia, and a few years later in Ireland. Coincident outbreaks occurred during this period also in the United States.

[1] Netter, Arnold; and Debré, Robert; La méningite cerebrospinale, Paris, 1911, Masson & Cie, 292 p.

From 1865–1885 epidemics were rare and generally small, except in the United States, where outbreaks occurred in New York (1872) and Boston (1874).

The years 1885–86 were marked by a recrudescence in European countries (France, Italy, Austria, Scandinavia) and an epidemic in the Fiji Islands.

The next period of epidemic prevalence was from 1896 to 1903, when the disease appeared in France, Germany, Austria, Norway, Scotland, Ireland, Bosnia, Italy, Algeria, the United States and Portugal (1901–1905).

Following close upon this last has come another cycle of epidemics dating from about 1904 in the United States, 1905 in Germany (especially Prussia), and 1908 in France. Apparently this last wave has not yet passed. During the winter and spring of 1911, outbreaks occurred in several of the Southern States of the United States; and, as above stated, there are reports of further outbreaks in the South and Southwest at present.

During the intermissions between epidemics, cerebrospinal meningitis has never disappeared entirely, continuing to appear annually and almost ubiquitously in sporadic cases and small outbreaks.

Nor can it be said that the pandemics have shown an orderly progression. On the contrary, they are more usually ushered in by coincident epidemics in widely separated localities.

SPECIFIC ETIOLOGY.

While the studies of the earlier epidemics had placed the clinical knowledge of cerebrospinal meningitis on a fairly sound basis, it was not until the outbreaks beginning in 1885 that progress was made toward determining the specific etiology of the disease; and it is only within the last few years that apparently contradictory observations have been harmonized by more extensive research with more exact technical methods.

In 1887 Weichselbaum described an organism, the *diplococcus intracellularis meningitidis*, isolated from the meningeal exudate of several cases of cerebrospinal meningitis, and suggested it as the specific cause of the disease. His observations and views, though they were the subject of much dispute in the succeeding years, have recently been so fully confirmed and so widely extended that at present the *diplococcus intracellularis meningitidis* (now commonly called "meningococcus") is almost universally accepted as the specific causative agent of this disease, whether occurring epidemically or sporadically. The evidence upon which this conclusion is based is: That the meningococcus is commonly, almost constantly, demonstrable intra-vitam or post mortem in the tissues and secretions of persons suffering from the disease; especially in the exudate from the tissues most constantly and severely affected, namely, the meninges.

The final link in the evidence of the causative relation of the meningococcus to cerebrospinal meningitis, namely, the reproduction of a clinically similar disease in lower animals by the inoculation of pure cultures, has not yet been satisfactorily accomplished. Acute meningitis can be produced in monkeys and occasionally in other animals by the subdural injection of pure cultures of the meningococcus; but this is of itself hardly convincing evidence, since quite similar effects may be produced by the subdural injection of various other bacteria.

THE DIPLOCOCCUS INTRACELLULARIS MENINGITIDIS OR MENINGOCOCCUS.

Morphology.—The meningococcus as found both in exudates and in cultures from artificial media, occurs in pairs, not infrequently in tetrads. In the cerebrospinal fluid the diplococci are characteristically located within the cells of the exudate, though by no means confined to this location. Irregularities in form and size are quite characteristic, especially in cultures taken from artificial media. Forms both larger and smaller than typical diplococci, as well as various involution forms, are encountered.

Staining.—The diplococcus takes the ordinary aniline stains readily. When stained by Gram's process it is decolorized. This characteristic serves to distinguish it from the more common pus-forming staphylococci and streptococci as well as from the *pneumococcus* and the *diplococcus capsulatus*, either of which may give rise to meningitic infections clinically similar to the specific cerebrospinal meningitis and may be found in cerebrospinal fluid from such cases.

Cultural characteristics.—The meningococcus grows aerobically on artificial media at temperatures from 25° to 42° C., preferably at about 37° C.

It grows best on media containing animal proteid, preferably human, such as ascitic or pleuritic fluid, blood serum, or defibrinated blood. On ordinary culture media (agar, gelatin, bouillon) the organisms grow sparsely if at all; when freshly isolated, more freely after cultivation for a while on the more suitable media. The addition of glucose (1 per cent to 5 per cent) to the culture media favors its growth.

According to Elser and Huntoon[1] the optimum reaction of media for the meningococcus is about +.6 to phenolphthalein.

The fermentations caused by the meningococcus in media containing various carbohydrates are fairly constant, and a very considerable aid in differentiating it from a group of diplococci quite similar in morphology, in staining, and in their growth on many media.

The fermentation tests may be made in a great variety of liquid or solid media. According to Elser and Huntoon, they may best be made in agar prepared from sugar-free bouillon, with the addition of ascitic fluid and of litmus to serve as an indicator.

Agglutination with specific immune serum.—The serum of animals immunized to the meningococcus by repeated injections of pure cultures, contains agglutinins which are, within certain limits, specific for the meningococcus. By the careful, quantitative application of this test, with serum of known potency, the meningococcus may usually be differentiated from other Gram-negative diplococci, including the culturally similar pseudomeningococcus and the closely allied gonococcus. The test will, however, often be misleading unless applied with the utmost care, with a full appreciation of the quantitative discrepancies due to differences between strains of the meningococci and to "group" agglutination of other organisms. It may even be necessary to resort to the more complicated tests of agglutinin-absorbing capacity to arrive at a satisfactory differentiation.

[1] Elser, W. J., and Huntoon, Frank, Studies on Meningitis, Jour. Med. Research, 1909, vol. 20, pp. 377–541.

BACTERIOLOGICAL DIAGNOSIS.

It is important for two reasons to distinguish cerebrospinal meningitis due to the meningococcus from other forms of meningitis.

First, in meningitis due to the meningococcus specific therapy offers a hope of cure, largely proportional to the promptness of its application.

Second, prophylactic measures not necessary in other forms of meningitis are required in the case of true cerebrospinal meningitis due to the meningococcus.

Not infrequently a certain diagnosis can be made only by bacteriological demonstration of the organism concerned.

The meningococcus may be isolated from the cerebrospinal fluid, blood, or nasopharyngeal secretions of persons sick with meningitis, post mortem from the meningeal exudate, and sometimes from the blood and various viscera.

For all practical purposes, the bacteriological diagnosis of cerebrospinal meningitis during life is based upon the demonstration of the meningococcus in the cerebrospinal fluid.

For the purposes of diagnosis the cerebrospinal fluid may be examined directly under the microscope or planted in media suitable for the isolation of the meningococcus in pure culture.

1. *Microscopic examination of the cerebrospinal fluid.*—Cerebrospinal fluid withdrawn by lumbar puncture with strict aseptic precautions is received in a clean sterile test tube. The sediment, preferably obtained by centrifuging, is spread evenly on clean glass slides, dried in the air, and fixed by passing through a flame.

The films are then stained by Gram's method, viz:

(*a*) Three minutes with aniline-water gentian violet solution.

(*b*) Wash lightly in water.

(*c*) Lugol's solution (iodine, 1 gram; potass iodide, 2 grams; water, 300 cc.), two minutes.

(*d*) Blot off this fluid.

(*e*) Decolorize the film by washing with absolute alcohol for 30 seconds or more, depending upon the thickness of the slide.

(*f*) Counterstain 30 seconds with an aqueous solution of bismarck brown, or with ordinary carbol-fuchsin diluted with nine volumes of distilled water.

The reagents and technique of staining should be carefully controlled by staining coincidently films of bacteria known to be Gram-negative (*B. coli, B. typhosus*) and others known to be Gram-positive (*Staphylococcus pyogenes aureus, Pneumococcus*, etc.).

Until one can get consistent results with Gram's method of staining, obviously he can not rely upon it for the differentiation of the meningococcus.

In films properly stained by Gram's method meningococci, when present, will be found to have been decolorized by the alcohol and stained with the subsequently applied counterstain. They will be found in pairs and tetrads within the cells of the exudate, as well as extracellularly.

For all practical purposes the detection of Gram-negative diplococci in cerebrospinal fluid, the gross and microscopic appearance of which indicates the existence of an acute meningitis, is sufficient to establish the diagnosis of cerebrospinal (meningococcus) menin-

gitis. This diagnosis is still further confirmed if the diplococci are found within the cells of the fluid.

While there are numerous other Gram-negative diplococci which can not be distinguished from the meningococcus by their morphology, none of these is likely to occur in the cerebrospinal fluid from cases of acute meningitis.

The pneumococcus and streptococci, especially the *streptococcus capsulatus*, may give rise to cases of meningitis clinically similar to true cerebrospinal meningitis, and may be found in the cerebrospinal fluid from such cases. They are distinguished from the meningococcus most readily by their different reaction toward Gram's stain, since these organisms are Gram-positive.

Elser and Huntoon were able to demonstrate the meningococcus by microscopic examination of the cerebrospinal fluid in 141 out of 171 cases examined (82.46 per cent). In some of the cases in which this examination was negative the meningococcus was isolated from the cerebrospinal fluid by culture. A single negative examination of cerebrospinal fluid does not necessarily exclude the diagnosis of cerebrospinal meningitis.

2. The isolation of the meningococcus in pure culture and its complete identification are processes requiring a refined bacteriologic technique, the details of which need not be discussed here. It may be mentioned, however, that intracellular Gram-negative diplococci can not be assumed to be meningococci unless found in the meningeal exudate. Many varieties of diplococci normally present in the nose and throat of man greatly resemble the meningococcus, and the demonstration of the latter in the naso-pharyngeal secretions involves complete identification by morphologic, cultural, and agglutination tests.

OCCURRENCE OF THE MICROCOCCUS.

Within recent years very extensive studies have been made to determine the natural habitat of the meningoccus. So far it has been encountered only as a parasite of man. The results of these studies may be briefly summarized as follows:

1. *Occurrence in the bodies of persons suffering from cerebrospinal meningitis.*—Following is a statement of the frequency with which the organism has been satisfactorily demonstrated by various observers in the cerebrospinal fluid of patients, either intra-vitam or post-mortem.[1]

	Number of specimens examined.	Number of specimens showing meningococcus.
Councilman, Mallory, and Wright	55	38
Faber	31	27
Bettercourt and Franca	271	271
Cochez and Lemaire	44	39
Schotmüller	49	43
Reuterberg	26	8
Weichselbaum and Gohn	58	39
Von Lingelsheim	308	198
Flugge	144	44
Elser and Huntoon[2]	210	194

[1] Cited by Kutscher in Kolle und Wassermann's Handbuch der Pathogenen Mikroorganismen, I Erganz. Bd., Jena, 1907, Gustav Fischer.
[2] Loc. cit.

The considerable variations in the results of different workers are explained by the different circumstances attending the collection of specimens and variations in the technique of examining them. Some investigators have worked chiefly with specimens obtained under favorable circumstances, with facilities for immediate examination; others with specimens chiefly sent in from distant points, subject to delay and contamination before examination. Again, some of these figures are based on direct microscopic examination of exudates, others on cultures of the fluid in various media, still others on the combined results of both methods. Where circumstances have been favorable and the technique careful, the proportion of positive results has generally been high.

The meningococcus has also not infrequently been demonstrated in the blood of patients with cerebrospinal meningitis, most frequently early in the course of the disease, and occasionally before the onset of meningitic symptoms. Elser and Huntoon report finding the organism present in the blood of 25 per cent of patients examined. Apparently, however, the organisms in the blood are relatively few—much less abundant than in the cerebrospinal fluid.

Special interest attaches to the demonstration of the meningococcus in the nasopharyngeal secretions of patients. In a recent extensive study, von Lingelsheim[1] was able to isolate the meningococcus from the throats of 182 out of 787 patients examined. These figures include a number of specimens examined under unfavorable circumstances, sent in to the laboratory from a distance. The meningococcus is demonstrable in the nasopharynx most constantly in the early stages of the disease, as illustrated by the following results reported by von Lingelsheim.

Day of disease on which specimens were taken.	Number of specimens examined.	Number of specimens in which meningococci were demonstrated.	Percentage of specimens in which meningococci were demonstrated.
First to fifth day	156	104	66.6
Sixth to tenth day	57	14	24.56
Eleventh to twentieth day	62	7	11.29
Twenty-first day or later	115	5	4.39
Total	390	130	33.3

Netter and Debré (*La meningite cerebrospinale*, pp. 42–43) report similar results in 100 examinations made upon 49 patients, viz:

Of specimens examined in—	Per cent positive.
First week	78.33
Second week	60.00
Third week	50.00
Fourth week	25.00
After thirtieth day	15.35

They also cite the following figures from Goodwin and Sholly:

Of examinations during—	Per cent positive.
First week	54.5
Second week	33.3
After second month	6.2

[1] Zeitschr. f. Hyg. u. Infectionskrankh., 1908, Bd. 50, pp 457–483.

All of these results refer to the isolation of the meningococcus in pure culture, a fairly difficult bacteriological procedure; which may well be assumed not infrequently to fail to demonstrate the meningococcus even when present.

It seems from the above and other concordant results that the meningococcus is quite frequently (probably constantly) present in the nasopharynx of patients in the early stage of infection; that it usually disappears rapidly from this location, often disappearing completely before the subsidence of the meningitic symptoms; that in rather exceptional instances it may persist in the nasopharynx, even after convalescence, for at least several weeks or months.

2. *Occurrence of the meningococcus in the nasopharynx of healthy persons in the vicinity of cases of meningitis.*—As the result of many recent exhaustive intensive studies it has now been well established that the meningococcus is quite frequently present in the nasopharynx of persons who show either no clinical manifestations whatsoever of such infection or only slight local manifestations (pharyngitis, coryza). These "meningococcus carriers" have been demonstrated almost exclusively among (1) persons intimately associated with cases of meningitis; (2) persons not directly associated with clinically recognizable cases but residing in communities where the disease is epidemic; and (3) less rarely among persons in communities where only sporadic cases of meningitis have occurred.

Albrecht and Ghon (1901) first isolated the meningococcus from the nasopharynx of a healthy person in contact with a meningitis patient.

The following tabulation presents the results of some of the more extensive recent researches upon this phase of the subject:

Demonstration of the meningococcus in the nasopharynx of apparently healthy persons.

Locality.	Condition.	Percentage of persons examined shown to be carriers.
Dieudonné (1906) during small outbreak in garrison at Munich examined. (Centralblatt f. Bakt., 1906, p. 418.)	(a) 39 men from a dormitory in which there had been several cases of meningitis—found 5 carriers.	12.8
	(b) 29 soldiers from the same battalion who applied for treatment on account of nasopharyngeal troubles—found 4 carriers.	13.8
	(c) 20 men from a regiment in which there had been no case of meningitis—found no carriers.	0.0
Osterman (1905–6) during an epidemic in vicinity of Breslau examined. (Deutsch. Med. Wochenschr., 1906, 1, p. 414.)	(a) 24 persons, members of families in which there were cases of meningitis—found 17 carriers.	70.8
	(b) 51 school children in a town where there had been a recent case—found 2 carriers, associates of patient's sister.	4.0
	(c) 10 persons not in contact with any case—found no carriers.	0.0
Bochalli, in garrison at Beuthen, Prussia, in which there had been a case recently, examined (Zeitschr. f. Hyg. u. Infektionskrank. Bd. LXI, pp. 454–464).	(a) 16 men associated in dormitory with a recent patient—found 10 carriers.	62.5
	(b) 114 men of the same company, not roommates of patient—found 13 carriers.	11.4
	(c) 355 men in the 3 other companies of same garrison—found 19 carriers.	5.4
	(d) Control: 40 men from 2 battalions in Gleiwitz, where there had been no cases of meningitis—found no carriers.	0.0
Von Lingelsheim, in vicinity of Beuthen, Prussia, during an epidemic, examined (Zeitschr. f. Hyg. u. Infektionskrank, 1908, Bd. 59, pp. 457–483).	(a) 387 persons in close contact with cases of meningitis—found 28 carriers.	7.23
	(b) 127 persons not in contact with cases—found no carriers...	0.0
	(c) 184 children suffering from scarlet fever, measles, whooping cough (apparently unassociated with any cases of meningitis)—found no carriers.	0.0

Demonstration of the meningococcus in the nasopharynx of apparently healthy persons—Continued.

Locality.	Condition.	Percentage of persons examined shown to be carriers.
Bruns and Hohn, in valley of the Ruhr, Prussia, during severe epidemic in 1907, examined (Klin. Jahrbuch. Jena, 1908, Bd. XVIII, pp. 285–310).	(a) 3,154 healthy persons in community where epidemic prevailed—found 465 carriers.	14.7
	(b) Of the above specimens were taken in the immediate vicinity, under the investigators' supervision, in 1,786 cases—showing 401 carriers.	22.5
	(c) Including only members of families in which cases of meningitis had occurred—609 were examined and 224 were found carriers.	36.78
	(d) Persons in the community examined under favorable circumstances during and after the epidemic, not directly associated with any cases of meningitis; 380 examined—30 found carriers.	7.9
Herford, during epidemic at Altona, examined (cited by Netter and Debré, loc. cit., p. 44).	172 persons in the families with cases of meningitis—found 43 carriers.	25.0
Trautmann, at Hamburg, examined (cited by Netter and Debré, loc. cit.).	261 persons in families with cases of meningitis—found 24 carriers.	9.2
Mayer, Waldmann, Furst, and Gruber examined (Münch. med. Wochenschr., 1910, vol. 57, p. 1584).	(a) 1,911 men from various garrisons from 1908 to 1910 at the time of occurrence of cases of meningitis in the respective garrisons—found 47 carriers (associated with a total of 46 cases of meningitis).	2.46
	(b) In 1910, at Munich, examined the whole garrison, 9,111 men. It is implied that there was no recent case of meningitis in the garrison at this time, but there had been one or more cases annually since 1908 in each of the barracks mentioned—158 of these men were found to be meningococcus carriers.	1.73
Kolle and Wasserman, in Berlin, in 1906 (cited by V. Lingelsheim) examined.	114 residents of Berlin; found 2 carriers, both of whom had been associated with suspicious cases of meningitis—possibly sporadic cerebrospinal meningitis.	1.8
Droba and Kucera, 1906, examined (cited by von Lingelsheim).	160 children in a community free from meningitis—found no carriers.	0.0
Kutscher, 1905 (cited by Kelsch, Rev. d'Hygiene, 1911, vol. 33, pp. 1-53) examined.	56 patients in Berlin for various affections—found 4 carriers.	7.4
Huber and Kutscher (cited by Kelsch, Rev. d'Hygiene, 1911, vol. 33, pp. 1-53) examined.	A detachment of 408 soldiers free from meningitis both before and after the time of examination—found 8 carriers.	2.0

The results of these investigations, which are further confirmed by the generally similar results of a number of others, while they show wide quantitative differences, all indicate the following conclusions:

1. Apparently healthy persons in the immediate vicinity of cases of cerebrospinal meningitis very frequently harbor the meningococci in their nasopharynx.

2. Apparently healthy persons themselves not in contact with any cases of meningitis, but residing in communities where an epidemic prevails, are not infrequently found to be meningococcus carriers.

3. Apparently healthy persons in communities where there have been only scattered cases of meningitis or none at all for several months are less frequently found to be meningococcus carriers.

4. The meningococcus is very rarely found in the throats of persons in communities quite free from cases of cerebrospinal meningitis.

The figures given by Bruns and Hohn show, moreover, that the proportion of carriers in a community was roughly proportional to the

course of the epidemic. This is illustrated by the following table, showing, by months, the number of cases of meningitis in the vicinity studied by them and the proportion of well persons found to be carriers:

1907	Number of cases of meningitis.	Number of well persons examined.	Number of carriers found.	Percentages of carriers among well persons examined.
				Per cent.
March	148	120	37	30.1
April	278	641	152	23.7
May	327	730	113	15.5
June	188	644	88	12.1
July	146	616	53	8.6
August	68	403	22	5.5
Total	1,155	3,154	465	14.7

Their results are similar if only the examinations of persons in the same families with cases of meningitis are considered.

1907	Number of families examined.	Number of families in which carriers were found.	Total number of persons in these families.	Number and percentage of meningococcus carriers among these persons.
March	7	7	23	14 persons, 61.7 per cent.
April	39	37	135	67 persons, 50 per cent.
May	43	40	172	81 persons, 47 per cent.
June	23	18	93	34 persons, 36.6 per cent.
July	21	11	67	18 persons, 27 per cent.
August	22	7	119	10 persons, 8.5 per cent.
Total	155	120	609	224 persons, 36.78 per cent.

It is thus shown that during this epidemic the percentage of carriers, both among persons in close contact with patients and in the community generally, was greatest at the beginning and height of the epidemic, declining as the epidemic declined. Indeed, it would appear from these figures that the infection must already have been widespread in the community before the existence of an epidemic was realized.

The persistence of the meningococcus in the throats of carriers has been studied especially by Mayer, Waldman, Furst, and Gruber,[1] who made repeated examinations of 96 carriers. According to the persistence of the meningococci, carriers are classified by them as follows:

1. Periodic (periodisch), in whom repeated examinations showed alternating periods of freedom from meningococci, and reappearances.
2. Persistent (zeitlich) in whom the meningococci were constantly demonstrable for several weeks or months.
3. Temporary (vorübergehend), in whom meningococci were found only for short periods.

[1] Münch. med. Wochenschr, 1910, vol. 57, pp. 1584.

The relative frequency of the carriers of these three classes was determined as follows in the 96 persons studied:

1. Periodic carriers		6= 6.25 per cent.
2. Persistent carriers		12=12.50 per cent.
3. Temporary carriers:		
(*a*) 3 examinations positive	12	
(*b*) 2 examinations positive	16	
(*c*) Only 1 examination positive	50	
		78=81.25 per cent.

In healthy carriers, as in persons ill with meningitis, it would appear that the meningococci commonly persist for only a short period, but in exceptional instances may persist for periods of many weeks.

3. *Occurrence and viability of the meningococcus outside the human body.*—As above stated, the meningococcus has seldom been isolated except from the tissues and secretions of persons suffering from meningitis, and secretions of persons more or less intimately associated with such patients. Mayer, Waldmann, Furst, and Gruber, however, believe that, like the pneumococcus, the meningococcus is almost ubiquitous in man.

All the evidence available indicates that the life of the meningococcus outside the human body is short. It is a very delicate organism, readily killed by the chemical disinfectants in common use, by a temperature of 50° C. in five minutes, and at 65° C. within three minutes. Cultures on solid media are killed in a few hours by sunlight, and even when protected from the sunlight die out rapidly at room temperature, especially if the medium becomes somewhat dried out by evaporation.

It is quite probable that the organism may live longer in particles of sputum or pus, but judging from the difficulty of isolating the organism from exudates or secretions when the examination of the specimens is delayed 24 hours or more, it would seem that even in these media the meningococcus dies out quickly.

Altogether, it appears to be so fragile an organism outside of its natural habitat (the human body) that its persistence in the dust of house, in fomites, etc., is in all probability very short.

EPIDEMIOLOGY.

The accumulated records of thousands of sporadic and epidemic cases of cerebrospinal menigitis warrant some generalizations as to the epidemiological characteristics of the disease.

Geographic distribution.—The area over which the disease has prevailed is not definitely limited. Epidemics have occurred practically all over the world under the most various conditions as regards climate, topography, commercial relations, and social conditions. Yet certain areas seem to be especially liable to epidemics, as the northeastern United States, France, and Germany.

As previously pointed out epidemics come in cycles. Periods of widespread epidemics or pandemics alternate with periods of comparative freedom from outbreaks. It has usually been impossible in periods of widespread epidemics to trace the progress of the infection in such a way as to show any definite spread from one locality to another. Epidemics are apt to appear simultaneously in widely separated communities not in close communication, often sparing

intervening points to which the spread of infection would seem most probable. Instances are cited, however, in which the infection has apparently been spread from place to place along the routes of travel, the most striking instances of this being in connection with the movements of troops from infected to previously uninfected places.

Sporadic cases and small outbreaks continue, in the periods of decreased epidemic prevalence, to occur perennially and almost ubiquitously though with great rarity as compared with the more common infectious diseases.

Seasonal prevalence.—It has long been noted that the disease is most prevalent in the spring and late winter, epidemics usually declining with the advent of summer.

Netter and Debré give the following statistics as to the seasonal prevalence of the disease in Germany from 1905 to 1908:

	Number of cases.				Per cent of total.
	1905	1906	1907	1908	
March, April, May	2,545	1,031	1,254	609	61
June, July, August	535	258	577	199	14.8
September, October, November	151	160	286	125	6
December, January, February	531	580	466	353	18.2

Approximately 80 per cent of these cases are seen to have occurred during the winter and spring months.

The seasonal prevalence is strikingly similar to that of pneumonia and influenza, and not unlike that of a number of other diseases (scarlet fever, measles, diphtheria, smallpox) in which the primary seat of infection is believed to be the respiratory tract, and which are supposed to be spread by contact.

Incidence among the population of a community.—Even in severe epidemics the total number of cases in a community is usually small in proportion to population, especially where one considers large populations, as in big cities or whole States. Netter and Debré cite the following figures, showing the incidence of cases in proportion to population in several epidemics:

New York, 1872.....8.07 cases per 10,000
New York, 1905.....6.30 cases per 10,000
Glasgow, 1907.....8.47 cases per 10,000
Paris, 1909.....Less than 1 case per 10,000

In small towns the morbidity rate has been higher, as in—

Lippisch (near Dantzig).....1,250 per 10,000
Aigues-Mortes, 1841.....533 per 10,000

These latter are exceptional instances. In general the disease may not be expected to attack more than 1 to 2 per 1,000 of population during an outbreak in a city.

Even during an epidemic the cases in a city are characteristically scattered; sometimes grouped around several foci, but not commonly showing a definite grouping around or progress from a single focus.

In its incidence in the population of a community cerebrospinal meningitis is selective, attacking children much more frequently than adults. Among adults, the disease has often been more prevalent in military garrisons than in the civil population. The relative

proportion of children and adults attacked varies greatly in different epidemics. In general not less than 75 per cent of cases are in children under 15 years of age.

The disease is generally more prevalent in the crowded districts of cities among the poorer classes, living under unhygienic conditions, but it is by no means limited to these.

Neither in its general nor its local distribution does it show any constant relation to elevation, moisture, or bodies of water.

Local causes of epidemics.—The local causes of epidemics have usually been sought in vain. Epidemiologic studies have usually excluded the probability of the infection having been spread through water supplies, milk, or other generally distributed foods.

Contagiousness.—Cerebrospinal meningitis does not present the epidemiologic characteristics which we are accustomed to associate with a contagious disease.

Even in carefully studied epidemics it is the exception rather than the rule to find any direct or even traceable indirect contact between successive cases. Again, it is unusual to find more than one case of the disease in a family; and when multiple cases do occur in the same house, they often occur so close together or separated by such a long interval as to make it seem unlikely that one was infected from the other. The comparative rarity of cases among the members of patients' families and among physicians and hospital attendants makes it seem quite certain that the disease is not highly contagious. The lack of traceable relation between cases renders it virtually certain that direct contact with the sick is neither a necessary nor even a very common factor in contracting the infection. And yet instances of apparent infection by direct contact with patients have occurred just often enough to keep alive the suspicion that the disease may be transmitted in that way.

SOURCES AND ROUTES OF INFECTION.

The impossibility of tracing epidemics to definite sources by the most careful epidemiologic studies has invested this disease with a veil of mystery, which has only recently been drawn by investigators who have conducted the most thorough intensive studies, combining bacteriologic and epidemiologic methods. With the data supplied by them we are now in a position to draw at least reasonable inferences, if not definite conclusions, as to the mode of transmission of this disease.

1. Cerebrospinal meningitis is due to the meningococcus, as evidenced by the almost constant association of this organism with cases of the disease. Failures to demonstrate the meningococcus in well-authenticated cases are not more common than would be expected in view of the technical difficulties.

2. The natural habitat of the meningococcus is the human body. There is no record of its ever having been isolated from any other natural source. All the facts known of its biology indicate that in nature the conditions necessary for its multiplication are encountered only in the human body, and that its life outside this habitat is very short.

3. Man, being the only known natural host of the meningococcus, is therefore the only known source of infection. The sources of infec-

tion may be divided into two classes: (*a*) Persons suffering with clinically recognizable manifestations of cerebrospinal meningitis; and (*b*) persons not suffering from any illness clinically recognizable as this disease. In the former, that is in persons suffering from meningitis, the meningococcus has been shown to be present in the nasopharyngeal secretions (very commonly during the early stages of the disease, progressively less frequently, later), in the blood at times, and in the cerebrospinal exudate.

In the latter class, that is in the so-called "meningococcus carriers," the organisms are found only in the nasopharynx, where they persist for a variable period.

From patients suffering with meningitis and from "meningococcus carriers" the organisms are eliminated in the nasopharyngeal secretions.

The sick and the well carriers of meningococci are found closely associated. So far as the recorded studies show—and they include thousands of persons—they indicate that the number of cases of meningitis and that of carriers in a community bear a fairly definite ratio to each other.[1] While it is impossible to give a numerical statement of the relative number of cases of meningitis and of "carriers," Flugge's estimate that the carriers are probably ten times as numerous as the recognized cases seems conservative.

Since apparently healthy carriers are in all probability much more numerous than recognized cases of meningitis, and have at the same time much more freedom of movement and consequent opportunity to mingle with other people, they would seem to be of much more importance in the distribution of the meningococcus.

In this connection it is of course natural to question whether the meningococci eliminated by healthy carriers are equal in virulence to those eliminated by persons actually sick with meningitis. While it seems not improbable that in some cases (perhaps most likely with chronic carriers) the organisms eliminated by carriers may be of less virulence, on the whole, it is more logical to infer that no such difference exists, at least during an epidemic.

4. The primary seat of attack, the first site of multiplication of the meningococcus in the human body, is believed to be the nasopharynx. This is inferred because of (*a*) the common occurrence of the meningococci in this location in the early stages of the disease, sometimes even prior to the development of meningitic symptoms, and (*b*) because in many cases (carriers) the demonstrable occurrence of the organism in the body is limited to this site.

5. The meningococcus would appear to be transmitted from its sources (infected persons) to other persons by such contact as ordinarily takes place between people associated together—the transfer of secretions by kissing, by the use of common eating or drinking utensils, the use of the same handkerchiefs and towels, the soiling of hands in handshaking, the contamination of food by fingers soiled with secretions, etc. The apparently short viability of the meningococcus outside the human body, leads to the inference that the contact is usually direct—that not much time elapses between the elimination and the reception of the infective material.

[1] The researches of Mayer, Waldmann, Furst, and Gruber rather contradict this statement, to the extent of showing that in various barracks in Munich the carriers were not proportionate to the number of cases of meningitis within the past three years.

6. The factors which determine whether the meningococcus, once lodged and multiplying in the nasopharynx shall cause a general infection and involvement of the meninges or shall remain localized in the pharynx are to a large extent indeterminate. Variations in virulence of the meningococcus do not seem to furnish an adequate explanation, since cases of severe meningitis and carriers showing no morbid symptoms are found side by side, to all appearances infected with the same organism. It seems more likely that variations in individual resistance to the action of the meningococcus are a very important factor. The majority of persons are apparently not readily susceptible to general (meningeal) infection with the meningococcus. Some predisposition seems necessary, but just what constitutes predisposition to meningitis is undetermined, except in a very broad general way. The preponderance of the disease among children is best explained by assuming that children are more susceptible than adults. Its seasonal prevalence suggests that susceptibility is greater in the winter and spring months. The previous condition of the general health, trauma, and exposure seem not to be factors of any constant importance.

7. Just why the disease should suddenly become widespread in epidemics after years of comparatively rare occurrence in isolated sporadic cases is by no means clear. This tendency to recur in "cycles" of pandemics is, however, not peculiar to cerebrospinal meningitis. Influenza exhibits the same tendency quite strikingly. On a smaller scale, other diseases also exhibit alternating periods of epidemic prevalence and relative rarity. For example, a study of the incidence of measles in Richmond, Va., showed such regularity in the cycles of epidemics that the health officer was able to predict an epidemic before it actually occurred.[1]

It is likewise impossible to analyze the local conditions which determine the occurrence of an epidemic in one community while other communities, offering to all appearances equally good chances for the spread of the disease, remain free from it. But again, this element of mystery is by no means peculiar to cerebrospinal meningitis. The same problem is encountered in the epidemiology of other diseases.

SERUM THERAPY.

The use of antimeningococcic serum in the treatment of this disease may now be considered to have passed beyond the experimental stage and to have been established as a therapeutic measure of such well-proven efficacy that its use becomes imperative. Now that the serum may be obtained readily upon the markets in this country, it becomes the duty of those who undertake to treat cerebrospinal meningitis to inform themselves as to the principles and methods involved in this therapy.

The review of this phase of the subject has been drawn almost entirely from the monograph of Netter and Debré, previously cited, and from a recent extensive treatise by Levy.[2] The necessity of condensing these articles is regretted, and a careful study of them in the original is recommended to all to whom they are available.

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[1] Levy, E. C., Annual Report of the Health Department of the city of Richmond, Va., for the year 1910. Richmond, Va., 1911.

[2] Levy, Ernst, Serumbehandlung der uebertragbaren Genickstarre, Klinisches Jahrbuch, Jena, 1911, bd. XXV, pp. 121-272.

Antimeningococcic serum is obtained from horses immunized against the meningococcus by repeated, long-continued injections of live cultures, of killed cultures, or the disintegration products (autolysates) of cultures. In its therapeutic action this serum differs essentially from antidiphtheritic and antitetanic serums. The latter are antitoxic; their chief action is the neutralization within the body of soluble toxins (poisons) formed by the bacilli of diphtheria and tetanus. The action of antimeningococcic serum, on the other hand, is directed chiefly toward the destruction of the organisms themselves. (1) This serum is bacteriolytic; in the body, and under suitable conditions in vitro, it kills and dissolves the meningococci. (2) It is opsonic; that is, it in some way facilitates the destruction of the meningococci by the phagocytic cells of the body. (3) It is to some extent antitoxic. While the meningococcus does not produce a soluble toxin similar to that produced by the diphtheria and tetanus bacilli, it contains so-called endotoxins, poisons within the bodies of the meningococci, set free when the latter are destroyed by bacteriolytic or phagocytic action. It is these endotoxins, liberated by the destruction of meningococci within the body, and exerting a toxic influence upon the system, which are neutralized by the antitoxin present in antimeningococcic serum.

The action of this serum then is, first, to destroy the meningococci by bacteriolysis and phagocytosis, and, second, to neutralize the poisons resulting from their disintegration. These processes are similar to those by which the human body itself combats the meningococcus infection.

Since the serum exerts its action chiefly upon the meningococci themselves, it is essential that it should be brought into actual contact with them. This can be accomplished efficiently only by introducing it directly into the subarachnoid space, by injection into the spinal canal, or occasionally into the ventricles of the brain.

TECHNIQUE OF ADMINISTERING SERUM.

1. *Lumbar puncture.*—The first step in the administration of serum is "lumbar puncture," the passage of a needle into the spinal canal in the lumbar region. The needle employed for this purpose is preferably one made especially for the purpose, a fairly thick, stout, hollow needle, provided with an obturator to prevent stoppage and to strengthen the needle during its passage into the canal. A convenient needle, already sterilized, is furnished with each package of antimeningococcic serum as commercially supplied in this country.

As the procedure is not extremely painful, it is best performed, wherever possible, without general anesthesia. The question of employing an anesthetic must, however, be left largely to the discretion of the operator. In patients with marked opisthotonos, especially when restless or violently delirious, it is frequently better to employ a general anesthetic than to run the risk of failure or accident by attempting to proceed without one.

Rigid asepsis is absolutely essential to success. The same care should be used in cleansing the area of operation, the hands of the operators, instruments, etc., as would be employed in an aseptic laparotomy.

If the operation is done without anesthetic, there should be a sufficient number of attendants to keep the patient quite still. If done

under general anesthesia, there should be at least two persons besides the anesthetist.

The patient is laid upon the side with the back bowed. The puncture may be in the second, third, or fourth lumbar interspace. The site may be conveniently located as follows: Draw a line across the back, joining the highest points of the iliac crests. This line passes between the spinous processes of the fourth and fifth lumbar vertebræ, which, having been thus located, should be verified by counting. The puncture may be made midway between these processes, one-fourth to one-half inch from the mid line, the needle being directed forward, very slightly upward, and a little inward, so as to reach the dural sac just a little to the side of the median line, avoiding the veins located there.

If the needle is properly directed, its entry into the dural sac will be readily perceived by the sudden cessation of resistance. If it is improperly directed and impinges upon the bone, it should be withdrawn and redirected after a careful review of the landmarks. The distance to which the needle must be passed to reach the dural sac varies according to the age and musculature of the patient. In children it will be about 2 centimeters (three-fourths to 1 inch). In adults it may be as much as 4 to 6 centimeters (1½ to 2½ inches).

When the needle is in place the obturator should be removed and the fluid which flows from the needle be received directly into a sterile flask or large test tube, so marked as to indicate at least approximately the amount (in cubic centimeters) of fluid withdrawn. It is important to know the amount of fluid withdrawn, as it has a bearing upon the amount of serum which may be safely injected. It is also important to have the fluid in a clean glass vessel where its gross appearance may be immediately noted, and in which it may be kept for bacteriological examination.

Ordinarily the fluid may be expected to flow freely in a stream under pressure. It should be withdrawn until the pressure is relieved and it flows only by drops. The amount withdrawn may vary considerably, from 10 to 150 c. c. or more. When possible a quantity equal at least to the amount of serum to be injected (30 to 60 c.c.) should be withdrawn; a larger amount if the pressure is high and the flow free. The fluid is characteristically turbid in cerebrospinal meningitis, sometimes purulent with flakes of fibrin.

Sometimes when a puncture seems to have been successful no fluid comes from the needle. In such cases the needle should be cautiously manipulated—the needle cleared thoroughly with the obturator, then pushed cautiously in a little farther or withdrawn slightly. After the fluid has started to flow it may cease because of the needle becoming clogged. The needle should therefore be thoroughly cleared with the obturator before the operator allows himself to be satisfied that the pressure of the fluid is sufficiently reduced. In some cases it may happen that no fluid at all is obtained, as when the case is more chronic and the meningeal exudate thick and fibrinous.

Injection of the serum.—When a sufficient amount of fluid has been withdrawn the serum is injected through the same needle. The serum furnished by American manufacturers is put up in syringes which may be connected aseptically with the puncture-needle supplied. If the serum is not supplied in these syringes it should be

drawn up from its receptacle into a carefully sterilized large syringe, previously tested with care to insure effective smooth working.

The serum should be injected very slowly, while the condition of the patient is carefully watched by an assistant. The amount to be injected depends upon several considerations. A child should receive ordinarily about 15 c. c. to 30 c. c., an adult from 30 c. c. to 60 c. c., at the first injection. These amounts may ordinarily be introduced with little fear or difficulty if the amount of fluid withdrawn is equal to or greater than this. Quite often, however, the amount of fluid obtainable is less than the amount of serum which it is desirable to administer. In such cases one must carefully note the resistance offered to the injection, must avoid undue pressure, and must watch closely for untoward symptoms, but in their absence need not be deterred from administering the full dose.

Course of treatment.—Antimeningococcic serum has not as yet been standardized with an accuracy comparable to that used in the standardization of antidiphtheritic serum. Greater variations are therefore to be expected in the potency of different samples. Also its action differs essentially from that of the purely antitoxic sera; hence in its administration one must be guided by somewhat different considerations, must be guided to a greater extent by results rather than by dosage.

Experience has shown that the best results can be obtained only by repeated injections. Although surprising results are often obtained from a single injection, unless the destruction of the meningococci is complete relapse is likely to recur. It is therefore recommended by Netter and Debré as a routine procedure to give at least three or four injections of full doses of serum at intervals of 24 hours, and after that to be guided by the clinical signs and changes in the cerebrospinal fluid. Ordinarily after three or four daily injections the fever will have fallen, the rigidity be relaxed, and the mental condition of the patient markedly improved. Since, however, these signs do not necessarily indicate complete recovery, it is highly important to make observations at each injection upon the cerebrospinal fluid and to be guided largely by its appearance. Under the influence of the serum the cerebrospinal fluid becomes clearer, the large adventitial cells diminish, the leucocytes are relatively increased and less degenerated, lymphocytes to some extent replace the polymorphonuclear leucocytes, the number of meningococci present in the fluid is diminished, and those that remain are found to be degenerated. Under favorably progressing treatment the meningococci disappear completely after from one to four injections. Levy gives the following figures as to the disappearance of meningococci in the cerebrospinal fluid. Meningococci could no longer be demonstrated:

In 18 cases after a single injection; in 33 cases after 2 injections; in 35 cases after 3 injections; in 14 cases after 4 injections; in 9 cases after 5 injections; in 4 cases after 6 injections; in 1 case after 11 injections.

While these results illustrate the remarkable action of the serum in destroying the meningococci, they also show the necessity of repeating the injections as recommended and of being guided by the examination of the cerebrospinal fluid in continuing injections after the third or fourth.

Too much emphasis can not be laid upon the point that the treatment of cerebrospinal meningitis must be vigorous, with full doses,

continued until a cure is effected. A large part of the failures to get satisfactory results have been from ignorance or neglect of this important point, from the tendency to let well enough alone, and to wait for the full effect of each dose before following it up with another.

It may happen that the inflammatory process may be largely localized in the ventricles of the brain, and the communication between these and the spinal subarachnoid space obliterated. In such cases severe symptoms will continue even after the cerebrospinal fluid appears free from meningococci, and intraspinal injections will be ineffective. It is advisable in these cases to make the injections directly into the ventricles of the brain, bilaterally if necessary. The indications for this procedure are prolonged subacute or chronic course of the disease, with the signs of acute hydrocephalus, viz, intensified stupor, headache, cerebral vomiting, slowing and irregularity of the pulse, "choked disc," and the failure of intraspinal injections to relieve the conditions. The procedure itself is a surgical operation, which can not be described here.

Indications for the use of antimeningococcic serum.—Antimeningococcic serum should be used in every case of cerebrospinal meningitis. The chances of recovery, other things being equal, are proportional to the promptness of its use; the delay of a day, sometimes of a few hours, may seriously affect the patient's chances for recovery. It is therefore vital to make at least a provisional diagnosis as early as possible. From the clinical signs it is often impossible to make an early distinction between cerebrospinal meningitis and meningitis due to infection with other organisms; such a distinction can be made only by bacteriological examination of the cerebrospinal fluid. Lumbar puncture should therefore be made upon the first suspicion that the case may be one of cerebrospinal meningitis. Rather than suffer the delay incident to a bacteriological report, the physician should be prepared to make the first injection of serum at the same time as the diagnostic lumbar puncture. If the fluid obtained is turbid, it indicates an acute inflammatory process due to bacterial infection. Without waiting to determine whether the infection is due to the meningococcus or to the pneumococcus or some other bacterium, the first injection should be made at once, especially if the prevalence of an epidemic strengthens the suspicion of cerebrospinal meningitis. The serum will be of benefit only in case the infection is due to the meningococcus; but the danger attending a useless injection of serum in a case of meningitis due to another cause is slight as compared to the danger of delaying its administration in a case of meningococcus infection. The fluid should then be examined by a competent bacteriologist, and if Gram-positive cocci are found (pneumococcus, streptococcus) no further injections need be made. If Gram-negative cocci are found, treatment should be continued. If the appearance of the fluid indicates an acute inflammation of the meninges, such as expected in cerebrospinal meningitis, and the clinical picture warrants that diagnosis, treatment should be continued even where no organisms are found. But in such cases the examination of the fluid should be most careful and repeated at each injection.

If, however, the cerebrospinal fluid is clear and does not show the characteristic cellular elements, the diagnosis of cerebrospinal meningitis is not probable.

Untoward results from the administration of serum.—More or less unpleasant, sometimes alarming, and occasionally serious consequences result from the administration of serum by intraspinal injection. These results are due to various causes: The pressure of the serum in the canal, the local action of the serum in destroying meningococci, and the toxic action of a foreign serum upon the human body.

The injection of serum may cause immediate painful sensations in the lumbar region and in the lower limbs, sometimes with vesical and rectal tenesmus, and considerable agitation of the patient. Netter and Debré recommend the administration of morphine when needed to quiet the patient in such circumstances. Sometimes a more alarming train of symptoms may occur during the administration of the serum; the patient may suddenly pass into syncope and collapse, becoming pale and limp, with feeble pulse and respiration. In the more serious cases the respiration becomes irregular, then ceases, the heart stops, the patient becomes cyanotic and comatose, with convulsive movements of the face or limbs, and occasionally dies suddenly. Sometimes, though rarely, the patient remains in a state of coma for several hours, then dies. Usually, however, even when the collapse is very alarming the patient may be restored by prompt measures.

It is recommended that at the first signs of collapse the injection be stopped, and if the serum injected has caused a high pressure some of it may be allowed to escape through the needle. Artificial respiration, heart massage, lowering of the head, and immediate stimulation are to be used when indicated, as in collapse under a general anesthetic.

The cause of these sudden symptoms is not clearly understood. Probably they are due to several causes—too sudden or too great change of pressure, sudden liberation of toxins by the destruction of meningococci within the spinal canal, hypersusceptibility to horse serum.

It is stated by Levy that patients who exhibit alarming collapse at the first injection of serum may bear subsequent injections well. Levy noted collapse in 16 of 160 patients treated. Of these two failed to rally; five others died later during the course of the disease. Levy intimates that severe collapse is more apt to occur in very severe than in milder infections; that serious accidents are most likely to occur in the cases which would most probably have died without serum treatment.

Later symptoms, which may be expected in some cases from the administration of serum, are: Irregularity of the pulse, restlessness, twitching, headache, pains in the back and lower limbs. These symptoms, which may follow shortly after the injection, are usually of a few hours' duration only and seldom alarming.

Quite frequently the injection of serum may be followed within a few hours by a rise of temperature which may be considerable, and may be accompanied by an exaggeration of meningitic symptoms. This, according to Levy's view, is due to the action of the serum in destroying the meningococci and liberating consequently large amounts of their endotoxin. The rise of temperature is more constant and more severe following the first injection than after subsequent injections.

Still another, later train of symptoms attributable to the action of the serum may be expected, namely, the symptoms of so-called serum disease, which not uncommonly follows the administration of horse serum subcutaneously. This manifests itself most commonly from 8 to 14 days after the injections, giving rise to an elevation of temperature, and an urticarial eruption, sometimes accompanied by other symptoms suggestive of a relapse, viz: Pains in the limbs and joints, accentuated stiffness of the neck, headache, Kernig's sign.

If the clinical distinction can not be made between serum sickness and a relapse, lumbar puncture will usually differentiate. If a relapse is occurring the fluid will show meningococci; if the symptoms are due to the toxic action of the serum upon a recovered patient, the cerebrospinal fluid will be clear and free from meningococci.

According to Netter and Debré the amount of serum injected at a single dose or upon successive days has little influence upon the frequency or severity of such symptoms. Symptoms are apt to be more severe but not serious where the patient has previously received injections of horse serum, as in the treatment of diphtheria, and especially where a relapse renders it necessary to administer serum a week or more after the first injections.

These unpleasant and sometimes disquieting results from the administration of serum have been dwelt upon not to impress their gravity. As a matter of fact they are practically insignificant as compared to the disease itself, and are mentioned rather that they may be looked for, guarded against so far as compatible with vigorous treatment, and may not cause unnecessary alarm when encountered. The fear of them should not deter any one from using full, vigorous serum treatment in every case of cerebrospinal meningitis.

RESULTS OF SERUM THERAPY.

The following table, taken from Levy's treatise, presents succinctly some of the results accomplished by the use of antimeningococcic serum in reducing the mortality from cerebrospinal meningitis.

Since the disease is one in which the case mortality varies greatly in different epidemics, the results of serum treatment as shown in this table can best be appreciated by comparing in each instance the mortality of untreated cases in the same vicinity:

Reported by—	Cases treated with serum.		Cases treated without serum (percentage mortality).
	Number.	Percentage mortality.	
Flexner (collective)	712	31.4	70–80.0
Netter	100	28	49.0
Dopter	402	16.44	65.0
Schoene	30	25	53.0
Jehle, Weiss-Eder	64	42	70–85.0
Leick	34	32.4	66.0
Neglein	30	26.6	50.0
Kleinschmidt	21	19	[1] 62.47
Quenstedt	18	22.2	[2] 56.2
Levy	165	18.18	[3] 52.14

[1] General mortality in Prussia, 1907.
[2] General mortality in Prussia, 1908.
[3] General mortality in Prussia, 1909.

The above table gives the gross mortality, including among the serum-treated cases a number of fatalities in patients moribund when treatment was commenced, a considerable number in whom the treatment was not sufficiently vigorously carried out, still others who died from complications such as pneumonia, tuberculosis, valvular heart disease, etc. Even including these cases the mortality as compared to cases in the same vicinity not treated with serum has commonly been reduced to one-half, not infrequently to one-third or one-fourth. It is abundantly proven that in cases treated early and vigorously the mortality may be expected to be reduced to even lower rates than those given above.

The importance of instituting serum treatment as early as possible in the course of the disease is illustrated by an analysis of the 712 cases reported by Flexner,[1] 99 cases reported by Netter and Debré from their own experience, and 402 cited by them as reported by Dopter.

Day of disease when treatment was begun.	Mortality, per cent.		
	Flexner's cases (712).	Dopter's cases (402).	Netter and Debré's cases (99).
First to third day	25.3	8.20	20.9
Fourth to seventh day	27.8	14.40	33.3
Later than seventh day	42.1	24.10	26.0
Average mortality	34.1	16.44	28.0

Of the 44 cases treated by Netter and Debré before the third day 9 died. Of these 9 fatalities 4 were in patients moribund when brought in for treatment, 3 others in patients who left the hospital apparently cured and were brought back after a considerable interval in a desperate state in relapse, another in a patient with cardiac lesions. Excluding the cases, in which the authors believe the serum treatment did not have a fair trial, there are left 36 cases with only 2 deaths, a mortality of only 5.55 per cent. These authors consider that recovery is the rule in patients in whom treatment is begun within the first three days of the disease.

The beneficial results of serum therapy in the treatment of cerebrospinal meningitis are not limited to the reduction in mortality. The use of the serum shortens the course of the disease, renders it less distressing, and among the patients who recover reduces the proportion of the most serious sequelæ, such as blindness, deafness, idiocy, and paralysis.

During the spring of 1911 the writer had the opportunity of studying an epidemic of cerebrospinal meningitis at Savannah, Ga., where antimeningococcic serum, prepared for the market by an American firm, was used by various physicians.

Full data concerning the treatment employed were obtained in 50 cases, of which 22 received more or less thorough serum treatment and 28 received no serum.

[1] Flexner, Simon, The Present Status of the Serum Therapy of Epidemic Cerebrospinal Meningitis. Jour. Am. Med. Assn., 1909, vol. 53, pp. 1443-1445.

The mortality among the serum-treated cases was as follows:

Day of disease on which treatment was begun.	Number of cases.	Number of deaths.	Case mortality.
			Per cent.
First to third day	11	5	45.5
Fourth to seventh day	6	3	50.0
Later than seventh day	4	3	75.0
No serum given	28	16	57.0

Of 11 cases reported as having recovered after the administration of serum, 2 (18.8 per cent) had defects remaining; of 12 cases reported as having recovered without the administration of serum, 5 (41.6 per cent) had defects remaining.

Of the 5 cases which died in spite of serum therapy begun within the first three days, 1 was complicated with puerperal septicemia, 1 with whooping cough and pneumonia; 2 of the remaining cases received each only a single dose, and the fifth received repeated small doses.

These figures are of interest as showing the value of American commercial serum such as is readily available to all. When administered early and vigorously, the results were prompt and striking. The writer was, however, chiefly impressed in this epidemic with the extreme importance of having the treatment administered by physicians expert in the technique and well acquainted with the principles.

Summarizing the observations upon the use of antimeningococcic serum in the treatment of cerebrospinal meningitis, it has been agreed upon by those best qualified to judge—

(1) That the serum when promptly and properly used effects a very substantial reduction in mortality, shortens the course of the disease, and reduces the proportion of disastrous sequelæ.

(2) That it must be used freely—repeated daily for at least three days in most cases, and as much longer as may be found necessary from observation of clinical signs and examinations of cerebrospinal fluid.

(3) That the best results can be obtained only by persons expert in the technique and principles of the treatment and conversant with the clinical aspects of the disease.

PROPHYLAXIS.

If the inferences from the above facts are correctly drawn, it is obvious that the prevention of the spread of cerebrospinal meningitis is a matter of extreme practical difficulty. If, indeed, persons apparently in good health, carriers of the meningococcus, unrecognizable except by means of a difficult bacteriologic examination, are the most important source of the infection, it must be admitted that the sources of infection are largely uncontrollable by any means of general, practical application. If, as estimated by Fluegge, healthy carriers are ten times more numerous than recognized cases of meningitis, and because of their freer movements are more than ten times as prolific a source of infection for others, then the most that we can hope to accomplish by the isolation of every recognized case is a slight

reduction, perhaps 10 per cent, in the dissemination of the infection. By complete isolation of all the associates of every recognized case more might perhaps be accomplished; but rigid quarantine is a serious economic matter, justified only by a reasonable hope of proportionate results; and considering that the most prompt and rigid isolation of all the immediate associates of every recognized case would still leave at large a very considerable number of carriers, the rigid quarantine of either houses or communities on account of cerebrospinal meningitis seems ordinarily unjustified. The chances are that by the time the first case in a community is recognized other foci of infection have already been established; that by the time an epidemic is recognized in one community, the infection has already been carried to other communities in close communication with the first.

To undertake to make bacteriological examinations sufficient to discover all the carriers in a community of any considerable size is obviously impracticable; if it were possible it would consume so much time that the infection would have ample opportunity to spread in the meantime. Moreover, the control of carriers when discovered would be practicable only under military rule or in institutions. The most recent bacteriologic studies, as well as past experience, indicate that cerebrospinal meningitis, when once it has become epidemic, is not controllable by any known means of practical application.

PUBLIC MEASURES FOR THE CONTROL OF CEREBROSPINAL MENINGITIS.

The high mortality of cerebrospinal meningitis, its peculiarly distressing clinical course, and the frequency of most serious after-effects render it imperative that every possible measure be taken to protect the public from its ravages. Public-health authorities, in their efforts to minimize the damage done by this disease may consider two lines of procedure (1) prevention of its spread, and (2) reduction of mortality and disability by providing facilities for the most advantageous treatment. Of these lines of procedure, prevention is undoubtedly preferable—if it can be accomplished—and at the same time more in line with the generally accepted views of the functions of public-health organizations. As stated above, however, even the most rigid preventive measures offer at best a very doubtful hope of materially reducing the prevalence of this disease. On the other hand, serum therapy, well administered, does offer the well-justified expectation of reducing the damage done to one-half or even one-fourth.

There are, moreover, special reasons why public-health authorities should take an active part in the serum therapy of cerebrospinal meningitis. The cost of the serum itself, while not great, is sufficient to render it unavailable to the very poor. Aside from the serum the proper treatment of a case is very expensive, requiring the daily and almost constant services of at least two physicians and skilled attendants. The best results require expert services which are not available in all communities; and the number of cases which can be treated at the same time by a single staff of experts is small unless the patients are concentrated in a hospital with adequate facilities. Finally, the diagnosis and the proper control of treatment require

expert bacteriological services which are not available in many communities, and when available are very justly expensive.

It is believed that the most effective work which can be done by State and municipal health authorities toward controlling epidemics of this disease is along the lines of rendering assistance in its therapy. An outline of the measures suggested is presented.

1. To require prompt reports to the local authorities of all suspected cases of this disease.

2. To provide the best possible facilities for diagnosis, viz:

(*a*) An expert diagnostician, employed by the health authorities to visit suspected cases in consultation with the reporting physician.

(*b*) An expert bacteriologist, with a laboratory established in the immediate locality, to examine and report upon specimens of cebrospinal fluid.

3. To provide the best possible facilities for treatment, by employing the necessary staff of properly qualified physicians, with hospital facilities adequate for the treatment of all cases, and the requirement that all cases pronounced suspicious by the diagnostician be sent at once to the hospital for diagnostic lumbar puncture and treatment. The necessary serum and medical and hospital attendance should be provided free.

In many communities local men might be most advantageously employed to take charge of the diagnostic and therapeutic measures. The feasibility of such methods depends, of course, upon the support of public sentiment, and especially upon the cooperation of the practicing physicians, and the details in each community would need to be adjusted to suit the circumstances. It is believed, however, that with the modifications required by local conditions these measures can readily be carried out and will prove effective.

In spite of the apparently insuperable obstacles in the way of preventing the spread of the disease, such measures as are practical should be taken toward that end. Following is a brief outline of the measures suggested:

1. Reporting of all cases, on suspicion.

2. Isolation of patients and disinfection of nasopharyngeal discharges, as for diphtheria. The utmost cleanliness among all associates of the patient and the use of antiseptic gargles and nasal douches.

3. Such restriction as practicable of communication between the associates of the patient and others; placarding the house, exclusion of unnecessary visitors, exclusion of the children of the family from schools, and so far as possible confining to the house all members of the family who are not obliged to go out in pursuit of necessary business. Quarantine of the breadwinners on the assumption that they are carriers is of doubtful justification.

4. In the discretion of the health authorities it may be wise to close schools and prohibit public gatherings in a severe epidemic, especially if there is evidence that the epidemic is still localized in some part of the community, which is, however, seldom the case.

5. The public might well be advised, when the disease is prevalent in a community, to minimize their chances for contracting the infection by keeping away from large public gatherings, especially keeping their children away; by avoiding the use of public drinking

cups; and by exercising care as to the personal cleanliness of themselves and their children.

6. The administration of urotropin in moderate doses, under the supervision of a physician, may be suggested as a possible though quite unproven prophylactic.

Under some circumstances more rigid measures may be justified. For example, a localized outbreak of the infection in an institution, a military or industrial camp, or even a severe outbreak in a small town might justify quarantine of the whole aggregation associated with the cases, though it is highly improbable that the quarantine would prevent the spread of the infection.

It is to be remembered in this connection that by the time an epidemic is recognized in a locality the infection is probably widespread in the community; that even in the vicinity of rather rare sporadic cases a considerable proportion of carriers have been found; that a not inconsiderable proportion of infected persons remain carriers for a long time, and that finally quarantine has been in a good many instances thoroughly tried and found unavailing.

Even systematic search for carriers and their isolation is probably useless except in strictly localized outbreaks.

Where rigid quarantine has been tried and the disease has failed to spread from a recognized focus the conclusion is not justified that the quarantine has prevented the spread. It is to be remembered that the majority of cases give rise to no apparent, traceable secondary cases, that the disease often fails to spread under conditions that would seem most favorable for it, and characteristically appears where it is not expected

UNITED STATES.

MUNICIPAL ORDINANCES, RULES, AND REGULATIONS PERTAINING TO PUBLIC HYGIENE.

[Adopted since July 1, 1911.]

CLEVELAND, OHIO.

DRINKING CUPS AND DISHES USED IN PUBLIC PLACES AND IN HOTELS, RESTAURANTS, ETC.

SEC. 1. The use of public and common drinking cups, glasses, or vessels of any kind to be used in common, for the purpose of drinking therefrom on railroad trains or in stations, in public or private schools, public buildings, halls, churches, theaters, markets, playgrounds, parks, stores, hotels, offices and office buildings, factories or manufacturing establishments, or in any other public place whatsoever, in the city of Cleveland, is hereby prohibited.

SEC. 2. No person, partnership, or corporation in charge or control of any railroad train or station, or public or private school, public building, hall, church, theater, market, playground, park, store, hotel, office or office building, factory or manufacturing establishment, or in any other public place whatsoever, shall furnish, provide, place or expose, or allow to be furnished, provided, placed or exposed, any cup, glass, or any other drinking vessel at any place where the public or more than one particular individual may or can have access to or the use of such vessel, or where such vessels, may or can be used in common by the public or by more than one particular individual, on any railroad train or in any station, or public or private school, public building, hall, church, theater, market, playground, park, store, hotel, office and office building, factory or manufacturing establishment, or at any other place whatsoever, under his or its control in the city of Cleveland.

SEC. 3. The owner, lessee, or person in charge of any hotel, saloon, restaurant, drug store, soda fountain, or any place of public refreshment, shall furnish glasses, cups, dishes, and other eating or drinking vessels and utensils used in the said hotel, saloon, restaurant, drug store, soda fountains, or other places of public refreshment, to be thoroughly cleansed after use by each and every customer in a manner approved by the board of health.

SEC. 4. Any person violating any of the provisions of the above sections shall, upon conviction, be deemed guilty of a misdemeanor and punishable by a fine of not less than $10 or more than $25, and each day's failure to comply with any provision of the above sections shall constitute an additional and separate offense.

This resolution shall take effect and be in force from and after its adoption and legal publication. [Resolution board of health, adding Title VII to part 6 of Rules and Regulations of the board of health. Adopted Sept. 1, 1911.]

HARTFORD, CONN.

COMMUNICABLE DISEASES—NOTIFICATION, ISOLATION, PLACARDING, DISINFECTION.

REGULATION 1. Every physician shall report in writing to the board of health, within 12 hours after his recognition of the disease, every case of cholera, yellow fever, typhus fever, leprosy, smallpox, diphtheria (membranous croup), typhoid fever, scarlet fever, cerebrospinal fever, poliomyelitis, whooping cough, measles, or such other contagious or infectious disease as the board of health may designate.

REGULATION 2. Every householder in whose house any person shall be ill with any of the following diseases, to wit: Cholera, yellow fever, typhus fever, leprosy, smallpox, diphtheria (membranous croup), typhoid fever, scarlet fever, cerebrospinal fever, poliomyelitis, whooping cough, measles, or such other contagious or infectious disease as the board of health may designate, shall report the same to the board of health within 12 hours of his first gaining knowledge of such disease, provided no physician shall be in attendance.

REGULATION 3. Until permission has been received from the board of health, no clothing or other property that may have been exposed to the infection of cholera, typhus fever, leprosy, diphtheria (membranous croup), scarlet fever, smallpox, or such other malignant contagious diseases as the board of health may designate shall be removed from the house; neither shall any occupant of such infected dwelling change his residence, nor shall any public or circulating library or any schoolbook be taken into the house without the consent of said board of health.

REGULATION 4. Whoever is infected with smallpox, scarlet fever, diphtheria (membranous croup), or other malignant contagious disease requiring isolation to protect the public shall immediately proceed to some isolated place or room designated by the board of health, and remain there until permitted to remove by order of said board. Every parent or guardian of any child or ward infected with smallpox, scarlet fever, diphtheria, membranous croup, or other malignant contagious disease shall immediately cause such child or ward to be conveyed to some isolated place or room designated by the board of health, and no parent or guardian shall permit such child or ward to remove from such place or room until the board of health shall certify that all danger of communicating the disease is passed.

REGULATION 5. No person other than the attending physicians, nurses, and the agents of the board of health shall enter, and no dog, cat, or other animal shall be allowed to enter any apartment or place set apart for the treatment of smallpox, scarlet fever, diphtheria, or other malignant contagious disease without the consent of the board of health.

REGULATION 6. No person affected with smallpox, diphtheria, membranous croup, scarlet fever, whooping cough, or measles shall attend any public meeting or assembly or travel in any public conveyance.

REGULATION 7. Upon every house or apartment in which there is a case of diphtheria, including membranous croup, scarlet fever, or such other malignant contagious disease as the board of health may determine under quarantine, shall be placed a placard with the name of the disease. This placard shall not be defaced or removed by any person without the authority of the board of health.

REGULATION 8. No person having the care either as physician, parent, or attendant of any person who has been placed in isolation for a contagious disease shall advise or permit such other person to leave any place designated by the board of health as a place of quarantine before said board shall have certified that this can be done without danger to others.

REGULATION 9. It shall be the duty of any physician or person having charge of a case of contagious disease ordered into isolation by the board of health to report to said board as soon as the case is ready for dismissal.

Before the card placed upon a house or apartment in which there is a case of diphtheria or membranous croup on the restrictions placed on intercourse between the inmates of such house will be removed, a culture shall be taken from the throat of each patient surviving and a report received from the laboratory of the Hartford board of health or the State board of health that such culture does not show the presence of bacillus of diphtheria. And a second culture and report and cultures from persons in contact with the case may be required as the board of health may direct. The culture for release as above described shall be taken by the physician attending the case. Subsequent cultures may be taken by the medical inspector if desired. If an interval of four weeks has elapsed without securing a culture free from diphtheria bacilli and clinical signs of the disease are absent, the board of health will, upon request of the physician in attendance, take further cultures as may be necessary.

REGULATION 10. Placards posted on account of scarlet fever may be removed when desquamation has ceased and no abnormal discharges from the nose or throat are present. Cases in which no evident desquamation or unusual discharge exists will be kept under quarantine for three weeks and may be released after that date upon the approval of the board of health.

DISINFECTION REGULATION 11. It is to be remembered that direct sunlight and fresh air are powerful disinfectants, and that both of these should be admitted as freely as possible to all rooms in which patients are under treatment for contagious disease.

All washable clothing removed from contact with cases of smallpox, typhoid fever, scarlet fever, diphtheria, or such other diseases as the board of health may direct shall be disinfected by soaking for at least one hour in a 5 per cent solution of carbolic acid in water, a 1 to 1000 solution of corrosive sublimate in water, or by such other means as the board of health may direct before being removed from the room. Clothing or bed linen thus treated may then be washed and laundered in the usual way. Milk bottles are to be thoroughly washed in scalding water before being returned to the dealer.

Discharges from the nose and throat of patients suffering from diphtheria, consumption, scarlet fever, or such other diseases as the board of health may direct are preferably to be received in a paper sputum cup or on pieces of tissue paper or cloth, which should be at once placed in a paper bag and burned before they become dry; otherwise, they may be received in a receptacle containing one of the above-named disinfecting solutions, which should be emptied frequently.

All discharges from cases of typhoid fever should be disinfected by remaining in contact with at least a pint of a solution of 6 ounces of chlorinated lime to a gallon of water for at least one hour, after which the vessels may be emptied and cleansed.

Upon termination or removal of all cases of diphtheria, membraneous croup, scarlet fever, consumption, or such other diseases as the board of health may direct, the premises must be disinfected in a manner satisfactory to the board of health.

REGULATION 12. No superintendent, principal, or teacher in any school or any parent or guardian of any child attending school shall permit a child sick with smallpox, scarlet fever, diphtheria, membraneous croup, measles, German measles, consumption, chickenpox, mumps, itch, lice, favus, ringworm, contagious impetigo, or such other contagious diseases as the board of health may direct, to attend school, nor shall any child residing in any household in which such disease exists be allowed to attend school without a permit from the board of health. No person living in any single house or apartment upon which a card has been placed, as required in section 7, shall attend school without a written permit from the board of health and the superintendent of schools.

Children exposed to infection from diphtheria who have removed from the infected household may be admitted to school if cultures from the nose and throat do not show the germ of that disease. Those exposed to scarlet fever may be admitted if showing no unusual symptoms after an interval of 10 days from the last exposure.

Children sick with measles, German measles, mumps, or chickenpox shall be excluded from school for two weeks, and in chickenpox until all crusts are removed. Other children in the family who have not had the disease are excluded for two weeks from the appearance of the last case. Cases of whooping cough are excluded for a period of one month and until a period of three days have elapsed without a "whoop." Other children in the family are to be excluded if showing any signs of cough. Children who have had these diseases may be admitted if in the opinion of the medical inspector it is safe to do so. [Regulations board of health, approved Nov. 1, 1911.]

ST. JOSEPH, MO.

MILK—PRODUCTION, CARE, AND SALE.

Be it ordained by the common council of the city of St. Joseph as follows:

SEC. 1. Every person or firm selling milk or cream within the city of St. Joseph shall obtain from the board of health, on the 1st day of November of each year, a certificate of registration; such certificate to be nontransferable, and may be revoked for the violation of milk ordinances of the city of St. Joseph or any rule of the board of health. Also every person or firm who may desire to engage in the sale of milk or cream at any time shall obtain a certificate of registration, as above stated, before engaging in such business. Every person on making application for a certificate of registration shall be required to give his name and address and the location of his dairy and the number of cows in his herd from which the milk or cream is obtained; or, if such person is not a producer, but buys milk from another party, he shall give the name and address of the other party, together with the location of the dairy of such party, if any, and the number of cows in the herd. Said certificates shall be serially numbered, and every dealer shall have his certificate number legibly painted on both sides of each vehicle which is used by him in the delivery of milk or cream. When milk or cream is sold in any place of business the certificate itself shall be conspicuously posted. Any dealer desiring to change his supply of milk shall notify the board of health of his intention, and if such source of supply is found to be conducted in accordance with the provisions of the law, the dealer may make such change.

SEC. 2. Every person or firm controlling or having in possession any dairy or cows supplying milk or cream to anyone within the city of St. Joseph shall provide and maintain a suitable milk house for the purpose of cooling, mixing, storing, canning or bottling the same. Said milk house or room shall not be located in or be a part of any residence, dwelling house, or barn. Milk or cream shall not be cooled, stored, mixed, or kept in any room or place occupied by any person or persons for sleeping or living apartments, or occupied by horses, cows, or other animals or fowls of any kind. Cooling, bottling, mixing, or store rooms for milk or cream shall be used for no other purpose whatever. All rooms or houses in which milk or cream is cooled, stored, mixed, or

bottled shall be provided with such walls as can be kept clean, and will exclude flies and other insects, and the floors of said rooms shall be made of such material as may be kept clean and sanitary. Furthermore, such walls and floors must be kept clean and sanitary at all times, and flies and other insects must be excluded from said room. All doors and windows in said rooms must be properly screened.

SEC. 3. All cans or other receptacles containing milk or cream, either on wagons or n places where same is offered for sale, shall be clean and in good condition.

SEC. 4. The collection of milk vessels, milk cans, or any other container used in the delivery of milk or cream from houses in which are located cases of any contagious disease is forbidden. Such vessels must be left at the house until they have been disinfected under the supervision of the board of health, after which they may be collected by the owner.

SEC. 5. No person, firm, or corporation engaged in the sale or the delivery of milk or cream shall use any milk checks, tickets, or coupons except aluminum, a second time in exchange for any milk or cream, and all tickets or coupons shall have the name and address of the person or firm selling such milk or cream plainly printed thereon, and such checks, tickets, or coupons should be numbered consecutively.

SEC. 6. Every wagon or other vehicle used in the sale or the delivery for sale of milk or cream shall have painted on both sides thereof, in a conspicuous manner and in legible Roman letters not less than five inches in height the name of the person, firm, or corporation owning or operating such vehicle.

SEC. 7. No milk or cream shall be sold, offered or exposed for sale within the city of St. Joseph which shall have been sterilized or pasteurized without the can, bottle, or other container being marked in plain Gothic letters with the word "sterilized" or "pasteurized."

SEC. 8. All milk or cream subjected to the process of pasteurization for sale within the city of St. Joseph shall be pasteurized in accordance with one of the following processes, so that said milk or cream will have been heated below boiling but sufficiently to kill most of the active organisms present:

A uniform heating at 140° maintained for 20 minutes.

150° F. maintained for 15 minutes.

155° F. maintained for 5 minutes.

160° F. maintained for 1½ minutes.

165° F. maintained for 1 minute.

This time shall be calculated from the period the entire quantity reaches the required temperature. The pasteurized product shall be cooled at once to a temperature of 5° F. or lower. This cooling shall be so conducted that the pasteurized product is not exposed to the air or other contamination. The apparatus shall be so constructed that it can readily be cleaned and sterilized.

SEC. 9. No milk or cream shall be sold, offered or exposed or kept with the intention of selling the same within the city of St. Joseph after November 1, 1911, unless such milk or cream shall have been obtained from cows that have given a satisfactory tuberculin test within one year from the date of such sale, or offer for sale, of such milk or cream. All cows that have been satisfactorily tested and that have given a negative reaction shall be marked "tuberculin tested" in a manner satisfactory to the board of health, and shall be numbered, and a certificate shall be filed with the health department of the city of St. Joseph by the person making such test upon forms furnished by the said health department, giving the number of the animal, the date of taking said test, name of the owner and the result of the test made, together with a brief description of the animal tested, said certificate shall be signed by the person making such test. All tests so made shall be by the State veterinarian or his duly authorized deputy.

SEC. 10. It shall be unlawful for any milkman, dairyman, veterinarian or any other person except the State veterinarian or one of his assistants or a United States veterinarian working under the direction of the State veterinarian or the United States Government, to test by using in the eyes or injecting any tuberculin or any product of tuberculin into any milk cow or cows, the milk of which is sold or offered for sale within the city of St. Joseph.

SEC. 11. Any person, firm, or corporation having milk in his or its possession and offering the same for sale the temperature of which is higher than 60° F., the milk inspector or other officer of the board of health who shall be authorized by the board of health to inspect the same may add aniline to such milk to change its color so as to make it unsalable for domestic purposes and not make it unfit for other purposes.

SEC. 12. Whenever the word "milk" or term "milk or cream" are used in this ordinance it shall be construed to include milk, cream, skim milk, and milk modified in any form, but nothing in the ordinance shall be so construed as to prohibit the sale of sour milk, or what is known as buttermilk, provided the same is sold as such and is produced from pure and wholesome milk.

SEC. 13. No milk sold, kept, or offered for sale within the city of St. Joseph shall contain more than 300,000 bacteria per cubic centimeter.

SEC. 14. The following rules shall be complied with:

RULE 1. Barn must not leak, must have tight floor with well-drained gutter, and have a sufficient number of windows for proper light and ventilation.

RULE 2. Barn must be thoroughly cleaned at least once a day, and manure must be removed not less than 25 feet from barn.

RULE 3. Feed troughs and mangers must be kept clean and sanitary at all times.

RULE 4. Cows must be supplied with clean, fresh well, spring, or hydrant water, and the watering troughs must be kept clean and sanitary.

RULE 5. Barn must be whitewashed on inside at least once a year.

RULE 6. The udders and the surrounding parts must be wiped with a clean damp cloth immediately before milking, and milking must be done with dry hands. Tobacco should not be used while milking.

RULE 8. Milk must be strained in milkhouse through four thicknesses of clean, recently sterilized cloths, free from holes.

RULE 9. All cans, bottles, and other utensils must be thoroughly cleaned with salsoda, soap, or any reliable cleansing powder, after which they must be thoroughly sterilized with boiling water or live steam and placed in an inverted position in pure air to drain.

RULE 10. All milk must be cooled to a temperature of 60° F., or lower, immediately after milking, and kept at such temperature until delivered to the customer.

RULE 11. The United States Government score-card system shall be used in scoring all dairies, and any person whose dairy scores lower than 40 shall be notified and given 30 days in which to make necessary improvements, at the end of which time, if such improvements shall not have been made, the sale of all milk or cream from such dairy shall be prohibited within the city and the certificate of such person shall be revoked.

RULE 12. All milk wagons, ice chests, or ice containers therein must be kept at all times clean and free from all odor, and it is hereby declared unlawful for any garbage or refuse of any form or kind to be allowed on any milk wagon.

SEC. 15. No provisions of this ordinance except sections 4 and 5 shall apply to any resident of the city of St. Joseph who may sell milk or cream from not to exceed 2 cows: *Provided*, That that portion of section 9 which pertains to the tuberculin test shall apply to all dealers.

SEC. 16. All ordinances or parts of ordinances in conflict herewith are hereby repealed and any person, firm, or corporation violating any of the provisions of this ordinance shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not less than $10 and not more than $50. [Ordinance adopted Sept. 13, 1911.]

SAN FRANCISCO, CAL.

RAGS AND CAST-OFF CLOTHING—USE OF AS WIPING RAGS.

SEC. 1. It shall be unlawful for any person, firm, or corporation to sell or offer for sale soiled cloths or rags, or soiled or disused or cast-off underclothing, garments, bedding, bedclothes or parts thereof, for use as wiping rags, unless the same have been cleansed and sterilized by a process of boiling continuously for a period of 40 minutes in a solution containing at least 5 per cent of caustic soda.

SEC. 2. It shall be unlawful for any person, firm, or corporation employing mechanics, workmen, or laborers, to furnish or supply such employees for use as wiping rags, soiled cloths or rags, or soiled or disused or cast-off underclothing, garments, bedclothes, bedding or parts thereof, unless the same have been cleansed and sterilized in the manner herein prescribed.

SEC. 3. Wiping rags within the meaning of this ordinance are cloths and rags used for wiping and cleaning the surfaces of machinery, machines, tools, locomotives, engines, motor cars, automobiles, cars, carriages, windows, furniture, and surfaces of articles, in factories, shops, steamships, and steamboats, and generally in industrial employments; and also used by mechanics and workmen for wiping from their hands and bodies soil incident to their employment.

SEC. 4. It shall be unlawful for any person, firm, or corporation to establish or maintain a laundry for cleaning or sterilizing wiping rags or soiled cloths or rags or soiled and disused or cast-off clothing, garments, underclothing, bedclothes, bedding, or parts thereof, within the limits of the city and county of San Francisco, without having first complied with the ordinances of the said city and county regulating the conducting of public laundries and obtain a permit therefor as required by section 12 of this ordinance.

SEC. 5. No charge whatever shall be made, or compensation or fee collected or received for the performance of any services required by the provisions of this ordinance, or the issuance of certificates or permits, but all such services shall be performed free of charge.

SEC. 6. All soiled cloths and rags and soiled and disused and cast-off underclothing, garments, bedclothes, bedding and parts thereof, before being offered for sale, or sold or furnished for use as wiping rags must be subjected to a process of sterilizing approved by the board of health of the city and county of San Francisco, including the process of boiling for a period of 40 minutes in a solution of caustic soda mentioned in section 1. Before washing, all sleeves, legs, and bodies of garments must be ripped and opened and all garments made into flat pieces.

SEC. 7. It shall be unlawful for any person, firm, or corporation to wash, cleanse, sterilize, or dry disused or castoff clothing, garments, underclothing, bedclothes, bedding or parts thereof, or soiled cloths or rags in the same building or by the same machines or appliances by which clothing, bedding, or other articles for personal or household use are laundered.

SEC. 8. Each package or parcel of wiping rags must before being sold be plainly marked "Sterilized wiping rags," with the number and date of the certificate given by the health officer of the said city and county for the conducting of a laundry in which the rags contained in such package or parcel were cleansed and sterilized or with the name and location of the laundry in which said rags were cleansed and sterilized.

SEC. 9. Wiping rags imported into this city and county from other cities, counties, or States shall not be used, sold, or offered for sale, unless they have been cleansed and sterilized as required by this ordinance, or unless such imported rags are inspected by the health officer and a certificate given by him that such rags have been inspected and cleansed and sterilized as required by this ordinance.

SEC. 10. The health officer shall inspect all wiping rags and give a certificate to that effect when the rags inspected have been cleansed and sterilized as required by this ordinance. Such certificate shall also state the date of inspection, the quantity and number of parcels inspected, the name of the owner, and the place where the wiping rags were cleansed and sterilized.

SEC. 11. All persons having wiping rags in their possession for sale or for use shall, upon demand of any officer of the department of public health or any police officer, exhibit such wiping rags for inspection and give all information as to where and from whom said wiping rags were obtained.

SEC. 12. No person, firm, or corporation shall engage in the business of laundering, cleaning, or sterilizing cloths or material for wiping rags, or selling wiping rags without a permit therefor from the board of health. Such permit shall be granted as of course on the first application and may be revoked by the board of health for violation by the holder of any of the provisions of this ordinance. Subsequent permits to a person, firm, or corporation in place of a permit revoked may be granted or refused at the discretion of the board. The board of health shall keep a register of all persons engaged in laundering, cleaning, sterilizing, or selling wiping rags, and shall enter therein the place of business, the date of issue, and the revocation of permit.

PENALTY.

SEC. 13. Any person, firm, or corporation who shall violate any of the provisions of this ordinance shall be guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine not to exceed $500, or by imprisonment in the county jail for not more than six months, or by both such fine and imprisonment.

SEC. 14. The police authorities are hereby directed to have the provisions of this ordinance enforced.

SEC. 15. This ordinance shall take effect and be in force 10 days after its passage. [Ordinance adopted Sept. 18, 1911.]

CEREBROSPINAL MENINGITIS IN TEXAS.

Cerebrospinal meningitis was reported present in Texas, January 9, in 12 localities, with a total of approximately 300 known cases, occurring to that date. On January 16 Passed Asst. Surg. von Ezdorf was directed to confer with the State health authorities of Texas and to investigate the prevalence of the disease. He reported January 20 that the principal points of prevalence were Austin (5 cases, 1 death), Dallas (about 200 cases), Waco (100 cases, 39 deaths), Fort Worth (37 cases, 18 deaths), Houston (8 cases), and that in 36 towns and counties in various parts of the State 95 other cases had been reported.

Dr. von Ezdorf further reported January 25 that to that date there had been 61 cases with 27 deaths at Fort Worth since December, and 249 cases with 110 deaths at Dallas since October.

On January 20, Surg. Guiteras at Galveston reported that a death from cerebrospinal meningitis occurred January 19 in the person of a Negro dock laborer, age about 35 years, who had not been absent from Galveston for several months, and that a case suspicious of the same disease was reported there January 20.

CASE OF LEPROSY IN INDIANAPOLIS, IND.

Dr. Charles S. Woods, commissioner of public health and charities, of Indianapolis, reports that on December 26, 1911, a case of leprosy was notified to the department of public health and charities. The patient is Mrs. L. B., aged 61, colored, widow, living in Indianapolis. She was born in Hawkins County, Tenn., about 60 miles from Knoxville. Her mother was free and her father was a slave. She moved to Knoxville, Tenn., during her childhood and lived there until May, 1907, when she moved to Indianapolis. She did general housework and laundry work while in Tennessee and since living in Indianapolis has done laundry work. She gives no history of leprosy in the family nor does she remember ever having seen a case. The source of the infection is unknown.

She has had six children, two living, one died at age of 18 months and the other three at over 20 years of age. Her husband died about 15 years ago. She has always been well. In the fall of 1907 (before she left Tennessee) a spot appeared on her forehead which felt as if she had been stung by a bee. This later became a nodule.

The case is one of tubercular leprosy and during the past few months there have been rapid progress and change. There is some sensory disturbance, but the case has few of the anæsthetic characteristics. A microscopic examination has been made repeatedly and the lepra bacillus is microscopically demonstrable. The facies is characteristic. Some enlargement of the left ulnar nerve is present. The skin of the body is involved and there are numerous nodules on the chest, arms, and legs.

The patient is absolutely quarantined.

PLAGUE-PREVENTION WORK.

DISTRIBUTION OF POISON.

In connection with the making and maintenance of a squirrel-free zone around the cities of California on San Francisco Bay, 2,172 acres of land in Alameda County were covered with poison during the week ended January 6, 1912.

During the same period 5,700 acres of land in San Joaquin County and 5,920 acres in Stanislaus County were covered with poison for the purpose of eradicating plague foci.

RECORD OF PLAGUE INFECTION.

Places.	Date of last case of human plague.	Date of last case of rat plague.	Date of last case of squirrel plague.	Total number of rodents found infected since May, 1907.
California:				
Cities—				
San Francisco	Jan. 30, 1908	Oct. 23, 1908	None	398 rats.
Oakland	Aug. 9, 1911	Dec. 1, 1908	do	126 rats.
Berkeley	Aug. 27, 1907	None	do	None.
Los Angeles	Aug. 11, 1908	do	Aug. 21, 1908	1 squirrel.
Counties—				
Alameda (exclusive of Oakland and Berkeley).	Sept. 26, 1909	Wood rat, Oct. 17, 1909.	Oct. 9, 1911	114 squirrels and 1 wood rat.
Contra Costa	July 21, 1911	None	Sept. 23, 1911	364 squirrels.
Fresno	None	do	Oct. 27, 1911	1 squirrel.
Merced	do	do	July 13, 1911	5 squirrels.
Monterey	do	do	Aug. 6, 1911	Do.
San Benito	June 5, 1910	do	June 8, 1911	22 squirrels.
San Joaquin	Sept. 18, 1911	do	Aug. 26, 1911	18 squirrels.
San Luis Obispo	None	do	Jan. 29, 1910	1 squirrel.
Santa Clara	Aug. 23, 1910	do	Oct. 5, 1910	23 squirrels.
Santa Cruz	None	do	May 17, 1910	3 squirrels.
Stanislaus	do	do	June 2, 1911	13 squirrels.
Washington:				
City—				
Seattle	Oct. 30, 1907	Sept. 21, 1911	None	25 rats.

RATS COLLECTED AND EXAMINED FOR PLAGUE INFECTION.

Places.	Week ended—	Found dead.	Total collected.	Examined.	Found infected.
California:					
Cities—					
Berkeley	Jan. 6, 1912	5	[1] 118	65	.....
Fresno	do	.....	[2] 75	75	.....
Oakland	do	10	[3] 498	409	.....
San Francisco	do	7	[4] 1,283	980	.....
Counties—					
San Joaquin	do	.....	[5] 113	113	.....
Santa Clara	do	.....	[6] 50	50	.....
Washington:					
City—					
Seattle	do	.....	1,073	1,036	.....

[1] Identified: Mus norvegicus, 75; Mus musculus, 43.
[2] Identified: Mus alexandrinus, 72; Mus rattus, 1; Mus musculus, 1; unidentified, 1.
[3] Identified: Mus norvegicus, 428; Mus musculus 69; Mus rattus, 1.
[4] Identified: Mus norvegicus, 657; Mus rattus, 187; Mus musculus, 305; Mus alexandrinus, 134.
[5] Identified: Mus norvegicus, 99; Mus rattus, 2; Mus musculus, 8; Mus alexandrinus, 4.
[6] Identified: Mus norvegicus, 50.

SQUIRRELS COLLECTED.

During the week under report 14 squirrels were found dead in Alameda County, Cal.

SMALLPOX IN THE UNITED STATES.

In the following table the States indicated by an asterisk are those from which reports of smallpox are received only from certain city, and in some cases county, boards of health. In these States, therefore, the recorded cases and deaths should not be taken as showing the general prevalence of the disease. In the States not marked by an asterisk the reports are received monthly from the State boards of health, and include all cases reported to the State authorities.

REPORTS RECEIVED DURING WEEK ENDED JAN. 26, 1912.

Places.	Date.	Cases.	Deaths.	Remarks.
California:				
Counties—				
Los Angeles	Dec. 1-31	19	3	
Orange	do	1		
San Bernardino	do	7		
San Diego	do	4		
Santa Cruz	do	1		
Stanislaus	do	1		
Tulare	do	1		
Total for State		34	3	
*Louisiana:				
New Orleans	Jan. 7-13	3		
Michigan:				
Counties—				
Allegan	Dec. 1-31	1		
Delta	do	1		
Eaton	do	2		
Huron	do	1		
Ingram	do	1		
Ionia	do	2		
Jackson	do	24		
Leelanau	do	5		
Manistee	do	1		
Monroe	do	6		
Montcalm	do	5		
Ontonagon	do	5		
Ottawa	do	1		
St. Clair	do	2		
Wayne	do	12		
Total for State		69		
South Dakota:				
Counties—				
Day	Dec. 1-31	1		
Lincoln	do	1		
Minnehaha	do	6		
Stanley	do	2		
Total for State		10		
*Tennessee:				
Knoxville	Jan. 7-13	1		
Washington:				
Counties—				
Franklin	Nov. 1-30	1		
King	do	3		
Kittitas	do	2		
Lincoln	do	2		
Pend Oreille	do	12		
Pierce	do	3		
Spokane	do	30		
Walla Walla	do	1		
Yakima	do	3		
Total for State		57		

SMALLPOX IN THE UNITED STATES—Continued.

Reports Received during week ended Jan. 26, 1912.

Places.	Date.	Cases.	Deaths.	Remarks.
Wisconsin:				
Counties—				
Adams	Dec. 1-31	2		
Bayfield	do	2		
Chippewa	do	1		
Dane	do	5		
Douglas	do	29		
Kenosha	do	1		
La Crosse	do	5		
Marathon	do	7		
Wood	do	34		
Total for State		86		
Grand total for the United States		260	3	

For reports received from July 1 to December 29, see Public Health Reports for December 29, 1911. The cumulative table of reported cases of smallpox, heretofore published each week, has been discontinued, and in its place summaries will be published periodically.

MORBIDITY AND MORTALITY.

MORBIDITY AND MORTALITY TABLE, CITIES OF THE UNITED STATES, FOR WEEK ENDED JAN. 6, 1912.

Cities.	Population, United States census 1910.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Smallpox.		Tuberculosis.		Typhoid fever.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Cities having over 500,000 inhabitants.														
Baltimore, Md	558,485	170	30	3	5	....	25	2	....	....	48	21	10	....
Boston, Mass	670,585	208	49	7	139	3	38	1	....	....	53	13	9	....
Chicago, Ill	2,185,283	685	129	19	54	....	116	9	....	....	113	80	24	4
Cleveland, Ohio	560,663	139	35	1	50	3	34	1	....	....	26	16	8	....
New York, N. Y	4,766,883	1,405	252	20	498	7	234	8	....	....	314	167	66	11
Philadelphia, Pa	1,549,008	536	66	13	11	....	25	2	....	....	58	50	147	11
Pittsburg, Pa	533,905	145	26	3	7	....	13	1	....	....	20	17	14	3
St. Louis, Mo	687,029	192	29	3	2	....	21	3	....	....	33	12	4	....
Cities having from 300,000 to 500,000 inhabitants.														
Buffalo, N. Y	423,715	132	22	4	16	....	12	....	....	....	15	12	7	2
Cincinnati, Ohio	364,463	118	14	....	3	....	26	....	2	....	24	15	5	1
Los Angeles, Cal	319,198	131	7	1	2	....	14	....	....	....	20	22	2	....
Milwaukee, Wis	373,857	90	15	1	23	....	32	2	....	....	10	7	17	1
Newark, N. J	347,469	100	35	2	....	....	21	....	....	....	21	12	....	....
New Orleans, La	339,075	124	3	....	....	....	7	....	3	....	39	26	4	....
San Francisco, Cal	416,912	161	7	....	192	....	12	....	....	....	19	10	1	....
Washington, D. C	331,069	129	12	....	....	....	8	....	....	....	26	16	13	1
Cities having from 200,000 to 300,000 inhabitants.														
Denver, Colo	213,381	51	27	2	....	....	11	....	....	....	....	7	....	....
Jersey City, N. J	267,779	73	12	1	1	....	8	....	1	....	8	4	1	....
Kansas City, Mo	248,381	17	4	....	....	....	2	....	1	....	10	7	2	....
Providence, R. I	224,326	66	14	1	11	1	11	1	1	....	....	5	1	....

MORBIDITY AND MORTALITY—Continued.

Morbidity and mortality table, cities of the United States, for week ended Jan. 6, 1912—Continued.

Cities.	Population, United States census 1910.	Total from deaths all causes.	Diphtheria.		Measles.		Scarlet fever.		Smallpox.		Tuberculosis.		Typhoid fever.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Cities having from 100,000 to 200,000 inhabitants.														
Bridgeport, Conn.	102,054	27	1	....	1	....	....	....	....	....	2	....	1	....
Cambridge, Mass.	104,839	....	19	1	....	1	8	....	....	....	4	6	....	....
Columbus, Ohio.	181,548	53	7	....	12	....	12	....	1	....	5	5	....	....
Dayton, Ohio.	116,577	27	3	1	....	....	....	....	....	....	....	2	....	1
Fall River, Mass.	119,295	28	6	1	....	....	1	....	....	....	4	3	1	....
Grand Rapids, Mich.	112,571	39	3	....	....	....	3	....	....	....	1	3	2	....
Lowell, Mass.	106,294	32	8	....	14	1	11	....	....	....	4	2	1	....
Nashville, Tenn.	110,364	11	5	....	....	....	....	....	....	....	3	2	2	....
Oakland, Cal.	150,174	35	1	....	....	....	1	....	....	....	1	6	....	1
Omaha, Nebr.	124,096	44	6	1	....	....	5	....	....	....	....	1	1	1
Spokane, Wash.	104,402	....	3	....	8	....	3	....	9	....	1	1	1	....
Toledo, Ohio.	168,497	46	5	1	5	....	9	....	1	....	9	5	5	....
Worcester, Mass.	145,986	46	7	....	1	....	12	....	....	....	3	1	1	....
Cities having from 50,000 to 100,000 inhabitants.														
Altoona, Pa.	52,127	8	3	....	....	....	1	....	....	....	1	1	....	....
Bayonne, N. J.	55,545	....	4	....	2	....	....	....	....	....	....	....	....	....
Brockton, Mass.	56,878	16	1	....	37	....	....	....	....	....	7	1	3	....
Camden, N. J.	94,538	....	3	....	....	....	5	....	....	....	....	....	....	....
Elizabeth, N. J.	73,409	25	3	1	10	....	8	....	....	....	1	4	1	....
Erie, Pa.	66,525	16	3	....	....	....	1	....	....	....	5	2	2	1
Evansville, Ind.	69,647	19	2	....	2	....	....	....	1	....	....	2	4	....
Harrisburg, Pa.	64,186	27	9	2	1	....	....	....	....	....	5	3	....	....
Hartford, Conn.	98,915	26	10	....	....	....	5	....	....	....	2	....	1	....
Hoboken, N. J.	70,324	....	8	1	....	....	....	....	....	....	4	....	....	....
Houston, Tex.	78,800	23	1	1	....	....	....	....	....	....	....	1	....	1
Johnstown, Pa.	55,482	14	3	1	1	....	1	....	....	....	....	1	....	....
Lawrence, Mass.	85,892	30	3	....	3	....	....	....	....	....	3	1	2	1
Lynn, Mass.	89,336	31	7	2	2	....	4	....	....	....	2	3	3	1
Manchester, N. H.	70,063	21	2	....	19	....	....	....	....	....	....	....	1	1
New Bedford, Mass.	96,652	39	1	....	....	....	2	....	....	....	3	6	2	1
Passaic, N. J.	54,773	17	4	1	3	....	1	....	....	....	....	1	....	....
Peoria, Ill.	66,950	26	1	....	2	....	....	....	1	....	....	....	....	....
Portland, Me.	58,571	21	1	....	....	....	2	....	....	....	....	1	3	....
Reading, Pa.	96,071	23	12	2	....	....	18	....	....	....	3	....	2	....
St. Joseph, Mo.	77,403	14	1	....	....	....	2	....	....	....	....	2	1	....
San Antonio, Tex.	96,614	38	1	....	5	....	2	....	....	....	....	10	....	....
Schenectady, N. Y.	72,826	18	2	....	2	....	1	....	....	....	4	....	1	....
South Bend, Ind.	53,684	12	1	....	....	....	....	....	....	....	....	2	....	....
Springfield, Ill.	51,678	15	3	....	....	....	....	....	3	....	....	1	....	....
Springfield, Mass.	88,926	24	2	....	49	....	3	....	....	....	2	1	1	1
Terre Haute, Ind.	58,157	....	....	1	....	....	3	....	1	....	....	2	....	1
Trenton, N. J.	96,815	45	2	1	....	....	3	....	....	....	4	5	2	....
Wilkes-Barre, Pa.	67,105	16	7	....	366	....	....	....	....	....	3	1	....	....
Wilmington, Del.	87,411	25	....	1	....	....	....	....	....	....	....	6	....	....
Yonkers, N. Y.	79,803	23	5	1	4	....	17	....	....	....	3	2	....	....
Cities having from 25,000 to 50,000 inhabitants.														
Atlantic City, N. J.	46,150	11	6	2	....	....	....	....	....	....	....	....	....	....
Aurora, Ill.	29,807	8	2	....	....	....	....	....	....	....	....	....	....	....
Berkeley, Cal.	40,434	7	1	1	1	....	....	....	....	....	....	....	....	....
Binghamton, N. Y.	48,443	18	....	....	2	....	....	....	....	....	1	1	....	....
Brookline, Mass.	27,792	12	7	....	....	....	....	....	....	....	....	....	....	....
Butte, Mont.	39,165	27	....	....	....	....	....	3	....	....	....	2	....	....
Chattanooga, Tenn.	44,604	....	....	....	....	....	....	....	....	....	....	2	1	1
Chelsea, Mass.	32,452	6	1	....	6	....	3	....	....	....	1	....	....	....
Chicopee, Mass.	25,401	7	1	....	....	....	....	....	....	....	1	2	....	....
Danville, Ill.	27,871	9	1	....	....	....	1	....	....	....	....	1	....	....
Dubuque, Iowa.	38,494	7	3	....	....	....	....	....	....	....	....	....	....	....
East Orange, N. J.	34,371	3	1	....	2	....	....	....	....	....	1	....	....	....
Elmira, N. Y.	37,176	13	1	....	....	....	1	....	....	....	....	....	1	1
El Paso, Tex.	39,279	30	1	....	....	....	1	....	....	....	....	3	3	....
Everett, Mass.	33,484	8	1	....	7	....	....	....	....	....	....	....	....	....
Haverhill, Mass.	44,115	15	5	....	12	....	4	....	....	....	....	2	....	....
Kalamazoo, Mich.	39,437	9	....	....	....	....	1	....	....	....	3	1	....	....
Knoxville, Tenn.	36,346	10	1	....	....	....	....	....	....	....	....	3	....	....
La Crosse, Wis.	30,417	10	2	1	....	....	1	....	....	....	2	....	....	....
Lancaster, Pa.	47,227	....	3	....	....	....	2	....	....	....	....	....	1	....
Lexington, Ky.	35,099	20	1	....	20	....	....	....	....	....	....	1	....	....

MORBIDITY AND MORTALITY—Continued.

Morbidity and mortality table, cities of the United States, for week ended Jan. 6, 1912—Continued.

Cities.	Population, United States census 1910.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Smallpox.		Tuberculosis.		Typhoid fever.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Cities having from 25,000 to 50,000 inhabitants—Continued.														
Lima, Ohio	30,508	3	2											
Lynchburg, Va	29,494	13	1		3		3							
Malden, Mass	44,404	5			6		2				1			
Montgomery, Ala	38,136	16	3				2		1					1
Mount Vernon, N. Y	30,919		2		21						2			
Newcastle, Pa	36,280		9				1				9		8	
Newport, Ky	30,309	7	1				2				1	1		
Newton, Mass	39,806	10			4								1	
Niagara Falls, N. Y	30,445	8	1									1	10	1
Norristown, Pa	27,875	7	1		12		2				5	1		
Orange, N. J	29,630	7	10		1		5				4			
Pasadena, Cal	30,291	10									1	2		
Pittsfield, Mass	32,121	14	3	1			2				2	1		
Portsmouth, Va	33,190	6	9	1			2		1					
Racine, Wis	38,002	17	1											1
Roanoke, Va	34,874	9	5		10						4		2	
Salem, Mass	43,697	9	1				3				3	1		
San Diego, Cal	39,578	3			1						2	2		
South Omaha, Nebr	26,259	12									1	1		
Superior, Wis	40,384	1							3					
Taunton, Mass	34,259	15					5				2			
Waltham, Mass	27,834	11									1			
West Hoboken, N. J	35,403		3				1							
Wheeling, W. Va	41,641	17	3								1	1	3	1
Williamsport, Pa	31,860	13	1										1	
York, Pa	44,750		5										2	
Zanesville, Ohio	28,026	12	4	1									7	
Cities having less than 25,000 inhabitants.														
Ann Arbor, Mich	14,817	8					3							
Beaver, Falls, Pa	12,191		3										4	
Bennington, Vt		3											1	
Biddeford, Me	17,079	1	3									1		
Braddock, Pa	19,957	13										1		
Butler, Pa	20,782	6												
Cambridge, Ohio	11,327	2			3									
Carbondale, Pa	17,040	1			2		1							
Clinton, Mass	13,075	1					1				2			
Columbus, Ga	20,554	6												
Columbus, Ind		2	1						2					
Concord, N. H	21,497	5												
Cumberland, Md	21,839	5	3	1			1						3	1
Galesburg, Ill	22,089	8	1										1	1
Gloucester, Mass	24,398	6										1		
Harrison, N. J	14,498	3	1											
Homestead, Pa	18,713	8	3		1		1				1	1		
Kearny, N. J	18,659	10	3		2									
La Fayette, Ind	20,081	12										1		
Lebanon, Pa	20,081	5	5		1								1	
Marinette, Wis	14,610	1			8								7	
Marlboro, Mass	14,579	5									1			
Medford, Mass	23,150	2			1		1						1	
Melrose, Mass	15,715	5			3									1
Moline, Ill	24,199	7	1									1		
Montclair, N. J	21,150		3				2				2		2	
Morristown, N. J	12,507	2												
Nanticoke, Pa	18,857	12	1		34									
Newburyport, Mass	19,240	5	1								2			
North Adams, Mass	22,012	5		1							1			
Northampton, Mass	19,431	4			3						3			
Ottumwa, Iowa	22,012	9												
Palmer, Mass		1												
Peekskill, N. Y		2	2				1				1			
Pottstown, Pa		3			1		1							
Saratoga Springs, N. Y		7											1	
South Bethlehem, Pa	19,973	6	3	1	5								1	
Steelton, Pa	14,246		3						5					
Warren, Pa	11,080	1											1	
Wilkinsburg, Pa	18,924	6	2				6							
Woburn, Mass	15,308	5									1	1		

STATISTICAL REPORTS OF MORBIDITY AND MORTALITY, STATES OF THE UNITED STATES (Untabulated).

CONNECTICUT.—Month of December, 1911. Population of reporting towns 1,129,399. Total number of deaths from all causes 1,340, including diphtheria 24, measles 5, scarlet fever 11, tuberculosis, pulmonary, 113, typhoid fever 8. Cases reported: Diphtheria 237 in 52 towns, measles 148 in 24 towns, scarlet fever 234 in 41 towns, tuberculosis, pulmonary, 113 in 32 towns, typhoid fever 57 in 22 towns.

FLORIDA.—Week ended January 6, 1912. Reports from the State board of health show diphtheria present in 2 localities with 7 cases, malaria in 3 localities with 18 cases, smallpox in 4 counties with 33 cases, tuberculosis in 2 localities with 5 cases, typhoid fever in 2 localities with 2 cases.

MARYLAND.—Month of November, 1911. Population 1,295,346. Total number of deaths from all causes 799, including diphtheria 7, scarlet fever 2, tuberculosis 80, typhoid fever 52. Cases reported: Diphtheria 117, measles 16, scarlet fever 94, typhoid fever 206. The typhoid fever cases were distributed as follows: Potomac River watershed 87, Patapsco River watershed 14, Patuxent River watershed 33, Susquehanna River watershed 3, Choptank River watershed 1, Herring Run watershed 1, Baltimore city 6.

MASSACHUSETTS.—Week ended November 4, 1911. Population of reporting towns 2,565,623. Total number of deaths from all causes 632, including diphtheria 8, measles 1, tuberculosis 75, typhoid fever 3. Cases reported: Diphtheria 141, measles 61, scarlet fever 107, tuberculosis 125, typhoid fever 54.

Week ended November 11, 1911. Total number of deaths from all causes 685, including diphtheria 8, measles 5, scarlet fever 3, tuberculosis 49, typhoid fever 9. Cases reported: Diphtheria 157, measles 105, scarlet fever 120, tuberculosis 112, typhoid fever 65.

Week ended November 18, 1911. Total number of deaths from all causes 661, including diphtheria 8, measles 1, scarlet fever 1, tuberculosis 52, typhoid fever 12. Cases reported: Diphtheria 139, measles 149, scarlet fever 117, smallpox 1, tuberculosis 140, typhoid fever 35.

Week ended November 25, 1911. Total number of deaths from all causes 645, including diphtheria 9, measles 2, scarlet fever 1, tuberculosis 58, typhoid fever 5. Cases reported: Diphtheria 139, measles 187, scarlet fever 157, smallpox 1, tuberculosis 117, typhoid fever 44.

MINNESOTA.—Month of September, 1911. Population 2,075,708. Total number of deaths from all causes 1,489, including diphtheria 21, measles 1, scarlet fever 7, tuberculosis 132, typhoid fever 23.

PENNSYLVANIA.—Reports from the State department of health show as follows: Morbidity month of October, 1911: Total number of deaths reported 8,399, including typhoid fever 221, scarlet fever 30,

diphtheria 264, measles 16, whooping cough 50, influenza 31, malaria 6, tuberculosis of the lungs 588, tuberculosis of other organs 100, cancer 404, diabetes 62, meningitis 42, anterior poliomyelitis 7, pneumonia 575, diarrhea and enteritis under 2 years 559, diarrhea and enteritis over 2 years 113, Bright's disease 491, early infancy 597, suicide 70, accidents in mines 104, railway injuries 126, other forms of violence 458, all other diseases 3,485.

TEXAS.—Month of October, 1911. Population 3,896,542. Total number of deaths from all causes 2,124, including diphtheria 31, measles 1, scarlet fever 2, smallpox 1, tuberculosis 256, typhoid fever 110, typhus fever 7. Cases reported: Diphtheria 130, scarlet fever 61, tuberculosis 58, typhoid fever 194.

FOREIGN AND INSULAR.

CANADA.

Ontario—Communicable Diseases in December, 1910-11.

The following statement of communicable diseases in the Province of Ontario for the month of December, 1911, as compared with December, 1910, was issued by the Ontario provincial board of health:

Diseases.	1910		1911	
	Cases.	Deaths.	Cases.	Deaths.
Infantile paralysis	14	2	.....	.....
Cerebrospinal meningitis	10	8	2	2
Smallpox	33	.....	41	.....
Scarlet fever	494	15	264	19
Diphtheria	263	36	355	31
Measles	339	7	112	2
Whooping cough	28	6	5	1
Typhoid fever	134	30	197	21
Tuberculosis	113	77	113	68
Total	1,428	181	1,089	144

The decrease noted in December, 1911, is stated to be due to the large diminution in diseases among children.

The population of the Province is approximately 2,500,000.

CHINA.

Hongkong—Plague.

Surg. Brown reports the occurrence of 1 case of plague with 1 death during the week ended December 16, 1911.

HAWAII.

Record of Plague Infection.

The last case of human plague at Honolulu occurred July 12, 1910.

The last plague-infected rat was found at Aiea, 9 miles from Honolulu, April 12, 1910.

A case of human plague was reported at Kapulena, Hawaii, October 28, 1911.

At Hilo the last case of human plague occurred March 23, 1910. At Honokaa, 60 miles from Hilo, a fatal case occurred April 20, 1911.

The last plague-infected rat was found at Honokaa December 18, 1911. A plague-infected rat was found at Hilo during the week ended June 10, 1911.

Honolulu—Plague-Prevention Work.

Chief Quarantine Officer Ramus reports:

Week ended Dec. 30, 1911.

Total rats and mongoose taken	342
Rats trapped	340
Mongoose trapped	2
Rats examined bacteriologically	316
Classification of rats trapped:	
Mus alexandrianus	52
Mus musculus	53
Mus norvegicus	32
Mus rattus	203
Average number of traps set daily	1,720

Mosquito-Eradication Measures at Honolulu.

The following statement of the work of mosquito destruction at Honolulu was received from Passed Asst. Surg. McCoy:

Mosquito-eradication measures conducted at Honolulu from Dec. 10 to 17, 1911, both inclusive.

Inspections of—	Total inspections.	Larvæ found in—	Cleaned.	Oiled.	Drained.	Emptied.	Collected.	Filled.	Ordered repaired.	Fixtures installed.	Screened.	Stocked with fish that destroy mosquito larvæ.
Gutters:												
House	906	53	164	67	707	.....	.....	.....	33	.....	.....	.....
Street	128	1	54	76	15	.....	.....	.....	.....	.....	.....	.....
Standing water	420	29	.....	385	27	.....	.....	4	.....	.....	.....	7
Cesspools	556	6	.....	342	6	.....	.....	.....	7	.....	1	.....
Privy vaults	585	1	.....	427	.....	.....	.....	.....	7	.....	.....	.....
Holes and low places	435	18	.....	122	3	.....	.....	183	.....	.....	.....	.....
Catch basins	191	6	.....	161	.....	.....	.....	.....	.....	.....	.....	.....
Leaky fixtures	135	.....	.....	.....	.....	.....	.....	.....	105	.....	.....	.....
Banana and other plants	.....	45	.....	.....	.....	.....	45	.....	.....	.....	.....	.....
Swamps	18	6	.....	16	.....	.....	.....	1	.....	.....	.....	.....
Ponds	62	1	.....	3	.....	.....	.....	.....	.....	.....	.....	9
Troughs and tanks	120	10	.....	47	.....	77	.....	.....	.....	.....	.....	6
Tubs and other receptacles	517	31	.....	.....	.....	341	.....	.....	.....	.....	.....	.....
Tin cans, bottles, etc.	20,268	77	.....	.....	.....	.....	20,268	.....	.....	.....	.....	.....
Water barrels	93	2	.....	.....	.....	75	.....	.....	.....	.....	.....	.....
Vacant houses	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Mosquito-eradication measures conducted at Honolulu from Dec. 17 to 23, 1911, both inclusive.

Inspections of—	Total inspections.	Larvæ found in—	Cleaned.	Oiled.	Drained.	Emptied.	Collected.	Filled.	Ordered repaired.	Fixtures installed.	Screened.	Stocked with fish that destroy mosquito larvæ.
Gutters:												
House	2,827	158	.....	1,410	1,746	.....	.....	.....	.....	.....	.....	.....
Street	152	7	.....	109	52	.....	.....	.....	.....	.....	.....	.....
Standing water	1,124	54	.....	882	68	.....	.....	10	.....	.....	.....	8
Cesspools	1,181	37	.....	879	7	.....	.....	.....	2	.....	174	.....
Privy vaults	894	10	.....	616	25	.....	.....	1	2	.....	.....	.....
Holes and low places	557	56	.....	171	48	.....	.....	235	19	.....	.....	.....
Catch basins	189	4	.....	131	.....	54	.....	.....	.....	.....	.....	.....
Leaky fixtures	222	.....	.....	.....	.....	.....	.....	.....	124	.....	.....	.....
Swamps	25	6	.....	19	.....	.....	.....	.....	.....	.....	.....	.....
Ponds	72	5	.....	63	10	.....	.....	3	.....	.....	.....	5
Troughs and tanks	145	10	.....	33	.....	86	.....	.....	.....	.....	3	.....
Tubs and other receptacles	489	10	.....	6	.....	431	.....	.....	.....	.....	.....	.....
Tin cans, bottles, etc.	3,530	22	.....	.....	.....	.....	3,530	.....	.....	.....	.....	.....
Water barrels	218	58	.....	34	.....	157	.....	.....	.....	.....	10	1
Vacant houses	.....	6	.....	2	.....	.....	.....	.....	.....	.....	.....	.....

INDIA.

Calcutta—Cholera and Plague.

Acting Asst. Surg. Allan reports: During the week ended November 25, 1911, 39 deaths from cholera and 9 from plague were reported at Calcutta; in all Bengal, 344 cases of plague with 255 deaths; in all India, 8,589 cases of plague with 6,922 deaths.

ITALY.

Status of Cholera.

During the week ended December 17, 1911, cholera was reported present in Italy as follows: In the Province of Caltanisetta, 10 cases with 4 deaths in two localities; in the Province of Girgenti, 8 cases with 6 deaths in one locality.

Naples—Examination of Emigrants.

Surg. Geddings reports:

Vessels inspected at Naples and Palermo week ended December 30, 1911:

NAPLES.

Date	Name of ship.	Destination.	Steerage passengers inspected and passed.	Pieces of baggage inspected and passed.	Pieces of baggage disinfected.
Dec. 24	Ivernia	New York	.....	.....	.....
Dec. 29	Perugia	do	147	20	245
	Total		147	20	245

PALERMO.

Dec. 28	Cerea	New York	.....	.....	.....
Dec. 30	Perugia	do	118	60	120
	Total		118	60	120

JAPAN.

Communicable Diseases in Kanagawa Ken.

Surg. Irwin at Yokohama reports: The sanitary authorities report 413 cases of diphtheria, 241 of dysentery, 81 of scarlet fever, 1 of smallpox, and 584 of typhoid fever present in Kanagawa Ken, December 19, 1911.

NATAL.

Plague at Durban.

Information received January 17 from the American consul shows the presence of plague at Durban. One death from plague was reported.

NEW ZEALAND.

Auckland—Examination of Rats.

The following information was taken from bulletins issued by the department of public health of New Zealand: During the 8 weeks ended December 9, 1911, 1,109 rats were examined for plague infection. No plague-infected rat was found.

The last case of human plague was reported May 8, 1911. The last plague-infected rat was found May 31, 1911.

TUNIS.

Status of Cholera.

During the period from December 8 to 21, 1911, 161 deaths from cholera were officially reported in the Regency of Tunis.

ZANZIBAR.

Zanzibar—Examination of Rats.

Consul Weddell reports: During the two weeks ended November 28, 1911, 2,171 rats were examined for plague infection. No plague-infected rat was found.

CHOLERA, YELLOW FEVER, PLAGUE, AND SMALLPOX.

REPORTS RECEIVED DURING WEEK ENDED JAN. 26, 1912.

[These tables include cases and deaths recorded in reports received by the Surgeon General, Public Health and Marine-Hospital Service, from American consuls through the Department of State and from other sources.]

CHOLERA.

Places.	Date.	Cases.	Deaths.	Remarks.
Austria-Hungary:				
Coastland—				
Capodistria	Dec. 14–24	2	2	
Hungary				Total Dec. 3–23: Cases, 21.
Backs-Bodog	Dec. 10–16	9		
Jasz-Nagykun-Szolnok	Dec. 3–23	11		
Torontal	Dec. 10–16	1		
Croatia and Slavonia—				
Sriem	do	5		
Bulgaria:				
Burgas	Nov. 22–23	2	2	
India:				
Calcutta	Nov. 19–Dec. 9		123	
Madras	Dec. 10–16	80	64	
Indo-China:				
Saigon	Nov. 20–Dec. 3	30	25	

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

Reports Received during week ended Jan. 26, 1912.

CHOLERA—Continued.

Places.	Date.	Cases.	Deaths.	Remarks.
Italy				Total Dec. 17-24: Cases 30, deaths 14.
Provinces—				
Caltanisetta	Dec. 17-23	1		
Girgenti	do	15	6	
Syracuse	do	14	8	
Roumania:				
Districts—				
Braila	Nov. 24-Dec. 13	1		
Doliju	do	1	2	
Tulcea	do		1	
Siam:				
Bangkok	Nov. 5-Dec. 2		149	
Tripoli:				
Tripoli	Oct. 25-Nov. 10			[1] 150 to 200 among the civil population and 25 to 30 among the military.
Tunis regency	Dec. 8-21	156	161	
Turkey in Asia:				
Kharput	Nov. 26-Dec. 16	38	30	
Mekka	do	153	165	
Tor	Dec. 14-26	29		

YELLOW FEVER.

Brazil:				
Manaos	Dec. 19-23		1	

PLAGUE.

Brazil:				
Para	Dec. 24-30	5	1	
Chile:				
Iquique	Dec. 10-23	6	1	
China:				
Hongkong	Dec. 9-16	1	1	
Egypt:				
Provinces—				
Assiout	Oct. 14-Dec. 27	22	22	
Behera	Oct. 15-Dec. 26	3	1	
Galioubeh	Oct. 5-Dec. 26	1		
India:				
Calcutta	Nov. 19-Dec. 9		16	
Kurrachi	Dec. 3-16	5	4	
Indo-China:				
Saigon	Nov. 27-Dec. 3	1	1	
Mauritius	Nov. 17-23	7	3	
Natal:				
Durban	Jan. 17		1	
Siam:				
Bangkok	Nov. 4-Dec. 2		2	
Straits Settlements:				
Singapore	Nov. 26-Dec. 2	5	5	

SMALLPOX.

Arabia:				
Aden	Dec. 12-18		1	
Brazil:				
Pernambuco	Nov. 16-30		67	
Canada:				
Ontario—				
Sarnia	Dec. 1-31	41		
Toronto	Jan. 6-13		1	
Quebec—				
Quebec	Jan. 7-13	17	1	
Chile:				
Iquique	Dec. 10-16	2		
Talcahuano	Dec. 10-23	7	1	

[1] Das österreichische Sanitatswesen, Dec. 21, 1911.

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

Reports Received during week ended Jan. 26, 1912.

SMALLPOX—Continued.

Places.	Date.	Cases.	Deaths.	Remarks.
China:				
Hongkong	Dec. 3-16	18	14	
Nangking	Dec. 10-16			Present.
Egypt:				
Cairo	Dec. 10-16	1		
France:				
Paris	Dec. 17-30	17	2	
Gibraltar	Dec. 24-31	4		
India:				
Calcutta	Nov. 26-Dec. 2		1	
Madras	Dec. 10-16	5	5	
Italy:				
Leghorn	Dec. 24-30	8		
Naples	do	5	1	
Palermo	do	313	90	
Indo-China:				
Saigon	Nov. 20-Dec. 3	13		
Japan:				
Kanagawa, ken	Dec. 17-23	1		
Malta	Dec. 24-30	2		
Mexico:				
Aguascalientes	Jan. 1-7		1	
Magdalena	Dec. 24-Jan. 8	54		Jan. 13, 76 cases in quarantine.
Mexico	Dec. 9-16	12	8	
Santa Ana	Jan. 8	4		
San Ignacio	do	3		
San Luis Potosi	Nov. 26-Dec. 2	1		
Portugal:				
Lisbon	Dec. 24-30	7		
Russia:				
Odessa	Dec. 17-23	2		
Reval	Nov. 1-30	1		
Warsaw	Nov. 5-Dec. 2		185	
Spain:				
Malaga	Nov. 1-30		45	
Valencia	Dec. 24-30	10	1	
Straits Settlements:				
Singapore	Nov. 26-Dec. 2	3		
Turkey in Europe:				
Constantinople	Dec. 25-31		5	
Venezuela:				
Caracas	Nov. 1-Dec. 31	11		

REPORTS RECEIVED FROM DEC. 30, 1911, TO JAN. 19, 1912.

[For reports received from July 1, 1911, to Dec. 29, 1911, see PUBLIC HEALTH REPORTS for Dec. 29, 1911. In accordance with custom, the tables of epidemic diseases are terminated semiannually and new tables begun.]

CHOLERA.

Places.	Date.	Cases.	Deaths.	Remarks.
Austria-Hungary:				
Croatia and Slavonia				Total Oct. 22-Dec. 3: Cases, 31.
Sriem	Oct. 22-Dec. 3	31		
Hungary				Total Nov. 19-Dec. 9: Cases 16.
Torontal	Nov. 19-Dec. 9	16	2	
Bulgaria:				
Varna	Nov. 6	1		
Dutch East Indies				Total Sept. 24-Oct. 9: Cases, 322; deaths, 256.
Batavia	Nov. 12-Dec. 2	14	5	
India:				
Calcutta	Nov. 5-18		81	
Madras	Nov. 26-Dec. 9	216	167	Madras Presidency, Dec. 1-31: Cases 3,879; deaths, 2,412.
Rangoon	Oct. 1-31	2	1	
Italy				Total June 8-Dec. 24: Cases, 15,979; deaths, 6,021.
Provinces—				
Caltanisetta	Nov. 26-Dec. 17	7	7	
Girgenti	do	85	50	
Messina	Nov. 26-Dec. 2	3	2	
Syracuse	do	1	1	

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

Reports Received from Jan. 1 to Jan. 19, 1912.

CHOLERA—Continued.

Places.	Date.	Cases.	Deaths.	Remarks.
Malta	Nov. 19–Dec. 10	6	6	Dec. 23 declared free from cholera.
Montenegro	Nov. 4–11	9	5	
Persia:				
Adaban	Nov. 4	1	1	
Philippine Islands:				
Province—				
Union	Oct. 29–Dec. 4	5	5	
Straits Settlements:				
Singapore	Nov. 5–18	3	3	
Tunis Regency				Total Nov. 25–Dec. 7: Cases, 169; deaths, 210.
Beja district	Nov. 25–Dec. 7	30	35	
Bizerta district	Nov. 25–Dec. 5	9	15	
Turkey in Asia:				
Adana	Dec. 2–6	16	5	
Basra	Oct. 22–28	14	10	
Erzeroum, vilayet	Sept. 11–16	50	28	
Erzeroum	do	11	8	
Kaifa	Dec. 8			Present.
Kharput	Nov. 19–Dec. 9	29	22	
Jiddah	Dec. 2–10	77	46	
Mekka	Dec. 4–10	716	678	
Mersina	Dec. 1–7	2	1	
Osmania	Dec. 1–6	2	4	
Sinope	Dec. 7	2	1	
Trebizond and vicinity	Sept. 18–23	64	34	
Turkey in Europe:				
Constantinople	Oct. 24–30	5	1	
Saloniki, vilayet	Nov. 6–19	4	3	In Serres.

YELLOW FEVER.

Brazil:				
Manaos	Nov. 19–Dec. 2		4	
Para	Dec. 9–16	1	1	
Ecuador:				
Bucay	Nov. 16–30	2		
Duran	Dec. 1–15	3	2	
Guayaquil	Nov. 16–Dec. 15	20	11	
Milagro	do	8	1	
Mexico:				
Merida	Nov. 12–Dec. 30	5	6	Total Aug. 1–Dec. 30: Cases, 50 deaths, 26.
Venezuela:				
Caracas	Nov. 16–Dec. 7	11		
Sabana Grande	Dec. 12			Epidemic.
At Sea	Dec. 17–23	1	1	On a vessel en route from Manaos to Para.

PLAGUE.

Algeria:				
Philippeville	Oct. 19–Nov. 11	8	2	Including 5 cases, p. 2096. Vol. XXVI.
Brazil:				
Bahia	Sept. 1–30		2	
Rio de Janeiro	Nov. 12–Dec. 2	3	1	
British East Africa:				
Kismayu	Oct. 15–25	2		1 case pneumonic.
Chile:				
Iquique	Nov. 12–Dec. 9	3	3	
China:				
Amoy	Jan. 15			Present.
Dutch East Indies:				
Java				Total Mar. 1–Dec. 9: Cases, 1,777; deaths, 1,262.
Pasoeroean Residency, Malang District.	Nov. 12–Dec. 9	31	16	
Soerobaya	Oct. 17–27	2		
Ecuador:				
Guayaquil	Nov. 16–Dec. 15	102	42	

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

Reports Received from Jan. 1 to Jan. 19, 1912.

PLAGUE—Continued.

Places.	Date.	Cases.	Deaths.	Remarks.
Egypt:				
Provinces—				
Assiout	Oct. 14–Dec. 13	16	14	
Kena	Nov. 20–Dec. 13	3	3	
Minieh	Dec. 13	1	.....	
India:				
Bombay	Nov. 19–Dec. 9	25	23	
Calcutta	Nov. 11–18	.....	14	
Karachi	Nov. 26–Dec. 2	.....	3	
Rangoon	Oct. 1–31	26	27	
Bombay Presidency and Sind.	Oct. 29–Dec. 9	27,376	19,684	
Madras Presidency	.....do	3,589	2,886	
Bengal	.....do	1,537	1,136	
United Provinces	.....do	6,139	4,975	
Punjab	.....do	820	579	
Burma	.....do	90	84	
Central Provinces	.....do	3,803	2,838	
Coorg	.....do	45	22	
Mysore State	.....do	3,600	2,787	
Hyderabad State	.....do	6,012	5,651	
Central India	.....do	3,403	2,825	
Rajputana and Ajmere Merwara.	.....do	302	246	
North West Province	.....do	1	1	Total for India, Oct. 29–Dec. 9: Cases, 56,717; deaths, 43,714.
Indo-China:				
Saigon	Nov. 13–19	3	.....	
Mauritius	Nov. 3–16	6	5	
Philippine Islands:				
Cebu quarantine station	Dec. 4	1	.....	On s. s. Montrose from Shanghai
Russian Empire:				
Astrakhan, government	Nov. 28–Dec. 20	87	84	
Straits Settlements:				
Singapore	Nov. 5–25	4	4	

SMALLPOX.

Algeria:				
Algiers	Nov. 1-30	.....	1	
Arabia:				
Aden	Nov. 28–Dec. 4	1	.....	
Argentina:				
Buenos Aires	Oct. 1–31	.....	6	
Rosario	.....do	.....	25	
Austria-Hungary:				
Trieste	Dec. 3–9	1	.....	From s. s. Baron Call from Beirut.
Brazil:				
Bahia	July 1–31	.....	1	
Pernambuco	Oct. 16–Nov. 15	.....	179	Report for Oct. 1–15 not received.
Rio de Janeiro	Nov. 26–Dec. 2	1	1	
Canada:				
British Columbia—				
Nelson	Dec. 24–30	1	.....	
Ontario—				
Kingston	Dec. 19–23	1	.....	
Ottawa	Dec. 10–23	12	.....	
Sarnia	Oct. 17–23	1	.....	
Quebec—				
Montreal	Dec. 17–23	2	.....	
Quebec	Dec. 10–Jan. 6	120	.....	
Ceylon:				
Colombo	Nov. 12–18	1	.....	
Chile:				
Talcahuano	Nov. 26–Dec. 9	7	2	
Valparaiso	Dec. 3–9	43	.....	
China:				
Canton	Nov. 11–25	15	3	
Chungking	Nov. 18–25	.....	.....	Present.
Hongkong	Nov. 12–25	16	10	
Cuba:				
Habana	Dec. 19	1	.....	From German s. s. Frankenwald from Spain and Canary Islands.
France:				
Marseille	Nov. 1–30	.....	1	
Paris	Dec. 3–16	26	2	

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

Reports Received from Jan. 1 to Jan. 19, 1912.

SMALLPOX—Continued.

Places.	Date.	Cases.	Deaths.	Remarks.
India:				
Bombay	Nov. 19–Dec. 9	25	13	
Madras	Nov. 26–Dec. 9	18	10	
Rangoon	Oct. 1–31	18	6	
Indo-China:				
Saigon	Nov. 13–19	2		
Italy:				
Genoa	Dec. 1–15	6	1	
Leghorn	Dec. 16–23	43	1	
Naples	Dec. 3–23	26		
Palermo	Nov. 26–Dec. 16	950	322	
Japan:				
Arima-Mura	Nov. 12–18	6	1	11 miles east from Kobe.
Java:				
Batavia	Nov. 12–Dec. 9	10	3	
Mexico:				
Aguascalientes	Dec. 18–24		1	
Chihuahua	Nov. 20–Dec. 26	30	6	
Coahuila, State	Oct. 1–30		16	
Juarez	Dec. 19–23	1		
Magdalena	Dec. 23	45	13	
Mazatlan	Dec. 11–Jan. 2		4	
Mexico	Nov. 26–Dec. 9	4	2	
Monterey	Dec. 11–24		2	
Porfirio	Dec. 3–Jan. 6	20	20	
Sandoval	Dec. 16			Present.
San Luis Potosi	Nov. 12–25	2		
Tampico	Dec. 1–20	4	4	
Tapachula	Nov. 1–22		13	
Portugal:				
Lisbon	Dec. 9–23	8		
Russia:				
Libau	Dec. 17–23	1		
Moscow	Nov. 19–Dec. 9	7	2	
Odessa	Nov. 26–Dec. 16	5	1	
St. Petersburg	Nov. 19–Dec. 16	30	7	
Spain:				
Cadiz	Nov. 1–30		5	
Valencia	Dec. 19–23	11	1	
Straits Settlements:				
Singapore	Nov. 19–25	2		
Valencia	Dec. 3–16	16	2	
Switzerland:				
Zurich, Canton	do	2		From the Orient.
Teneriffe:				
Santa Cruz	Dec. 3–23		20	
Turkey in Asia:				
Beirut	do	30	10	
Turkey in Europe:				
Constantinople	Dec. 4–24		16	
Uruguay:				
Montevideo	Sept. 1–Oct. 31	19	3	
Zanzibar:				
Zanzibar	Oct. 28–Dec. 1	3	1	

MORTALITY.

WEEKLY MORTALITY TABLE, FOREIGN AND INSULAR CITIES.

Cities.	Week ended—	Estimated population.	Total deaths from all causes.	Deaths from—									
				Tuberculosis.	Plague.	Cholera.	Yellow fever.	Smallpox.	Typhus fever.	Typhoid fever.	Scarlet fever.	Diphtheria.	Measles.	Whooping cough.
Aberdeen	Dec. 30	163,084	68	....	....	....	....	....	....	....	....	....	1	....
Aguascalientes	Dec. 31	40,000	47	4	....	....	....	....	1	....	....	....	....	2
Do	Jan. 7	.....	38	3	....	....	....	1	3	....	....	....	....	....
Aix-la-Chapelle	Dec. 16	156,467	49	3	....	....	....	....	....	....	....	....	3	....
Amsterdam	Dec. 30	580,365	138	21	....	....	....	....	....	2	1	....	2	3
Do	Jan. 6	.....	145	23	....	....	....	....	....	1	1	....	1	8
Barcelona	Dec. 28	591,272	275	18	....	....	....	....	....	3	....	....	1	2
Do	Jan. 5	.....	285	18	....	....	....	....	....	2	....	3	....	1
Barmen	Dec. 9	170,700	33	2	....	....	....	....	1	....	1	....	....	1
Barranquila	Dec. 30	40,000	17	....	....	....	....	....	....	....	....	1	....	....
Batavia	Dec. 9	217,630	11	....	....	2	....	....	1	....	....	....	....	....
Belfast	Dec. 30	385,492	125	16	....	....	....	....	....	....	5	2	....	3
Berlin	Dec. 10	2,082,972	597	83	....	....	....	....	....	1	14	27	3	3
Do	Dec. 23	.....	543	59	....	....	....	....	....	1	8	24	2	9
Birmingham	Jan. 6	842,512	273	....	....	....	....	....	....	1	2	2	1	15
Bordeaux	Dec. 30	253,000	96	11	....	....	....	....	....	....	....	....	....	1
Do	Jan. 6	.....	84	13	....	....	....	....	....	....	....	....	1	....
Bremen	Dec. 16	246,850	71	7	....	....	....	....	....	....	1	2	1	....
Do	Dec. 23	.....	81	5	....	....	....	....	....	....	2	5	4	1
Bristol	Jan. 6	359,400	102	9	....	....	....	....	....	....	1	3	....	....
Brunswick	Dec. 30	145,000	.....	7	....	....	....	....	....	1	7	22	....	....
Budapest	Dec. 16	1,000,000	.....	....	....	....	....	....	....	2	5	2	10	....
Do	Dec. 20	.....	.....	....	....	....	....	....	....	2	2	2	12	....
Cairo	Dec. 9	689,439	428	26	....	....	....	....	....	3	....	5	....	....
Do	Dec. 16	.....	414	12	....	....	....	....	2	3	....	13	....	....
Calcutta	Nov. 25	890,493	525	16	9	39	....	....	....	....	....	....	....	....
Do	Dec. 2	.....	540	22	5	51	....	1	....	....	....	....	....	....
Do	Dec. 9	.....	510	24	2	33	....	....	....	....	....	....	....	....
Catania	Dec. 29	207,000	66	7	....	....	....	....	1	....	6	2	1	....
Chihuahua	Dec. 24	39,000	20	1	....	....	....	2	....	....	....	....	....	....
Cologne	Dec. 16	522,694	151	19	....	....	....	....	....	1	2	3	6	1
Do	Dec. 23	524,847	128	....	....	....	....	....	....	....	....	....	....	....
Do	Dec. 30	.....	142	15	....	....	....	....	....	....	....	3	3	1
Colombo	Dec. 9	213,974	170	10	....	....	....	....	....	13	....	....	....	....
Constantinople	Dec. 31	1,000,000	252	30	....	....	....	5	....	....	7	4	....	....
Copenhagen	Dec. 23	462,000	146	23	....	....	....	....	....	....	1	....	1	4
Dresden	Dec. 16	555,500	156	12	....	....	....	....	....	....	2	7	1	....
Dublin	Dec. 30	403,732	160	30	....	....	....	....	....	1	1	3	3	4
Dundee	...do.....	171,006	50	5	....	....	....	....	....	....	....	2	....	....
Do	Jan. 9	.....	47	2	....	....	....	....	....	....	....	2	....	....
Edinburgh	Dec. 30	320,829	95	7	....	....	....	....	....	....	....	4	2	....
Do	Dec. 16	.....	35	6	....	....	....	....	....	2	....	4	....	....
Erfurt	Dec. 23	125,834	42	1	....	....	....	....	....	1	1	5	....	....
Frankfort on the Main	...do.....	419,300	106	....	....	....	....	....	....	....	1	1	....	....
Georgetown	Dec. 16	56,000	53	5	....	....	....	....	....	1	....	....	....	....
Do	Dec. 30	.....	55	3	....	....	....	....	....	1	....	....	....	....
Ghent	Dec. 23	165,965	39	4	....	....	....	....	....	....	1	1	....	....
Do	Dec. 30	.....	35	....	....	....	....	....	....	....	....	1	....	1
Gibraltar	Dec. 31	25,367	8	....	....	....	....	....	....	....	....	....	....	....
Glasgow	Jan. 5	784,655	274	....	....	....	....	....	....	2	3	5	17	4
Halifax	Dec. 16	46,000	26	2	....	....	....	....	....	....	....	2	....	....
Do	Dec. 23	.....	12	2	....	....	....	....	....	....	....	1	....	....
Do	Jan. 6	.....	14	1	....	....	....	....	....	....	....	1	....	....
Hamburg	Dec. 30	931,035	259	34	....	....	....	....	....	1	....	13	6	3
Havre	...do.....	136,159	52	10	....	....	....	....	....	2	....	....	....	....
Hongkong	Dec. 9	336,488	.....	....	....	....	....	2	....	....	....	3	....	....
Hull	Dec. 23	278,968	82	....	....	....	....	....	....	1	1	....	....	2
Do	Dec. 30	.....	87	....	....	....	....	....	....	2	....	....	....	....
Iquique	Dec. 16	40,000	.....	7	....	....	....	....	....	....	....	....	....	....
Do	Dec. 23	.....	.....	5	1	....	....	....	....	1	....	....	....	....
Karachi	Dec. 9	148,000	86	....	1	....	....	....	....	....	....	....	3	....
Do	Dec. 16	.....	99	....	3	....	....	....	....	....	....	....	....	....
Kharput	Dec. 2	21,000	.....	....	....	12	....	....	....	....	....	....	....	....
Do	Dec. 16	.....	.....	1	....	18	....	....	....	2	....	....	....	....
Kingston, Jamaica	Dec. 30	59,584	.....	....	....	....	....	....	....	1	....	....	....	....
Konigsberg	Dec. 16	247,300	124	8	....	....	....	....	....	....	....	1	1	5
Do	Dec. 23	.....	129	13	....	....	....	....	....	....	....	3	5	7
Leghorn	Dec. 30	104,000	41	....	....	....	....	....	....	....	....	....	....	....
Leeds	Jan. 6	445,568	162	12	....	....	....	....	....	1	....	4	....	....
Leith	Dec. 30	80,674	14	1	....	....	....	....	....	....	....	1	....	....

MORTALITY—Continued.

Weekly mortality table, foreign and insular cities—Continued.

Cities.	Week ended—	Estimated population.	Total deaths from all causes.	Deaths from—									
				Tuberculosis.	Plague.	Cholera.	Yellow fever.	Smallpox.	Typhus fever.	Typhoid fever.	Scarlet fever.	Diphtheria.	Measles.	Whooping cough.
Leipzig	Dec. 23	595,703	158	30	....	....	....	....	1	....	1	2	....	1
Liege	Dec. 30	163,521	35	4	....	....	....	....	....	....	1	....	....	....
Liverpool	Jan. 6	720,014	253	17	....	....	....	....	....	....	2	2	5	2
London	Dec. 30	7,269,752	1,926	....	....	....	....	....	....	3	5	18	14	14
Lubeck	Dec. 31	100,000	22	2	....	....	....	....	....	....	1	....	1	1
Madras	Dec. 16	518,660	625	....	....	64	....	5	....	1	....	....	....	1
Manaos	Dec. 23	52,000	46	4	....	....	1	....	....	....	....	....	....	....
Manchester	Dec. 30	631,533	233	25	....	....	....	....	....	1	....	3	7	4
Mannheim	Dec. 16	198,800	.....	4	....	....	....	....	....	....	....	....	....	1
Mexico	...do....	719,052	341	20	....	....	....	8	5	....	....	2	....	14
Montreal	Jan. 13	466,197	162	22	....	....	....	....	....	5	4	1	....	3
Munich	Dec. 23	597,000	168	20	....	....	....	....	....	....	....	3	2	2
Nagasaki	Dec. 17	178,704	35	3	....	....	....	....	....	....	....	1	....	....
Newcastle-on-Tyne	Dec. 3	267,261	76	7	....	....	....	....	....	....	1	1	....	....
Nottingham	...do....	259,942	81	....	....	....	....	....	....	....	....	....	10	....
Odessa	Dec. 23	546,000	191	33	....	....	....	....	3	2	4	5	9	2
Palermo	Dec. 30	320,000	223	11	....	....	....	90	....	3	6	....	....	....
Para	...do....	185,000	68	8	1	....	....	....	....	....	....	....	....	....
Paris	Dec. 23	2,847,000	937	198	....	....	....	1	....	8	2	5	15	1
Do	Dec. 30	.....	885	197	....	....	....	1	....	6	5	8	19	1
Patras	Dec. 31	40,000	13	3	....	....	....	....	....	1	....	....	....	....
Penang	Dec. 2	101,427	76	10	....	....	....	....	....	1	....	....	....	....
Prague	Dec. 16	225,204	84	15	....	....	....	....	....	....	3	2	3	....
Do	Dec. 23	.....	68	12	....	....	....	....	....	....	2	....	1	....
Progreso	Jan. 6	6,959	12	1	....	....	....	....	....	....	....	....	2	....
Quebec	Jan. 13	78,200	.....	3	....	....	....	1	....	....	....	....	....	....
Rangoon	Dec. 2	289,432	172	....	3	5	....	1	....	....	....	....	....	....
Rome	Aug. 26	551,749	215	19	....	....	....	....	....	5	....	1	1	1
Do	Sept. 2	.....	184	21	....	....	....	....	....	5	....	....	2	....
Do	Sept. 9	.....	204	36	....	....	....	....	....	6	....	....	....	1
Saigon	Nov. 26	220,000	6	....	....	6	....	....	....	....	....	....	....	....
Do	Dec. 3	.....	20	....	1	19	....	....	....	....	....	....	....	....
St. John	Jan. 13	40,711	11	1	....	....	....	....	....	....	....	1	....	....
St. Pierre	Dec. 23	3,400	.....	....	....	....	....	....	....	1	....	....	....	....
San Luis Potosi	Dec. 2	82,946	68	3	....	....	....	....	....	1	....	....	....	....
San Pedro	Dec. 9	10,000	4	1	....	....	....	....	....	....	....	....	....	1
Sarnia	Jan. 14	9,936	5	....	....	....	....	....	....	....	1	....	....	....
Shanghai	Dec. 17	492,000	125	15	....	....	....	....	....	....	....	2	....	....
Sheffield	Dec. 23	454,653	110	6	....	....	....	....	....	3	1	2	1	2
Do	Jan. 6	.....	119	13	....	....	....	....	....	4	1	2	1	3
Singapore	Dec. 2	303,328	202	18	5	....	....	....	....	2	....	....	....	....
Smyrna	...do....	400,000	59	9	....	....	....	....	....	1	....	1	....	....
Do	Dec. 9	.....	55	8	....	....	....	....	....	2	2	1	....	....
Do	Dec. 16	.....	51	9	....	....	....	....	....	....	....	1	1	1
Do	Dec. 23	.....	44	8	....	....	....	....	....	1	....	1	....	....
Stettin	...do....	237,000	84	7	....	....	....	....	....	2	....	8	....	....
Do	Dec. 30	.....	75	7	....	....	....	....	....	....	....	2	....	....
Stockholm	Dec. 16	343,832	60	9	....	....	....	....	....	....	....	....	....	1
Stoke-on-Trent	Dec. 30	235,049	93	6	....	....	....	....	....	1	....	....	6	1
Talcahuano	Dec. 16	28,000	.....	2	....	....	....	1	....	....	....	....	1	2
Do	Dec. 23	.....	.....	2	....	....	....	....	....	....	....	....	1	2
Tarragona	...do....	23,150	8	1	....	....	....	....	....	....	....	....	1	....
Tientsin	Dec. 16	465,000	24	8	....	....	....	....	....	....	1	....	....	....
Toronto	Dec. 30	392,000	133	12	....	....	....	....	....	1	1	3	....	....
Do	Jan. 6	.....	113	4	....	....	....	....	....	....	....	7	....	1
Do	Jan. 13	.....	116	10	....	....	....	1	....	....	2	6	....	1
Trieste	Dec. 16	233,925	76	....	....	....	....	....	....	....	....	1	....	1
Turin	Dec. 24	401,555	104	19	....	....	....	....	....	1	....	....	....	....
Do	Dec. 30	.....	111	13	....	....	....	....	....	2	....	1	....	....
Valencia	...do....	240,000	102	6	....	....	....	1	....	....	1	1	1	....
Vienna	Dec. 9	2,064,583	586	99	....	....	....	....	....	....	2	3	8	3
Do	Dec. 16	.....	603	86	....	....	....	....	....	1	1	5	7	4
Warsaw	Nov. 11	797,093	316	36	....	....	....	25	....	7	15	3	3	....
Do	Nov. 18	.....	302	34	....	....	....	20	....	3	18	7	6	2
Do	Nov. 25	.....	253	23	....	....	....	19	....	6	18	6	6	1
Do	Dec. 2	.....	292	41	....	....	....	17	....	3	21	4	7	2
Yokohama	Dec. 25	419,630	.....	....	....	....	....	....	....	....	....	2	....	....

MORTALITY—FOREIGN AND INSULAR—COUNTRIES AND CITIES (Untabulated).

AUSTRALIA—*Newcastle.*—Month of November, 1911. Population 60,700. Total number of deaths from all causes 43, including diphtheria 2, tuberculosis 1, typhoid fever 1.

BRAZIL—*Bahia.*—Month of September, 1911. Population 292.000. Total number of deaths from all causes 412, including measles 2, plague 2, tuberculosis 53.

Ceara.—Month of November, 1911. Population 60,000. Total number of deaths from all causes 96, including tuberculosis 12, typhoid fever 7.

Santos.—Two weeks ended November 11, 1911. Population 85,000. Total number of deaths from all causes 59. No contagious diseases reported.

BRITISH INDIA—*Rangoon.*—Month of October, 1911. Population 289,432. Total number of deaths from all causes 725, including cholera 1, plague 27, smallpox 6, tuberculosis 40.

CANADA—*Sherbrooke.*—Month of December, 1911. Population 17,700. Total number of deaths from all causes 16, including diphtheria 1, tuberculosis 4.

CHILE—*Punta Arenas.*—Month of October, 1911. Population 14,000. Total number of deaths from all causes 36, including tuberculosis 3, typhoid fever 1.

FORMOSA.—Two weeks ended December 2, 1911. Population 3,290,186. Total number of deaths from all causes not reported. The deaths include diphtheria 3, typhoid fever 4.

GERMANY—*Kehl.*—Month of November, 1911. Population 180,193. Total number of deaths from all causes 196, including diphtheria 2, scarlet fever 2, smallpox 1, tuberculosis 26, typhus fever 3.

GREAT BRITAIN.—Week ended December 23, 1911.

England and Wales.—The deaths registered in 77 great towns correspond to an annual rate of 15.8 per 1,000 of the population, which is estimated at 16,157,797.

Ireland.—The deaths registered in 21 principal town districts correspond to an annual rate of 18.2 per 1,000 of the population, which is estimated at 1,149,495. The lowest rate was recorded at Sligo, viz. 4.7; and the highest at Kilkenny, viz, 39.7.

Scotland.—The deaths registered in 8 principal towns correspond to an annual rate of 18.6 per 1,000 of the population, which is estimated at 1,710,291. The lowest rate was recorded at Perth, viz, 13.1, and the highest at Greenock, viz, 25.6 per 1,000. The total number of deaths from all causes was 609, including diphtheria 7, measles 38, scarlet fever 3, typhoid fever 1.

ITALY—*Florence.*—Month of November, 1911. Population, 232,860. Total number of deaths from all causes 307, including measles 1, tuberculosis 43, typhus fever 12.

MALTA.—Two weeks ended December 23, 1911. Population, 213,395. Total number of deaths from all causes 207, including diphtheria 1, measles 4, typhoid fever 1.

NEW ZEALAND.—Month of October, 1911.

Auckland.—Estimated population, 102,676. Total number of deaths 101, including tuberculosis 5.

Christchurch.—Estimated population, 80,193. Total number of deaths 58, including tuberculosis 6.

Dunedin.—Estimated population, 64,237. Total number of deaths 46, including tuberculosis 4.

Wellington.—Estimated population, 70,729. Total number of deaths 52, including diphtheria 2, measles 1, tuberculosis 4.

RUSSIA.—*Libau.*—Four weeks ended September 13, 1911. Population, 90,000. Total number of deaths from all causes not reported. The deaths include diphtheria 1, scarlet fever 1, smallpox 2, typhoid fever 2.

Four weeks ended October 13, 1911. Total number of deaths from all causes not reported. The deaths include diphtheria 2, scarlet fever 4, typhoid fever 2.

SPAIN—*Cadiz.*—Month of November, 1911. Population, 67,306. Total number of deaths from all causes 165, including diphtheria 1, measles 3, scarlet fever 3, smallpox 5, tuberculosis 18, typhoid fever 1.

Huelva.—Month of November, 1911. Population, 28,982. Total number of deaths from all causes 57, including tuberculosis 5.

Madrid.—Year ended December 31, 1911. Population, 584,117. Total number of deaths from all causes 14,050, including diphtheria 157, measles 266, scarlet fever 10, smallpox 32, tuberculosis 1,823, typhoid fever 138, typhus fever 8.

By authority of the Secretary of the Treasury:

RUPERT BLUE,
Surgeon General,
United States Public Health and Marine-Hospital Service.