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STANDARDIZATION OF INSULIN.

1. TOXICITY OF INSULIN FOR WHITE RATS AS INFLUENCED BY TEMPERATURE OF ROOM IN WHICH ANIMALS ARE KEPT.

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One of the most difficult problems presented since the introduction of insulin for the treatment of diabetes has been the development of a satisfactory and relatively simple method for the determination of the therapeutic potency of this drug. It is, of course, very important that the physician should receive a product of uniform activity and free from any toxic impurities, and which will permit him to administer the proper dosage to his patients. As a result of the efforts of the Toronto investigators, a method of bio-assay has been worked out which is based on the determination of the dose of insulin which will reduce the blood sugar of fasting (24 hours) rabbits to a level where convulsions will occur. In practice it has been found that rabbits exhibit a great individual variation in susceptibility to insulin, and this has necessitated, according to information furnished by Doctor Clowes, of the Eli Lilly Co., the use of from 100 to 500 rabbits for the bio-assay of each lot of the drug. It is obvious that this means a very considerable expense in money and time. For this reason we have undertaken some work in order to secure, if possible, a simplification of the method.

Experience with the biological standardization of arsphenamine and its substitutes has suggested the use of a standard strain of albino rats in place of rabbits, as previous experience has shown us that the standardization of the animals used in the bio-assay of drugs is of the greatest importance. It is almost impossible to secure a sufficient supply of standard rabbits. The idea occurred to us that the determination of the minimum lethal dose (M. L. D.) of insulin in rats might serve as a pretty good index of the potency of such preparations. This method has, of course, one chief disadvantage, owing to the possibility of the disturbing interference of toxic impurities. However, the process of manufacture of insulin

has recently been so much improved that this complication no longer appears to be of any material significance. As a matter of fact, we have tested out this question by means of tests which indicate the specific effect of insulin and have found that the toxicity of the recent batches is altogether due to insulin. The details of the rat test have not been completely worked out at the present time, and the purpose of the first of this series of papers dealing with this subject is to call attention to one of the factors which appears to play an important part in the accuracy of the test, namely, the influence of the atmospheric temperature to which the animals are exposed after the injection of the drug.

The work was carried out as follows:

Young, healthy, albino rats from a standard strain and weighing about 50 to 60 grams were put on a standard diet of the following composition:

Graham flour	16 lbs.
Milk powder	10 lbs.
Corn meal	3 lbs.
Cod liver oil	300 c. c.
Sodium chloride	150 gms.
Calcium carbonate	10 gms.

This diet, which has been extensively used in the Hygienic Laboratory, has given entire satisfaction in the bio-assay of arsphenamine. Rats kept on this diet show a normal growth curve and appear to be in excellent physical condition. As soon as the animals had reached 100 to 110 grams, they were used for the test. The food was withdrawn 18 hours before the test, at which time the animals were weighed and injected subcutaneously with graded doses of a recent lot of insulin, kindly supplied to us for experimental purpose by Doctor Clowes, director of research of the Eli Lilly Co. The drug was kept in the refrigerator (10° C.) until used, and was diluted on the day of the test so as to yield a 10 per cent solution in sterile physiological saline. The original product, as received, contained 10 units per cubic centimeter, and the diluted solution therefore contained 1 unit per cubic centimeter. The doses given in the table refer to the undiluted preparation and are expressed in cubic centimeters per kilo bodyweight.

That the atmospheric temperature may play a rôle in the toxicity of insulin was suggested to us by the differences in the results obtained on relatively cool days as compared with those obtained on hot days. The problem of keeping the temperature constant was solved by working on relatively warm days and exposing one set of rats to the ordinary atmospheric temperature and another set to air in a cabinet (ventilated) which was cooled to the desired temperature by means of a crushed ice and salt mixture. An automatic tempera-

ture register was employed. As a rule it was quite easy to keep the temperature fluctuations within 1° C.

Three ranges of temperature were used, 15° to 17°, 18° to 22°, and 28° to 30° C. These temperatures about cover the range of atmospheric indoor temperature in this country during the various seasons of the year, with exception of unusually warm days.

In all, 270 rats were used, divided into lots of 30 animals.

The results are summarized in the table. It will be noted that the difference in the mortality rate is not appreciable between the animals exposed to 15° to 17° C. and 18° to 22° C., respectively. There is, however, a great difference between the percentage mortality in the latter group of animals and that of the group exposed to 28° to 30° C.

It is furthermore evident that the time of survival of those animals which ultimately died on a given dose of insulin is progressively shortened with a rise in atmospheric temperature. We also observed that the characteristic symptoms of insulin poisoning in the rat made their appearance much more rapidly at a high temperature. These symptoms consist in salivation and a gradually increasing weakness. Finally, the animal passes into coma, the body feels cold, and some animals develop convulsions, rolling over sidewise. Respiration is greatly depressed and often so shallow that the animal appears to have died, although it lives for a considerable time longer. Death is always preceded by respiratory failure.

It is difficult to give a satisfactory explanation for the temperature effect described. It is possible that it may be due to differences in the rate of absorption of the drug from the subcutaneous tissues. A low atmospheric temperature may delay absorption, owing to a more or less active peripheral vasoconstriction; and, vice versa, a higher temperature may promote absorption by peripheral vasodilatation.

At any rate, the fact remains that the toxicity of insulin in albino rats is greatly influenced by the room temperature, and this factor must be controlled in work of this kind.

The effect of atmospheric temperature on the toxicity of insulin.

	15° to 17° C.			18° to 22° C.			28° to 30° C.		
Dose of insulin per kilo of body weight.	Number of animals used.	Mortality (per cent).	Average time of death (hours).	Number of animals used.	Mortality (per cent).	Average time of death (hours).	Number of animals used.	Mortality (per cent).	Average time of death (hours).
C. c.									
0.2	30	3	26.5	30	3	9.3	30	20	2.4
0.6	30	36	19.6	30	20	13.9	30	80	2.6
1.2	30	43	14.9	30	43	5.0	30	100	1.7

DENGUE FEVER.

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Introduction.

Definition.—Dengue fever is an acute, insect-borne fever of unknown etiology which is endemic in the Tropics and which at times becomes epidemic. It may spread to temperate regions in the hotter portions of the year. In typical cases the disease is characterized by a sudden onset; an initial erythema; pains in the head, trunk, and limbs; fever of short duration, which shows a saddle-back curve; a slow pulse; marked leucopenia; a terminal rash; slow convalescence; and practically no mortality. Its pathology in uncomplicated cases is unknown.

Importance.—The disease is important because it attacks large numbers of people, causes much suffering, and incapacitates its victims for varying lengths of time. It is especially of military importance, as whole Army units may be disqualified for duty by an epidemic of the disease.

Geographical distribution.—Dengue is mainly confined between parallels 32°, 47′ N. and 23°, 23′ S., but has been known to extend beyond these limits in hotter portions of the year, as, for instance, to Philadelphia, Constantinople, and Athens.

Previous epidemics.—What was probably dengue fever was first described in 1779 at Cairo by Gaberti;[1] the following year the disease was described by Rush in Philadelphia and by Bylon[2] in Batavia. Many epidemics have been recorded since, some of which are as follows: Spain, 1793; Peru, 1818; India and Suez, 1825; United States, Mexico, West Indies, and South America, 1826–1828; India, 1824–1828; Arabia, 1835; India, 1836 and 1844; Bermuda, 1837; Egypt, 1845; India, 1847; Senegambia, 1845–1848; Brazil, 1845–1849; United States and West Indies, 1850–1854; India, 1853–54; Tropics of Eastern Hemisphere, 1870–1875; Louisiana (U. S. A.), 1872; Tripoli, 1878; Caribbean, North America, and Egypt, 1880; Caledonia, 1884–85; Fiji Islands, 1885; Texas (U. S. A.), 1885; Tripoli, 1887; Asia Minor, 1889–90; Texas, 1894 and 1897; Hawaii, 1903; Texas, 1907 and 1918; Bermuda, 1915; Egypt, 1916; and southern United States, 1922.

Etiology.

As dengue is a mosquito-borne disease it is natural to infer that the causative organism is present in the blood stream, and various authors have demonstrated that this is true by the injection of

[1] Stitt suggests that Gaberti may have described relapsing fever and thinks that Rush should have the honor for the earliest recognizable description of dengue.

[2] Cited from Hirsch.

volunteers. It has also been demonstrated that the organism is filterable. Cleland, Bradley, and MacDonald, 1916, produced dengue in volunteers by the injection of washed corpuscles as well as of serum and plasma, thus indicating that the virus is present in all elements of the blood. With the exception of these few facts the nature of the virus is unknown.

From time to time numerous workers have reported various "causative organisms," but the reports lack confirmation.

In 1873 Charles[3] described an organism in the blood; in 1886 McLaughlin described a coccus; in 1903 Graham described a hematozoan; in 1910 Nagib Ardate described bodies in the corpuscles which he thought were the same as Graham had described. Eberle, in 1904, described his plasmeba, and in 1906 Reiche described some very actively mobile translucent bodies in the blood of dengue cases. In 1904 J. C. D. Allen described spirochetes from the sputa of several cases, and in 1919 McMullin suggested that the disease was possibly an anaphylactic reaction brought about by repeated injections of protein by the mosquito. Craig has suggested that the causative organism is probably a spirochete, from certain analogies which dengue bears to yellow fever.

Couvy, in Beirut, 1914, described short, slender spirochetes having two or three turns and fine extremities, which he found in the blood of patients drawn two or three hours before the rise of fever, but not at other times. In 1921 he again found spirochetes not only before the onset of fever, but from 3 to 48 hours thereafter. They were not numerous. Blood inoculated into rabbits caused fever, and Couvy found spirochetes in their blood at the time of onset and relapse. Transfers were made through three rabbits without attenuation. In two animals, crushed infected sand flies gave febrile attacks, and spirochetes were found. While the author considered this outbreak to be one of dengue fever, his charts would well illustrate *phlebotomus* fever, and there seems to be some doubt as to the identity of the fever which he was studying.

Holt, 1922, described polymorphous organisms seen in blood of patients and inoculated animals.

These observations, however, all lack confirmation, although many attempts to find the organism have been made.

Epidemiology.

Climate.—Hirsch noted that seashore cities and towns upon large rivers were especially liable to the visitation of dengue, but the disease may also travel inland as has been the case in India and the United States.

[3] Cited from Hirsch.

With the exception of temperature, there is very little dependence of the disease upon climatic conditions. It flourishes in wet weather but it also occurs in times of drouth. The epidemics at Philadelphia. 1780; Goojeret, 1824; St. Thomas, 1827; Senegambia, 1860; Southern States, 1922, and many others occurred in very dry weather. Frosts soon bring the disease under control.

Age and sex distribution of cases.—When the disease spreads among a nonimmune population it has been repeatedly observed to attack both sexes and all ages indiscriminately, although Argramonte, in Habana, 1905, states that the disease did not occur or at least was not recognized in children under 5 years of age.

Diffusion and numbers attacked.—The spread of dengue is similar to that observed in yellow fever, but more rapid. In regard to the numbers attacked and the rapidity with which they are stricken, epidemic dengue is second only to influenza. At Austin, Tex., 1885, it is estimated that 16,000 out of 22,000 population were attacked; at Cairo, Egypt, in 1880, four-fifths of the people are said to have suffered with the disease; at Lima, Peru, 1818, only a few persons are said to have escaped; in Galveston, Tex., in 1897, it is estimated that one-half of the population suffered, and in 1922, 60 per cent; in Monroe, La., 1922, perhaps one-fourth had the disease. In many epidemics, however, smaller proportions of the population are often attacked, owing to the advent of cool weather or perhaps to the presence of an immunity to the disease. At Monroe, La., 1922, the writer observed a sharp, severe outbreak among the poorer negro classes on the eastern boundary of the city, where piped water was not supplied and screens were seldom found. This localized epidemic had attacked perhaps 1,000 persons before its existence was known to the local health authorities. The disease spread slowly in the better districts of the town for several weeks until the epidemic was terminated by frosts. The same sort of spread was observed by Manson at Amoy, China.

Influence of economic status, crowding, etc.—Before Graham demonstrated that dengue could be transmitted by the mosquito, older writers had attributed considerable importance to filth, poverty, and overcrowding. These conditions are important in so far as they are related to the life habits of the insect carriers. The disease is practically confined to cities, showing little tendency to spread to rural areas and villages.

Case chronology.—There are but few figures bearing on the case chronology of dengue (except in military groups); and owing to the great rarity of deaths from the disease, mortality statistics are also lacking. Kennedy gives the accompanying curve for an epidemic of dengue in India, 1912, among a group of soldiers (Fig. 1). The rise and fall in this epidemic curve are seen to be very sudden,

perhaps more sudden in this limited group than would be observed in the larger and more scattered population of a city. The decline of the epidemic is usually considerably slower than the rise, and in large cities the epidemic may continue for some time, even to several months.

Incubation period.—The incubation period in dengue is usually from 3 to 6 days, but has been observed to vary from less than 2 days to as much as 15 days.

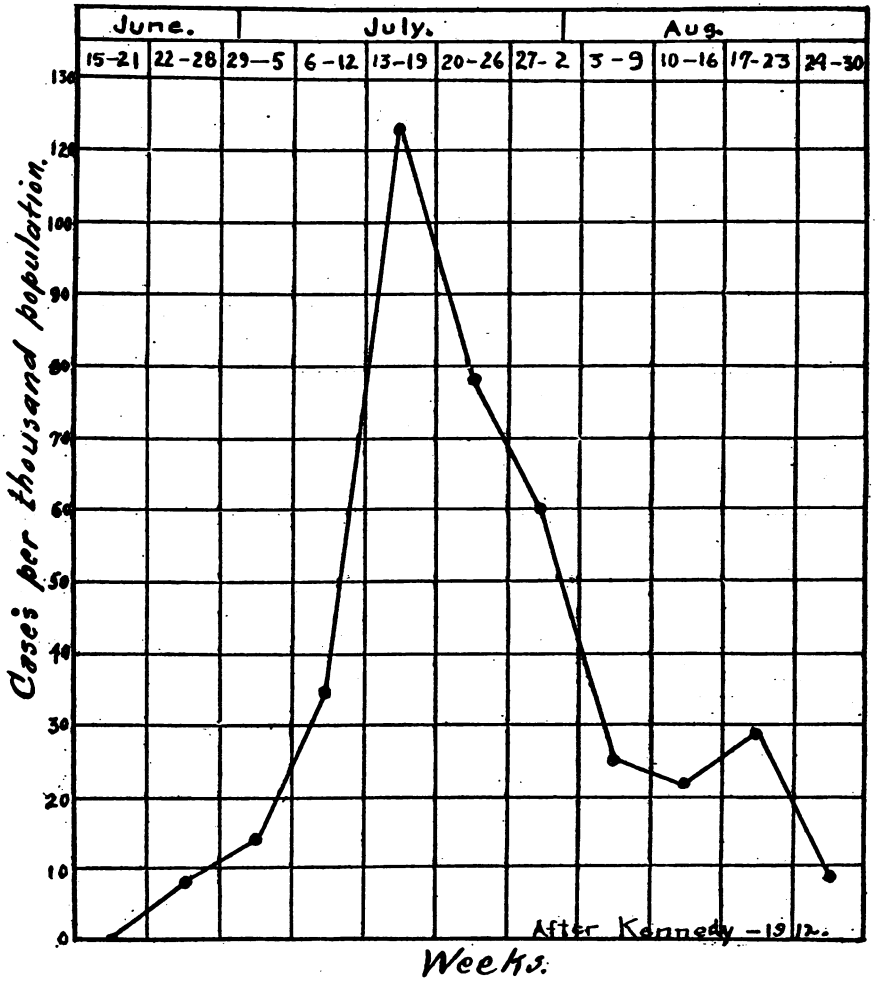

FIG. 1.—Incidence curve of dengue epidemic: Cases per thousand population, by weeks.

Agramonte notes that two children returning to Habana from New York were stricken with dengue in 36 and 56 hours, respectively, after their arrival home.

Vassal and Brochet note that the first case to appear on the steamship *Kersaint*, after arrival at the infected port of Saigon, occurred on the fourth day.

Hare notes the occurrence of the disease in two men who visited an infected town for one day only, both of whom were attacked five days later.

Adrien, after landing upon the infected island of Rouad, records the time of attack in 20 men as follows:

Three men on the fourth day.
Seven men on the fifth day.
Five men on the sixth day.
Three men on the eighth day.
Two men on the tenth day.

In the experimental cases produced by infected mosquitoes the following incubation periods were noted:

Experimenter.	Number of cases.	Incubation period, days.	Experimenter.	Number of cases.	Incubation period, days.
Graham	2	4	Cleland et al	2	7- 8
Do	2	5	Do	1	9-10
Do	1	6	Ashburn and Craig	1	3- 4
Bancroft	1	5	Chandler and Rice	1	4- 5
Do	1	6	Do	1	5- 6
Cleland et al	1	6-7	Do	2	6- 7

In the cases produced by the injection of blood, the following results were attained:

Experimenter.	Number of cases.	Incubation period, days.	Experimenter.	Number of cases.	Incubation period, days.
Cleland et al	1	4- 5	Cleland et al	1	15
Do	4	5- 6	Ashburn and Craig	4	2- 3
Do	3	6- 7	Do	2	3- 4
Do	3	7- 8	Do	1	4- 5
Do	5	8- 9	Do	1	7
Do	2	9-10	Chandler and Rice	2	5- 6

Koizumi et al. report in their experimental cases an average incubation period of 5.4 days.

It may be noted from the above figures that the incubation period observed by Cleland and his coworkers are longer than those observed by other experimenters. Variations in the dosage, state of the virus, or in the susceptibility of the subjects may be important factors in this determination.

Cleland injected two groups of two volunteers each on two different occasions, with identical amounts of blood from the same patient, and found practically identical incubation periods in each pair of volunteers. These observations would point to the state of the virus as being of more importance than individual variation.

Symptomatology.

Judging from the literature of the subject, there is evidently considerable variation in the symptomatology and severity of dengue in different parts of the world and in different epidemics. Seidelin, commenting on the less frequent mention of the terrific pains in later epidemics, suggests that perhaps the older writers were wont to describe the very severe cases and to overlook milder ones. This variability in the symptomatology of the disease appears to be especially marked among outbreaks occurring on the Western Hemisphere.

Onset.—The onset is often without prodromal symptoms, or, when present, they are usually of a mild character, consisting of a chilly feeling, headache, pains in the back, lack of appetite, etc. The sudden onset may be typified by the attack in an unfortunate victim at Port Said, an account of which is quoted by Selim Saigh. The patient described it thus: "I have been out to work all day, feeling the same as usual; about sunset I had a headache, and, feeling tired, I sat on a chair to rest; suddenly I began to have pains all over, and half an hour later when I had to go home I was so stiff that two men had to support me all the way home."

Primary erythema (primary rash).—During the first day or two of the disease the skin of the head, chest, neck, and arms is markedly congested. The features appear red, hot, and puffy, and the conjunctivæ and mucous membranes are injected. (The erythema may be best seen in some cases near the knees and elbows.) The patient may complain of a little soreness of the throat, but on examination there is only the congestion of the pharynx with, perhaps, a little dryness. During this stage of the disease the features have been described as resembling those following an alcoholic debauch. The erythema usually fades in a day or two, but may persist and merge with the later secondary rash.

Pains.—Agramonte describes headache, backache, and fever as an ever-present triad at the onset of dengue. The headache, usually severe, is perhaps oftenest located deep behind the eyes, but may be described as occurring in any portion of the head or often as "all over." Koizumi and others noted headache in 93 per cent of cases.

Pains in the back, loins, muscles, and about the joints are very severe in many cases, and it is their severe character which caused Rush to apply to the disease the term "break-bone."

Sandwith described them as "burning as if a hot iron were being pushed into the joints." These pains, when severe, together with the mental depression so often evident during convalescence, has induced some one to designate the disease as "the sum total of human misery."

The pains, however, are fortunately not always so severe. Seidelin noted pains less commonly in India than usually described. Jones states that pains in the limbs were rare in the Philippines in 1907. Levy, at Galveston, 1919, states that many students suffering with dengue continued to attend medical classes regularly. Cleland and others mention "break-bone" pains as rare in their cases. Masterman states that the pains of dengue are less than in influenza, and Skae (also Meagher), in Bermuda, 1915, states that many cases were so mild as to be missed except for the presence of an epidemic. The writer suffered an attack without any notable pains of the limbs, and saw a number of such cases at Monroe, La., 1922; but there were also many patients who suffered with the more classical pains about the joints, and pains in the back were present in nearly all cases.

A quite constant and rather typical symptom is pain in connection with the muscles of the eye, which results when the eyes are rotated. The eyeballs are also usually tender to pressure. Young children, it is often stated (Skattowe, Scott, et al.), suffer less than adults, and their convalescence is more rapid. Hare observed a few cases with initial pain in the testicles and groins. The writer saw one such case in Louisiana—a large, muscular negro who, when first seen, was almost maniacal with pain in both testicles. There was no swelling or other abnormality apparent. The pain yielded readily to codeia.

Fever.—As found in a few experimentally observed cases, mild fever may exist for some hours before the onset of other symptoms. With the onset of headache, etc., however, the temperature usually rises rapidly to its peak, 102° to 105° or higher. The fever is usually high for the first day or two and then begins to descend more or less rapidly, and may reach normal by the end of the third or fourth day and not rise again (see Fig. 2). There is usually an amelioration of the symptoms as the temperature falls. In the typical textbook attack, however, the temperature, either before or after reaching normal, on about the third or fourth day, begins to rise (see Fig. 3), giving the classical saddleback temperature curve of dengue. It is during this second rise of fever (seldom as high as the primary rise) that the secondary rash, when present, usually appears. After reaching its peak in the second rise, the fever usually descends either by crisis, in which case there may be profuse sweating, or more slowly, and it usually remains normal. It would seem that antipyretics may interfere with the normal temperature curve; however, Sutton states that they have little influence. Megaw and De Brun state that patients may suffer with typical pains and other symptoms of a mild character, but without rise of temperature; and the latter states that the eruption may occasionally be the only symptom of the disease.

Secondary rash.—The secondary rash is present, as noted by various writers, in widely different proportions of cases in different epidemics and localities. Rush states that it is almost universally found if looked for, as does Manson, Goldsmid, et al., while Charles [1] states that it is present in two-thirds of the cases, and Von Dühring,

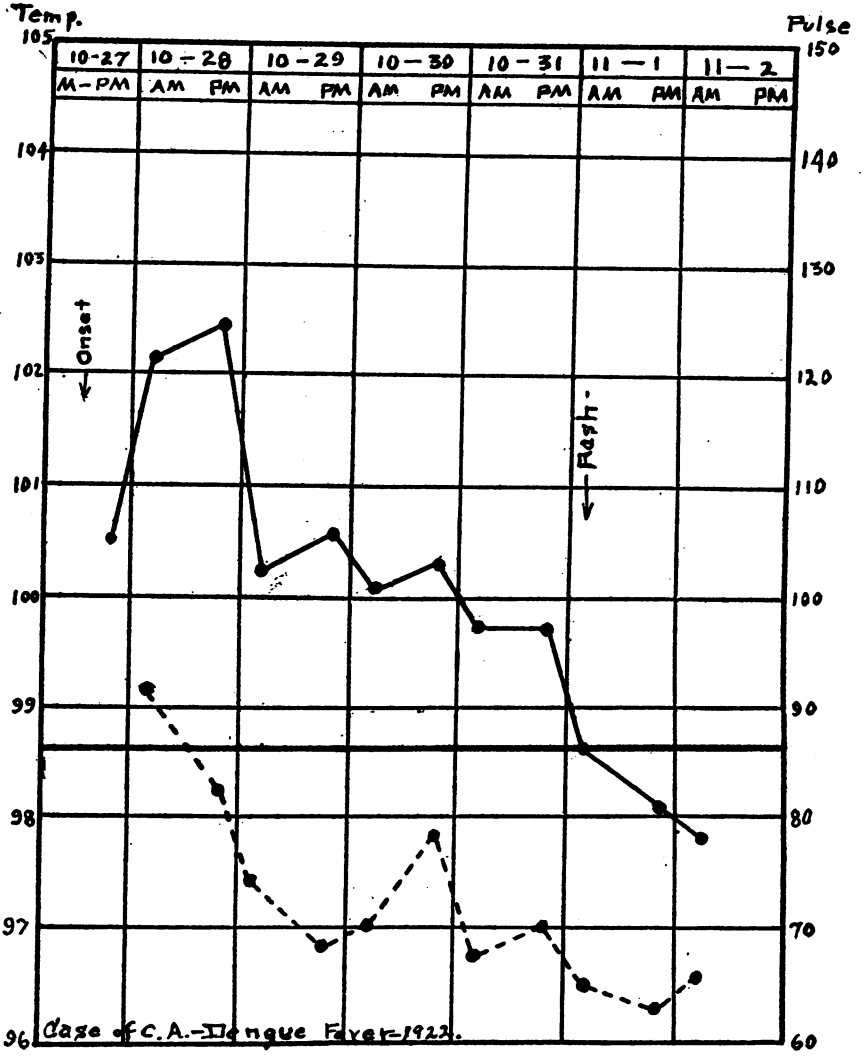

FIG 2.—Chart of temperature and pulse rate observed in dengue fever patient. (Solid line, temperature; dotted line, pulse rate.)

in half the cases. Various physicians in the Philippines reported it to Wilson as present in from 10 to 100 per cent. No doubt some of the apparent discrepancies are to be explained by the difficulty of seeing a rash in dark-skinned peoples.

[1] Quoted from Risk.

Its chief characteristic, as some one has said, is its lack of characteristics. The rash usually begins about the fourth or fifth day, often first appearing upon the hands, forearms, and feet. It may remain confined to these parts or spread to the chest, forehead, and remainder of the body. The rash is often morbilliform in character and, as McCulloch says, often so like measles that there is no use trying to

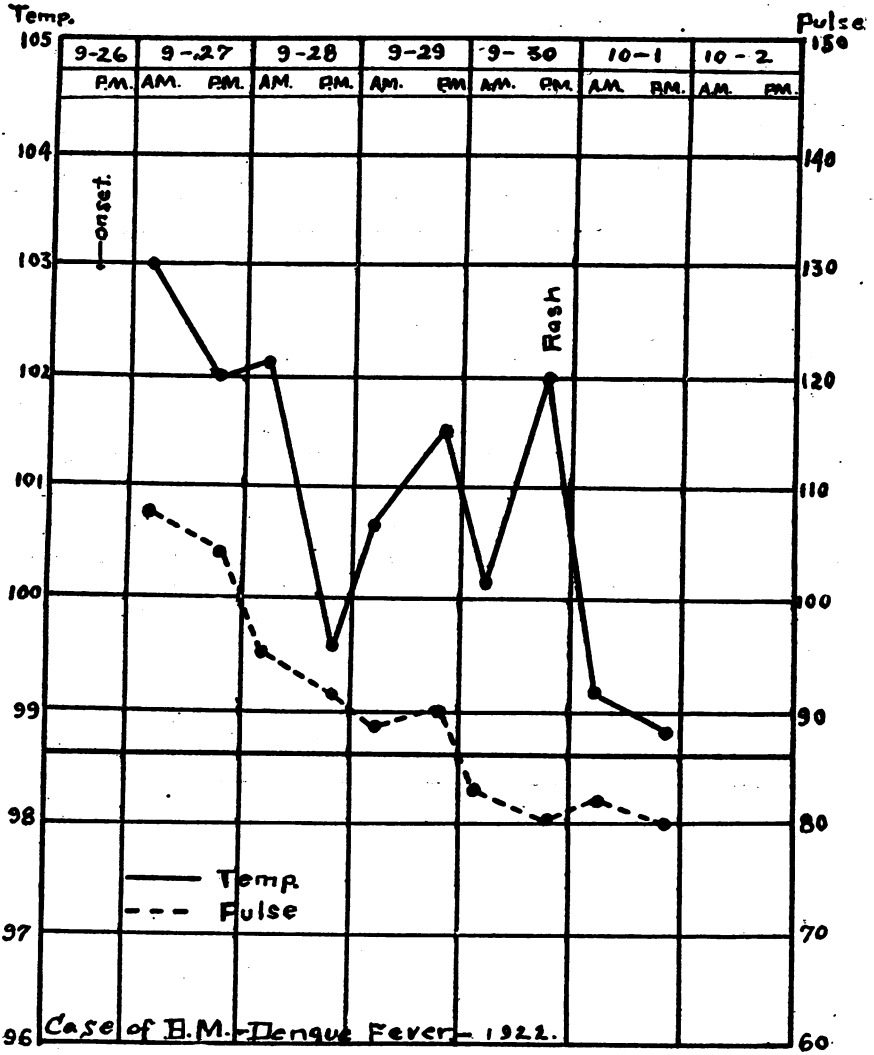

FIG. 3.—Graphs of observed temperature and pulse rate in dengue fever case (typical textbook attack).

differentiate the two rashes. Perhaps almost as often, however, it is scarletiniform in character, and may cover the whole body. Typical urticarial rashes are occasionally described in dengue, and Phillips described one case with a petechial rash resembling typhus. King described a flea-bitten rash and thinks the rash is most pro-

nounced where the pains are greatest. Hare states that a rash resembling prickly heat is common in the Tropics, but with the lesions less elevated. Agramonte, Von Dühring, and others state that the eruption may occasionally last only a few hours and may easily be overlooked by the physician or nurse. The rash usually lasts for three or four days, but in occasional instances has been recorded by Robertson et al., Von Dühring, and others, to have persisted for from two to four weeks. Itching and burning are not uncommon at the site of the eruption, especially of the soles and palms. The itching usually persists for only a day or two.

During convalescence a fine furfuraceous desquamation is quite common, which, at times, may amount to peeling, as noted by Kraus, Agramonte, Sandwith, Graham, and others; and it may be as pronounced as that seen in moderate cases of scarlatina. Goldsmid and Crosse have described a fine stippling of the soft palate as often the only rash seen at the first visit.

Gastro-intestinal symptoms.—The tongue is usually covered with a whitish yellow fur which gives way at the edges to a clean red mucous membrane. The appetite in practically every case is lost and may amount to a loathing of food. However, in Cleland's thirteen experimental cases only one showed anorexia. There may be a feeling of pain or discomfort in the epigastrium; and nausea, often accompanied by vomiting, is quite common. Jaundice is very rare in dengue, but when occasionally seen, as by Goldsmid and Crosse, is always described as mild and transient. Mild constipation is often present, but yields readily to laxatives.

The loss of from 7 to 14 pounds is usually suffered during an attack of dengue, probably a result of the fever, anorexia, etc.

Pulse.—The pulse in dengue usually varies with the temperature and may be rapid (Chart II), but more often it is slower than would be expected in most fevers of corresponding degree.

Rush did not mention this feature at Philadelphia, 1780, but it has been observed in most epidemics since that time, the pulse in many cases not going above 100. During convalescence the pulse is also usually slow. Koizumi noted rates from 44 to 48 as common during this period. Faget's sign is very rare in dengue.

Genito-urinary symptoms.—The urine, as in most fevers, is reduced in amounts. In most epidemics, albumin is not described as being present, but is occasionally encountered. When present, it is usually transient and in small amounts, coming on about the end of the second day and disappearing with the fever. McCulloch found no albumin in his cases; Hanabusa noted small amounts in 8.3 per cent of his cases; Hare states he observed slight amounts commonly; Carpenter and Sutton observed albumin in 6 out of 122 men; Koizumi noted albumin in 15 per cent of his cases; Agramonte

in Habana, 1905, states that albumin was present in practically every one of his 154 cases and in many more seen in consultation, usually beginning on the second day and lasting throughout the disease. The same was true of 70 cases treated at the Los Animas Hospital in the same epidemic. These varied results may be due to the character of the tests employed.

A number of authors describe menstrual disturbances in dengue. Hare thinks that menstruation is increased and prolonged when present, or, if absent, its onset is often precipitated; and he considers this one of the most distinctive features of the disease. Dennis noted these features in three-fifths of his adult female cases, and Robertson states that they are the rule. Rice noted them in 75 per cent of his adult female cases. Craven states that the menstrual irregularities may persist for several years after an attack of dengue.

Glands.—Glandular involvement is a feature wherein great variation is apparent in different epidemics. The writer saw no cases of glandular enlargement in Monroe, La, 1922; King, in Fort Worth, Tex., 1907–8, states that enlarged glands were found in a few cases and were without soreness; Goldberger and McCoy noted a few enlarged glands in Brownsville, Tex., 1907, but state that they were discrete and neither tender nor painful; Levy, at Galveston, Tex., 1918, states that a small proportion showed glandular enlargement. On the other hand, Pridmore, describing an outbreak in Burma, 1902, states that 75 per cent of cases showed enlargement of the cervical, axillary, inguinal, and supra-condylar glands; Castellani mentions enlarged and tender glands as present in from 30 to 70 per cent of cases, and states that they often remain for weeks after the acute attack is past. He also states that dengue was produced in two out of three cases by the injection of aspirated gland juice into healthy subjects. Lane, in the Virgin Islands, 1918, noted affection of all the large superficial glands in 47 out of 75 cases. There was no suppuration, but in many cases the glands were so painful as to require the application of ice.

McMullin describes enlargement of the spleen, coming on with the secondary rise of temperature, in about 50 per cent of cases; Ardate also mentions splenic enlargement as common.

Joints.—Swelling of one or more joints is not uncommon in some epidemics, though almost absent in others. No swollen joints were encountered by the writer in Monroe, La. Skottowe, in the Fiji Islands, did not see a swollen joint, neither did Levy at Galveston. Cleland states that, with one doubtful exception, he saw only one joint affection. The swelling when present is described as being a sort of puffiness of the tissues about the joint and never leads to suppuration. Pridmore states that joint pains and swelling may persist in a few cases and cites one case in which they lasted for one

month. Castellani mentions the same condition, which, though rare, he states, may last seven to eight weeks.

Nervous symptoms.—During the first days of an attack there is usually great restlessness, with insomnia, lasting for three to four days. These features are less in children. The sense of taste is almost universally altered, and many patients complain of a bad taste, with a loathing of food. Photophobia is not uncommon during the earlier days of the ailment. Itching has already been mentioned, and paresthesia of the skin is not uncommon. All types of mild mental confusion may exist during the period of high fever, and occasionally a patient is seen who is drowsy, indifferent, responds with difficulty to questions, and rapidly sinks again into somnolence. The writer saw one such case in Monroe, La. Moulliac mentions such a case in which the symptoms persisted for two months, recovery being without sequelæ. Giddiness is often complained of upon rising, and Goldsmid states that fainting was not uncommonly observed by him in elderly women. Couffon and Pagnier state that they observed nearly constant absence of knee jerks and pupillary responses to light, but that these symptoms appeared several days after the temperature reached normal. (From his description it may be questioned as to whether this outbreak was really dengue.)

The asthenia, mental depression, dejection of spirits, and irritability which often follow the attack are quite marked in dengue, even in a few cases leading to suicide, as noted by Love.

Blood findings.—The white-blood count is quite characteristic in dengue. Practically all clinicians who have studied this feature of the disease have noted marked leucopenia, with reduction of the percentage of neutrophiles, accompanied by a relative and absolute increase in the mononuclear elements, especially the lymphocytes. The percentages of large and small lymphocytes vary considerably in different cases and in the same case at different times. So, while they do behave in a somewhat characteristic fashion, they are of less importance from a diagnostic standpoint than is the leucopenia with reduction of the polymorphs.

Stitt, in the Philippines, studied 100 cases and found the average white count to be 3,200; the lowest, 1,700; the average percentage of polymorphs was 51 per cent; the lowest, 29 per cent.

Ashburn and Craig give the following percentages for the white-blood cells in a case on different days of the disease:

	First day.	Third day.	Sixth day.
	Per cent.	*Per cent.*	*Per cent.*
Polymorphs (neutrophiles)	50	52	48
S. lymphocytes	41	36	14
L. lymphocytes	7.5	8	32
Eosinophiles	1.5	4	6

The following table is from Vedder, 1907:

Day of disease.	Number of counts.	Average per cent of—					
		Polys.	S. lymp.	L. lymp.	L. monos.	Eos.	Bas.
First	24	64.68	26.59	6.40	1.44	0.49	0.19
Second	28	43.46	49.38	5.00	.97	.62	.23
Third	27	37.14	53.21	7.28	1.11	.99	.27
Fourth	24	38.35	51.04	6.56	1.34	1.57	.42
Fifth	22	37.38	51.28	7.58	.99	2.46	.31
Sixth	21	33.62	52.48	9.79	1.54	1.79	.27
Seventh	18	35.66	50.71	9.29	1.96	2.20	.16
Eighth	10	39.82	43.22	10.98	1.41	2.72	.29

Harnett, Stitt, Carpenter and Sutton, and others have observed an increase of the eosinophiles, beginning about the third to sixth day and continuing well into convalescence, and they attribute considerable diagnostic significance to it.

Red cells.—Carpenter and Sutton, Stitt, Vedder, Graves, and others have noted no change in the red cells, either their number or hemoglobin content, whereas Eberle and Levy, on the other hand, report a reduction in red cells and hemoglobin as common.

Complications.

Complete recovery is the rule in dengue, but complications occasionally occur. It has been suggested that the marked leucopenia in the disease may leave the patient susceptible to various infections.

Boils or small abscesses are mentioned by Allen, Kennedy, Hare, Skottowe, and others. Orchitis, inflammation of Cowper's glands, pericarditis, catarrhal ophthalmia, and other pyogenic affections have been occasionally described.

Eye complications.—Barkan notes one case of paralysis of accommodation which was first noted two weeks after the onset of dengue. In this case there was no response to accommodation and but slight response to light. The Wassermann was negative. The patient gradually recovered. Van Milligen mentions two cases with normal vision who developed weakness of accommodation with presbyopia. Upon rest, both recovered. Gibson encountered a case of acute glaucoma in a lady of 58, which began on the second day of dengue. Hare mentions a case of acute inflammatory glaucoma following dengue. Barkan noted abducens paralysis coming on nine days from the onset of dengue and clearing up later. Gibson observed three cases of "keratitis dengue" and five cases of "keratitis post-dengue." Archibald observed keratitis in one case.

Spadero mentions one case of choroiditis following dengue. The writer noted that his eyes tired easily for several weeks following the attack.

Hemorrhagic tendencies.—Tendencies toward bleeding have been noted by various writers, more in some epidemics than in others. Epistaxis and bleeding from the mucous membranes are not uncommon during the period of congestion. Menstrual hemorrhage is common. Dennis noted it in 60 per cent and Rice in 75 per cent of their cases among women.

Goldsmid mentions two cases dying with purpuric manifestations, and Marks performed two autopsies after dengue, both showing hemorrhagic tendencies. Bloody vomit may be occasioned either by the swallowing of blood or from gastric hemorrhage. Rice noted 47 cases of gastric hemorrhage in Galveston (1922) among 565 cases. In several there was "black vomitus," but without jaundice. Wilson, Hahn, Gozanet, the writer, and others have noted this tendency to bleed in occasional cases.

Circulatory system.—Disturbances of the heart and circulatory apparatus are mentioned as occasionally present either during or after the attack, by Davidson, Hare, Vassal and Brochet, Nicoll, and others. Acute and chronic myocarditis are the lesions most commonly mentioned.

Relapses and delayed recovery.—Relapses are not uncommon. In a number of cases swelling or pain in one or more joints has been described as persisting for weeks after an attack. Hahn and others have observed glandular enlargement persisting for a considerable period. Asthenia, depression of spirits and inability to work, however, are common after dengue, but disappear in from two to eight weeks. It is to be remembered, however, that complications are distinctly the exception and complete recovery is the rule. Hare even states that patients after dengue often describe their health as distinctly above par. Craven and Robertson thought that dengue was effective in increasing the number of deaths from pulmonary tuberculosis and that the rapidity of the course of phthisis was enhanced by an attack of dengue.

Prognosis.

Recovery is almost certain in uncomplicated cases. In the weak, old, or debilitated, dengue may be serious, and it is among these persons that it occasionally causes death. Nielly noted five deaths out of 450 cases at Aden, 1871; Cleland et al., 1918, state that 94 deaths in a population of 125,000 were attributed to dengue at Brisbane (these deaths were largely among persons under 5 and over 60); Hare collected accounts of 60 deaths in North Queensland in 1897, mainly accompanied by complications, old age, diabetes, chronic bronchitis, and especially alcoholism.

Diagnosis.

Dengue must be differentiated from yellow fever, trench fever, measles, scarlet fever, influenza, pappataci fever, Brill's disease, Rocky Mountain spotted fever, meningitis, malaria, and the early stages of smallpox.

The differentiation from yellow fever is especially important, owing to the seriousness of the latter infection and to the fact that dengue and yellow fever are spread by the same mosquito and therefore are likely to occur together. The two diseases existed in Habana in 1905 and were confused for a time.

Both diseases in the early stage are marked by a congestion of the superficial capillaries of the head, chest, arms, etc., and are indistinguishable by this symptom. The fever may rise more rapidly in dengue than in yellow fever, and albumin, when present, may appear earlier in dengue, by the end of the second day (Agramonte), but always of slight amount. In yellow fever the albumin is often so intense as to solidify in the tube and seldom comes on before the third day, except in severe cases.

Jaundice is rare in dengue and common in yellow fever, but usually not before the third day. Agramonte recounts, however, a case of a yellow fever post mortem in which there was no trace of jaundice.

The pulse in yellow fever is likely also to be slow. Faget's sign is common (a pulse rate which may rise or fall with the temperature, but not in proportion to it, so that the pulse curve tends to fall away from the temperature curve in the first three days or during the period of active congestion).

The blood count is very variable in yellow fever. O'Brien, in Guayaquil, found the average white count in yellow fever to be practically normal, but found variations from 3,200 to 20,000. A low count, therefore, is of slight differential diagnostic value. Hemorrhages are much commoner in yellow fever than in dengue and begin usually about the third to the fifth day. The gums should be examined for bleeding upon the first visit, as should the urine for albumin, otherwise doubt may exist as to the significance of later findings. Vomiting is common in both diseases, but bloody vomit is decidedly rare in dengue and common in yellow fever. Fatal cases are common in yellow fever. For the differential features in other diseases with which possible confusion may occur, the reader is referred to any standard work on medicine.

Treatment.

Treatment constitutes the least interesting feature of the disease and is entirely symptomatic. Aspirin or sodium salicylate afford some relief, and H. R. Carter states that hot applications may com-

pletely relieve the pain of dengue. Rest in bed and an abundance of water are the most important considerations. The myocardium in patients over 50 years of age should be watched.

When the fever is high, sponge baths are indicated. The bowels should be opened with a mild purgative; but drastic purgation is probably injurious, owing to the muscular exertion incurred. Persons who attempt to "carry on" during the attack, or who exert themselves before recovery is complete, often suffer slow convalescences, marked by weakness and mental depression which may last as long as two or three months.

Immunity.

Most observers consider that an attack of dengue is followed by a definite though not absolute immunity. The duration of this immunity has not been definitely ascertained, however, but probably extends for a few years. A few observations bearing on these features will be noted, but it must be said that there is great need for further observations on these points.

Epidemics often run their course and subside in a given community, notwithstanding the fact that the presence and transmissability of the virus still exists, as is demonstrated by the prompt occurrence of the disease among newcomers from noninfected territory. Graham, at Beirut, notes that the epidemic among the city dwellers was at an end, when unexposed summer dwellers began to return from the mountains, among whom an epidemic immediately broke out and continued for some weeks.

It has been noted that where an epidemic has run its course it seldom recurs the succeeding year.

The apparent racial immunity noted among certain tropical natives is probably acquired by early or perhaps repeated mild attacks. Bonne, in Paramaribo, states that the three European nurses at his hospital had dengue and that European soldiers coming to the hospital for treatment were almost certain to contract it within a week or two, whereas among 100 creole nurses and other colored attendants there was not a single case, at least in recognizable form. He investigated the mulatto children and found that they, however, were not immune. The same was probably true of the black children; but in their case the evidence was less clear, owing to the difficulty of seeing the rash on a black skin. In the outbreak at Monroe, La., 1922, the negroes were certainly not immune. Skottowe states that in 1885 the native Fiji Islanders suffered more severely than the Melanesians. (This was probably the first visitation of dengue upon the islands.) Likewise, Agramonte, Stedman, and others have noted that the natives of the West Indies are less susceptible, and that when attacked the symptoms are often lighter than those in Euro-

peans. Vassal and Brochet, on the boat *Manche*, 1905, observed the presence of 114 cases of dengue among 127 Europeans (sailors), whereas among 30 Annamese none had it. The following year, on the same ship but with a different crew, among 108 Europeans there were 94 cases of dengue, whereas among 32 Annamese sailors no case occurred. The same rules for shore leave applied to both groups. The natives were all questioned, but not one remembered having had the disease. They were, however, from infected territory, and the writers suggested that they had possibly suffered repeated mild attacks. The 14 whites who escaped were also questioned, and it was found that 1 had had the disease earlier in the year under consideration, 3 had had it the previous year, and 6 had been in infected territory but gave no definite history of dengue.

Montague states that in the epidemic of 1906 in the Fiji Islands the old residents who had had the disease in 1885 escaped in almost every instance. He states that the island had been particularly free from dengue in the interim.

Dickson [4] states that at Charleston in 1850 only those persons escaped who had had the disease in 1828.

Cleland et al. failed to produce the disease by the injection of dengue blood in two volunteers who had had the disease 38 and 229 days previously, respectively.

Ashburn and Craig, however, induced the disease in a volunteer who stated that he had had dengue two and one-half years previously. They also state that they know of a few cases in which the disease was contracted naturally after a similar period. O'Brien observed cases in persons who had suffered with dengue three years previously, Le Gendre cites two classical attacks in a girl at intervals of two years, and Sandwith states that many had the disease in 1887 who had had it in 1880.

Method of Spread.

Graham, in 1903, first actually demonstrated that dengue could be transmitted by the mosquito, and this method of transmission has been amply confirmed.

Probably the best evidence that this is the only natural method of transmission lies in the fact that Port Said remained free from dengue after it was cleaned of mosquitoes by Ross, whereas previously the disease was practically endemic there. Likewise, McCulloch, after freeing Corregidor Island of mosquitoes, found that introduced cases never spread. Likewise, Welch, in Alabama, noted the absence of dengue in 1922 in towns rid of mosquitoes. Graham, Ashburn and Craig, Stitt, and others have noted this same absence of contagiousness in the absence of mosquitoes, even in spite of the closest kind of

[4] Cited from Hirsch.

contact. Graham confined four children, one of whom was suffering with dengue, in a room which he kept mosquito free. The children played together and slept in the same bed, yet none of the three developed the disease.

Ashburn and Craig confined well men and men ill of dengue under mosquito-proof tents. The well men slept in the same beds, wore the pajamas and underclothes of the patients, used the same dishes, etc., yet none of them developed the disease. There is, moreover, a marked similarity in the epidemiology of dengue and yellow fever, a disease which has been more carefully studied and which, as far as known, is transmitted in nature by no other means than by the mosquito.

On the other hand, Archibald thought that the bedbug may possibly have served as a carrier in an outbreak of the disease observed by him in Egypt; and phlebotomus fever of Mediterranean shores which some authors think may possibly be a mild form of dengue is known to be conveyed by the sand fly *Phlebotomus papatassii*.

Hanabusa, moreover, reports an outbreak of dengue among a regiment of engineers in Formosa (86 attacked out of 842) in January and February, a time of year, he states, when no mosquitoes were present. In the United States, however, mosquitoes seem to be the sole agent of dissemination.

Cleland et al. attempted to convey the disease by vaccination, gargling, and ingestion, and by the placing of serum from dengue cases upon the mucous membranes of the nose. The results were inconclusive, mild and doubtful types of illness resulting in a few cases.

Ashburn and Craig, using somewhat similar methods, secured only negative results.

Type of Mosquito.

Aëdes ægypti.--*Aëdes ægypti* has been definitely incriminated as a carrier of dengue. The distribution of this mosquito corresponds well with that of the disease, and Bancroft, in 1905, carried out a series of experiments with these insects, allowing them to bite five volunteers, with two positive results. This work, however, was done at Brisbane, which was infected with dengue at the time, and other sources of infection could not with certainty be ruled out. Cleland et al., however, carried infected *Aëdes ægypti* to Sydney, which was free from the disease, and allowed them to feed upon eight volunteers, four of whom suffered typical attacks. The workers were also able to produce typical cases in others by the injection of blood from two of these experimental cases.

Again, Bancroft noted that persons from noninfected places who visited Brisbane only during daylight often carried dengue infection

away with them. Granting the transmissibility of the disease by insect, this observation would point to a day-biting insect, and the *Aëdes ægypti* feeds by preference during the day.

Culex quinquefasciatus.—The distribution of this insect corresponds well with that of dengue; however, in Australia, as noted by Cleland et al., the distribution is far wider than the extent of dengue.

In 1901 Graham collected mosquitoes from the rooms and nets of dengue patients and allowed them to bite four volunteers. After from four to six nights spent under the nets with the infected mosquitoes, three of the four volunteers developed typical attacks. The negative result was in a man who had had the disease two years previously. As these experiments were conducted at Beirut, which was then suffering an epidemic, Graham carried infected mosquitoes to a village in the mountains where no dengue had occurred. Here he allowed two volunteers in different parts of town to be bitten by his mosquitoes. Both developed dengue after spending four nights and five nights, respectively, with the infected mosquitoes. No other cases developed in the village. While Graham thought that most of his mosquitoes were *Culex quinquefasciati,* he states that in almost if not actually in every case, *Aëdes ægypti* were among them.

Ashburn and Craig, in 1906, allowed specimens of *Culex quinquefasciatus* to feed on dengue cases and then confined the insects with nine volunteers in mosquito-proof tents. Three of the volunteers were later shown to be "absolutely immune," since the injection of blood from dengue patients failed to produce the disease. Three others were considered by these authors to have been "relatively immune"; since, with later tests, by the injection of comparatively large amounts of dengue blood, they did develop mild symptoms of the disease, one after a greatly prolonged period of incubation. A seventh case was later proved to be susceptible, but mosquitoes refused to bite him. In one of the two remaining volunteers a typical attack of dengue followed three and one-half days after he had been bitten by mosquitoes fed on a dengue case[5] two days previously. This volunteer is stated, as far as known, not to have been exposed to dengue. It may be noteworthy, however, that, as Ashburn and Craig point out, the temperature chart in this case shows a mild fever for 24 hours before the onset of symptoms, and, in fact, shows a slight elevation of temperature from the time he was bitten. Moreover, this work was done in infected territory and it is difficult to rule out other sources of infection.

Kennedy, in India, during an outbreak among soldiers, made an insect survey and reported *Culex*, three species, including *quinque-*

[5] This volunteer was exposed to the bite of mosquitoes placed in his sleeping tent on the first and second nights following their infective feedings, but the authors state that he was not bitten until the second night. It has been suggested that this might have been a case of mechanical transfer of the virus owing to the shortness of the interval.

fasciatus, as very numerous, and thinks *Aëdes ægypti* could be ruled out on account of insufficient numbers. It should be noted, however, that this survey was made near the end of the epidemic.

Vassal and Brochet state that only culicines, mainly *Culex quinquefasciati*, were upon the boat *Manche* during the epidemic on board in 1907.

On the other hand, Cleland et al. were unable to transmit the disease to five volunteers, some of them repeatedly bitten by *Culex quinquefasciati*. Likewise, Guiteras and Cartaya, as well as Koizumi and his coworkers, had only negative results in transmission experiments with this type of mosquitoes.

Agramonte, in Habana, used several species with negative results. He mentions *Culex quinquefasciati* as being very numerous, and it seems highly probable that this species was included. Cleland et al. noted that dengue cases brought to Sydney did not spread, though *Culex quinquefasciati* were numerous; there were however no *Aëdes ægypti* present. Legendre, at Hanoi, noted the termination of an epidemic when the *ægypti* were killed by cold weather, although culicines continued to the extent of being a plague.

It must therefore be said that the evidence is strongly against *Culex quinquefasciatus* being a carrier of dengue. It should be remembered, however, as pointed out by Carter, that *Aëdes ægypti* are more susceptible to cold than many types of mosquitoes, and the failure of dengue to spread when *ægypti* are absent, even though *quinquefasciatus* and other species are present, may possibly be due to the fact that the temperature is too low for the development of the parasite in the mosquito.

Other species.—Carpenter and Sutton had negative results with *Culex stimulans* and *Culex tarsalis*, and Cleland et al. had negative results in one trial with *Culex vigilax*. Koizumi et al. secured some positive results with *Stegomyia scutellaris* and with *Desvoidea obturans*. Their volunteers, however, were not under confinement before the experiments, and the results are therefore inconclusive.

THE RAPID SPREAD OF DENGUE AS COMPARED TO YELLOW FEVER.

Since *Aëdes ægypti* is the only proved vector of dengue fever, is it necessary to assume other intermediate hosts in order to explain its more rapid spread as compared to yellow fever?

Aëdes ægypti is certainly an efficient carrier of yellow fever, since one feeding during the infective period of the disease usually infects her, and once infected she remains so apparently indefinitely. A single bite, moreover, is usually infective for the susceptible individual. In dengue the same is probably true,[6] though not proved. Especially is the duration of infection in the mosquito not established.

[6] Graham notes an attack which followed a single bite, and the writer suffered an attack five days after being bitten, as far as known, by but a single mosquito. Koizumi and his coworkers produced infection by the transfer of 0.00005 mils of blood from man to man.

In yellow fever, however, there is the period of about 12 days which must elapse before the mosquito fed on infective blood is capable of transmitting the disease. And if, as has been noted, the life of the winged insect in nature is about 50 days, we should expect one-fourth of the infected mosquitoes to perish before they become infective. In dengue there is no period of extrinsic incubation; Chandler and Rice were able to produce the disease with mosquitoes fed on cases from 24 to 96 hours previous to the successful feeding on volunteers. The person infected with dengue is, moreover, a more potent agent for infecting *ægypti* than is the yellow fever patient, because—

(1) The dengue case is infective possibly to the eighth day, whereas the yellow fever case is infective for only three or possibly four days.

(2) In dengue, if mild, the patient is likely to be up and about or, in more severe cases, is likely to venture forth during the period of remission, whereas in yellow fever he is usually so ill during the infective period that he is confined to his bed, where he is capable of infecting only those *ægypti* which gain access to his room or net.

(3) Visiting of the ill is less curtailed in dengue than in yellow fever, since dengue fails to engender the fear so common in yellow fever.

(4) The immunity to dengue is fleeting, whereas in yellow fever it is lasting. This consideration may be of some importance in endemic centers for these diseases, since an infective feeding on an immune individual is lost as far as the epidemic is concerned.

With the same vector, therefore, dengue would obviously spread more rapidly than yellow fever, and the writer would be unwilling to assume the existence of other vectors simply to explain this greater rapidity of spread.

LIFE HABITS OF *AËDES ŒGYPTI*.

Aëdes ægypti is essentially a domestic mosquito, living about and in the habitations of man. The female is very savage, attacking one's ankles and hands and buzzing about the head. She is extremely wary and hard to capture. She feeds in the daytime by preference, but also at night.

Francis, in 1907, made the observation that deposits of water having natural mud bottoms are seldom found in which *ægypti* are breeding. As Carter suggests, it is probable that it is not the character of the bottom but of the sides of the container where they meet the surface of the water, that is important. The female deposits her eggs in irregular groups at or just above the water line, and apparently finds a dirt surface not to her liking. When *ægypti* larvæ are found developing in such an earthbound collection of water, it is likely that they or the eggs were carried there by washing.

Owing to this peculiarity of the mosquito, she lays her eggs by preference in artificial containers. Francis, McCoy, Carter, and others have found her using such places as the following: Cisterns, barrels, water containers, flowerpot saucers, jugs, tubs, storm-sewer catch basins, water troughs, old shoes, house gutters, holes in rocks, tin cans, iron pots, bottles, boxes, water-holding plants, holes in trees, grindstone pans, wells, canoes, vases in the cemeteries, and even the holy-water font in churches.

Gorgas, in Habana, 1901, at the completion of the first mosquito survey of the city, reports 26,000 different collections of water in which *ægypti* were breeding.

The eggs of *ægypti* are quite resistant to drying. Francis found that they would develop normally after having remained dry for as long as six and one-half months; and Cleland et al. kept dried eggs in the laboratory for two months and found that they hatched normally thereafter.

Under favorable tropical conditions eggs develop through larval and pupal stages to the adult winged insect in as short a time as nine days, but probably never sooner. Under less favorable conditions this cycle may be considerably prolonged.

Infectivity of Man for the Mosquito.

Ashburn and Craig secured a number of positive results by the injection of volunteers with blood drawn on the third and fourth days of the disease. Cleland at al. likewise secured positive results with bloods drawn from the eighteenth to ninetieth hours of the disease. They secured negative results, however, with blood drawn at the one hundred and fifteenth, one hundred and thirtieth, and one hundred and ninetieth hours of the disease. In their earlier experiments, however, they had a few cases which may indicate the presence of the virus in the blood up to the eighth day. In one trial they got negative results at the end of 14 days.

Chandler and Rice secured positive results by the transfer of blood drawn 4½ and 24 hours after onset of symptoms. They also secured positive results in transmission experiments using *ægypti* fed on the second to fifth days of illness, inclusive. Attempts at longer intervals were not made.

Period of Infectivity of the Mosquito for Man.

Most of the mosquito transmission experiments were performed with mosquitoes captured from the nets or rooms of dengue patients, and therefore throw little light upon the question of period of infectivity of the mosquito for man. Bancroft kept such captured mosquitoes for 12 days and produced dengue in one case. He also

had one positive result with reared mosquitoes allowed to bite 10 days after the infective feeding.

He secured negative results in two cases with mosquitoes fed 15 days previously, and in one case with mosquitoes fed 17 days previously.

Chandler and Rice, using reared mosquitoes, secured positive results with *ægypti* in from 24 to 96 hours following the infective feeding. Attempts were not made at longer intervals.

Ashburn and Craig's case, if infected by *Culex quinquefasciatus*, was caused by mosquitoes fed two days previously.

Graham produced a disease in a patient by the subcutaneous injection of an emulsion of the salivary glands of a *Culex quinquefasciatus* which had bitten a patient 27 days previously. The patient became ill in three days with such severe symptoms that Graham did not repeat the experiment. He thought the disease was dengue, as he found his "parasite of dengue" in the blood. The attack was possibly septicemia. These observations are too few in number to permit conclusions, but it seems probable from the epidemiology of the disease that when once infected the mosquito is infective for the rest of her life.

Continuance of the Virus from Epidemic to Epidemic.

A disease of so short duration and of so few fatalities, and especially if mild in type, is not one which attracts the attention either of the public or of the medical profession unless unduly prevalent. Smart,[1] Davidson, Legendre, and others, however, have reported the presence each year of what they believed to be dengue in the West Indies, Australia, Indo-China, and Central America, and it is probable that these areas are endemic centers of the disease. There is no evidence indicating that the virus is carried from year to year in the mosquito (at least in temperate climates), or that chronic carriers or animal reservoirs exist.

Survival of the Virus in Vitro.

The virus has been found by injection experiments to remain alive outside the body for some hours if kept cool. In several instances Cleland et al. secured positive results with blood drawn 48 hours previously, and in one instance after 99 hours.

Prevention of Dengue.

Control of patient.—Theoretically, if every case of dengue could be isolated under screens the disease would eventually die out in a community. Practically, however, this method is unworkable,

[1] Cited from Hirsch.

owing to the obvious difficulty of locating the cases. The disease is not one which strikes terror into a community as does yellow fever, many patients failing even to call a physician. In yellow fever, isolation of cases has been long practiced, but has been found insufficient to free any large group of people from the presence of yellow fever if once established.

The screening of houses, while perhaps affording a measure of protection to a community, is likewise only an adjunct, because the mosquito vector bites by day as well as night and it is not possible for any large number of people to remain continually indoors. Screens used against *ægypti* must be at least 16 mesh, if the wire is heavy, or 18 mesh per inch if the strands are of smaller diameter. Care must also be taken that *ægypti* does not breed inside the screened inclosure.

Mosquito control.—This is the one method to be relied upon in controlling dengue; and as communities where *Aëdes ægypti* are present are subject not only to dengue but to the spread of yellow fever as well, there are more than ample public health reasons for controlling the pests.

The part (if any) which mosquitoes other than *ægypti* play in the spread of dengue fever must await further study. However, dengueous regions are usually also badly infested with malaria, which constitutes an urgent necessity for including anopheles among the species of mosquitoes to be attacked; and measures against these two varieties will largely control *Culex quinquefasciatus* and other mosquitoes which constitute at least an annoying pest irrespective of any influence which they may exert in dengue. Moreover, such a combined attack upon *Anopheles* and *Aëdes ægypti* is far more likely to receive the continued financial support of a community than is an attack against either one, since it will more nearly free the community of the mosquito pest. Again, an adequate supply of piped water, so highly desirable for other reasons, is also an important factor in the reduction of available breeding places for mosquitoes. In connection with this article the control of *Aëdes ægypti* only will be discussed, as it is probably the most important, if, in fact, not the only vector of dengue in this country.

To be successful, mosquito control should be begun before dengue makes its appearance in the community, as control measures are largely directed against wrigglers, and the imagoes in flight will suffice to spread the disease, once introduced, before the control measures can effect the eradication.

Carter,[8] at Paita, March 3, 1920, by systematic work, had the *ægypti* breeding index so reduced that he knew yellow fever cases

[8] Unpublished lecture at Hygienic Laboratory.

would cease. The last case appeared 52 days later, produced, of course, by the adults in flight. It would therefore appear that the life of the adult female in flight is in the neighborhood of this period (52 days). Measures against the winged insect, such as fumigation, have been tried, but are time-consuming, difficult, and too expensive for practical application.

Control of Aëdes ægypti.—In practice the measures at one's disposal may be enumerated as follows:

1. Destruction of containers.
2. Covering of containers.
3. Placing of fish in containers.
4. Periodic emptying of containers.
5. Oiling of containers.
6. Education and law enforcement as valuable adjuncts.

1. *Destruction of containers.*—Destruction of containers which serve as breeding places is naturally the best method to pursue. The procedure, however, presupposes a corps of intelligent men working under trained inspectors who will zone the city and instruct and direct the men under them. Men for this work must be intelligent, tactful, acquainted with the habits of the mosquito, and possessed of infinite patience as well as courage. Men should be supplied with notebooks, ladders, screening or muslin, oil, buckets of minnows, etc. It may be found more advantageous to have separate gangs, to correct the faulty conditions found by the inspectors.

Premises must be inspected from the housetop to the cellar; including wells, cisterns, etc. Trash, cans, and other refuse, after being collected, should be dumped into salt water or buried, since hauling to a dump will simply transfer the breeding to other places.

Grass and weeds should be kept cut from vacant lots, since this growth constitutes an inviting place for the throwing of rubbish and a place where, once deposited, it is difficult for the inspectors to locate it.

In the Philippines the rain spouting of houses was found to be one of the chief sources of mosquito breeding and one of the most difficult to remove. When there is a little sag or pocket of water *ægypti* will breed in numbers, and, if rain follows, the eggs or wrigglers will be washed into the rain barrel or cistern, where they can continue their development. The punching of small holes in spouting has been tried but is useless, as the holes soon become plugged, and larger holes render the spouting valueless. Its complete removal would be preferable. If this is not possible, it should be given a steep pitch to insure drainage. The axils of leaves in such plants as the banana tree and spider lily, while probably not a large factor in the breeding of *ægypti*, are difficult to deal with. McCoy evolved

the scheme of placing sawdust in this water for the purpose of hastening evaporation.

2. *Covering of containers.*—This procedure is applicable to wells, cisterns, rain barrels, and similar water containers. A piece of muslin tied over the top of a barrel or cistern is just as efficacious, is cheaper, and is much easier to apply than is the proper fitting of a rigid screen cover. Water barrels should be provided with spigots, and cisterns with pumps, so that water may be drawn without removing the cover, for to do so may liberate a swarm of adults which have developed there from eggs washed in from the eave spouting.

3. *Placing of fish in containers.*—Minnows are a great help in the eradication of *ægypti*. Connor and Hanson used them extensively at Guayaquil and Peru in rain barrels, cisterns, wells, and other water containers. Not only do they devour the larvæ, but they facilitate the work of inspection, for it is easier and simpler to see if the fish are living than it is to search for wrigglers.

4. *Periodic emptying of containers.*—Containers not otherwise protected should be emptied once each week (at least every nine days). To empty oftener is a waste of energy. In emptying it is important that every bit of water be turned out, for when wrigglers are disturbed they go to the bottom of the containers, and the last water remaining will contain most of them. It is a good plan to wipe the container with a cloth, which will insure complete emptying and also the destruction of any larvæ or eggs left clinging to the vessel.

After the more accessible breeding places have been destroyed, screened, or oiled, the female mosquito will employ great ingenuity in searching out a place to lay her eggs. Thus she may be driven to use places which are relatively inaccessible or difficult to locate and control. To meet this contingency the trap breeding place has been devised. This consists of placing an inviting container of water in a suitable place—best one fairly dark—and then emptying it once a week.

5. *Oiling of containers.*—A thick film of oil upon the surface of rain barrels, cisterns, etc., will effectively prevent mosquito breeding. It was formerly supposed that the larvæ were killed by suffocation, but it has been found that if larvæ are kept confined so that they can not reach the surface they can live for hours and that the film of oil actually kills in some other way, possibly by poisoning.

6. *Education and law enforcement.*—The education of the community should be a definite part of any antimosquito campaign, for, if the cooperation of the citizens can be secured, much quicker and more permanent results will be attained.

With the exception of granting legal access of the authorized inspectors to premises, laws have little place in a mosquito campaign

and will always fail to accomplish desired results. The work is technical, requiring the systematic attention of trained men, and is properly a function of the health department.

By the proper application of the above methods it is possible to rid a community of most of its *Aëdes ægypti;* it is extremely difficult to get rid of them all. Luckily, however, it is not necessary or indeed desirable (on account of the expense) to try to rid a community of every mosquito. All that is necessary to render a community safe from a dengue epidemic is to keep the mosquito index at a point at which introduced cases will not spread, or, let us say, at which 10 introduced cases will give rise to 9, 8, 7, or less number of cases, when, evidently, the disease will soon die out. The exact degree of eradication at which this will occur is not easy to define definitely, but it is some considerable degree short of total extinction.

Animal Transmission.

Occurrences have been recorded (Sandwith, Hirsch) for India, Cadiz, Algiers, and Senegal, in which dogs, cats, sheep, cattle, rats, mice, and birds have suffered epizoötics coincident with the presence of dengue among the human population.

Kraus attempted to produce the disease in guinea pigs by the injection of blood from patients. The guinea pigs were observed for eight days, but neither fever nor other symptoms appeared during this time.

Cleland et al. likewise tried to produce the disease in guinea pigs and rabbits, but also with negative results. One guinea pig, injected with blood which produced the disease in a volunteer, was killed at the end of seven and one-half days, and its blood injected into a second volunteer. No symptoms followed. This would indicate that the virus was not present in the guinea pig's blood at this time. The tissues of animals killed at various times following inoculation were examined by various methods of staining, including Levaditi's method, but no abnormalities or spirochetes were found.

Lavinder and Francis tried to infect rhesus monkeys with blood drawn during the second to fifth day of the disease. No symptoms, fever, or skin eruption resulted during 14 days of observation in any of 9 monkeys. The investigators considered their attempts to have resulted negatively; however, they thought that the blood counts were perhaps suggestive enough to warrant further trials.

Chandler and Rice, 1922, attempting to convey the disease to guinea pigs, white mice, and a young rhesus monkey secured only negative results. Their attempts to culture an organism from the blood were likewise unsuccessful.

The writer, 1922, attempted to convey the disease to guinea pigs, rabbits, white rats, and rhesus monkeys, but with negative results.

Animals were injected with blood taken at various stages of the disease (fifth hour to convalescence). The animals were observed for from 8 to 30 days in various cases. In no instances was the behavior of the injected animals different from that of the controls. Blood counts were made in monkeys, rabbits, and rats, but no variations deemed significant were noted. In the case of the guinea pigs, however, the results were complicated by an epidemic of broncho-pneumonia which broke out among them after about the fifteenth day. Controls and injected animals were alike attacked. These experiments will be made the subject of a more detailed report. The tissues have not yet been examined.

Koizumi et al. used dogs, white mice, rabbits, long-tailed Formosa monkeys, and guinea pigs, but symptoms followed only in the latter. They produced similar symptoms in second guinea pigs by subinoculation, but were unable to secure passage beyond the second series of animals. (In view of these findings it may be mentioned that Cleland carried the virus through four successive transfers in human volunteers.) Their pigs inoculated from human cases usually died in from 7 to 36 days, while blood from these to others caused death in from 5 to 19 days if given subcutaneously or intraperitoneally. However, death is said to have been delayed to from 28 to 34 days if given intravenously.

Holt, using guinea pigs and rabbits, was unable to produce symptoms in them by the injection of the blood of dengue cases, but describes polymorphous organisms seen in the fresh and stained blood of several of these animals.

These discordant results are difficult to explain and it is to be hoped that, wherever dengue may occur, workers will embrace the opportunities of repeating these trials at animal transmission as well as attempt to clear up other of the many points which require further elucidation.

Bibliography.

Adrien, C. (1918): Dengue méditerranéenne observée à l'île Rouad (Syrie). Arch. de méd. et pharm. nav., Paris, vol. 105, pp. 275–307.

Agramonte, A. (1906): Some clinical notes upon a recent epidemic of dengue fever. New York Med. J., vol. 84, pp. 231–233.

Allan, J. C. D. (1909): Dengue, or "three-day fever." J. Trop. Med., London, vol. 12, pp. 301–302.

Allen, A. H. (1908): Notes on dengue in Cuba. New York. Med. J., vol. 87, pp. 358–359.

Archibald, R. G. (1917): Seven-day fever in the Anglo-Egyptian Sudan. J. Trop. Med., London, vol. 20, pp. 133–135.

Armand-Delille (1916): Note sur les principaux caractères de la dengue méditerranéenne, observés aux Dardanelles et en Macédoine. Bull. et mém. Soc. méd. d. hôp. de Par., 3. s., vol. 40, pp. 1709–1714.

Ashburn, P. M.; and Craig, C. F.:
(1907): Experimental investigations regarding the etiology of dengue fever. J. Infect. Dis., Chicago, vol. 4, pp. 440–475.
(1907): Observations on the etiology of dengue fever. J. Am. Med. Assoc., Chicago, vol. 48, pp. 692–693.
Balfour, A.:
(1904): First report, Wellcome Research Laboratories, Khartoum, page 14.
(1907): Notes on the differential leucocyte count, with special reference to dengue fever. J. Trop. Med., London, vol. 10, pp. 113–116.
(1908): Third report, Wellcome Research Laboratories, Suppl., page 38.
Bancroft, Thomas L.:
(1906): On the etiology of dengue fever. Australas. Med. Gaz., Sydney, vol. 25, p. 17.
(1912): On a proposed technique for the prevention of dengue fever and filariasis. Australas. Med. Gaz., Sydney, vol. 31, p. 80.
Barber, M. A.; and Hayne, T. B. (1921): Arsenic as a larvacide for anopheline larvæ. Pub. Health Rep., Wash., D. C., vol. 36, pt. 2, pp. 3027–3034.
Barkan, H. (1919): Ocular complications of dengue fever. Am. J. Ophth., St. Louis, vol. 2, pp. 650–652.
Bell, W. D. (1906): Dengue in the Philippine Islands. Dietet. and Hyg. Gaz., N. Y., vol. 22, pp. 76–78.
Bellile, P. (1913): Sur la fièvre des phlebotomes. Arch. de méd. nav., Paris, vol. 99 and 100, pp. 5–39.
Bonne, C. (1918): Dengue-like fever in Dutch Guiana. J. Trop. Med., London, vol. 21, pp. 189–193.
De Brun, H.:
(1889): La fièvre rouge en Syrie; relation d'une épidémie de fièvre dengue observée à Beyrouth. Rev. de méd., Paris, vol. 9, pp. 657–707.
(1890): Lafièvre dengue en 1889. Rev. de méd., Paris, vol. 10, pp. 37–57.
(1898): Étude sur les formes éruptives de la dengue. Rev. de méd., Paris, vol. 14, pp. 477–493.
(1906): La dengue en 1904 et en 1902; formes atténuées; formes sévères et prolongées. Rev. de méd., Paris, vol. 26, pp. 465–470.
Cantani, A. (1890): La denga. Gior. internaz. d. sc. med., Napoli, n. s., vol. 12, pp. 201–212.
Caragéorgiadès, J. G. (1889): Étude sur l'épidémie dengue dans l'île de Chypre pendant l'année 1888. Rev. méd.-pharm., Constantinople, vol. 2, pp. 85–89.
Carpenter, D. N., and Sutton, R. L. (1905): Dengue in the Isthmian Canal Zone, including a report on the laboratory findings. J. Am. Med. Assoc., Chicago, vol. 44, pp. 214–216.
Carriere (1909): La dengue à bord du "Brux." Arch. de méd. nav., Paris, vol. 92, pp. 237–240.
Carroll, J. (1911): Dengue. Handbook Pract. Treatment (Musser & Kelly), vol. 2, p. 581.
Carter, H. R. (1916): Immunity in yellow fever. Am. Trop. Med. and Parasitol., Liverpool, vol. 10, pp. 153–164.
Castellani, A. (1917): Notes on tropical diseases met with in the Balcanic and Adriatic zones. J. Trop. Med. and Hyg., London, vol. 20, pp. 170–174.
Chandler, Asa C., and Rice, Lee (1923): Observations on the etiology of dengue fever. Am. J. Trop. Med., Baltimore, vol. III, pp. 233–261.
Cleland, J. B., Bradley, B., and MacDonald, W.:
(1918): Dengue fever in Australia. J. Hyg., Cambridge, Eng., vol. 16; pp. 317–418.
(1919): Further experiments in etiology of dengue fever. J. Hyg., Cambridge, Eng., vol. 18; pp. 217–254.

Coleman, T. D. (1913): Dengue. Modern Medicine (Osler & McCrae), vol. 1, pp. 950–955.

Corrado, M. (1890): La fièvre dengue à Alep. Rev. méd.-pharm., Constantinople, vol. 3, pp. 66, 82.

Corson, J. F. (1921): A case of fever resembling dengue, occurring at Accra, Gold Coast. J. Trop. Med. and Hyg., London, vol. 24, pp. 253–254.

Couffon, M. O., and Pagnier (1919): Note sur une épidémie observée chez des hommes de l'armée d'Orient et présentant les caractères de la dengue. Bull. et mém. Soc. méd. d. hôp. de Par., vol. 43, pp. 1059–1063.

Couvy, L.:

(1914): Dengue: Constatation de spirochètes dans le sang. Bull. Soc. de path. exot., Paris, vol. 14, p. 198.

(1920–21): Notes sur deux épidémies de dengue à Beyrouth. (Abstract of Article in Trop. Dis. Bull., London, vol. 20, p. 384). Ann. Inst. Pasteur, Paris, vol. 20, pp. 851–858.

Cozanet (1910): Note sur deux épidémies de dengue à Noumea. Ann. d'hyg. et de méd. colon., Paris, vol. 13, pp. 485–499.

Craig, Charles F. (1920): The etiology of dengue fever. J. Am. Med. Assn., vol. 75, pp. 1171–1176.

Craven, T. A. (1888): Dengue fever; its sequelæ. South. Calif. Pract., Los Angeles, vol. 3, pp. 84–87.

Crendiropoulos, M. (1890): La dengue à Smyrna en 1889. Bull. gén. de thérap., etc., Paris, vol. 119, pp. 405–422.

Dabney, W. C. (1888): Account of an epidemic resembling dengue which occurred in Charlottesville and University of Virginia in June, 1888. Am. J. M. Sc., Philadelphia, vol. 96, pp. 488–494.

Dalsukhram, Gaupatrum (1913): Dengue in Guzrat. Indian Med. Gaz., Calcutta, vol. 48, p. 451.

Davidson, G. (1911): The recent epidemic of dengue in Queensland. Australas. Med. Gaz., Sydney, vol. 30, p. 256.

Davies, L. W., and Johnson, W. B. (1921): Notes upon the occurrence of twelve-day fever of dengue group in Nigeria. J. Trop. Med., London, vol. 24, pp. 189–192.

Dennis (1898): Proceeding of the Queensland branch of the British Medical Association. Australas. Med. Gaz., vol. 17, p. 125.

Dey, U. N. (1912): Dengue fever. Indian Med. Gaz., Calcutta, vol. 47, p. 453.

Diamantopulos, G. (1890): Notizen über die Denguefieber-Epidemie und die Influenza-Epidemie zu Smyrna. Wien. med. Presse, vol. 31, pp. 1113, 1149, 1214, 1302, 1342.

Douvall, C. (1889): La dengue et la grippe. Progrès méd., Paris, 2. s., vol. 10, p. 577.

von Dühring (1890): An epidemic of dengue. [Abstract from Monatsh. f. prakt. Dermat.] Brit. M. J., London, vol. 1, pp. 802–803.

Eberle, H. A. (1904): The plasmœba of dengue. N. York Med. J., vol. 80, pp. 1207–1212.

Enoue, R. (1917): Immunity in dengue. [Abstract of article in Taiwan Igakukai Zasshi, Nos. 163, 164, June 28, 1916, pp. 389, 390.] Trop. Dis. Bull., London, vol. 9, p. 485.

Fooks, H.:

(1908): Report of an epidemic of dengue consisting of both a three-day and seven-day fever type among the 15th Lancers at Sialkot, 1907. Indian Med. Gaz., Calcutta, vol. 43, pp. 50–52.

1909: A few notes in support of Capt. Megaw's article, "Are seven-day fever and three-day fever forms of dengue?" Indian Med. Gaz., Calcutta, vol. 44, pp. 130–134.

Francis, E. A. (1907): Observations on the life cycle of Stegomyia calopus. Pub. Health Rep., Washington, D. C., vol. 22, pt. 1, pp. 381–383.

Gaide (1913): Note sur la dengue en Annam-Tonkin. Ann. d'hyg. et de méd. colon., Paris, vol. 16, pp. 1177–1181.

Gibson, J. L.:

(1898): Acute inflammatory glaucoma induced in a susceptible patient by dengue. Australas. Med. Gaz., Sydney, vol. 17, p. 339.

(1906): Keratitis, dengue, and post dengue. Australas. Med. Gaz., Sydney, vol. 25, pp. 227–229.

Glover, S. P. (1889): Dengue. Med. News, Philadelphia, vol. 55, p. 637.

Godding, C. C. (1890); An account of an obscure outbreak of dengue, occurring on board H. M. S. *Agamemnon* while stationed at Zanzibar between November, 1888, and September, 1889. Brit. Med. J., vol. 1, pp. 352–354.

Goldberger, J., and McCoy, G. W. (1907): Dengue fever, as observed in Brownsville, Texas, Aug. 1907. Pub. Health Rep., Washington, D. C., vol. 22, pt. 2, pp. 1757–1762.

Goldsmid, J. A. (1917): Fatal hemorrhagic dengue. Med. J. Australia, Sydney, vol. 1, p. 7.

Goldsmid, J. A., and Crosse, W. (1916): Some notes on dengue [at Murvillumbah, 1916]. Med. J. Australia, Sydney, vol. 1, p. 377.

Gorgas, W. C. (1904): A few general directions with regard to destroying mosquitoes. (Bulletin) Govt. Printing Office, Washington, D. C.

Graham, H. (1903): The dengue. A study of its pathology and mode of propagation. J. Trop. Med., London, vol. 6, pp. 209–214.

Graves, M. L. (1908–09): Dengue. Texas State J. Med., Fort Worth, vol. 4, pp. 123–127.

Guiteras, J., and Cartaya, J. T. (1906): El dengue en Cuba; su importancia y su diagnostico con la fiebre amarilla. Rev. de med. trop., Habana, vol. 7, pp. 37–42.

Hahn, A. J. (1890): Dengue fever. Med. and Surg. Reporter, Philadelphia, vol. 63, pp. 500–503.

Halliday, C. H. (1911–12): A report of "low country fever," diagnosed as "dengue." J. Alumni Assoc. Coll. Phys. and Surg., Baltimore, vol. 14, pp. 83–89.

Hanabusa, S.:

(1918): Dengue epidemic in Formosa among soldiers. [Abstract of article in Gunidan Zasshi, 1917, No. 70, pp. 578–594.] Trop. Dis. Bull., London, vol. 12, p. 78.

(1919): Epidemic of dengue among soldiers in Formosa. [Abstract of article in Japan Med. Lit., 1918, vol. 3, p. 72.] Abstracts Bacteriol., Baltimore, vol. 3, p. 161.

Hare, F. E. (1898): The 1897 epidemic of dengue in N. Queensland. Australas. Med. Gaz., Sydney, vol. 17, pp. 98–107.

Harnett, W. L.:

(1913): The differential blood count in dengue. Indian Med. Gaz., Calcutta, vol. 48, pp. 45–49.

(1916): Sand-fly fever and dengue. Indian. Med. Gaz., Calcutta, vol. 51, pp. 444–452.

Hildebrand, S. F. (1919): Fishes in relation to mosquito control in ponds. Pub. Health Rep., Washington, D. C., vol. 34, pt. 1, pp. 1113–1128.

Hirsch, A. (1883): Handbook of geographical and historical pathology. Vol. 1, p. 55.

Hirschfeld, E. (1905): Spring hill fever. Australas. Med. Gaz., Sydney, vol. 24, pp. 101–105.

Hobbs, J. (1907): Cas isolés de dengue au Caire. Clinique, Paris, vol. 2, p. 795.

Holt, W. L. (1923): Summary of dengue research, Oct. to Nov. 13, 1922. South. Med. J., Birmingham, Ala., vol. 16, pp. 112–113.

Hossack, W. L. (1913): The problem of dengue, three-day and seven-day fever. Indian Med. Gaz., Calcutta, vol. 48, pp. 49–52.

Johnson, R. E. I. (1922): Dengue vs. malaria. J. Trop. Med., London, vol. 25, pp. 111–112.

Jones, H. W. (1909): An epidemic of dengue in the Philippine Islands. Boston Med. and Surg. J., vol. 160, pp. 46–48.

Kennedy, S. S. (1912): Some notes on an epidemic of dengue-form fever amongst Indian troops, Calcutta. Indian Med. Gaz., Calcutta, vol. 47, pp. 436–440.

Khan, S. (1913): Dengue at Meerut. Indian Med. Gaz., Calcutta, vol. 48, p. 204.

Khoury, A. (1913): L'insuffisance surrénale dans la fièbre dengue. Bull. et mém. Soc. méd. d. hôp. de Par., 3 s., vol. 36, p. 498.

King, F. B. (1907–08): Dengue fever. Texas State J. Med., Fort Worth, vol. 3, p. 311.

King, W. W. (1917): The clinical types of dengue in the Porto Rico epidemic of 1915. New Orl. Med. and Surg. J., vol. 69, pp. 572–589.

Koizumi, T., Yamaguchi, K., and Tonomura, K.

(1918): A study of dengue fever. [Abstract of article in Taiwan Igakukai Zasshi, 1917, No. 177, pp. 432–463:] Abstracts Bacteriol., Baltimore, vol. 2, p. 240.

(1918): An epidemiological study of dengue fever. [Abstract of article in Taiwan Igakukai Zasshi, 1917, Nos. 176, 177, pp. 369–392; 432–463.] Trop. Dis. Bull., London, vol. 12, pp. 77–78.

Kondo, T. (1903): Remarks on the bacillary origin of dengue fever. Saitake Gaku Zasshi, Tokyo, pp. 654–657.

Kraus, R. (1916): Ueber die Feststellung der Dengue in Argentinien. Deutsche med. Wchnschr., Leipzig, vol. 42, p. 1314.

Lalluyaux d'Ormay (1914): Épidémie de dengue en Cochinchine en 1873. Ann. d'hyg. et de méd. colon., Paris, vol. 17, pp. 535–547.

Lane, F. F. (1918): A clinical study of 100 cases of dengue at St. Thomas, V. I. U. S. Nav. Med. Bull., Washington, D. C., vol. 12, pp. 615–623.

Lavinder, C. H., and Francis E. (1914): The etiology of dengue: An attempt to produce the disease in the rhesus monkey by the inoculation of defibrinated blood. J. Inf. Dis., Chicago, vol. 15, pp. 341–346.

Legendre, J.:

(1911): Dengue et Stegomyia. Bull. Soc. de path. exot., Paris, vol. 4, pp. 26–30.

(1912): La dengue, ses variétés et la conservation de son virus en Indo-Chine. Bull. Soc. méd.-chir. de l'Indo-Chine, Hanoi and Haifong, vol. 3, pp. 456–462.

Legnani, M. (1917): Dengue complicada. Rev. méd. d. Uruguay, Montevideo, vol. 20, pp. 87–92.

Leichtenstern, O. (1905): Dengue. Nothnagel's Encyl. Pract. Med., Philadelphia and London, pp. 719–742.

Levy, M. D. (1920): Dengue: Observations on a recent epidemic. Med. Rec., N. Y., vol. 97, pp. 1040–1042.

Love (1898): Proceeding of the Queensland branch of the British Medical Association. Australas. Med. Gaz., vol. 17, pp. 124, 125.

McCarrison, R. (1908): A critical analysis of the etiology and symptomatology of the three-day fever of Chitral; and an analogy between this condition and dengue fever. Indian Med. Gaz., Calcutta, vol. 43, pp. 5–12.

McCoy, Geo. W. (1912): Notes on mosquito eradication. Publ. Health Rep., Washington, D. C., vol. 27, pt. 1, pp. 1029–1034.

McCulloch, C. C. (1918): Dengue fever. New Orl. Med. and Surg. J., vol. 70, pp. 694–706.

McLaughlin, J. W. (1886): Researches into the etiology of dengue. J. Am. Med. Assoc., Chicago, vol. 6, pp. 673–680.

McMullin, J. J. A. (1919): Some practical and theoretical considerations. U. S. Nav. Med. Bull., Washington, D. C., vol. 13, pp. 87–89.

Maleas, K. (1889): Das Dengue-Fieber in Konstantinopel. Wien. med. Wchnschr., vol. 39, pp. 2075–2082.
Manson, Patrick (1897): Dengue. Allbutt's System of Medicine, vol. 3, pp. 376–385.
Marks, A. H. (1905): Dengue fever. Dublin J. Med. Sc., vol. 120, pp. 95–99.
Masterman, E. W. G. (1913): Dengue in Palestine. Indian Med. Gaz., Calcutta, vol. 48, p. 317.
Maurel, E. (1890): Note sur la dengue et l'épidémie régnante. Rev. méd. de Toulouse. vol. 24, pp. 7–9.
Meagher, E. T. (1916): On dengue; referring to an epidemic at Bermuda. J. Roy. Nav. Serv., London, vol. 2, pp. 188–190.
Megaw, J. W. D.:
(1906): Is Calcutta "seven-day fever" a form of dengue? Indian Med. Gaz., Calcutta, vol. 41, pp. 429–432.
(1909): Are "seven-day fever" and "three-day fever" forms of dengue? Indian Med. Gaz., Calcutta, vol. 44, pp. 9–20.
(1919): Sand-fly fever and its relations to dengue. Indian Med. Gaz., Calcutta, vol. 54, p. 241.
Miki, K. (1910): On dengue fever. Sei-i-Kwai M. J., Tokyo, vol. 29, No. 4.
Montague, A. (1908): Dengue in Fiji. J. Trop. Med. and Hyg., London, vol. 11, p. 353.
de Moulliac, V., and Cozanet (1911): Troubles psychiques de la dengue. Encéphale, Paris, vol. 1, pp. 27–46.
Muller, F. M. (1905): Notas clínicas sobre el dengue. Rev. de med. y cirug. de la Habana, vol. 10, pp. 513–516.
Nagib, Ardati (1910): Observation on dengue. Med. Rec., New York, vol. 78, p. 408.
Nattan-Larrier, L., and Bussière, A. (1909): La formule leucocytaire dans la fièvre dengue. Rev. de méd. et d'hyg. trop., Paris, vol. 6, pp. 93–97.
Nicoll, William (1917): The conditions of life in tropical Australia. J. Hyg., Cambridge, Eng., vol. 16, pp. 269–290.
Noguchi, Hideyo (1919): Etiology of yellow fever. VI. Cultivation, morphology, virulence, and biological properties of Leptospira icteroides. J. Exper. Med., Baltimore, vol. 30, pp. 13–29.
O'Brien, R. A. (1908): In Queensland, observed cases of dengue in persons who had suffered three years before. Australas. Med. Gaz., Sydney, vol. 27, p. 121.
Ornstein, B. (1890): Zur Frage über die Dengue oder das dengueische Fieber. Deutsche med. Wchnschr., Leipzig, vol. 16, pp. 25–27.
Phillips, L. (1906): Dengue in Egypt. J. Trop. Med., London, vol. 9, pp. 373, 374.
Porter, I. W. (1894): Dengue [in Florida—Jacksonville to Key West]. South. Med. Rec., Atlanta, Ga., vol. 24, pp. 659–661.
Pridmore, W. G. (1902): Dengue fever in Burmah [1902]. Brit. Med. J., London, vol. 2, pp. 1582, 1583.
Reiche, C. (1906): Certain motile organisms in the blood plasma in dengue. J. Am. Med. Assoc., Chicago, vol. 46, p. 1527.
Rice, L. (1922): Preliminary report of epidemic at Galveston. Texas State J. Med., Fort Worth, vol. 18, pp. 217, 218.
Ringwood, J.:
(1890): Inflammation of Cowper's glands in dengue in Ireland. Brit. Med. J., London, vol. 1, p. 129.
(1890): A fever resembling dengue observed at Kells, County Meath. Tr. Roy. Acad. Med. Ireland, Dublin, vol. 8, pp. 75–85.
Risk, E. J. Erskine (1890): Dengue and influenza. Brit. Med. J., London, vol. 1, p. 60.
Robertson, et al. (1905): Report on the dengue epidemic in Brisbane in 1905. J. Trop. Med., London, vol. 8, pp. 355–363.

Rogers, L. (1909): Dengue and "seven-day fever." Indian Med. Gaz., Calcutta, vol. 44, p. 36.
Ross, E. H. (1908): The prevention of dengue fever. Ann. Trop. Med. and Parasitol., Liverpool, vol. 2, pp. 193–195.
Rouché (1913): Note sur une épidémie de dengue à borde de la "Manche" en 1911. Arch. de méd. et pharm. nav., Paris, vol. 99, pp. 450–461.
Rush, Benjamin (1789): Medical inquiries and observations, Philadelphia, p. 104.
Saigh, Selim (1906): Dengue in Port Sudan, Red Sea Province. J. Trop. Med. and Hyg., London, vol. 9, p. 348.
Sandwith, F. M.:
(1888): Dengue in Egypt. Lancet, London, vol. 2, pp. 107, 154.
(1890): A comparison between dengue fever and influenza. Lancet, London, vol. 2, p. 15.
Sarrailhé, A. (1916): Dengue et fièvre de trois jours. Bull. Soc. de path. exot., Paris, vol. 9, pp. 778–795.
Scott, K. (1911): The recent epidemic of dengue in Brisbane. Australas. Med. Gaz., Sydney, vol. 30, p. 255.
Scott, L. C. (1923): Dengue fever in Louisiana. J. Am. Med. Assoc., Chicago, vol. 80, pp. 387–393.
Seaman, W. (1904): Unusual sequelæ of dengue. Rep. Surg. Gen. U. S. Navy, Washington, D. C., pp. 286, 287.
Seidelin, Harold:
(1912): Report of a yellow fever expedition to Yucatan, 1911–12. Yellow Fever Bureau Bull., Liverpool, vol. 2, No. 2, pp. 123–242.
(1913): Dengue. Indian Med. Gaz., Calcutta, vol. 48, pp. 408–414.
Siotis, J. (1889): La fièvre dengue à Constantinople. Rev. méd.-pharm., Constantinople, vol. 2, pp. 139–142.
Skae, F. M. T. (1902): Dengue fever in Penang [1901]. Brit. Med. J., London, vol. 2, pp. 1581–1582.
Skottowe, A. J. F.:
(1890): Dengue fever in the Fiji Islands. Brit. Med. J., London, vol. 1, p. 1485.
(1890): An epidemic of dengue fever in Fiji during the year 1885. Glasgow Med. J., vol. 34, pp. 166–182.
Spadaro, E.:
(1890–91): De la fièvre dengue en 1889. Gaz. méd. d'Orient, Constantinople, vol. 33, pp. 5–8.
(1890–91): De la fièvre dengue en 1890. Gaz. méd. d'Orient., Constantinople, vol. 33, pp. 21–25.
Stamatiades, Alex., et al. (1890): The dengue fever epidemic in Smyrna. Lancet, London, vol. 1, p. 43.
Stedman, F. O. (1902): An epidemic of dengue fever. Brit. Med. J., London, vol. 2, pp. 94, 95.
Stesko, W. (1917): Dengue à Trébizonde (Turquie) en 1916. Bull. Soc. de path. exot., Paris, vol. 10, p. 724.
Stitt, E. R.:
(1907): Dengue and influenza in the Tropics: A method of differential diagnosis. U. S. Nav. Med. Bull., Washington, D. C., vol. 1, pp. 30–33.
(1913): Dengue; its history, symptomatology and epidemiology. Johns Hopkins Hosp. Bull., Baltimore, vol. 24, pp. 117–121, 124.
Sutton, R. L. (1904): Dengue in the Isthmian Canal Zone. J. Am. Med. Assoc., Chicago, vol. 43, pp. 1869–1871.
Tavares, C. (1889): Febre dengue em Lisboa. Med. contemp., Lisbon, vol. 7, pp. 337, 345, 373.

U. S. Public Health Service (1920): A model mosquito ordinance. Pub. Health Rep., Washington, D. C., vol. 35, pt. 1, pp. 829–831.
Van Millingen (1889–90): Rapport sur certaines affections oculaires consécutives à la fièvre dengue. Gaz. méd. d'Orient, Constantinople, vol. 32, pp. 131–134.
Vassal, J. J. and Brochet, A. (1909): Dengue in Indo-China: Epidemic on board the "Manche," 1907. Philippine J. Sc., Manila, B. Med. Sc., vol. 4, pp. 21–36.
Vedder, E. B. (1907): The leucocytes in dengue. N. York Med. J., vol. 86, pp. 203–206.
Villa, T. (1890–91): Dengue. Ann. Acad. de med. de Medellín, vol. 3, pp. 151–155.
Welch, S. W. (1923): Development of malaria control work in Alabama on a county-wide basis. South. Med. J., vol. xvi, p. 267.
Will, J. H. (1915): Case of dengue fever (relapse). N. Zealand Med. J., Wellington, vol. 14, p. 181.
Wilson, G. W. (1904): Epidemic of dengue in the Territory of Hawaii during 1903. Publ. Health Rep., Washington, D. C., vol. 19, pt. 1, p. 67–70.
Wimberly, C. N. C. (1910): Dengue or phlebotomus fever? Notes on an epidemic at Nowshera. Indian Med. Gaz., Calcutta, vol. 45, p. 281.
Wortabet, J. (1887): Epidemiological notes on dengue during the autumn of 1883, Beyrouth, Syria. Tr. Internat. Med. Cong. IX, Washington, vol. 4, pp. 466–471.
Zohrab (1890): Sur la dengue à Constantinople. Province méd., Lyon, vol. 4, pp. 354–356.

DEATHS DURING WEEK ENDED JULY 21, 1923.

Summary of information received by telegraph from industrial insurance companies for week ended July 21, 1923, and corresponding week of 1922. (From the Weekly Health Index, July 24, 1923, issued by the Bureau of the Census, Department of Commerce.)

	Week ended July 21, 1923.	Corresponding week, 1922.
Policies in force	54,435,960	50,271,674
Number of death claims	9,288	8,255
Death claims per 1,000 policies in force, annual rate	8.9	8.6

Deaths from all causes in certain large cities of the United States during the week ended July 21, 1923, infant mortality, annual death rate, and comparison with corresponding week of 1922. (From the Weekly Health Index, July 24, 1923, issued by the Bureau of the Census, Department of Commerce.)

City.	Week ended July 21, 1923.		Annual death rate per 1,000, corresponding week, 1922.	Deaths under 1 year.		Infant mortality rate, week ended July 21, 1923.[2]
	Total deaths.	Death rate.[1]		Week ended July 21, 1923.	Corresponding week, 1922.	
Total	5,816	10.4	10.2	795	841	.....
Akron, Ohio	21	5.3	4.5	4	1	47
Albany, N. Y.[3]	37	16.4	11.7	7	3	155
Atlanta, Ga.	80	18.7	12.1	12	8	.....
Baltimore, Md.[3]	168	11.3	12.0	28	40	82
Birmingham, Ala	64	17.0	12.3	15	7	.....
Boston, Mass	173	11.7	11.9	19	29	54
Bridgeport, Conn	30	10.9	7.3	4	4	55
Buffalo, N. Y.	109	16.6	10.5	19	15	80
Cambridge, Mass.	21	9.8	8.0	3	4	53

[1] Annual rate per 1,000 population.
[2] Deaths under 1 year per 1,000 births—an annual rate based on deaths under 1 year for the week and estimated births for 1922. Cities left blank are not in the registration area for births.
[3] Deaths for week ended Friday, July 20, 1923.

Deaths from all causes in certain large cities of the United States during the week ended July 21, 1923, infant mortality, annual death rate, and comparison with corresponding week of 1922. (From the Weekly Health Index, July 24, 1923, issued by the Bureau of the Census, Department of Commerce.)—Continued.

City.	Week ended July 21, 1923.		Annual death rate per 1,000, corresponding week, 1922.	Deaths under 1 year.		Infant mortality rate, week ended July 21, 1923.
	Total deaths.	Death rate.		Week ended July 21, 1923.	Corresponding week, 1922.	
Camden, N. J.[1]	23	9.7	13.3	4	4	66
Chicago, Ill	484	8.7	9.2	61	85	.....
Cincinnati, Ohio	97	12.4	9.8	10	10	66
Cleveland, Ohio[1]	160	9.4	8.1	26	18	71
Columbus, Ohio	62	12.4	10.7	3	9	31
Dallas, Tex	43	12.6	11.2	6	8	.....
Dayton, Ohio	28	8.8	9.7	7	4	115
Denver, Colo	57	10.9	13.3	3	6	.....
Des Moines, Iowa	25	9.3	.....	5	.....	.....
Detroit, Mich	214	11.2	9.5	52	39	104
Duluth, Minn	17	8.3	.....	1	.....	23
Erie, Pa	16	7.4	9.0	2	1	41
Fall River, Mass.[1]	31	13.4	11.2	5	7	71
Flint, Mich	22	9.7	.....	6	.....	119
Fort Worth, Tex	16	5.8	11.8	1	2	.....
Grand Rapids, Mich	28	10.0	9.8	5	3	79
Houston, Tex	41	13.8	12.2	6	7	.....
Indianapolis, Ind	83	12.6	11.2	9	10	69
Jacksonville, Fla	32	16.7	16.0	4	3	.....
Jersey City, N. J	72	12.1	10.6	11	13	74
Kansas City, Kans	32	14.4	11.5	7	4	160
Kansas City, Mo	85	12.6	8.9	14	9	.....
Los Angeles, Calif	167	13.1	12.2	23	20	86
Louisville, Ky	69	14.0	12.2	12	7	129
Lowell, Mass	17	7.7	12.3	5	4	87
Lynn, Mass	22	11.2	.....	2	.....	53
Memphis, Tenn	50	15.3	24.9	12	14	.....
Milwaukee, Wis	67	7.2	7.2	6	6	30
Minneapolis, Minn	83	10.6	9.0	14	6	76
Nashville, Tenn.[1]	42	18.1	15.2	2	3	.....
New Bedford, Mass	31	12.4	4.9	10	1	155
New Haven, Conn	27	8.1	10.1	2	5	26
New Orleans, La	126	16.2	15.0	13	19	.....
New York, N. Y	993	8.7	9.4	131	143	52
Bronx Borough	104	6.5	6.4	8	8	28
Brooklyn Borough	323	7.8	8.6	36	57	38
Manhattan Borough	449	10.3	11.2	65	63	63
Queens Borough	85	8.3	8.0	18	10	96
Richmond Borough	32	13.1	16.3	4	5	73
Newark, N. J	75	8.9	9.3	11	19	52
Norfolk, Va	22	7.2	12.1	4	5	71
Oakland, Calif	38	8.3	8.3	6	3	77
Omaha, Nebr	46	11.7	10.1	4	3	43
Paterson, N. J	21	7.8	9.4	1	8	16
Philadelphia, Pa	383	10.4	10.8	40	63	52
Pittsburgh, Pa	151	12.8	11.9	22	22	76
Portland, Oreg	54	10.3	9.9	1	6	10
Providence, R. I	43	9.3	11.0	8	8	65
Richmond, Va	49	14.1	17.5	7	14	86
Rochester, N. Y	39	6.4	10.0	11	9	87
St. Louis, Mo	162	10.5	9.6	16	13	.....
St. Paul, Minn	50	10.8	8.9	7	3	65
San Antonio, Tex	42	11.9	14.1	8	12	.....
San Francisco, Calif	106	10.3	10.1	9	5	54
Seattle, Wash	48	7.9	7.6	2	3	18
Spokane, Wash	24	12.0	10.5	1	5	22
Springfield, Mass	29	10.5	7.1	2	4	29
Syracuse, N. Y	49	13.8	9.2	10	9	130
Tacoma, Wash	18	9.2	.....	2	.....	50
Toledo, Ohio	56	10.9	8.4	3	12	30
Trenton, N. J	30	12.3	13.3	5	4	85
Utica, N. Y	22	11.1	.....	0	.....	0
Washington, D. C	100	11.9	12.6	13	16	74
Wilmington, Del	28	12.4	11.7	3	6	61
Worcester, Mass	47	12.8	10.8	5	3	57
Youngstown, Ohio	19	7.5	9.5	3	5	41

[1] Deaths for week ended Friday, July 20, 1923.

PREVALENCE OF DISEASE.

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring.

UNITED STATES.

CURRENT STATE SUMMARIES.

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

Reports for Week Ended July 28, 1923.

ALABAMA.

	Cases.
Cerebrospinal meningitis	3
Diphtheria	8
Dysentery	64
Influenza	7
Malaria	161
Measles	118
Mumps	1
Paratyphoid fever	1
Pellagra	15
Pneumonia	19
Scarlet fever	14
Tuberculosis	28
Typhoid fever	76
Whooping cough	49

ARIZONA.

Diphtheria	1
Scarlet fever	2
Tuberculosis	1
Typhoid fever	1

ARKANSAS.

Chicken pox	14
Diphtheria	2
Hookworm disease	1
Influenza	7
Malaria	462
Measles	83
Mumps	4
Paratyphoid fever	2
Pellagra	77
Poliomyelitis	1
Scarlet fever	1
Smallpox	10
Trachoma	2
Tuberculosis	61
Typhoid fever	47
Typhus fever	1
Whooping cough	75

CALIFORNIA.

	Cases.
Diphtheria	113
Influenza	12
Lethargic encephalitis:	
Hollister	1
Merced	1
San Francisco	1
Whittier	1
Measles	138
Scarlet fever	56
Smallpox:	
Los Angeles	9
Los Angeles County	9
Scattering	7
Typhoid fever	17
Typhus fever:	
San Fernando	1

COLORADO.

(Exclusive of Denver.)

Cerebrospinal meningitis	1
Chicken pox	6
Diphtheria	13
Measles	35
Mumps	10
Paratyphoid fever	1
Scarlet fever	6
Tuberculosis	82
Typhoid fever	7
Whooping cough	3

CONNECTICUT.

Chicken pox	10
Diphtheria	26
Dysentery (amebic)	1
German measles	1
Lethargic encephalitis	1
Malaria	2

CONNECTICUT—continued.

	Cases.
Measles	32
Mumps	7
Pneumonia (lobar)	8
Poliomyelitis	2
Scarlet fever	31
Septic sore throat	1
Tuberculosis (all forms)	36
Typhoid fever	8
Whooping cough	34

FLORIDA.

Diphtheria	3
Leprosy	1
Malaria	17
Scarlet fever	1
Smallpox	3
Typhoid fever	10

GEORGIA.

Dengue	2
Diphtheria	12
Dysentery (amebic)	1
Dysentery (bacillary)	4
Hookworm disease	17
Influenza	6
Malaria	75
Measles	59
Mumps	4
Pneumonia	28
Poliomyelitis	1
Scarlet fever	8
Septic sore throat	4
Smallpox	26
Trachoma	2
Tuberculosis (pulmonary)	15
Typhoid fever	42
Whooping cough	14

ILLINOIS.

Cerebrospinal meningitis:	
Chicago	1
Sangamon County	1
Warren County	1
Diphtheria:	
Cook County (including Chicago)	49
Chicago	43
Scattering	14
Influenza	4
Lethargic encephalitis—Chicago	1
Pneumonia	75
Poliomyelitis—Chicago	2
Scarlet fever:	
Cook County (including Chicago)	22
Chicago	20
Scattering	21
Smallpox	10
Typhoid fever:	
Williamson County	8
Scattering	22
Whooping cough	173

INDIANA.

Diphtheria	22
Influenza	4
Measles	63
Pneumonia	1
Poliomyelitis—Marion County	1
Scarlet fever	20
Smallpox	28
Tuberculosis	57
Typhoid fever	11

IOWA.

Diphtheria	13
Scarlet fever	9
Smallpox	1
Typhoid fever	6

KANSAS.

Chicken pox	8
Diphtheria	24
German measles	1
Measles	77
Mumps	9
Pneumonia	2
Poliomyelitis	1
Scarlet fever	20
Smallpox	6
Tetanus	3
Tuberculosis	30
Typhoid fever	18
Whooping cough	142

LOUISIANA.

Dengue	1
Diphtheria	14
Malaria	24
Measles	29
Poliomyelitis	2
Tuberculosis	22
Typhoid fever	26
Whooping cough	15

MAINE.

Chicken pox	3
Diphtheria	8
Measles	43
Mumps	1
Pneumonia	1
Scarlet fever	9
Tuberculosis	9
Typhoid fever	2

MARYLAND.[1]

Cerebrospinal meningitis	3
Chicken pox	10
Diphtheria	20
Dysentery	25
Influenza	1
Lethargic encephalitis	2
Malaria	10
Measles	108
Mumps	9
Ophthalmia neonatorum	2
Paratyphoid fever	1
Pneumonia (all forms)	15
Poliomyelitis	1
Scarlet fever	22
Smallpox	1
Tuberculosis	90
Typhoid fever	30
Vincent's angina	1
Whooping cough	117

[1] Week ended Friday.

MASSACHUSETTS.

	Cases.
Cerebrospinal meningitis	2
Chicken pox	52
Conjunctivitis (suppurative)	11
Diphtheria	111
German measles	5
Influenza	1
Lethargic encephalitis	4
Measles	114
Mumps	59
Ophthalmia neonatorum	10
Pellagra	2
Pneumonia (lobar)	18
Poliomyelitis	3
Scarlet fever	79
Septic sore throat	3
Tetanus	1
Trachoma	2
Tuberculosis (all forms)	121
Typhoid fever	16
Whooping cough	85

MICHIGAN.

Diphtheria	67
Measles	201
Pneumonia	37
Scarlet fever	76
Smallpox	23
Tuberculosis	289
Typhoid fever	19
Whooping cough	130

MINNESOTA.

Chicken pox	2
Diphtheria	51
Measles	36
Poliomyelitis	3
Scarlet fever	89
Smallpox	13
Tuberculosis	48
Typhoid fever	7
Whooping cough	30

MISSISSIPPI.

Diphtheria	11
Influenza	4
Scarlet fever	3
Smallpox	3
Typhoid fever	54

MISSOURI.

Chicken pox	6
Diphtheria	32
Epidemic sore throat	1
Influenza	1
Measles	120
Mumps	8
Ophthalmia neonatorum	2
Scarlet fever	28
Smallpox	24
Trachoma	11
Tuberculosis	87
Typhoid fever	25
Whooping cough	195

MONTANA.

Diphtheria	6
Rocky Mountain spotted fever:	
Yellowstone National Park	1

MONTANA—continued.

	Cases.
Scarlet fever	5
Smallpox	3
Typhoid fever	3

NEW JERSEY.

Cerebrospinal meningitis	4
Chicken pox	62
Diphtheria	90
Influenza	53
Measles	168
Paratyphoid fever	1
Pneumonia	78
Poliomyelitis	3
Scarlet fever	47
Typhoid fever	11
Whooping cough	93

NEW MEXICO.

Chicken pox	1
Diphtheria	23
Measles	9
Mumps	2
Rabies in animals	3
Trachoma	3
Tuberculosis	7
Typhoid fever	5
Whooping cough	1

NEW YORK.

(Exclusive of New York City.)

Cerebrospinal meningitis	1
Diphtheria	80
Influenza	5
Lethargic encephalitis	3
Measles	515
Pneumonia	81
Poliomyelitis	6
Scarlet fever	80
Septic sore throat	11
Smallpox	16
Tetanus	2
Typhoid fever	37
Whooping cough	217

NORTH CAROLINA.

Cerebrospinal meningitis	1
Chicken pox	11
Diphtheria	42
German measles	1
Measles	238
Scarlet fever	17
Septic sore throat	2
Smallpox	23
Trachoma	1
Typhoid fever	135
Whooping cough	266

OREGON.

Chicken pox	7
Diphtheria	6
Measles	7
Mumps	3
Pneumonia	[1] 2
Scarlet fever	12
Smallpox	10
Tuberculosis	7
Typhoid fever	1
Whooping cough	8

[1] Deaths.

SOUTH DAKOTA.

	Cases.
Diphtheria	4
Measles	36
Pneumonia	1
Poliomyelitis	2
Scarlet fever	6
Smallpox	2
Tuberculosis	6
Typhoid fever	4

TEXAS.

Chicken pox	2
Dengue	5
Diphtheria	12
Dysentery	2
Measles	11
Mumps	2
Poliomyelitis	1
Rabies	3
Scarlet fever	7
Smallpox	2
Tuberculosis	30
Typhoid fever	60
Whooping cough	37

VERMONT.

Chicken pox	3
Measles	98
Mumps	8
Pneumonia	1
Scarlet fever	5
Smallpox	3
Typhoid fever	2
Whooping cough	30

WASHINGTON.

Chicken pox	13
Diphtheria	16
Measles:	
Seattle	11
Scattering	10
Mumps	5
Pneumonia	1
Poliomyelitis:	
King County	1
Seattle	1

WASHINGTON—continued

	Cases.
Scarlet fever	5
Smallpox	6
Tuberculosis	11
Typhoid fever	13
Whooping cough	40

WEST VIRGINIA.

Diphtheria	2
Scarlet fever	4
Typhoid fever	20

WISCONSIN.

Milwaukee:	
Chicken pox	3
Diphtheria	5
Measles	3
Ophthalmia neonatorum	1
Pneumonia	2
Scarlet fever	11
Tuberculosis	12
Whooping cough	24
Scattering:	
Cerebrospinal meningitis	1
Chicken pox	23
Diphtheria	38
Influenza	8
Measles	183
Ophthalmia neonatorum	1
Pneumonia	2
Poliomyelitis	2
Scarlet fever	60
Smallpox	31
Tuberculosis	35
Typhoid fever	3
Whooping cough	160

WYOMING.

Chicken pox	1
Measles	32
Pneumonia	1
Scarlet fever	2
Smallpox	1
Typhoid fever	3
Whooping cough	1

Reports for Week Ended July 21, 1923.

ALABAMA.

	Cases.
Cerebrospinal meningitis	1
Diphtheria	8
Dysentery	38
Influenza	4
Malaria	148
Measles	86
Pellagra	6
Pneumonia	9
Scarlet fever	19
Tuberculosis	26
Typhoid fever	75
Whooping cough	51

CALIFORNIA.

Cerebrospinal meningitis:	
Long Beach	1
Los Angeles	1
San Bernardino	1
San Francisco	1

CALIFORNIA—continued.

	Cases.
Diphtheria	111
Influenza	8
Lethargic encephalitis—Susanville	1
Measles	302
Poliomyelitis:	
Los Angeles	2
Redlands	1
Santa Monica	1
Scarlet fever	78
Smallpox:	
Los Angeles	13
San Bernardino County	9
Scattering	18
Typhoid fever	13
Typhus fever—Los Angeles	1

DELAWARE.

Diphtheria	3
Malaria	3

DELAWARE—continued.

	Cases.
Measles	2
Scarlet fever	4
Tuberculosis	2
Whooping cough	3

DISTRICT OF COLUMBIA.

Chicken pox	18
Diphtheria	1
Measles	17
Scarlet fever	6
Tuberculosis	31
Whooping cough	12

INDIANA.

Diphtheria	12
Measles	74
Scarlet fever	10
Smallpox	29
Tuberculosis	11
Typhoid fever	10

MINNESOTA.

Cerebrospinal meningitis	1
Chicken pox	1
Diphtheria	39
Influenza	1
Measles	56
Pneumonia	5
Scarlet fever	85
Smallpox	32
Tuberculosis	56
Typhoid fever	6
Whooping cough	4

MISSISSIPPI.

Diphtheria	10
Influenza	2
Smallpox	1
Typhoid fever	37

MISSOURI.

Cerebrospinal meningitis	1
Chicken pox	1
Diphtheria	24
Epidemic sore throat	3
Influenza	2
Measles	65
Mumps	6

MISSOURI—continued.

	Cases.
Pneumonia	1
Poliomyelitis	2
Scarlet fever	14
Smallpox	5
Tetanus	1
Trachoma	4
Tuberculosis	45
Typhoid fever	14
Whooping cough	198

NEBRASKA.

Chicken pox	3
Diphtheria	7
German measles	1
Measles	6
Mumps	1
Scarlet fever	4
Tetanus	1
Tuberculosis	2
Typhoid fever	15
Whooping cough	18

NEW YORK.

(Exclusive of New York City.)

Cerebrospinal meningitis	5
Diphtheria	69
Influenza	1
Lethargic encephalitis	
Measles	823
Pneumonia	82
Scarlet fever	115
Smallpox	10
Tetanus	6
Typhoid fever	33
Whooping cough	208

NORTH DAKOTA.

Chicken pox	2
Diphtheria	5
German measles	6
Measles	33
Mumps	1
Pneumonia	3
Scarlet fever	9
Tuberculosis	5
Typhoid fever	1
Whooping cough	4

SUMMARY OF CASES REPORTED MONTHLY BY STATES.

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

State.	Cerebrospinal meningitis.	Diphtheria.	Influenza.	Malaria.	Measles.	Pellagra.	Poliomyelitis.	Scarlet fever.	Smallpox.	Typhoid fever.
June, 1923.										
California	11	581	75	9	3,712	1	5	517	93	75
District of Columbia	.....	19	2	.....	429	.....	.....	56	.....	13
Hawaii	.....	13	490	.....	27	.....	.....	1	.....	12
Idaho	.....	2	.....	.....	3	.....	.....	2	4	.....
Illinois	6	532	14	5	6,320	.....	4	475	128	68
Iowa	.....	61	.....	.....	407	.....	.....	166	103	3
Kansas	1	90	5	1	1,698	.....	1	108	33	35
Maryland	1	110	30	14	2,068	1	.....	329	1	53
Michigan	.....	462	.....	1	10,219	.....	1	928	106	49
Mississippi	.....	30	208	8,520	1,668	1,026	5	7	13	173
Oregon	.....	54	.....	.....	27	.....	.....	52	73	13
South Carolina	1	75	.....	.....	145	5	.....	8	26	101
South Dakota	.....	32	10	.....	496	.....	2	79	2	5
Virginia	14	81	189	305	4,632	18	6	52	33	152
Wisconsin	8	169	37	.....	4,096	.....	2	873	102	10

BERIBERI.

Opelousas, La.

A case of beriberi has been reported in Opelousas, La. The patient is a farm hand. The onset of the disease was given as about June 20, 1923.

POLIOMYELITIS (INFANTILE PARALYSIS.)

Virginia.

During the month of July, 1923, 38 cases of poliomyelitis were reported in Fredericksburg and Stafford, Va., and vicinity. One case of the disease was reported during the month in each of the following-named Virginia counties: Northampton, Pittsylvania, Wise, and Wythe.

CITY REPORTS FOR WEEK ENDED JULY 14, 1923.

CEREBROSPINAL MENINGITIS.

The column headed "Median for previous years" gives the median number of cases reported during the corresponding week of the years 1915 to 1922, inclusive. In instances in which data for the full eight years are incomplete, the median is that for the number of years for which information is available.

City.	Median for previous years.	Week ended July 14, 1923.		City.	Median for previous years.	Week ended July 14, 1923.	
		Cases.	Deaths.			Cases.	Deaths.
California:				Minnesota:			
Los Angeles	0	1	1	Minneapolis	0	.....	1
San Bernardino	0	.....	1	Montana:			
San Francisco	0	1	1	Great Falls	0	1	1
Connecticut:				New York:			
New Haven	0	1	.....	New York	5	2	3
Waterbury	1	1	1	Niagara Falls	0	2	.....
District of Columbia:				Ohio:			
Washington	0	1	.....	Canton	0	.....	1
Illinois:				Cleveland	0	1	.....
Chicago	2	.....	1	Pennsylvania:			
Indiana:				Philadelphia	1	.....	1
Newcastle	0	.....	1	Wisconsin:			
Massachusetts:				Milwaukee	1	1	1
Boston	1	3	1				

CITY REPORTS FOR WEEK ENDED JULY 14, 1923—Continued.

DIPHTHERIA.

See p. 1797; also Current State summaries, p. 1786, and Monthly summaries by States, p. 1791.

INFLUENZA.

City.	Cases.		Deaths, week ended July 14, 1923.	City.	Cases.		Deaths, week ended July 14 1923.
	Week ended July 15, 1922.	Week ended July 14, 1923.			Week ended July 15, 1922.	Week ended July 14, 1923.	
Alabama:				Massachusetts:			
Birmingham			1	Boston		1	
California:				Minnesota:			
Los Angeles	2	3		Minneapolis			1
Oakland		1		Missouri:			
San Francisco	1	4		Kansas City	1		
Connecticut:				New Jersey:			
Meriden	1			Newark	1	2	
New Haven		1		New York:			
Florida:				New York	7	2	1
Tampa	1			Ohio:			
Georgia:				Cleveland		1	
Atlanta		1		Pennsylvania:			
Illinois:				Philadelphia		1	2
Chicago	1	6	1	Rhode Island:			
Indiana:				Providence	1		
Newcastle			1	Tennessee:			
Maryland:				Memphis		1	1
Cumberland		1					

LETHARGIC ENCEPHALITIS.

City.	Cases.	Deaths.	City.	Cases.	Deaths.
Oregon:			West Virginia:		
Portland		1	Morgantown	1	

MALARIA.

Alabama:			New Jersey:		
Birmingham	8		Jersey City	1	
Mobile	3	1	Newark	2	
Montgomery	1		New York:		
Tuscaloosa	3		New York	7	
Arkansas:			Ohio:		
Little Rock	4		Lorain	2	
Connecticut:			Pennsylvania:		
New Haven	1		Philadelphia	1	
Florida:			South Carolina:		
St. Petersburg	1		Charleston		1
Georgia:			Tennessee:		
Augusta	5		Memphis	19	
Brunswick	1		Texas:		
Savannah	4		Austin	1	
Illinois:			Dallas	1	
Chicago		1	Houston		1
Kentucky:			Virginia:		
Owensboro	1		Richmond	2	
Louisiana:					
New Orleans	5				

MEASLES.

See p. 1797; also Current State summaries, p. 1786, and Monthly summaries by States, p. 1791.

CITY REPORTS FOR WEEK ENDED JULY 14, 1923—Continued.

PELLAGRA.

City.	Cases.	Deaths.
Alabama:		
Birmingham	3	
Arkansas:		
Little Rock	1	
Georgia:		
Atlanta		1
Augusta		1
Brunswick		1
Louisiana:		
New Orleans	1	2
Massachusetts:		
Danvers	1	
Michigan:		
Kalamazoo	1	1
Saginaw		1
South Carolina:		
Columbia		1
Tennessee:		
Memphis	1	
Texas:		
Dallas		1
San Angelo		1

PNEUMONIA (ALL FORMS).

City.	Cases.	Deaths.
Alabama:		
Birmingham	4	3
California:		
Alameda		2
Bakersfield		1
Los Angeles		17
Oakland		2
Pasadena	2	
San Bernardino		1
San Diego		2
San Francisco	4	2
Colorado:		
Denver		3
Connecticut:		
Bridgeport	1	
Bristol		1
Greenwich	1	
Hartford		1
New Haven		2
District of Columbia:		
Washington		5
Georgia:		
Atlanta		9
Augusta		2
Brunswick		1
Illinois:		
Aurora		1
Chicago	83	24
Cicero	3	1
Decatur	1	
Galesburg		1
Oak Park		1
Indiana:		
Crawfordsville		1
East Chicago		2
Gary		1
Huntington		1
Indianapolis		4
La Fayette		2
South Bend		1
Iowa:		
Council Bluffs		1
Coffeyville	1	
Kansas:		
Kansas City	1	
Kentucky:		
Covington		1
Louisville		6
Louisiana:		
New Orleans	6	5
Maine:		
Biddeford		1
Portland		2
Maryland:		
Baltimore		10
Cumberland	1	
Frederick	1	
Massachusetts:		
Boston		5
Cambridge		1
Danvers		1
Everett	2	
Massachusetts—Continued.		
Fall River		2
Lowell		1
Malden	1	
New Bedford		4
Newburyport		1
Woburn		1
Worcester	2	
Michigan:		
Alpena	1	
Detroit	28	16
Grand Rapids		1
Highland Park		3
Muskegon	3	
Pontiac	2	1
Minnesota:		
Duluth	1	
Minneapolis		3
St. Paul		4
Missouri:		
Kansas City		3
Montana:		
Billings		1
Great Falls		1
Helena		1
Nebraska:		
Lincoln		3
Omaha		3
New Hampshire:		
Concord		1
New Jersey:		
Atlantic City	1	
Elizabeth		2
Hoboken		2
Morristown		1
Newark	9	2
Passaic		1
Perth Amboy		1
Plainfield	1	
Trenton		1
Mew Mexico:		
Albuquerque		1
New York:		
Albany	3	
Amsterdam		1
Buffalo	8	5
Cohoes	1	
Elmira	1	
Glens Falls		1
Lackawanna	4	
Lockport		2
Mount Vernon	3	
New York	87	62
Newburgh		2
Olean		1
Rochester		1
Schenectady	4	1
Syracuse	5	3
Troy	1	
Watertown		1
Yonkers		1

CITY REPORTS FOR WEEK ENDED JULY 14, 1923—Continued.

PNEUMONIA (ALL FORMS)—Continued.

City.	Cases.	Deaths.
Ohio:		
Akron	1	
Canton		1
Chillicothe	1	
Cincinnati		9
Cleveland	17	7
Columbus		1
Dayton	1	
East Cleveland	1	
East Youngstown		1
Hamilton		1
Lancaster		1
Newark		1
Norwood		1
Piqua		1
Springfield		1
Toledo		1
Youngstown		3
Zanesville		1
Oklahoma:		
Oklahoma		3
Oregon:		
Portland		5
Pennsylvania:		
Philadelphia	28	14
Pittsburgh		13
Rhode Island:		
Providence		3
South Carolina:		
Charleston		1
Columbia		1
Tennessee:		
Memphis		4
Nashville		1
Texas:		
Austin	1	
Fort Worth		1
Houston		3
San Antonio		5
Utah:		
Salt Lake City		3
Vermont:		
Burlington		1
Virginia:		
Norfolk		1
Petersburg		2
Richmond		2
West Virginia:		
Clarksburg		2
Huntington		1
Parkersburg		2
Wheeling		1
Wisconsin:		
Eau Claire	1	
Kenosha		1
Milwaukee	1	
Racine		2
Superior		1

POLIOMYELITIS (INFANTILE PARALYSIS).

The column headed "Median for previous years" gives the median number of cases reported during the corresponding week of the years 1915 to 1922, inclusive. In instances in which data for the full eight years are incomplete, the median is that for the number of years for which information is available.

City.	Median for previous years.	Week ended July 14, 1923.	
		Cases.	Deaths.
Massachusetts:			
Worcester	0	1	
Michigan:			
Saginaw	0		1
Missouri:			
St. Louis	0	1	
New Jersey:			
Elizabeth	0	1	
Jersey City	0	3	
New York:			
New York	2	26	3
Texas:			
Houston	0	1	
San Antonio		1	
Wisconsin:			
Milwaukee	0	1	1

RABIES IN ANIMALS.

City.	Cases.	Deaths.
California:		
Los Angeles	23	
Pasadena	2	
Missouri:		
Kansas City	6	
Texas:		
Austin	3	

RABIES IN MAN.

Texas:		
Austin	1	1

CITY REPORTS FOR WEEK ENDED JULY 14, 1923—Continued.

SCARLET FEVER.

See p. 1797; also Current State summaries, p. 1786, and Monthly summaries by States, p. 1791.

SMALLPOX.

The column headed "Median for previous years" gives the median number of cases reported during the corresponding week of the years 1915 to 1922, inclusive. In instances in which data for the full eight years are incomplete, the median is that for the number of years for which information is available.

City.	Median for previous years.	Week ended July 14, 1923.	
		Cases.	Deaths.
Alabama:			
Birmingham	1	1	
California:			
Los Angeles	1	11	
Georgia:			
Atlanta	3	9	
Illinois:			
Chicago	0	2	
Elgin	0	1	
Rock Island	0	1	
Indiana:			
Fort Wayne	0	1	
Gary	0	2	
Huntington	0	1	
Indianapolis	0	4	
Muncie	0	7	
South Bend	0	2	
Iowa:			
Davenport	0	7	
Kansas:			
Hutchinson	0	1	
Massachusetts:			
Malden	0	1	
New Bedford	0	1	
Michigan:			
Detroit	4	2	
Minnesota:			
St. Paul	1	4	
Winona	0	5	
Montana:			
Missoula	0	1	
New York:			
New York	0	3	
North Carolina:			
Raleigh	0	1	
Winston-Salem	0	5	
North Dakota:			
Fargo	0	1	
Grand Forks	0	1	
Ohio:			
Cleveland	1	1	
Columbus	0	1	
Dayton	0	2	
Youngstown	0	1	
Oklahoma:			
Tulsa	0	3	
Oregon:			
Portland	5	9	
Pennsylvania:			
Pittsburgh	0	2	
South Carolina:			
Greenville	0	1	
Tennessee:			
Knoxville	0	1	
Memphis	0	1	
Utah:			
Salt Lake City	7	1	
Vermont:			
Burlington	0	2	
Virginia:			
Richmond	0	1	
Washington:			
Aberdeen	1	1	
Seattle	0	3	
Spokane	6	9	
Tacoma	2	2	
Wisconsin:			
Eau Claire	0	1	
Kenosha	0	2	
Superior	2	2	

TETANUS.

City.	Cases.	Deaths.
Alabama:		
Birmingham	1	
California:		
Long Beach	1	1
Illinois:		
Chicago		1
Quincy		1
Indiana:		
Indianapolis		1
Terre Haute		1
Kansas:		
Coffeyville	2	
Leavenworth	1	
Kentucky:		
Covington		1
Massachusetts:		
Boston	1	
New Bedford	1	1
Springfield		1
Missouri:		
St. Joseph		1
St. Louis	3	
New Jersey:		
Newark	2	
Orange	1	1
New York:		
Cohoes	1	1
Lackawanna	1	
New York	2	1
Ohio:		
New Philadelphia	1	
Pennsylvania:		
Pittsburgh	1	
Texas:		
Dallas		1
Vermont:		
Burlington		2

TUBERCULOSIS.

See p. 1797; also Current State summaries, p. 1786.

CITY REPORTS FOR WEEK ENDED JULY 14, 1923—Continued.

TYPHOID FEVER.

The column headed "Median for previous years" gives the median number of cases reported during the corresponding week of the years 1915 to 1922, inclusive. In instances in which data for the full eight years are incomplete, the median is that for the number of years for which information is available.

City.	Median for previous years.	Week ended July 14, 1923.	
		Cases.	Deaths.
Alabama:			
Birmingham	5	2	
Montgomery	1	1	
Arkansas			
Little Rock	2	5	
California:			
Los Angeles	4	2	
San Francisco	3	2	
Colorado:			
Denver	1	3	1
Connecticut:			
Bridgeport	0	1	
Hartford	0	1	
New Haven	1	2	
District of Columbia:			
Washington	5	6	
Georgia:			
Atlanta	1	1	3
Augusta	1	3	2
Brunswick	0	2	
Macon	0	1	
Rome	0	3	
Savannah	2		1
Illinois:			
Blue Island	0	1	
Centralia	0	2	
Chicago	5	6	1
Decatur	0	1	
Elgin	0	2	
Springfield	0	1	1
Indiana:			
Elwood	0	1	
Indianapolis	2	3	
Kokomo	0	2	
South Bend	0	1	
Kansas:			
Atchison	0	1	
Coffeyville	1	1	
Hutchinson	2	1	
Wichita	2	1	
Kentucky:			
Louisville	4	4	
Owensboro	6	1	
Paducah	0	1	
Maine:			
Portland	1	4	
Maryland:			
Baltimore	9	6	
Frederick	0	1	
Massachusetts:			
Beverly	0	1	
Boston	3	1	1
Methuen	0	1	
New Bedford	1	1	
Worcester	0	2	
Michigan:			
Detroit	8	5	
Flint	0	1	2
Highland Park	0	1	
Saginaw	0		1
Missouri:			
Kansas City	3	1	
St. Louis	6	8	1
Springfield	0		1
New Jersey:			
Newark	1	1	
Plainfield	0	2	1
Summit	0	1	
New York:			
Albany	2	2	
Buffalo	2	2	1
Hudson	0	1	
New York—Continued.			
Mount Vernon	0	1	
New York	27	5	4
Rochester	0	1	
Rome	0	1	
Syracuse	1	2	
Troy	0		1
Yonkers	0	1	
North Carolina:			
Raleigh	0	1	
Wilmington	0	1	
Winston-Salem	4	3	1
Ohio:			
Akron	1	1	
Cambridge	0	1	
Canton	0		1
Chillicothe	0	2	
Cincinnati	2	1	
Cleveland	4	2	
Columbus	1	4	
Fremont	0	1	
Kenmore	0	1	
Toledo	1	1	
Oklahoma:			
Oklahoma	2	3	
Tulsa	8	10	
Pennsylvania:			
Allentown	0	1	
Butler	0	1	
McKeesport	0	1	
New Castle	0	1	
Philadelphia	12	9	
Pittsburgh	3	2	
Pottsville	0	2	
Punxsutawney	0	1	
Scranton	0	1	
South Carolina:			
Charleston	6	1	
Columbia	0	3	
Greenville	0	1	
Tennessee:			
Chattanooga	1	3	
Knoxville	1	8	
Memphis	5	18	2
Nashville	10	3	
Texas:			
Beaumont	0	1	
Corpus Christi	0	1	
Dallas	6	2	
El Paso	0	6	2
Fort Worth	2		1
Houston	1	2	
San Antonio		12	1
Utah:			
Salt Lake City	1	1	
Virginia:			
Norfolk	3	2	
Petersburg	1	1	
Roanoke	1	1	
Washington:			
Aberdeen	0	1	
Seattle	0	1	
Tacoma	0	1	
West Virginia:			
Bluefield	0		1
Charleston	1	2	2
Clarksburg	0	1	
Huntington	0	7	
Wisconsin:			
Oshkosh	0	1	
Wausau	0	1	

CITY REPORTS FOR WEEK ENDED JULY 14, 1923—Continued.

TYPHUS FEVER.

City.	Cases.	Deaths.
Massachusetts:		
Boston	1	

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS.

City.	Population Jan. 1, 1920.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Alabama:										
Birmingham	178,806	63	1	1	18	2	2		17	6
Mobile	60,777	27	1							
Montgomery	43,464	12			1					1
Tuscaloosa	11,996				1					
Arkansas:										
Little Rock	65,142				1				1	
North Little Rock	14,048				1					
California:										
Alameda	28,806	5			13					
Bakersfield	18,638	4								
Glendale	13,536	7								1
Long Beach	55,593	17	4		3					1
Los Angeles	576,673	209	44	4	71		19	1	77	28
Oakland	216,261	42	6		16	1	3		1	1
Pasadena	45,354	20					1		1	2
Richmond	16,843	1								
Riverside	19,341	6	1		1					1
Sacramento	65,908	16	1		9				3	2
San Bernardino	18,721	8								
San Diego	74,683	25	1		11		3			
San Francisco	506,676	123	13	2	90	1	10	1	29	10
Santa Ana	15,485	3					1			
Santa Barbara	19,441	2								
Stockton	40,296	18	1							2
Colorado:										
Denver	256,491	68	35	5	12		9			21
Pueblo	43,050	9	1		1					
Connecticut:										
Bridgeport	143,555	28	3	1	2				5	2
Bristol	20,620		2						1	
Greenwich (town)	22,123				3		1			
Hartford	138,036	34		1			2		3	
Manchester (town)	18,370	6								
Milford (town)	10,193	3								
New Haven	162,537	29	1				1		9	2
New London	25,688	14								1
Stonington (town)	10,236	0	2		6					
Waterbury	91,715	21	3				15		4	
District of Columbia:										
Washington	437,571	112	2		14		6		27	14
Florida:										
Key West	18,749	4								
St. Petersburg	14,237	4								1
Tampa	51,608	19								
Georgia:										
Albany	11,555				1					
Atlanta	200,616	96	1		3	1			8	7
Augusta	52,548	21			18					3
Brunswick	14,413	9			1					1
Macon	52,995				12					
Rome	13,252				8					
Savannah	83,252	37		1	18	1	1		3	3
Idaho:										
Boise	21,393	3	1				1			
Illinois:										
Alton	24,682	16			2				1	1
Aurora	36,397	11	3		3		1		4	1
Bloomington	28,725	8	1		1				2	
Blue Island	11,424	1								
Centralia	12,491	6			4					
Champaign	15,873				2					

CITY REPORTS FOR WEEK ENDED JULY 14, 1923—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population Jan. 1, 1920.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Illinois—Continued.										
Chicago	2,701,705	509	63	4	109	1	32	.....	164	37
Cicero	44,995	5	2	.....	3	.....	.....	.....	.....	.....
Decatur	43,818	6	.....	.....	8	.....	.....	.....	.....	.....
Elgin	27,454	5	.....	.....	5	.....	.....	.....	1	.....
Evanston	37,234	11	.....	.....	8	.....	.....	.....	2	.....
Forest Park	10,768	.....	.....	.....	1	.....	.....	.....	.....	.....
Freeport	19,669	4	.....	.....	4	.....	4	.....	1	.....
Galesburg	23,834	11	.....	.....	6	.....	.....	.....	.....	.....
Jacksonville	15,713	7	.....	.....	.....	.....	.....	.....	2	1
Kewanee	16,026	0	.....	.....	1	.....	.....	.....	.....	.....
La Salle	13,050	.....	.....	.....	1	.....	.....	.....	.....	.....
Mattoon	13,552	.....	.....	.....	2	.....	.....	.....	.....	.....
Oak Park	39,858	13	.....	.....	18	.....	1	.....	.....	.....
Quincy	35,978	5	.....	.....	2	.....	.....	.....	.....	.....
Rock Island	35,177	6	4	.....	17	.....	.....	.....	.....	.....
Springfield	59,183	16	.....	.....	1	.....	.....	.....	2	1
Urbana	10,244	.....	.....	.....	2	.....	.....	.....	1	.....
Indiana:										
Anderson	29,767	6	.....	.....	1	.....	.....	.....	.....	1
Bloomington	11,595	8	.....	.....	.....	.....	.....	.....	.....	.....
Crawfordsville	10,139	2	.....	.....	.....	.....	.....	.....	.....	.....
East Chicago	35,967	15	.....	.....	1	.....	.....	.....	.....	1
Elwood	10,790	4	.....	.....	.....	.....	.....	.....	.....	.....
Fort Wayne	86,549	26	2	.....	.....	.....	.....	.....	.....	2
Frankfort	11,585	2	.....	.....	3	.....	.....	.....	.....	.....
Gary	55,378	16	.....	.....	.....	.....	2	1	.....	1
Hammond	36,004	9	.....	.....	2	.....	1	.....	.....	.....
Huntington	14,000	3	.....	.....	.....	.....	.....	.....	.....	.....
Indianapolis	314,194	71	2	.....	30	.....	.....	.....	.....	6
Kokomo	30,067	7	.....	.....	4	.....	.....	.....	.....	2
La Fayette	22,486	6	.....	.....	3	.....	.....	.....	.....	1
Logansport	21,626	5	.....	.....	.....	.....	.....	.....	.....	.....
Michigan City	19,457	9	.....	.....	.....	.....	.....	.....	.....	1
Mishawaka	15,195	7	.....	.....	.....	.....	1	.....	3	2
Muncie	36,524	2	.....	.....	20	.....	.....	.....	.....	.....
Newcastle	14,458	3	.....	.....	.....	.....	.....	.....	.....	.....
South Bend	70,983	14	.....	.....	3	.....	2	.....	2	.....
Terre Haute	66,083	16	.....	.....	.....	.....	.....	.....	.....	.....
Iowa:										
Burlington	24,057	6	3	.....	2	.....	.....	.....	.....	.....
Cedar Rapids	45,566	.....	.....	.....	.....	.....	1	.....	.....	.....
Council Bluffs	36,162	14	1	.....	.....	.....	1	.....	.....	1
Davenport	56,727	.....	3	.....	4	.....	.....	.....	.....	.....
Iowa City	11,267	.....	1	.....	.....	.....	.....	.....	1	.....
Muscatine	16,068	5	.....	.....	.....	.....	.....	.....	.....	.....
Sioux City	71,227	.....	2	.....	.....	.....	.....	.....	.....	.....
Waterloo	36,230	.....	.....	.....	.....	.....	3	.....	.....	.....
Kansas:										
Coffeyville	13,452	5	.....	.....	1	.....	1	.....	.....	.....
Fort Scott	10,693	4	.....	.....	1	.....	.....	.....	.....	.....
Kansas City	101,177	.....	.....	.....	11	.....	2	.....	5	.....
Lawrence	12,456	0	1	.....	1	.....	.....	.....	.....	.....
Leavenworth	16,912	6	.....	.....	3	.....	.....	.....	.....	.....
Parsons	16,028	.....	.....	.....	.....	.....	1	.....	.....	.....
Topeka	50,022	8	.....	.....	27	.....	.....	.....	5	.....
Wichita	72,217	33	.....	.....	21	.....	1	.....	.....	3
Kentucky:										
Covington	57,121	25	2	.....	2	.....	.....	.....	3	1
Henderson	12,169	1	.....	.....	.....	.....	.....	.....	.....	.....
Lexington	41,534	12	1	.....	2	.....	.....	.....	2	2
Louisville	234,891	76	.....	.....	3	.....	.....	.....	19	5
Owensboro	17,424	.....	.....	.....	.....	.....	.....	.....	2	.....
Paducah	24,735	.....	1	.....	.....	.....	.....	.....	.....	.....
Louisiana:										
New Orleans	387,219	134	6	1	10	1	1	.....	24	16
Maine:										
Auburn	16,985	4	.....	.....	2	1	.....	.....	.....	.....
Bangor	25,978	.....	1	.....	1	.....	.....	.....	.....	.....
Bath	14,731	4	.....	.....	.....	.....	.....	.....	.....	.....
Biddeford	18,008	6	.....	.....	2	.....	.....	.....	.....	.....
Lewiston	31,791	6	2	.....	8	.....	1	.....	.....	.....
Portland	69,272	35	2	.....	1	.....	.....	.....	.....	.....
Sanford (town)	10,691	2	.....	.....	.....	.....	.....	.....	.....	.....
Waterville	13,351	.....	1	.....	.....	.....	.....	.....	.....	.....

CITY REPORTS FOR WEEK ENDED JULY 14, 1923—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population Jan. 1, 1920.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Maryland:										
Baltimore	733,826	176	9	1	83	1	21	1	60	16
Cumberland	29,837	9					1			1
Frederick	11,066	1			1				1	
Massachussetts:										
Adams (town)	12,967	2								
Arlington (town)	18,665	2							2	1
Attleboro	19,731	4								
Belmont (town)	10,749				7					
Beverly	22,561	2								
Boston	748,060	164	71	4	49	1	27	2	50	14
Braintree (town)	10,580		1		6		1			
Brockton	66,254	16	2		6		2			
Brookline	37,748	9			3		2			1
Cambridge	109,694	23	3		1		4		3	5
Chelsea	43,184	7	1				3		3	
Chicopee	36,214	9	3		1					1
Clinton	12,979	2								
Danvers	11,108									1
Dedham	10,792	4								
Everett	40,120	6	8		7		1		2	
Fall River	120,485	25	1		1		3		2	3
Fitchburg	41,029	10	2	1	10		3		1	
Framingham	17,033	5			3					
Gardner	16,971	4							2	
Greenfield	15,462	3								
Haverhill	53,884	11			5		3			
Holyoke	60,203	13	5				3		5	1
Lawrence	94,270	28	2		5				4	2
Leominster	19,744	4			20					1
Lowell	112,759	17			3		2		2	3
Lynn	99,148	14			2		2		2	1
Malden	49,103	8	1		2		4		5	
Medford	39,038	14	1				2		2	2
Melrose	18,204	3			8		1			
Methuen	15,189	3			7				3	
New Bedford	121,217	21	1		1				7	
Newburyport	15,618	5			1					
Newton	46,054	13			2		1			
North Adams	22,282	2					1			
Peabody	19,552	2	3						1	
Pittsfield	41,763	11	1		2				3	3
Plymouth	13,045	3								
Quincy	47,876	3	1		2		3		1	
Salem	42,529	0	2		1		2		1	
Somerville	93,091	13					2		2	1
Southbridge	14,245	2			3					
Springfield	129,614	25			2				7	1
Taunton	37,137	8					1			
Wakefield	13,025	2								
Waltham	30,915	5	4		1				1	
Watertown	21,457	2	1		4		1			
Webster	13,258						1			
Westfield	18,604	6			1		1		2	1
Winthrop	15,455	2			1					
Woburn	16,574	4								
Worcester	179,754	36	8		11		5		6	1
Michigan:										
Ann Arbor	19,516	18	1		25		1		3	
Battle Creek	36,164						13			
Detroit	993,678	192	36	3	56	2	38	2	57	18
Flint	91,599	21	4		38		4		2	1
Grand Rapids	137,634	38			39		7		5	7
Highland Park	46,499	7	3		6		1			
Holland	12,183	0					7			
Kalamazoo	48,487	15	2		25		1		1	
Marquette	12,718	3			3		1	1		
Muskegon	36,570	8			6					
Pontiac	34,273	12			5		4			1
Port Huron	25,944	7			3					
Saginaw	61,903	22			20	1	8		1	2
Saulte Ste. Marie	12,096	2								

CITY REPORTS FOR WEEK ENDED JULY 14, 1923—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population Jan. 1, 1920.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Minnesota:										
Duluth	98,917	13	.....	.....	4	.....	3	.....	3	2
Mankato	12,469	.....	.....	.....	.....	.....	.....	.....	1	.....
Minneapolis	380,582	98	5	.....	6	.....	17	.....	24	2
Rochester	13,722	19	.....	.....	2	.....	.....	.....	.....	1
St. Cloud	15,873	.....	5	.....	1	.....	.....	.....	.....	.....
St. Paul	234,698	59	19	2	5	.....	4	.....	11	4
Winona	19,143	4	.....	.....	.....	.....	1	.....	.....	.....
Missouri:										
Cape Girardeau	10,252	3	.....	.....	.....	.....	.....	.....	.....	.....
Joplin	29,902	.....	.....	.....	2	.....	.....	.....	.....	.....
Kansas City	324,410	93	5	.....	14	1	.....	.....	10	11
St. Joseph	77,939	28	.....	.....	12	.....	.....	.....	.....	1
St. Louis	772,897	198	21	.....	7	.....	2	.....	21	8
Springfield	39,631	11	.....	.....	.....	.....	.....	.....	.....	.....
Montana:										
Billings	15,100	7	.....	.....	.....	.....	.....	.....	.....	1
Great Falls	24,121	9	.....	.....	.....	.....	.....	.....	.....	.....
Helena	12,037	6	.....	.....	.....	.....	.....	.....	1	1
Missoula	12,668	1	.....	.....	.....	.....	2	.....	.....	.....
Nebraska:										
Lincoln	54,948	15	.....	.....	.....	.....	.....	.....	.....	.....
Omaha	191,601	39	6	.....	3	.....	1	.....	.....	2
Nevada:										
Reno	12,016	3	.....	.....	.....	.....	.....	.....	1	.....
New Hampshire:										
Concord	22,167	4	.....	.....	12	.....	.....	.....	.....	1
Dover	13,029	2	.....	.....	.....	.....	.....	.....	.....	.....
Keene	11,210	3	.....	.....	16	.....	.....	.....	.....	.....
Manchester	78,384	21	1	.....	2	.....	.....	.....	.....	3
Nashua	28,379	4	.....	.....	24	.....	.....	.....	2	.....
New Jersey:										
Asbury Park	12,400	1	.....	.....	.....	.....	.....	.....	.....	.....
Atlantic City	50,707	13	.....	.....	1	.....	.....	.....	2	.....
Bayonne	76,754	.....	1	.....	.....	.....	.....	.....	3	.....
Bloomfield	22,019	3	.....	.....	.....	.....	1	.....	.....	.....
Clifton	26,470	3	.....	.....	.....	.....	.....	.....	.....	2
East Orange	50,710	4	1	.....	10	.....	.....	.....	3	.....
Elizabeth	95,783	.....	7	.....	.....	1	1	.....	5	1
Englewood	11,627	2	.....	.....	4	.....	.....	.....	.....	1
Garfield	19,381	0	3	.....	1	.....	.....	.....	4	.....
Hackensack	17,667	6	.....	.....	2	.....	.....	.....	.....	.....
Hoboken	68,166	14	2	.....	.....	.....	2	.....	2	.....
Jersey City	298,103	.....	4	.....	.....	.....	4	.....	10	.....
Kearny	26,724	2	4	.....	.....	.....	1	.....	.....	.....
Long Branch	13,521	2	.....	.....	3	.....	.....	.....	.....	.....
Morristown	12,548	6	.....	.....	.....	.....	.....	.....	.....	.....
Newark	414,524	73	4	1	32	.....	4	.....	20	11
Orange	33,268	7	.....	.....	1	.....	.....	.....	2	1
Passaic	63,841	6	4	1	1	.....	1	.....	2	1
Perth Amboy	41,707	10	.....	.....	.....	.....	.....	.....	2	1
Phillipsburg	16,923	5	.....	.....	.....	.....	.....	.....	2	1
Plainfield	27,700	5	.....	.....	3	.....	.....	.....	1	.....
Summit	10,174	2	.....	.....	.....	.....	.....	.....	1	.....
Trenton	119,289	31	5	1	1	.....	.....	.....	4	2
Union (town)	20,651	.....	.....	.....	1	.....	.....	.....	.....	.....
West Hoboken	40,074	2	.....	.....	.....	.....	.....	.....	1	1
West New York	29,926	1	1	.....	.....	.....	.....	.....	.....	.....
West Orange	15,573	1	.....	.....	.....	.....	.....	.....	.....	.....
New Mexico:										
Albuquerque	15,157	9	.....	.....	3	.....	.....	.....	2	3
New York:										
Albany	113,344	.....	.....	.....	40	.....	3	.....	4	.....
Amsterdam	33,524	7	1	.....	13	.....	1	.....	.....	.....
Auburn	36,192	5	.....	.....	.....	.....	.....	.....	3	1
Buffalo	506,775	109	8	1	38	1	13	.....	23	9
Cohoes	22,987	6	.....	.....	4	.....	.....	.....	2	.....
Elmira	45,393	.....	.....	.....	19	.....	.....	.....	1	.....
Geneva	14,648	3	.....	.....	.....	.....	.....	.....	.....	.....
Glens Falls	16,638	5	.....	.....	.....	.....	.....	.....	.....	.....
Hornell	15,025	0	.....	.....	7	.....	1	.....	.....	.....
Hudson	11,745	4	.....	.....	1	.....	.....	.....	.....	.....
Ithaca	17,004	6	.....	.....	6	.....	.....	.....	.....	.....
Lackawanna	17,918	3	.....	.....	19	.....	.....	.....	1	.....

CITY REPORTS FOR WEEK ENDED JULY 14, 1923—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population Jan. 1, 1920.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
New York—Continued.										
Little Falls	13,029	2								
Lockport	21,308	5			3		1		1	1
Middletown	18,420						1			
Mount Vernon	42,726	13	1		1				3	
New York	5,620,048	1,083	146	6	168	2	58		[1] 260	[1] 1,02
Newburgh	30,366	6			2					
Niagara Falls	50,760	9			5		2		4	1
North Tonowanda	15,482	3		1	33		3			
Olean	20,506	4					5		1	
Peekskill	15,868	4			3		1			
Plattsburg	10,909	3								
Rochester	295,750	50	5		8		1			2
Rome	26,341	5	2	1	3		1			1
Saratoga Springs	13,181	4			2					
Schenectady	88,723	18	1		49		2	2	2	1
Syracuse	171,717	47	6	2	48	8	7		7	
Troy	72,013	25	2		14				5	1
Watertown	31,285	6			41					
Yonkers	100,176	17	13	1	3		4			3
North Carolina:										
Durham	21,719	5							1	
Raleigh	24,418	6			4					1
Salisbury	13,884	2								
Wilmington	33,372	11			1					2
Winston-Salem	48,395	23	1		61	1			4	2
North Dakota:										
Fargo	21,961	0								
Grand Forks	14,010				1		2			
Ohio:										
Akron	208,435	21	3		1				1	
Ashtabula	22,082	3			1					
Barberton	18,811	1								
Bucyrus	10,425	1					1			
Cambridge	13,104	4			1					
Canton	87,091	18	1	1	3					1
Chillicothe	15,831	3								
Cincinnati	401,247	111	3		48	2			13	5
Cleveland	796,841	165	27	3	60	2	23		41	20
Cleveland Heights	15,236		2		1				1	
Columbus	237,031	70			1		3		7	3
Dayton	152,559	31			2		3		1	
East Cleveland	27,292	4			2		3		2	1
East Youngstown	11,237	1								
Findlay	17,021	4								
Fremont	12,468						1			
Hamilton	39,675	13								2
Kenmore	12,683				1				1	
Lancaster	14,706	6								2
Lorain	37,295		2		2		4			
Mansfield	27,824	2			3				2	
Marion	27,891				1		1			
Martins Ferry	11,634	5								
Middletown	23,594	5							2	3
New Philadelphia	10,718				12					
Newark	26,718	9								
Norwood	24,966	3							2	
Piqua	15,044	6								
Salem	10,305	3			5					1
Sandusky	22,897	5	2				1			
Springfield	60,840	12	1		1		1		3	2
Steubenville	28,508	9								
Tiffin	14,375	3								
Toledo	243,164	59	6		6		9			
Youngstown	132,358	25	5	1	24		2			2
Zanesville	29,569	10							2	
Oklahoma:										
Oklahoma	91,295	22			2		2		1	2
Tulsa	72,075		1				2			
Oregon:										
Portland	258,288	52	2		1		1		2	2

[1] Pulmonary only.

CITY REPORTS FOR WEEK ENDED JULY 14, 1923—Continued

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population Jan. 1, 1920.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Pennsylvania:										
Allentown	73,502		2		6				2	
Altoona	60,331				1					
Bethlehem	50,358		2		2		3		2	
Braddock	20,879				2				2	
Bradford	15,525				2					
Butler	23,778		2		1					
Carlisle	10,916				1					
Carrick	10,504		1		1		1			
Chambersburg	13,171		1							
Charleroi	11,516				1					
Coatesville	14,515		1				1			
Easton	33,813				2					
Erie	93,372				37		2		7	
Farrell	15,586		1				2			
Harrisburg	75,917						2			
Hazelton	32,277						1		1	
Homestead	20,452		4						2	
Jeannette	10,627		1							
Johnstown	67,327		2		5		1			
Lancaster	53,150		1		1				1	
Lebanon	24,643		2				1			
McKee's Rocks	16,713		4		2		1			
McKeesport	46,781						1		1	
Meadville	14,568				2					
New Kensington	11,987		1		1					
Norristown	32,319		1				4			
Oil City	21,274				1					
Philadelphia	1,823,779	388	27	1	12		21		71	50
Pittsburgh	588,343	128	30	2	27		33	8		14
Reading	107,784		1						3	
Scranton	137,783		1		6				8	
Shamokin	21,204				2					
Sharon	21,747			1			2			
Steelton	13,428								2	
Swissvale	10,908		2							
Washington	21,480				12					
Wilkes-Barre	73,833		1		4		1		1	
Wilkinsburg	24,403		2							
Williamsport	36,198		4		3					
York	47,512		1							
Rhode Island:										
Cranston	29,407	2								
Newport	30,255	2					1			
Pawtucket	64,248	16	2							2
Providence	237,595	61	9	1	5		3			1
South Carolina:										
Charleston	67,957	24			1					4
Columbia	37,524	26			2				1	4
Greenville	23,127	2					1			
South Dakota:										
Sioux Falls	25,202	5	4		3					
Tennessee:										
Chattanooga	57,895	0	2							
Knoxville	77,818		2		6		1		1	1
Memphis	162,351	61			1				8	4
Nashville	118,342	43			3		1		5	4
Texas:										
Austin	34,876	9							1	
Beaumont	40,422	9								
Corpus Christi	10,522	3							1	
Dallas	158,976	39	4		7		4		3	3
El Paso	77,560	27			5		1		3	5
Fort Worth	106,482	19	3		2		4		3	1
Galveston	44,255	16	1		5					3
Houston	138,276	40			1				2	2
San Angelo	10,050	17								11
San Antonio	161,379	60	2		4		1			10
Waco	38,500	8	2		1					1
Utah:										
Salt Lake City	118,110	36	4	1	2		1		3	2
Vermont:										
Burlington	22,779	10	1		3					

CITY REPORTS FOR WEEK ENDED JULY 14, 1923—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population Jan. 1, 1920.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Virginia:										
Alexandria	18,060	4								1
Charlottesville	10,688	1			1				4	
Lynchburg	30,070	11							1	1
Norfolk	115,777				11		4		9	6
Petersburg	31,012	10			6				1	1
Richmond	171,667	55			40	1	1		5	6
Roanoke	50,842	15	2		3		1			1
Washington:										
Bellingham	25,585						1			
Everett	27,644						1			
Hoquiam	10,058		1							
Seattle	315,312		3		32		4		19	
Spokane	104,437		2		10					
Tacoma	96,965		6		2		5			
West Virginia:										
Bluefield	15,282	5	1		1					
Charleston	39,608	21								
Clarksburg	27,869	11			6		1		1	1
Fairmont	17,851		1		2					
Huntington	50,177	17				1				
Morgantown	12,127		1				1		2	
Parkersburg	20,050	6					1			
Wheeling	56,208	14	2		5		4			1
Wisconsin:										
Appleton	19,561	3								
Ashland	11,334	1			3		2			
Beloit	21,284	1			4		3			
Eau Claire	20,906				9					
Fond du Lac	23,427	3	2							
Green Bay	31,017		1		2		7			
Janesville	18,293	2					1			
Kenosha	40,472	10	1				1		1	1
Madison	38,378	8	1		6		1			
Manitowoc	17,563				2					
Marinette	13,610				1					
Milwaukee	457,147	67	12	3	9		30		5	6
Oshkosh	33,162	7			7					
Racine	58,593	12					1		12	
Sheboygan	30,955	5	6				2		2	1
Superior	39,671	10			1		2			
Wuakesha	12,558		2				1		1	
Wausau	18,661		4		3				1	
West Allis	13,745						1		1	

FOREIGN AND INSULAR.

EGYPT.

Plague.

The following extract and tables are taken from the Epidemiological Report of the Health Section of the League of Nations, No. 51, issued June 15, 1923:

Telegraphic information from Alexandria states that the "epidemic shows signs of stopping" and that "all pneumonics are secondary." From May 1 to 29, 345 cases of plague were reported; but of this number 219, or two-thirds of the total, were reported in the first two weeks of May. The distribution of cases, according to the form of the plague and to the locality, is tabulated below:

Incidence of plague in Egypt from May 1 to 29, 1923, in the several localities.

Locality.	Total cases.	Bubonic.	Septicæmic.	Pneumonic.
Alexandria	14	12	2	.....
Port Said	13	9	4	.....
Suez	3	3	.....	.....
Province—				
Girgeh	123	77	42	4
Assiout	64	49	7	8
Minieh	46	35	11	.....
Menoufieh	34	31	3	.....
Keneh	22	21	.....	1
Fayoum	14	14	.....	.....
Benisouef	7	5	.....	2
Geizeh	3	1	2	.....
Garbieh	2	1	1	.....
Total	345	258	72	15

Cases of and deaths from plague in Egypt, by weeks, from February 18 to May 27, 1923.

Week ending—	Cases.	Deaths.	Week ending—	Cases.	Deaths.
Feb. 25	2	3	Apr. 15	83	39
Mar. 4	8	5	22	73	45
11	11	8	29	100	57
18	20	9	May 6	92	54
25	50	24	13	127	79
Apr. 1	71	32	20	52	31
8	68	33	27	71	23

GREECE.

Cases of Typhus Fever, Smallpox, and Lethargic Encephalitis Reported during May, 1923.

The Epidemiological Report of the Health Section of the League of Nations, No. 51, issued June 15, 1923, gives the following figures

showing the reported cases of typhus fever, smallpox, and lethargic encephalitis in Greece for the month of May, 1923. The incidence of smallpox and typhus fever was said to be diminishing throughout Greece.

Cases of typhus fever:	
Athens	150
Piræus	353
Rest of Greece	373
Total	876
Cases of smallpox:	
Athens	53
Piræus	31
Rest of Greece	127
Total	211
Cases of lethargic encephalitis:	
Whole of Greece	8

JAMAICA.

Smallpox (Reported as Alastrim).

Smallpox (reported as alastrim) has been notified in the island of Jamaica as follows: Week ended June 30, 1923, 19 new cases; week ended July 7, 1923, 13 new cases. Kingston (Parish): Week ended June 30, 1923, 5 cases; week ended July 7, 1923, 6 cases.

Typhoid Fever—Kingston and Vicinity.

Typhoid fever has been reported in Kingston and vicinity as follows: Week ended June 30, 1923—Kingston, 5 cases; vicinity, 20 cases. Week ended July 7, 1923—Kingston, 4 cases; vicinity, 16 cases.

RUSSIA.

Decrease in Epidemic Disease Prevalence [1]—Cholera—Plague.

Information received under date of May 24, 1923, in regard to decrease in epidemic disease prevalence, shows that from the beginning of the year to the middle of May, 1923, only 10 cases of cholera were reported in the Republic as compared with 10,000 cases reported during the corresponding period in the year 1922. A few cases of plague were reported in the Far East districts.

Lethargic Encephalitis.

Lethargic encephalitis was stated to have been observed at Moscow in 1920, one fatal case being reported. In November, 1922, the disease reappeared in Moscow, and during the winter of 1922–23 it was

[1] Public Health Reports, July 13, 1923, p. 1604.

present with 21 cases, of which 1 case terminated fatally. The disease was present also at Petrograd and in other localities.[1]

Malaria—Moscow—January-May 15, 1923.

Information dated May 24, 1923, shows that from January to May 15, 1923, 2,574 cases of malaria were reported in Moscow, according to the Moscow department of health. The occurrence was stated to have been principally in the Baumanov and Sokolniki districts. The monthly occurrence was reported as follows:

January 1–May 15, 1923.

Month.	Cases.	Remarks.
January	154	
February	155	
March	453	
April	852	(Provisional figures.)
May 1–15	960	

Mortality from Malaria Increased.

It was stated that the case fatality rate for malaria increased considerably with the spring cleaning of the cesspools, at which time tropical species of mosquitoes were noted.

Typhus Fever, Relapsing Fever, Typhoid Fever, Dysentery, and Lethargic Encephalitis—January to April, 1923.

The Epidemiological Report of the Health Section of the League of Nations, No. 51, issued June 15, 1923, says that "The latest reports from Russia, which give data for the first four months of the year, indicate a very marked improvement in the epidemic situation. The number of cases of typhus and relapsing fever, as well as abdominal typhoid [typhoid fever] and dysentery, reported during April shows a very abrupt drop in the incidence of these diseases. No cases of plague have been reported since February, and only a few isolated cases of cholera have been notified. The increasing incidence of malaria is probably the most serious feature of the present situation in Russia."

[1] Public Health Reports, July 13, 1923, p. 1604.

The following tables are taken from the above-mentioned report:

Cases of typhus fever, relapsing fever, typhoid fever, and dysentery reported in Russia, January to April, 1923, compared with similar reports for 1922.

Disease and area.	January.	February.	March.	April.	Total.
Typhus:					
European Russia and autonomous Republics	41,183	29,679	18,956	4,181	93,999
Siberia, Caucasus, and Central Asia	3,685	3,826	2,322	88	9,921
Waterways and railways	462	1,406	1,039	27	2,934
Total	45,330	34,911	22,317	4,296	106,854
Total, corresponding period 1922	159,305	206,687	270,050	211,474	847,516
Relapsing fever:					
European Russia and autonomous Republics	45,977	29,230	10,182	2,491	87,880
Siberia, Caucasus, and Central Asia	4,702	3,898	2,398	180	11,178
Waterways and railways	3,350	1,665	1,270	66	6,351
Total	54,029	34,793	13,850	2,737	105,409
Total, corresponding period 1922	177,482	186,747	208,065	156,464	728,758
Typhoid fever:					
European Russia and autonomous Republics	12,166	7,635	3,655	899	24,355
Siberia, Caucasus, and Central Asia	1,327	889	54	55	2,325
Waterways and Railways	634	302	736	.....	1,672
Total	14,127	8,826	4,445	954	28,352
Total, corresponding period 1922	49,333	45,084	40,616	26,965	161,998
Dysentery:					
European Russia and autonomous Republics	2,981	2,131	1,096	181	6,389
Siberia, Caucasus, and Central Asia	398	202	89	12	701
Waterways and railways	201	107	126	.....	434
Total	3,580	2,440	1,311	193	7,524
Total, corresponding period 1922	9,527	11,352	13,213	11,152	45,244

Cases of lethargic encephalitis reported in several localities of Russia, January to April, 1923.

	January.	February.	March.	April.	Total.
City of Moscow	4	14	10	10	38
Government of Moscow	.....	.....	.....	2	2
City of Petrograd	.....	14	9	.....	23
City of Kharkov	.....	.....	.....	4	4
Total	4	28	19	16	67

SOCIETY ISLANDS.

Influenza—Tahiti.

Prevalence of influenza was reported in Tahiti, Society Islands, during the month of June, 1923.

UNION OF SOUTH AFRICA.

Smallpox—Typhus Fever.

During the month of May, 1923, smallpox and typhus fever were reported in the Union of South Africa as follows: *Smallpox*—33 cases with 1 death occurring among the colored population. *Typhus fever*—102 cases with 21 deaths among the colored population and 6 cases among the white population. For distribution of occurrence according to locality, see pages 1809, 1810.

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

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

Reports Received During Week Ended August 3, 1923.[1]

CHOLERA.

Place.	Date.	Cases.	Deaths.	Remarks.
India:				
Calcutta	June 3–16	52	44	Epidemic.
Rangoon	May 27–June 2	4	3	
Philippine Islands:				
City—				
Manila	June 10–16	2	1	Death in foreign case from Chingkang, China.
Province—				
Bulacan	May 17–23	1		
Capiz	May 27–June 2	1	1	
Cebu	Apr. 8–21	1	1	
Cotobato	Apr. 8–14	1	1	
Laguna	May 6–12	1	1	
Russia (Soviet)				Jan. 1–May 15, 1923. Cases, 10.

PLAGUE.

Ceylon:				
Colombo	June 3–9	2	3	
Egypt				Jan. 1–June 21, 1923: Cases, 1,051; deaths, 548. May 1–29: Cases, 345.
City—				
Alexandria	Jan. 7–June 18	34	15	May 1–29, 1923: Cases, 14.
Port Said	Jan. 7–June 15	23	12	May 1–29, 1923: Cases, 13.
Suez	Mar. 2–June 15	12	7	May 1–29, 1923: Cases, 3.
Province—				
Assiout	May 1–29	64		Deaths not reported.
Benisouef	do	7		Do.
Fayoum	do	14		Do.
Garbieh	do	2		Do.
Geizeh	do	3		Do.
Girgeh	do	123		Do.
Keneh	do	22		Do.
Menoufieh	do	34		Do.
Minieh	do	46		Do.
India:				
Calcutta	June 3–9		1	
Karachi	June 10–16	10	10	Plague rats, 5.
Rangoon	May 27–June 2	31	23	
Java:				
East Java—				
Soerabaya	May 1–31	471	471	
Russia				Jan. 1–May 15, 1923: A few cases in Far East regions.
Straits Settlements:				
Singapore	May 20–June 2	2	2	
Syria:				
Beirut	May 12–21	1		

SMALLPOX.

Brazil:				
Rio de Janeiro	June 17–23	3		
Canada:				
Saskatchewan—				
Moose Jaw	July 8–14	1		
China:				
Amoy	June 10–16		1	
Chungking	do			Endemic.
Foochow	do			Present.
Manchuria—				
Harbin	May 28–June 3	2		
Nanking	June 9–23			Do.
Egypt:				
Cairo	Apr. 2–22	7	2	
Great Britain:				
Nottingham	June 3–9	1		

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

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

Reports Received During Week Ended August 3, 1923—Continued.

SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Greece				May 1-31, 1923: Cases, 211.
Athens	May 1-31	53		
Piræus	do	31		
India:				
Calcutta	June 3-9	7	5	
Karachi	June 10-16	2	1	
Madras	do	4	2	
Rangoon	May 27-June 2	10	7	
Jamaica				June 24-30, 1923: Cases, 19. July 1-7, 1923: Cases, 13. (Reported as alastrim.)
Kingston	June 24-30	5		Parish of Kingston.
Do	July 1-7	6		Do.
Japan:				
Kobe	June 22-28	1		
Java:				
East Java—				
Soerabaya	May 27-June 2	30	2	
West Java—				
Batavia	June 2-8	8	1	City and Province.
Mexico:				
Aguascalientes	July 8-14		1	
Mexico City	June 10-23	62		Including municipalities in Federal District.
Persia:				
Teheran	Feb. 22-Mar. 22		24	
Portugal:				
Lisbon	June 17-30	12		
Spain:				
Valencia	June 24-30	4	1	
Switzerland:				
Basel	do	1		
Berne	do	1		
Lucerne	June 1-7	7		
Zurich	June 17-23	4		
Tunis:				
Tunis	June 26-July 1	1		
Turkey:				
Constantinople	May 27-June 9		12	
Union of South Africa				May 1-31, 1923: Cases, 33; deaths, 1 (colored).
Cape Province				May 1-31, 1923: Cases 32 (colored).
Do	June 3-9			Outbreaks.
Transvaal				May 1-31, 1923: 1 case.
Do	June 3-9			Outbreaks.

TYPHUS FEVER.

Argentina:				
Rosario	May 25-31		3	
China:				
Antung	June 18-24	3		
Egypt:				
Alexandria	do		1	
Cairo	Apr. 2-15	2		
Greece				May 1-31, 1923: Cases, 876
Athens	May 1-31	150		
Piræus	do	353		
Mexico:				
Mexico City [1]	June 10-23	29		Including municipalities in Federal District.
Persia:				
Teheran	Feb. 22-Mar. 22		1	
Portugal:				
Oporto	July 1-7	2		
Russia				Jan 1-Apr. 30, 1923: Cases, 106,854. (Corresponding period, 1922: Cases, 847,516.)
European Russia and autonomous republics.	Jan. 1-Apr. 30	93,999		
Siberia, Caucasus, and Central Asia.	do	9,921		
Waterways and railways	do	2,934		

[1] Correction: Date in Public Health Reports, July 27, 1923, p. 1742, should read June 3-9.

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

Reports Received During Week Ended August 3, 1923—Continued.

TYPHUS FEVER—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Spain:				
Barcelona	June 21–27		1	
Syria:				
Aleppo	June 10–16	1	1	Among refugees
Turkey:				
Constantinople	May 27–June 2		2	
Union of South Africa				May 1–31, 1923: Cases, 102; deaths, 21 (colored). White—Cases, 6. Total, 108 cases, 21 deaths.
Cape Province				May 1–31, 1923: Cases 49 (colored); white, 5.
Natal				May 1–31, 1923: One case (colored).
Orange Free State				May 1–31, 1923: Cases, 45 (colored).
Transvaal				May 1–31, 1923: Cases, 7.
Johannesburg	May 1–31	1	3	

Reports Received from June 30 to July 27, 1923.[1]

CHOLERA.

Place.	Date.	Cases.	Deaths.	Remarks.
India				Apr. 15–June 2, 1923: Cases, 9,250; deaths, 8,126.
Bombay	June 3–9	8	3	
Calcutta	May 6–June 2	206	171	
Madras	June 3–9	1		
Rangoon	May 13–26	7	6	
Philippine Islands:				
Province—				
Laguna	do	1		
Mountain	Mar. 25–31	1	1	
Siam:				
Bangkok	May 13–19	3	4	

PLAGUE.

Australia:				
Sydney	June 30	1	1	
Azores:				
St. Michael Island	May 6–26	12	5	In one locality.
British East Africa:				
Kenya—				
Tanganyika	May 6–12	1	1	
Canary Islands:				
Las Palmas	June 7	1		
Ceylon:				
Colombo	May 6–June 2	8	12	Plague rats, 32.
China:				
Amoy	May 13–June 9		6	
Foochow	May 27–June 16			Present; epidemic form.
Hongkong	Apr. 29–May 26	29	14	
Ecuador:				
Guayaquil				May 16–31, 1923: Rats examined, 4,800; found infected, 21.
Hawaii:				
Hamakua				Plague-infected rats: Pohakea, May 23, 1923, 1 rat; vicinity of Pacific Sugar Co. mill, June 2, 1 rat.
India:				
Bombay	Apr. 29–June 9	479	393	
Calcutta	May 6–June 2	13	12	
Karachi	May 13–June 9	92	69	
Madras Presidency	do	250	138	
Rangoon	May 6–26	85	76	

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

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

Reports Received from June 30 to July 27, 1923—Continued.

PLAGUE—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Java:				
East Java—				
Soerabaya	Apr. 1–May 19	488	488	
Soerakarta				May 16, 1923: Epidemic in five districts.
Madagascar				Apr. 1–May 15, 1923: Cases, 66; deaths, 63. Bubonic, pneumonic, septicemic.
Province—				
Tananarive	Apr. 1–May 15	48	45	
Tananarive	Apr. 16–May 15	18	18	
Mauritius Island				May 4–21, 1923; Two cases.
Port Louis	May 4	1		
Mexico:				
Tampico				Apr. 15–21, 1923: 1 plague rat.
Peru				May 1–31, 1923: Cases, 57; deaths, 27.
Locality—				
Ayabaca	May 16–31	2		
Callao	May 1–31	3	1	
Canete	May 16–31	2	2	
Cerro Azul	May 1–31	3	1	
Chiclayo	do	8	2	
Cutervo	May 1–15	2	1	
Huancabamba	May 1–31	18	13	
Lima (city)	do	5	1	
Lima (country)	do	5	3	
Salaverry	do	7	2	
Trujillo	do	2	1	
Siam:				
Bangkok	Apr. 29–May 26	16	14	
Straits Settlements:				
Singapore	May 6–12		2	

SMALLPOX.

Algeria:				
Algiers	May 1–31	2		
Arabia:				
Aden	May 27–June 2		1	
Bolivia:				
La Paz	Apr. 1–30	1	2	
Brazil:				
Pernambuco	May 6–June 2	5		
Rio de Janeiro	May 13–26	4	1	
British East Africa:				
Kenya—				
Mombasa	May 20–26	1		From vessel from Bombay.
Tanganyika	Apr. 29–May 5	2		
Canada:				
Alberta—				
Calgary	May 27–June 2	1		Infection from Deer Lodge, Mont.
British Columbia—				
Vancouver	May 27–June 23	31		
Manitoba—				
Winnipeg	June 3–30	4		
New Brunswick—				
Kent County	July 1–7	1		
Ontario				June 1–30, 1923: Cases, 13.
Toronto	June 24–30	3		
Quebec—				
Quebec	June 10–16	1		Varioloid.
Saskatchewan—				
Regina	June 24–30	3		
Ceylon:				
Colombo	May 6–June 2	23	1	
Chile:				
Concepcion	May 22–28		2	
Valparaiso	May 7–June 2		107	
China:				
Amoy	May 13–26		2	May 27–June 9, 1923: Present.
Antung	May 14–20	1		
Chungking	May 13–June 2			Present.
Foochow	May 13–June 16			Do.
Hongkong	Apr. 29–May 26	33	31	

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

Reports Received from June 30 to July 27, 1923—Continued.

SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
China—Continued.				
Hongkong—Continued.				
Manchuria—				
Dairen	May 21–27	1		
Harbin	May 7–27	2		
Mukden	May 13–20	1		
Nanking	May 13–26			Present.
Shanghai	May 21–June 3	4		Foreign.
Chosen (Korea):				
Chemulpo	May 1–31	1		
Fusan	do	1		
Gensan	do	1		
Seoul	do	33	9	
Czechoslovakia				Jan.–Mar., 1923: Cases, 15.
Ecuador:				
Guayaquil	May 16–31	1		
Egypt:				
Cairo	Mar. 12–25	2	1	
Finland				May 1–15, 1923: 1 case.
Great Britain:				
Birmingham	June 18–30	3		
Bristol	June 28			Present.
Cardiff	June 3–30	6		
Gloucester	June 28			123 cases reported in hospital; present in rural districts.
Greece:				
Patras	Apr. 24–May 13		11	
Saloniki	Apr. 30–May 20	2	2	
India				Apr. 15–May 5, 1923: Cases, 4,973; deaths, 1,424.
Bombay	Apr. 22–May 19	246	114	
Calcutta	May 13–26	5	4	
Karachi	May 13–June 9	20	7	
Madras	do	23	3	
Rangoon	May 6–26	80	32	
Iraq (Mesopotamia):				
Bagdad	Apr. 1–30	10		
Italy:				
Turin	May 28–June 3	1		
Jamaica				May 27–June 23, 1923: Cases, 207 (reported as alastrim).
Kingston	May 27–June 23	34		
Japan:				
Kobe	May 28–June 10	2		
Java:				
East Java—				
Soerabaya	Apr. 22–May 26	99	17	
West Java—				
Batavia	May 5–25	9	2	Province.
Latvia				Apr. 1–30, 1923: Cases, 3.
Mexico:				
Chihuahua	June 11–24	7		
Mexico City	May 19–June 9	78		Including municipalities in Federal District.
Palestine:				
Jaffa	June 5–11	1		
Persia:				
Tabriz	Apr. 1–14		1	District.
Portugal:				
Lisbon	May 20–June 16	23	1	May 28–June 9, 1923: Cases, 8; deaths, 2.
Oporto	June 10–30	6	3	
Portuguese West Africa:				
Angola—				
Loanda	Apr. 1–21		2	
Rhodesia (British Africa):				
Northern Rhodesia	May 8–14	21	8	
Southern Rhodesia	May 3–16	4	2	
Siam:				
Bangkok	Apr. 29–May 19	43	16	
Sierra Leone:				
Kaballa	May 1–15	1		
Pujehun	May 16–31	1		In Sembehun district.
Spain:				
Barcelona	May 31–June 6		1	
Valencia	May 15–June 23	40	2	

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

Reports Received from June 30 to July 27, 1923—Continued.

SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Switzerland:				
Basel	May 27–June 16	3		
Berne	May 20–June 16	10		
Lucerne	May 1–31	29		
Zurich	May 20–June 2	6		
Syria:				
Damascus	May 15–June 11	7		
Tunis:				
Bizerta	June 10–20	1		
Tunis	June 11–17	1		
Turkey:				
Constantinople	May 13–29		29	
Union of South Africa:				
Cape Province	May 6–June 2			Outbreaks.
Orange Free State	Apr. 29–May 14			Do.
Transvaal	May 26–June 2			Do.
Yugoslavia:				
Serbia—				
Belgrade	June 10–16	1	1	
On vessel:				
S. S. Kargola	May 20–26	1		At Mombasa, British East Africa; vessel arrived from Bombay Mar. 25, 1923.
S. S. Makura	May 26	2		Two cases, in quarantine (reported as alastrim). Vessel left Victoria, B. C., Apr. 28, 1923. Touched at Honolulu.

TYPHUS FEVER.

Algeria:				
Algiers	May 1–31	41	14	
Chile:				
Concepcion	May 22–June 4		2	
Talcahuano	May 13–19	1		
Valparaiso	May 7–June 2		13	
China:				
Antung	May 28–June 10	9		
Hankow	May 19–25	1		
Manchuria—				
Harbin	May 6–13	1		
Mukden	May 14–20	2		
Czechoslovakia				Jan.–Mar., 1923: Cases, 191; deaths, 6.
Egypt:				
Alexandria	May 14–June 17	7	4	
Cairo	May 12–Apr. 1	9	8	
France:				
Marseille	Mar. 1–May 31		3	
Germany:				
Coblenz	May 27–June 2		1	
Hamburg	May 20–26	3		
Königsberg	May 13–June 2	2		
Stettin	May 27–June 9	1	1	
Greece:				
Patras	Apr. 24–May 13		18	
Saloniki	Apr. 30–May 27	27	4	Recurrent typhus: Cases, 8 deaths, 3.
Guatemala:				
Guatemala City	Apr. 1–May 31		4	
Hungary				Jan. 1–May 19, 1923: Cases, 318; deaths, 36. In 11 counties.
Budapest	Jan. 1–June 2	48	12	
Irak (Mesopotamia):				
Bagdad	Apr. 1–30	2		
Latvia				Apr. 1–30, 1923: Cases, 96.
Mexico:				
Mexico City	May 20–June 9	32		Including municipalities in Federal district.
Palestine:				
Jaffa	May 22–28	2		
Jerusalem	do	1		
Persia:				
Tabriz	Apr. 1–14	2		

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

Reports Received from June 30 to July 27, 1923—Continued.

TYPHUS FEVER—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Poland				Mar. 4–Apr. 7, 1923: Cases, 2,253; deaths, 172. Recurrent typhus: Cases, 338; deaths, 6.
Portugal:				
Oporto	June 10–16	1		
Rumania:				
Kishineff	May 1–31	28		
Russia (Soviet)				Feb. 1–28, 1923: Cases, 17,577. Recurrent, Jan. 1–Feb. 28, 1923: Cases, 43,540.
Spain:				
Madrid	May 1–31		1	
Syria:				
Aleppo	May 20–26	3	1	
Beirut	May 1–10	1		
Tunis:				
Tunis	May 28–June 24	3	2	
Turkey:				
Constantinople	May 13–26		13	
Union of South Africa:				
Cape Province	Apr. 29–June 9			Outbreaks.
Orange Free State	May 6–26			Do.
Transvaal	May 6–12			Do.
Yugoslavia:				
Croatia—				
Zagreb	May 27–June 2	1		

YELLOW FEVER.

Brazil:				
Bahia	May 13–June 9	17	5	