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## TULARÆMIA Francis 1921.<sup>1</sup>

### I. THE OCCURRENCE OF TULARÆMIA IN NATURE AS A DISEASE OF MAN.

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Tularæmia is a specific infectious disease due to *Bacterium tularensis* and is transmitted from rodents to man by the bite of an infected blood-sucking insect or by the handling and dissection of infected rodents by market men<sup>2</sup> or laboratory workers.<sup>3</sup>

As observed in Utah in the months of June, July, and August, the disease is initiated by the bite of an insect, most probably the blood-sucking horsefly, *Chrysops discalis*, which previously has bitten a jack rabbit infected with *Bacterium tularensis*. Following the fly bite on some exposed surface of the body (neck, face, hands, or legs), the onset is sudden, with pains and fever; the patient is prostrated and is confined to bed; the lymph glands which drain the bitten area become tender, inflamed, and swollen, and commonly suppurate, requiring incision. The fever is of a septic type, lasting from three to six weeks, and convalescence is slow.

Probably two dozen cases occurred in Millard County, Utah, in each of the years 1917, 1918, 1919, and 1920. The first case known to have terminated fatally was reported by the writer in 1919.<sup>4</sup> The chief interest in tularæmia as a disease of man arises from the disability which accompanies the illness; a disabling illness which overtakes the farmer in the busy season of midsummer, causing two or three months of sickness in the harvest season, is a serious matter. Tularæmia is a disease of the rural population, particularly attacking persons who work in the field. It occurs during the seasonal prevalence of the fly (*Chrysops discalis*) in a community where jack

<sup>1</sup> The name tularæmia is based on the specific name *Bacterium tularensis*, plus *æmia*, from the Greek, and has reference to the presence of this bacterium in the blood, on the analogy of leukæmia or bacteræmia, etc. The names thus far used for this disease are strictly vernacular and do not lend themselves to international usage as easily as a name in Latin form. Accordingly, the name tularæmia is proposed as a technical international name.

<sup>2</sup> Infection of man with *Bacterium tularensis*. By William B. Wherry and B. H. Lamb. J. Infect. Dis., 1914, 15, 331-340.

<sup>3</sup> Four cases in laboratory workers will be reported at a later date.

<sup>4</sup> Deer-fly fever: A disease of man of hitherto unknown etiology. By Edward Francis, Surgeon, United States Public Health Service. Public Health Reports, Sept. 12, 1919, pp. 2061-2062.

rabbits are dying from an epizootic of plague-like disease of rodents.<sup>5</sup> The reservoir of infection is in the sick and dying jack rabbits.

#### SEVEN CASES OF TULARÆMIA IN MILLARD COUNTY, UTAH.

A brief summary is given below of seven cases of tularemia which the writer investigated clinically and culturally in Millard County, Utah, one in 1919 and six in 1920:

##### CASE 1.

R. S., male; 52 years of age; farmer; residence 7 miles southeast of Delta, Utah; patient of Dr. H. L. Charles, Delta.

*July 23, 1919.*—Patient was taken sick while mowing alfalfa; went to bed with fever, pains in head, neck, and right shoulder; wife saw a small sore on right side of neck posteriorly, but paid very little attention to it; patient remained in bed from this date until death.

*July 26.*—Temperature was 101° F. at 3 p. m. During the night of July 26 was sleepless on account of pain in head and right side of neck.

*July 27.*—Temperature normal at 1 p. m. A sore on right side of neck, posteriorly, showed a black center  $\frac{1}{8}$  inch in diameter and surrounded by a yellow zone  $\frac{1}{8}$  inch wide, which probably resulted from a fly bite, although patient did not recall having been bitten. Behind the right ear was a very tender and somewhat swollen area. No enlargement of axillary glands or of glands of left side of neck. Drew 65 c. c. of blood from median basilic vein for inoculation of animals.

*July 28.*—Temperature at noon, 100.5° F.

*July 30.*—Temperature at noon, 99.8° F. The appearance of the bite unchanged. Right cervical glands palpable, size of peas. Over the right mastoid, a swelling which fluctuates and is very tender and painful.

*August 1.*—Temperature 99° at 10 a. m., 101° at 6 p. m. Pain in neck has been severe during past two days. Some pus has exuded from the site of bite. Glands palpable. Swelling over mastoid very tender.

*August 2.*—Temperature a. m., 99°; p. m., 101°; pulse, 65. The black center of the bite has sloughed out and a few drops of pus exuded. A very tender swollen gland is palpable. Complains of great pain beneath the outer end of the right clavicle.

*August 3.*—Temperature a. m., 100°; p. m., 101°.

*August 4.*—Temperature a. m., 99°; p. m., 98.6°.

*August 5.*—Temperature a. m., 99°; p. m., 100°.

<sup>5</sup>A plague-like disease of rodents. By George W. McCoy, Passed Assistant Surgeon, United States Public Health Service. Public Health Bulletin No. 43, April, 1911.

*Bacterium tularensis*, the cause of a plague-like disease of rodents. By George W. McCoy and Charles W. Chapin, Passed Assistant Surgeons, United States Public Health Service. Public Health Bulletin No. 53, January, 1912.

*August 6.*—Temperature a. m., 99.2; p. m., 100°. Opened the abscess over the mastoid and got about 2 c. c. of pus, which was injected into animals. Drew 20 c. c. of blood from left median basilic vein, which was used for animal inoculations. Much pain in neck; patient said he had a chill yesterday.

*August 7.*—Temperature p. m., 101.6°.

*August 8.*—Temperature noon, 98.6°. The bite is the site of a hole which is exuding a little pus.

*August 18.*—Terminated fatally.

CASE 2.

W. E. C., male; age, 50 years; farmer; residence, 5 miles west of Holden, Utah; patient of Dr. John E. Fuhrer, Fillmore, Utah.

*June 16, 1920.*—Patient was taken sick while mowing alfalfa; he noticed a stinging and burning sensation above the left ear, but did not know whether or not he had been bitten; had headache and backache; had a chill and felt weak.

*June 17-22.*—Patient remained on farm unable to do any work.

*June 23.*—Went to Fillmore, Utah, to consult Dr. John E. Fuhrer, who reported a temperature of 100.6° F.; pulse, 76; white blood cells, 14,000. Examination showed a small crust in the hair of the left temple, about 1 inch above and 2 inches in front of the left ear, about the diameter of a match stick. The tissues were swollen and tender, and the lymph glands behind the ear and at the angle of the jaw were enlarged and very tender. Patient remained in bed from this date.

*June 25.*—Blood taken from median basilic vein for animal inoculations.

*June 27.*—Temperature, 99° F.; pulse, 76.

*June 30.*—Temperature, 98.6°.

*July 2.*—Temperature, 98.6°.

*July 17.*—Incised gland behind left ear and evacuated pus, which was used for animal inoculations.

*July 21.*—Incised gland at angle of left jaw and evacuated pus.

*July 23.*—Incised skin in front of left ear and evacuated pus. Site of bite on temple in hair has sloughed, leaving an ulcer three-quarters of an inch in diameter.

This patient recovered after an illness of about three months.

CASE 3.

J. T. G., male; age, 48 years; farmer; residence 7 miles northwest of Holden, Utah; patient of Dr. John E. Fuhrer.

*June 27, 1920.*—Patient became sick in the field while spading dirt about an irrigation ditch. First noticed a painful lump at the angle of the right jaw. Quit work and went to Holden with aching sensation through his body.

*June 29.*—Called Dr. John E. Fuhrer, who was the first to find the site of the bite, which was in the hair of the right temple, 1 inch above and 2 inches in front of the right ear. The patient had entirely overlooked the site of the bite, all of his attention having been directed to the painful gland at the angle of the jaw.

*July 3.*—Patient in bed with clothes on. The site of the bite has a black necrotic center. Glands at the angle of right jaw and behind the ear are much swollen, tender, and painful. Drew 30 c. c. blood from median basilic vein for animal inoculations.

Recovery was complete after an illness lasting about 10 weeks.

CASE 4.

M. S., male; age, 16 years; farmer; worked 1 mile west of Holden, Utah; patient of Dr. John E. Fuhrer.

*June 23, 1920.*—Bitten on the posterior surface of right ear while in the hay field.

*June 24.*—Had headache and felt badly and went to bed. Noticed a lump behind the right ear.

*July 3.*—The boy has been in bed most of the time for the past nine days. Temperature, 103°; pulse, 110. There is a punched out ulcer one-quarter of an inch in diameter on the posterior surface of the right ear. There is an enlarged gland behind the right ear over the mastoid, which is beginning to soften. Incised the gland and evacuated the pus, which was used to inoculate guinea pigs.

The patient recovered after an illness of about six weeks.

CASE 5.

Mrs. McK, female; age, 41 years; residence, 4 miles west of Holden, Utah, in the country; patient of Dr. W. B. Hamilton, of Delta, Utah.

*June 16, 1920.*—Patient was taken sick; she was not conscious that she had been bitten by a fly nor does she know whether a fly bit her or not.

*July 2.*—A suppurating gland located behind the right ear was incised and the pus used for inoculation of animals. About 30 c. c. of blood was drawn from the median basilic vein for the inoculation of animals. The site of the fly bite is plainly seen in the edge of the hair of the neck on the right side as a small scar.

Case recovered after a protracted illness lasting about three months.

CASE 6.

C. F., male; age, 30 years; resident of Meadows, Utah, 9 miles southwest of Fillmore; patient of Dr. John E. Fuhrer.

*July 21, 1920.*—First noticed glandular swelling under the right ear. The bite is apparent on the posterior surface of the right ear; did not know he was bitten at the time.

*August 7.*—Incised post-auricular gland on the right side, from which some bloody pus was obtained for the inoculation of laboratory animals.

The duration of illness was about six weeks; ended in recovery.

TABLE 1.—*Bacteriological confirmation of seven human cases of tularemia in Millard County, Utah.*

Case.	Sex.	Age (years).	Occupation.	Date of onset.	Site of insect bite.	Site of suppurating lymph glands.	Blood, from median basilic vein injected into guinea pigs.	Pus from suppurating lymph glands injected into guinea pigs.	Results in inoculated animals and in cultures from inoculated animals.
1. R. S. ....	Male....	52	Farmer .....	July 23, 1919	Right side of neck, Posteriorly. Left temple in hair.	Right posterior auricular area. Left posterior auricular area; in front of left ear; at angle of jaw.	July 27 and Aug. 6..... June 25.....	Aug. 6 July 17	Typical for <i>Bacillus tularensis</i> . Do.
2. W. E. C. ....	do....	50	do.....	June 16, 1920	do.....	Right posterior auricular area, at angle of jaw.	July 3.....	do.....	Do.
3. J. T. G. ....	do....	48	do.....	June 27, 1920	Right temple in hair.	Right posterior auricular area, at angle of jaw.	July 3.....	do.....	Do.
4. M. S. ....	do....	16	do.....	June 23, 1920	Posterior surface of right ear.	Right posterior auricular area.	July 3	July 3	Do.
5. McK....	Female...	41	Wife of farmer....	June 16, 1920	In hair of neck, right side.	do.....	July 2.....	July 2	Do.
6. C. F. ....	Male....	30 (T)....	do.....	July 21, 1920	Posterior surface of right ear.	do.....	do.....	Aug. 7	Do.
7. Jackson....	Female...	7	Village resident....	Aug. 26, 1920	Posterior surface, lower third of right thigh.	Right inguinal region.....	Sept. 9	Sept. 9	Do.

## CASE 7.

Jackson, female; age, 7 years; resident of Hinckley, Utah; patient of Dr. H. L. Charles, Delta, Utah.

September 9, 1920.—Patient came to the doctor's office with a bubo of the right inguinal region, which was fluctuating. By incision there was readily obtained some pus, which was used for the inoculation of laboratory animals. The site of the bite was on the posterior surface of the lower third of the right thigh, on that bare area so commonly seen above the stocking when a small girl bends forward; the bite had the appearance of a punched-out ulcer about a quarter of an inch in diameter.

Patient recovered.

## TULARÆMIA IN JACK RABBITS.

The coexistence in the same locality of tularæmia in man and in jack rabbits was proved by the writer in June, July, and August, 1920, in Millard County, Utah. During this period, *Bacterium tularensis* was isolated from 17 jack rabbits and 6 human cases.

A survey of jack rabbits for evidence of tularemia was conducted throughout a stretch of irrigated farming country 60 miles in length, extending from Sugarville, Utah, which is approximately 35 miles northwest of Delta, to Fillmore, which is approximately 25 miles southeast of Delta. This survey began May 28 at Sugarville and ended June 18 at Fillmore. A total of 556 jack rabbits were shot and immediately dissected on the ground, examination being directed to their lymph glands, spleen, and liver. When the spleen and liver were considered suspicious, specimens were taken to the laboratory and rubbed on the abraded skin of the abdomen of a guinea pig; and in case of death of the guinea pig with typical lesions, cultures were made from the spleen and liver of the guinea pig. Twenty-three jack rabbits were found sufficiently suspicious by gross examination in the field to warrant inoculation of guinea pigs with their spleens and liver. Of these 23 jack rabbits, 17 were proved to be infected with *Bacterium tularensis* in the laboratory by subinoculation in animals and by cultures; three jack rabbits which failed of confirmation in the laboratory were found dead in the field, and it is presumed that their infection had died before they reached the laboratory.

The jack rabbit survey, which ended June 18, outlined the district of most heavily infected jack rabbits and located it west of Holden. At this time no human cases had yet been reported for 1920, although it developed a few days later that two cases had had their onset on June 16 and that they lived west of Holden. The third and fourth cases of the season developed on June 23 and June 27; both worked west of Holden. All four cases occurred in the heart of the jack-rabbit-infected district, 5 miles west of Holden, where, on June 16, we located five infected jack rabbits and 26 jack rabbit carcasses.

TABLE II.—Jack rabbits found infected with *Bacterium tularensis* in Millard County, Utah.

Date found.	Sex, age, or condition.	How taken.	Condition of spleen.	Condition of liver.	Condition of lymph glands of gon. and axilla.	Where found.	“Positive” means confirmed by sub-inoculations and sub-cultures.	Remarks.
1920.								
June 1	Pregnant.....	Found dead.....	Spotted.....	Spotted.....	Negative.....	2 miles south of Abrahams.....	Positive.....	
June 7	Young.....	Shot running.....	do.....	do.....	do.....	Near Sugarville.....	do.....	
June 11	do.....	Found dead.....	do.....	do.....	do.....	Maney ranch.....	do.....	
June 14	Female.....	Shot running.....	do.....	do.....	do.....	2 miles northwest of McCornick.....	do.....	
Do.....	Pregnant.....	do.....	Negative.....	Few spots.....	do.....	do.....	Negative.....	No specimens taken.
Do.....	Male.....	do.....	do.....	Spotted.....	do.....	2 miles southwest of McCornick.....	Positive.....	
June 15	do.....	Found dead.....	Spotted.....	do.....	do.....	2 miles southwest of McCornick.....	do.....	12 dried rabbit carcasses seen 2 miles southwest of McCornick, June 15.
Do.....	Adult.....	do.....	do.....	do.....	do.....	do.....	Positive.....	
Do.....	Young.....	Shot running.....	Shattered.....	do.....	do.....	do.....	Positive.....	
Do.....	Pregnant.....	do.....	3 spots.....	do.....	do.....	do.....	do.....	
Do.....	Male adult.....	Found dead.....	Negative.....	do.....	do.....	do.....	Negative.....	
June 16	Adult.....	Dead in road.....	do.....	do.....	do.....	8 miles northwest of Holden.....	Positive.....	
Do.....	Young.....	Shot running.....	do.....	do.....	do.....	5 miles west of Holden.....	do.....	
Do.....	Pregnant.....	do.....	do.....	do.....	do.....	do.....	Positive.....	
Do.....	Adult.....	Found dead.....	do.....	do.....	do.....	do.....	do.....	
Do.....	Female.....	Shot running.....	do.....	do.....	do.....	do.....	do.....	
Do.....	Pregnant.....	do.....	do.....	do.....	do.....	do.....	do.....	
Do.....	Young.....	do.....	do.....	do.....	do.....	do.....	Negative.....	
Do.....	Young female.....	do.....	Negative.....	do.....	do.....	do.....	Positive.....	
Do.....	Young.....	do.....	do.....	do.....	do.....	do.....	do.....	
June 18	Young.....	do.....	do.....	do.....	do.....	2 miles northwest of Fillmore.....	do.....	
Do.....	Adult.....	Dead in road.....	do.....	do.....	do.....	do.....	Negative.....	
Do.....	Young.....	Shot running.....	do.....	do.....	do.....	do.....	Positive.....	
Do.....	do.....	Found dead.....	do.....	do.....	do.....	do.....	do.....	
July 16	Young.....	do.....	do.....	do.....	do.....	do.....	do.....	
Do.....	do.....	do.....	do.....	do.....	do.....	do.....	do.....	
						Blue Lake, 7 miles southwest of Hinckley.		

TULARÆMIA IN GROUND SQUIRRELS (*Citellus mollis*) IN UTAH.

During the jack rabbit survey referred to above, extending from Sugarville to Fillmore, 277 ground squirrels (*Citellus mollis*) were shot. These animals were immediately dissected on the ground for evidence of tularæmia. The livers and spleens of three were considered suspicious by gross examination and were brought to the laboratory for confirmation by guinea pig inoculations and cultures. One, which was shot June 2, 1 mile southwest of Abrahams, and had a typical spleen, proved positive, i. e., the spleen was rubbed on the abraded skin of the abdomen of a guinea pig and inoculated subcutaneously into another guinea pig; both pigs died with typical lesions of tularæmia, from which a culture of *Bacterium tularensis* was obtained. The other two squirrels failed of confirmation in the laboratory.

Through the courtesy of Mr. W. C. Henderson, acting chief of the Bureau of Biological Survey, Department of Agriculture, specimens of *Citellus mollis* were determined.

## II. EXPERIMENTAL TRANSMISSION OF TULARÆMIA BY FLIES OF THE SPECIES *CHRYSOPODISCALIS*.

By EDWARD FRANCIS, Surgeon, and BRUCE MAYNE, Associate Sanitarian, United States Public Health Service.

A study of tularæmia in Millard County, Utah, in 1920, by one of us (Francis) proved the coexistence in the same locality of human cases of this disease and of a fatal epidemic in jack rabbits, both due to *Bacterium tularensis*. Further studies showed a much greater prevalence of *Chrysops discalis* (a blood-sucking horsefly) in these infected localities than in noninfected localities. It was well known that *Chrysops discalis* bites man. Popular belief had connected the occurrence of human cases of tularæmia with the bites of *Chrysops discalis*. No data were at hand, nor did we elicit any, bearing on the question of whether *Chrysops discalis* bites jack rabbits in nature, but we assume that they do and especially if the jack rabbits are in sick or dying condition and thus oblivious to biting flies. A prerequisite to the conveyance of the infection from jack rabbit to man by a blood-sucking fly is the presence of the causative organism in the rabbit's peripheral blood. McCoy<sup>1</sup> had already shown that the heart's blood of animals experimentally infected with *Bacterium tularensis* was infective even after great dilution when injected into fresh laboratory animals. Francis had isolated this organism from the peripheral blood of two human cases. The bacteraemia characteristic of the disease thus afforded the necessary condition for transference by a blood-sucking fly.

<sup>1</sup> A Plague-like Disease of Rodents (Public Health Bulletin No. 43). By George W. McCoy, Passed Assistant Surgeon, United States Public Health Service. 1911.

We decided to test the question of whether *Chrysops discalis* was capable by its bite of carrying the infection of *Bacterium tularensis* from an infected laboratory animal to a healthy laboratory animal. The experiments which we are about to report show that specimens of *Chrysops discalis* which have first bitten infected guinea pigs and tame rabbits in a laboratory can by their subsequent bites convey that infection to healthy guinea pigs and tame rabbits which they are allowed to bite. We therefore draw the conclusion that *Chrysops discalis* is capable of carrying the infection of *Bacterium tularensis* in nature from infected jack rabbits to man.

#### EXPERIMENTAL TRANSMISSION BY THE FLY (*Chrysops discalis*).

The specimens of *Chrysops discalis* used were female adult insects, captured in nature on horses near Blue Lake, Utah, a locality in which three human cases of tularæmia (diagnosed clinically) occurred in 1920 and in which one jack rabbit was found infected with *Bacterium tularensis*. Our transmission experiments are therefore open to the criticism that the *Chrysops discalis* which we used had an opportunity of becoming infected in nature before being brought into captivity in the laboratory. If this were true, however, it would only give added weight to the evidence of the agency of *Chrysops discalis* as a transmitter of tularæmia.

Each fly under experiment was confined singly at all times within a lantern globe, the ends of which were covered with cloth gauze of coarse mesh. Biting was permitted by applying the end of the globe to the animal's skin, the fly biting through the meshes of the gauze. When not actually biting, the flies were kept in the cold room at a temperature of approximately 15° to 20° C.

The experiments were conducted in the summer of 1920, at Delta, Utah, a town 150 miles south of Salt Lake City. The guinea pigs and rabbits used in these experiments were shipped from Washington, D. C., to Delta. In the transmission experiments we used, four human strains of *Bacterium tularensis* which one of us (Francis) had isolated in 1920 from four human cases of tularæmia in Utah.

We are indebted to Dr. J. M. Aldrich, of the division of insects of the National Museum for determining specimens of *Chrysops discalis*.

Table II shows the essential data connected with 11 successful transmissions of *Bacterium tularensis* from infected laboratory animals to healthy laboratory animals through the agency of the bites of *Chrysops discalis*. Twenty-seven unsuccessful attempts were made which are not reported in this paper. The unsuccessful experiments were conducted according to the same methods as were the 11 successful ones. No specific reason can be given for the failure of any

experiment. In this connection it is very interesting to note Experiment No. 1, in which, out of five flies which fed at the same time on the same infected rabbit, only one was found to be either infective or infected. The other four were found to be neither infective nor infected.

#### EXPERIMENT NO. 1.

In this experiment a single fly by a single bite caused the death of a guinea pig with typical lesions due to *Bacterium tularensis*, the interval which elapsed between biting the infected rabbit and the healthy guinea pig being only a few seconds and the interval between biting the healthy guinea pig and the death of this animal being seven days.

Flies Nos. 1, 2, 3, 4, and 5, fed August 14, 1920, during 5, 5, 6, 6, and 10 minutes, respectively, to partial engorgement on the clipped skin of the region of the crest of the ilium of a rabbit six days after its inoculation and two and one-half hours before death; and then, after an interval of only a few seconds, each fly bit to engorgement one of five guinea pigs, on the clipped skin on the region of the crest of the left ilium, for the period of 15, 15, 15, 6, and 25 minutes, respectively. The guinea pigs all remained well except the one which was bitten by fly No. 5; this one died August 21. At autopsy there were the typical lesions due to *Bacterium tularensis* in the left inguinal gland, pelvic gland, liver, and spleen. A piece of the spleen of the guinea pig was rubbed on the scarified shaven abdomen of another guinea pig, causing death in four days with typical lesions, spleen, and liver.

Inasmuch as only one of the five flies infected its guinea pig, the infectivity of all of the flies was tested as follows; the flies were dissected and the stomach contents of each were injected subcutaneously into a guinea pig.

*Fly No. 1.*—Stomach contents injected August 16, two days after biting the infected donor. Guinea pig remained well.

*Fly No. 2.*—Stomach contents injected August 16, two days after biting the infected donor. Guinea pig remained well.

*Fly No. 3.*—Stomach contents injected August 17, three days after biting the infected donor. Guinea pig died August 21. Negative.

*Fly No. 4.*—Stomach contents injected August 17, three days after biting the infected donor. Guinea pig remained well.

*Fly No. 5.*—Stomach contents injected August 18, four days after biting the infected donor. Guinea pig died August 23, with typical lesions of spleen, liver, and lymph glands due to *Bacterium tularensis*.

## EXPERIMENT 2.

In this experiment 6 flies, by 6 bites (1 each) caused the death of guinea pig No. 10 with typical lesions of tularæmia, the interval between the biting of the infected guinea pig and the healthy guinea pig being only a few seconds, and the time between the biting of the healthy guinea pig and the death of same being 5 days. The 6 flies fed to partial engorgement on August 25 during 2, 7, 12, 2, 9, and 14 minutes, respectively, on the ear of infected guinea pig No. 8, 4 days after inoculation and 2 to 5 hours before death; and then, after an interval of only a few seconds, they fed to engorgement on guinea pig No. 10, upon the clipped skin of the region of the crest of the ilium, for the periods of 20, 3, 14, 2, 10, and 16 minutes, respectively. Guinea pig No. 10 died August 30. At autopsy the glands and liver were apparently negative, but the spleen, being suspicious, was used to inoculate two guinea pigs subcutaneously. These guinea pigs died September 2 with typical inguinal and pelvic glands and typical livers and spleens. The virus was passed through three subsequent generations in guinea pigs, these animals dying with typical lesions on Sept. 6, 10, and 16. The method of inoculation was that of rubbing spleen tissue on the shaven, abraded skin of the abdomen of the guinea pig.

## EXPERIMENT 3.

In this experiment 11 flies, by 11 bites (1 each), caused the death of guinea pig No. 11, with typical lesions of tularæmia, the interval between the biting of the infected rabbits and the healthy guinea pig being only a few seconds, and the interval between biting the healthy guinea pig and the pig's death being 6 or 7 days. Six flies fed to partial engorgement (3 on Aug. 25 and 3 on Aug. 26) for 4, 4, 5, 6, 5, and 5 minutes, respectively, on the ear of infected rabbit C, 33, 31, 30, 9, 8, and 6 hours, respectively, before its death. Five other flies fed to partial engorgement (1 on Aug. 25, and 4 on Aug. 26) for 2, 10, 5, 1, and 16 minutes, respectively, on the ear of infected rabbit G, 22, 8, 2, 1, and  $\frac{1}{2}$  hours, respectively, before its death. After an interval of only a few seconds, the 11 flies fed to engorgement on guinea pig No. 11, on being applied to the clipped skin of the region of the crest of the right ilium for the periods of 42, 10, 40, 3, 4, 25, 5, 24, 20, 1, and 16 minutes, respectively. Guinea pig No. 11 died September 1, with typical lesions of the right inguinal gland, spleen, and liver. There was a slight local reaction at the site of the fly bites, consisting of a little redness and thickening of the skin. The infection was carried through two subsequent generations in guinea pigs by rubbing spleen tissue on the shaven abraded skin of the abdomen of guinea pigs. The pigs died September 5 and 12 with typical lesions of tularæmia.

## EXPERIMENT 4.

In this experiment, 16 flies by 16 bites (1 each), caused fatal tularæmia in guinea pig No. 13, the interval between the biting of the infected guinea pigs and the healthy guinea pig being only a few seconds and the time between biting the healthy guinea pig and the death of same being 6 or 7 days. Sixteen flies fed to partial engorgement for an average period of 7 minutes on the ears of infected guinea pigs Nos. 9, 10, 11, and 12, the pigs being in the latter stages of the disease, and after an interval of only a few seconds they fed to engorgement for an average period of 7 minutes on the clipped skin of the region of the crest of the right ilium of guinea pig No. 13. This pig was found dead September 6 with typical inguinal glands on the right side only (left inguinal glands negative) and typical liver and spleen; the site of the fly bites showed a slight pale thickening of the skin.

The infection was carried through two subsequent generations in guinea pigs by rubbing spleen tissue on the clipped, abraded skin of the abdomen of guinea pigs. The pigs died with typical lesions September 10 and 15.

## EXPERIMENTS 5 AND 6.

In experiment No. 5, 22 flies by 340 bites, caused the death of guinea pig No. 5, with typical tularæmia, and in experiment No. 6, 20 flies by 348 interrupted bites, caused the death of rabbit No. 8. These were the first transmission experiments which we performed; they were preliminary, and therefore large numbers of bites were employed, the object being to determine whether the fly acted even remotely in the role of the carrier of the infection. The method of fly biting in these experiments differed from that recorded in experiments 1, 2, 3, and 4, in that the flies were never allowed to bite longer than from 30 to 60 seconds. For instance, a given fly was allowed to bite from 30 to 60 seconds on the clipped skin of the region of the crest of the ilium of the infected animal and then was immediately applied for from 30 to 60 seconds to the clipped skin of the region of the crest of the ilium of the healthy animal, and this was repeated, the fly alternately biting the infected and healthy animal until it reached engorgement. Another fly would then be taken through the same process. This method of biting accounts for the large numbers of bites recorded in experiments 5 and 6, each fly biting the healthy animal an average of 16 times for an average of about 45 seconds each time.

Guinea pig No. 5 was dead August 2. The site of the fly bites showed hemorrhagic points on the underside of the skin; three inguinal glands were caseous on the side of the fly bites, but the inguinal glands on the opposite side were negative; pelvic glands

were caseous; liver and spleen were typical. The infection was carried over by rubbing a piece of spleen on the clipped, abraded skin of the abdomen of a guinea pig and a rabbit. These animals died with typical lesions on August 5 and 6.

Rabbit No. 8 was dead August 8. The site of the fly bites was negative; inguinal and axillary glands were negative; pelvic glands, substernal glands, liver, spleen, and lungs showed typical lesions of tularæmia. The infection was carried over by rubbing a piece of spleen on the clipped, abraded skin of the abdomen of a guinea pig and rabbit. These animals died with typical lesions August 12 and 13.

#### EXPERIMENTS 7, 8, AND 10.

In Experiments Nos. 7, 8, and 10 the interval between the biting of the infected animal and the healthy animal was extended to 1 hour, 3 hours, and 24 hours, respectively. Large numbers of flies were used and they bit a great number of times. In these experiments, as in Experiments Nos. 5 and 6, the flies were interrupted in their biting, being allowed to bite only from 30 to 60 seconds at a time and being made to bite alternately the infected and the healthy animal on the clipped skin in the region of the crest of the ilium. Each fly bit the infected and healthy animals in Experiment No. 7 an average of about four times each; in Experiment No. 8 an average of about two times each; and in Experiment No. 10 only once. Transmission was successful in the three experiments, rabbits Nos. 9, 10, and 11 dying with typical lesions of tularæmia. Rabbit No. 9 showed no enlargement of the inguinal or axillary glands, but showed typical lesions of the pelvic glands, liver, and spleen. The virus was carried over to another rabbit and a guinea pig by rubbing the spleen on the abraded surface of the abdomen of those animals. Death followed in 6 days, with typical lesions of the inguinal and pelvic glands, liver, and spleen.

Rabbit No. 10 showed no enlargement of the inguinal glands, but showed typical pelvic glands, liver, and spleen. The infection was carried over to a guinea pig by rubbing the spleen on the abraded skin of the abdomen of the pig, resulting in death in 5 days, with typical lesions of the inguinal and pelvic glands, liver, and spleen. Rabbit No. 11 showed no enlargement of inguinal or axillary glands, but the pelvic glands on the right side were typical, as were also the liver and spleen. The local reaction of the skin at the site of the fly bites over the crest of the right ilium was marked; the skin for an area 1 inch in diameter was raised and thickened, but perfectly movable over the fascia covering the muscle; and on section, this skin was pale, thick, and membranous.

## EXPERIMENT 9.

In Experiment No. 9, 10 flies, by 10 bites (1 each), caused fatal tularæmia in a rabbit, the intervals between the biting of the infected guinea pigs and the healthy rabbit being 5 to 72 hours. The average time of biting the infected animals on the ear, to partial engorgement, was 5 minutes, and the average time of biting the healthy rabbit, to complete engorgement, on the clipped skin of the area of the crest of the ilium, was 8 minutes. At autopsy the rabbit showed typical inguinal and pelvic glands, spleen, and liver. The infection was carried over to another animal by rubbing a piece of the spleen on the abraded skin of the abdomen, resulting in death in 4 days, with typical lesions of the inguinal, pelvic, and axillary glands and the liver and spleen.

## EXPERIMENT 11.

In this experiment, 24 flies, by 41 bites, caused fatal tularæmia in a rabbit, the intervals between the biting of the infected guinea pigs and rabbits and the biting of the healthy rabbit being 4 to 16 days. The average time of feeding the flies to partial engorgement on the ears of the infected animals was 5 minutes and the average time of feeding the flies to full engorgement on the clipped skin on the region of the crest of the ilium of the healthy rabbit was 9½ minutes. The rabbit died with typical lesions of the spleen, liver, and lungs, and showed a local lesion of the skin, consisting of a papule one-fourth inch in diameter on the right hip, posterior to the crest of the ilium, which was movable, hard, and which, on section, was hard, white, and not broken down. The pelvic glands on the right side were much enlarged and caseous, whereas those on the left side were negative, as were also the inguinal glands on both sides.

The infection was carried over for two generations in rabbits by rubbing a portion of the spleen on the abraded skin of the abdomen, both animals dying with typical lesions of inguinal and pelvic glands, liver, and spleen after 5 and 6 days, respectively.

LENGTH OF TIME THAT *CHRYSOPODISCALIS* WILL REMAIN INFECTED.

This question was answered in two ways: First, by noting among the 11 experiments in which tularæmia was successfully transmitted by *Chrysops discalis* the longest interval which elapsed between the bite which infected the fly and the subsequent bite by which that fly infected a healthy animal, 4 days being the longest successful interval noted; second, by injecting infected flies subcutaneously into guinea pigs, the flies having been kept for various lengths of time after becoming infected by biting an infected animal.

Flies which had bitten infected animals were kept at an average temperature of 15° to 20° C., and on each succeeding day from 1 to 15 days one or more flies were killed, their wings and legs discarded, and the entire fly was ground in a mortar with normal saline solution and the suspension injected subcutaneously into a guinea pig.

The longest interval of time that such a fly remained infected, as evidenced by the death of the guinea pig with typical lesions of tularæmia, was 14 days.

In all, 44 injections were made of 99 flies which had been kept for various periods after biting infected animals. The following table gives the results. Up to 5 days the flies remained quite constantly infected. The longer the flies were kept, the less tendency they showed to be infected. This would indicate probably that the virus does not multiply within the fly, but that *Chrysops discalis* acts merely in a mechanical way as a transmitter of tularæmia.

TABLE I.—*The length of time that Chrysops discalis remained infected as shown by injection of flies into guinea pigs.*

Number of days between biting the infected animals and being injected into a healthy guinea pig.	Number of flies injected into 1 guinea pig.	Results. ("Positive" means death of guinea pig with typical lesions of tularæmia.)	Number of days between biting the infected animals and being injected into a healthy guinea pig.	Number of flies injected into 1 guinea pig.	Results. ("Positive" means death of guinea pig with typical lesions of tularæmia.)
1	3	Negative.	8	2	Positive.
2	4	Positive.	8	2	Negative.
2	1	Do.	8	2	Positive.
2	3	Do.	8	1	Do.
2	8	Do.	9	1	Negative.
2	3	Do.	9	1	Do.
2	2	Do.	9	1	Positive.
2	1	Negative.	10	4	Do.
2	1	Do.	10	2	Negative.
3	2	Positive.	10	5	Do.
3	5	Do.	10	6	Do.
3	3	Do.	10	1	Do.
3	1	Do.	10	1	Do.
3	1	Negative.	12	2	Do.
4	4	Positive.	12	1	Do.
4	1	Do.	12	1	Do.
4	2	Do.	12	1	Do.
4	1	Do.	12	1	Do.
5	4	Do.	13	2	Do.
5	3	Negative.	14	2	Positive.
5	1	Positive.	15	1	Negative.
6	4	Do.	15	1	Do.

TABLE II.—*Successful transmission of tularemia in the laboratory from inoculated animals to healthy animals by the bites of Chrysops thessoides.*

Number of experimenter.	Inoculated animal which flies were allowed to bite and thus became infected.	Length of time between the inoculation of animal and death of same.	Length of time between the biting of the infected animal by the fly and death of animal.	Number of flies which bit infected animal and then bit healthy animal.	Number of times infected flies bit healthy animal.	Length of time between biting infected animal and biting healthy animal.	Dates on which infected flies bit healthy animal.	Healthy animals which the infected flies were allowed to bite.	Results. "Positive" means death from tularemia.
1	Rabbit	6	2½	1	1	Few seconds.	1920.	Guinea pig No. 15.	Positive; died Aug. 21.
2	Guinea pig No. 8.	4½	33, 31, 30, 9, 8, 6	6	6	do	Aug. 14.....	Guinea pig No. 10.	Positive; died Aug. 23.
3	Rabbit C.	4	22, 8, 2, 1, 1	5	5	do	Aug. 25 or 26.....	Guinea pig No. 11.	Positive; died Sept. 1.
4	Rabbit G.	5	22, 24	3	3	do	do	Guinea pig No. 12.	Positive; died Sept. 6.
5	Guinea pig No. 9.	17-43	1	1	1	do	Aug. 30 or 31.....	Guinea pig No. 13.	Positive; died Aug. 2.
6	Guinea pig No. 10.	6, 7	11	1	1	do	do	Rabbit No. 3.	Positive; died Aug. 8.
7	Guinea pig No. 11.	4	11	1	1	do	do	Rabbit No. 9.	Positive; died Aug. 15.
8	Guinea pig No. 12.	.....	22	340	do	July.....	Guinea pig No. 5.	Positive; died Aug. 2.	
9	Rabbit No. 3.	.....	20	348	do	August.....	Rabbit No. 3.	Positive; died Aug. 8.	
10	Rabbit.	.....	207	33	1	One hour.	August.....	Rabbit No. 9.	Positive; died Aug. 15.
11	.....	do	23	33	3	3 hours.	August 8.....	Rabbit No. 10.	Positive; died Sept. 16.
12	.....	do	31	55	do	do	Aug. 9.....	do	Positive; died Sept. 16.
13	.....	do	26	51	do	do	Aug. 10.....	do	Positive; died Sept. 16.
14	.....	do	34	74	do	do	Aug. 11.....	do	Positive; died Sept. 16.
15	.....	do	36	73	do	do	Aug. 12.....	do	Positive; died Sept. 16.
16	.....	do	3	3	3	3 days.....	Sept. 5, 7, 8, 9,	Rabbit.	Positive; died Sept. 16.
17	.....	do	1	1	1	do	do	do	Positive; died Sept. 16.
18	.....	do	3	3	3	do	do	do	Positive; died Sept. 16.
19	.....	do	3	3	3	do	do	do	Positive; died Sept. 16.
20	.....	do	28	28	28	24 hours.	Aug. 13.....	Rabbit No. 11.	Positive; died Aug. 23.
21	.....	do	39	39	39	do	do	do	Positive; died Aug. 23.
22	.....	do	45	45	45	do	Aug. 14.....	Rabbit No. 11.	Positive; died Aug. 23.
23	.....	do	25	25	25	do	Aug. 15.....	Rabbit No. 11.	Positive; died Aug. 23.
24	.....	do	37	37	37	do	Aug. 16.....	Rabbit No. 11.	Positive; died Aug. 23.
25	.....	do	38	38	38	do	Aug. 17.....	Rabbit No. 11.	Positive; died Aug. 23.
26	.....	do	35	35	35	do	Aug. 18.....	Rabbit No. 11.	Positive; died Aug. 23.
27	.....	do	30	30	30	do	Aug. 19.....	Rabbit No. 11.	Positive; died Aug. 23.
28	.....	do	41	41	4-16 days.....	do	Sept. 1, 2, 3, 4, 5,	Rabbit.	Positive; died Sept. 16.
29	.....	do	24	24	24	do	6, 7, 8, 9, 10, 11,	do	Positive; died Sept. 16.
30	.....	do	33	33	33	do	and 13.	do	Positive; died Sept. 16.

1 Minutes.

### III. EXPERIMENTAL TRANSMISSION OF TULARÆMIA IN RABBITS BY THE RABBIT LOUSE, *HÆMODIPSUS VENTRICOSUS* (DENNY).

By EDWARD FRANCIS, Surgeon, and G. C. LAKE, Passed Assistant Surgeon, United States Public Health Service.

The experiments here reported show that the common rabbit louse, *Hæmodipsus ventricosus* (Denny), when taken from rabbits which have died with the typical lesions of tularæmia and placed in the hair of healthy rabbits causes the death of the latter with typical tularæmia.

Experiments which we conducted in the Hygienic Laboratory between February 3 and May 16, 1921, showed that healthy tame rabbits in contact with rabbits inoculated intraperitoneally with heart's blood of infected rabbits died typically from tularæmia. Forty-three such positive results were obtained. The conditions of contact were that one inoculated rabbit and two healthy rabbits were confined in each compartment, the diameter of which was about 18 inches. These compartments were glass aquarium jars, galvanized-iron garbage cans, or well-ventilated wire cages. In determining the means of transmission in these cases, consideration was given to insects and to the infectivity of nasal secretions and urine.

#### INFECTIVITY OF NASAL SECRETIONS OF RABBITS.

It was found that the nasal washings from infected rabbits, when dropped into the nares of healthy rabbits or injected subcutaneously into guinea pigs, produced the disease. Of 17 specimens of nasal washings obtained from 17 infected rabbits, 9 were infective, as shown by the death from tularæmia of healthy rabbits into whose nares these washings were dropped; and of 24 specimens of nasal secretions obtained from 24 infected rabbits, 21 were infective, as shown by the death from tularæmia of healthy guinea pigs into which these washings were injected subcutaneously.

#### INFECTIVITY OF URINE OF RABBITS.

Four specimens of urine, two from rabbits dead of tularæmia and two from rabbits sick with the disease, injected subcutaneously into guinea pigs, caused the death of the pigs with typical lesions of tularæmia. A fifth specimen from a rabbit dead of tularæmia gave negative results. The amounts injected varied from 0.05 to 5 c. c. Precautions were taken to prevent the presence of blood in the specimens.

It was found impossible, however, to infect four rabbits and two guinea pigs by mixing with their food large quantities of nasal washings or urine from infected rabbits, although they ate the mix-

ture readily. This latter result made it doubtful whether the 43 positive results referred to above were due either to droplet infection or urine.

A constant watch for fleas has been kept with the result that only three were found in the laboratory during the eight months period ending in July, 1921. McCoy and Chapin had reported one successful experiment on the transmission of the infection from squirrel to squirrel by fleas (*C. acutus*).

#### INFESTATION OF RABBITS WITH LICE.

No systematic search was made for lice upon rabbits in the Hygienic Laboratory until early in May, when one was accidentally found. Since that time some lice have been found on every rabbit that has been carefully examined. Usually only a few are present, and careful search is required to find them; but occasionally they are present in large numbers. Most of them are found over the lumbar region, either on the skin or clinging to the butt ends of the hair.

The presence of blood-sucking lice immediately opened the question as to whether the large number of successful contact infections obtained between February 3 and May 16 may not have been due in part or entirely to this cause. It was therefore decided (1) to conduct experiments to determine whether the louse could readily carry the infection from rabbit to rabbit and (2) to repeat the contact experiments, using only carefully deloused animals. The results of (1) are quite conclusive and are the subject of this paper. The results of (2) will be reported later.

#### EXPERIMENTAL TRANSMISSION BY LICE.

Experiments upon the agency of lice in the transmission of tularemia were carried out as follows:

As soon as possible after the death of an infected rabbit its hair was pulled out over the lumbar and sacral regions, and, since the lice cling to the butts of the hairs, the butts were clipped off with a scissors and transferred to a glass jar. In most instances the infested hair was immediately transferred to the hair of a healthy rabbit, but in other instances an interval of one, two, or three days was allowed to elapse between the removal of lice from the infected rabbit and their transfer to a healthy rabbit. The louse-infested hair was applied to the hair of the lumbar region of a healthy rabbit and overlaid with two layers of gauze, the margins of which were held down by adhesive tape to hold the hair in place. The gauze and adhesive were removed on the following morning, care being taken not to injure the animal's skin in loosening the tape, which

was done by cutting off a little of the hair. The rabbits were placed at once in thoroughly cleaned tall ash cans, a single rabbit to each can, and a ring of vaseline was placed around the inside, about 6 inches from the top.

#### GUINEA PIGS IN CONTACT WITH RABBITS.

In 22 cases a healthy guinea pig was placed in the can with the infested rabbit in order to determine whether the guinea pig would develop tularæmia from contact with the rabbit. These guinea pigs all remained negative with the exception of five which were in contact with rabbits infested with lice removed from rabbit S 62 R; four of these died in from seven to nine days with typical lesions of tularæmia; the fifth died with typical lesions after 26 days. These five guinea pigs were all searched at the moment of death for rabbit lice, their hair being pulled out and examined. On one there were five dead rabbit lice; on another, there were six dead rabbit lice; on the other three guinea pigs none could be found. Of the 17 guinea pigs which remained well, 11 were in contact with infested rabbits which died typically of tularæmia, and six were in contact with infested rabbits which failed to contract tularæmia.

#### STRAINS OF TULARÆMIA USED.

The strains of tularæmia used in these experiments were five strains isolated by Francis in 1920 from human cases in Utah, and one California ground squirrel strain isolated by Passed Assistant Surgeon W. T. Harrison in San Francisco in 1920.

#### RESULTS.

The following results were obtained:

*First series.*—In this series, transmission of tularæmia to healthy rabbits was effected by the transfer to them of lice removed from rabbits dead after intraperitoneal inoculation with heart's blood from infected animals. Sixteen healthy rabbits were thus infested, the number of lice used for each rabbit varying from 28 to several hundred. Eleven of the 16 died with typical tularæmia. In these 11 cases the interval which elapsed between the removal of lice from the infected rabbit and their application to the healthy rabbit was at most only a few hours, and the intervals which elapsed between the infestation of the healthy rabbits and their deaths varied from 8 to 25 days, the average being 11.7 days. Five rabbits of this series remained negative. In two of these, intervals of 24 hours and two days, respectively, were allowed to elapse between the removal of lice from the infected rabbits and their application to the healthy rabbits. No explanation is offered for the three negative ones in which no such interval was interposed.

*Second series.*—Transmission of tularæmia was effected by lice transferred from the first series of louse-infected rabbits to healthy rabbits. Seven healthy rabbits were thus infested, the number of lice used for each rabbit varying from 70 to 300. Six of the seven rabbits died with typical tularæmia. In four of these six cases, the interval which elapsed between the removal of lice from the infected rabbit and their application to the healthy rabbit was less than three hours; in the fifth case (R L 18) the interval was two days, during which time the lice were allowed to feed on a healthy rabbit, R L 15, which died of pneumonia on the second day. In the sixth case (R L 23) the interval was three days.

*Third series.*—Transmission of tularæmia was effected by lice transferred from the second series of louse-infected rabbits to healthy rabbits. Four rabbits were thus infested. The first died with typical lesions 18 days after infestation; the second died with typical lesions 13 days after infestation; the third died 13 days after infestation (and in this case only 17 lice were applied and an interval of 3 days had elapsed between the removal of the lice from the infected rabbit and their application to the healthy rabbit); the fourth at the time of this report, 30 days after infestation, is still well, only four lice having been used for the infestation.

*Fourth series.*—Lice were transferred from louse-infected rabbits of the third series to healthy rabbits. Two rabbits were thus infested and both are still well (at the time of this report) on the twenty-ninth and thirtieth days, respectively, after infestation. One of them was infested with 20 lice which had been kept 3 days after removal from the infected rabbit before application to the healthy rabbit; the other was infested with 20 lice 3 hours after removal from the infected rabbit.

#### SUMMARY.

The transmission of tularæmia was effected in 20 out of 29 attempts through the agency of the common rabbit louse (*Hæmodipsus ventricosus*), by the transfer of lice from rabbits dead of tularæmia to the hair of healthy rabbits, the intervals elapsing between infestation of the healthy rabbits and their deaths varying from 8 to 26 days, the average being 12½ days. The intervals between the removal of lice from the infected animals and their application to the healthy animals were in all successful attempts not over three hours, with three exceptions, in which the interval was 2, 3, and 3 days, respectively.

Transmission of tularæmia was effected through three successive series of rabbits by transfer of lice to each succeeding series from the preceding series.

## CONCLUSION.

The practical importance of this experimental transmission of tularæmia from infected rabbits to healthy rabbits by the rabbit louse *Hæmodipsus ventricosus* is that it offers an explanation of the means by which the infection is kept alive throughout the year in the jack rabbits of Utah. Proof is at present complete that these jack rabbits are infested with lice, four specimens of *Hæmodipsus ventricosus* having been received from that source in July, 1921.

*Acknowledgment.*—Through the courtesy of Dr. L. O. Howard, Chief of the Bureau of Entomology, Department of Agriculture, the determination of specimens of *Hæmodipsus ventricosus* was made by Dr. H. E. Ewing, of that Bureau.

Transmission of tularemia in rabbits by *Hemodiplosis ventricosus*.

Series.	Infected animals from which lice were removed.		Interval which elapsed between removal of lice from infected animals and transfer to healthy animal.	Healthy animal to which lice were transferred.	Number of days between infestation with lice and death of rabbit.	Date of death of infected rabbit.	Result. "Positive" means depth from tularemia.
	Number of experiment.	Number of animal.	Date found dead from tularemia.	Approximate number of lice removed.			
First series: Transmission was effected by lice transferred from inoculated rabbits to healthy rabbits.							
1	SF 34 R.	May 28, 1 p. m.	36	Less than 15 minutes.	RL 1.....	15	June 12.... Positive.
	McK 96 R.	May 29.....	4	do.....	RL 2.....	6	May 21.... Do.
2	S 59 R.	May 22.....	15	do.....	RL 3.....	.....	Negative, July
	S 60 R.	May 27, 3 p. m.	15	do.....	RL 6.....	8	June 16.... Positive.
3	C 65 R.	May 27, 1 p. m.	80	About 2 hours.....	RL 7.....	16	June 23.... Do.
	S 62 R.	June 7.....	180	From 1 to 3 hours.....	RL 8.....	11	June 18.... Do.
4	do.....	do.....	180	do.....	RL 9.....	9	June 16.... Do.
	do.....	do.....	180	do.....	RL 10.....	9	do.....
	do.....	do.....	180	do.....	RL 11.....	8	June 15.... Do.
5	SF 36 R.	June 8, 2 p. m.	100	Not over 2 hours.....	RL 12.....	.....	Negative, July 27.
	J 57 R.	June 6.....	70	About 1 hour.....	LS R.....	11	June 17.... Positive.
7	McK 67 R.	June 5.....	500	Less than 3 hours.....	RL 13 A.....	18	June 30.... Do.
8	SF 37 R.	June 10, 1 p. m.	300	2 to 3 hours.....	RL 13.....	8	June 18.... Do.
9	C 67 R.	June 13, 1 p. m.	200	Not over 3 hours.....	RL 20.....	.....	Negative, July 27.
10	UF 1.	June 19.....	25	24 hours.....	RL 21.....	.....	Do.
11	Q 14 R.	do.....	200	2 days.....	RL 22.....	.....	Do.
Second series: Transmission was effected by lice transferred from louse-infected rabbits of first series to healthy rabbits.							
12	R L 2.	May 31.....	50	2 to 8 hours.....	RL 4.....	11	June 11.... Positive.
	do.....	do.....	50	do.....	RL 5.....	16	June 15.... Do.
13	R L 6.	June 15.....	180	1 to 4 hours.....	RL 15.....	2	June 17.... Negative.
	R L 11.	do.....	130	do.....	RL 18.....	.....	Positive.
				2 days during which lice were on RL 16.	RL 16.....	26	July 12.... Do.
				Not over 3 hours.....	do.....	11	June 28.... Do.
14	R L 9.	June 16.....	120	do.....	RL 19.....	15	July 16.... Do.
	R L 10.	June 16, 9 a. m.	160	Not over 2 hours.....	RL 23.....	18	Do.
15	J 58 R.	June 17.....	70	3 days.....	.....	.....	.....
16	R L 8.	June 18.....	150	.....	.....	.....	.....

Third series: Transmission was effected by lice transferred from second series of louse-infected rabbits to healthy rabbits.	17	RL 4.....	June 11.....	100	Not over 2 hours.....	RL 14.....	18	June 29.....	Positive.											
	18	RL 6.....	June 15.....	200	Not over 3 hours.....	RL 17.....	13	June 28.....	Do.											
	19	RL 18.....	June 26, 6 a. m.....	30	3 days, after which 17 remained alive.	RL 26.....	13	July 12.....	Do.											
	20	RL 19.....	June 28, 6 a. m.....	4	About 1 hour.....	RL 24.....	.....	.....	Negative, July 27.											
Fourth series: Lice transferred from third series of louse-infected rabbits to healthy rabbits.	21	RL 17.....	June 28, 6 p. m.....	47	3 days, after which 20 lice remained alive.	RL 27.....	.....	.....	Do.											
	22	RL 14.....	June 29.....	20	About 3 hours.....	RL 28.....	.....	.....	Do.											

<sup>1</sup>Died of pneumonia, June 17, on second day; his lice were then transferred to RL 18.

## EXPERIENCE WITH BUBONIC PLAGUE (HUMAN AND RODENT) IN GALVESTON, 1920.

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The very nearly simultaneous recognition of human bubonic plague in four previously uninfected Gulf ports early in 1920, three of which (Galveston, Beaumont, and Pensacola) are American, created a situation of great anxiety in the minds of all persons interested in public health. The recognition of rodent plague in Port Arthur was a later event. This simultaneous outbreak in four widely separated areas along the Gulf coast is strongly suggestive of some common source, although corroborative evidence was never secured. Since plague is a disease which but few American sanitarians have had opportunity to personally combat, it appeared that an account of some of the experience with the disease in this focus might prove of general interest.

### I. EPIDEMIOLOGY OF HUMAN PLAGUE IN GALVESTON, 1920.

In the period between June 16, when the first case of plague was diagnosed, and November 13, when the last case of the 1920 outbreak was recognized, there occurred a total of 18 cases of human bubonic plague attributable to infection acquired in Galveston. None occurred that could be attributed to infection acquired outside the city. Two of these cases left Galveston either in the incubation period or in early stages of the disease, and were diagnosed as plague at Port Arthur and Houston, respectively.

Some essential epidemiological data concerning these cases is presented in Table I.

TABLE I.—*Incidence of human plague in Galveston, 1920.*

No.	Age.	Sex.	Race.	Occupation.	Date of onset.	Duration of illness of fatal cases. (Days.)
1.	17	M.	W.	Collector, feed store.	June 8	8
2.	25	F.	N.	Bag sewer, feed store.	June 16	.....
3.	19	M.	N.	Longshoreman.	July 2	6
4.	30 (?)	F.	Mex.	Housewife.	.....	(1) (2)
5.	13	F.	Mex.	.....	.....	.....
6.	35	F.	W.	Housewife.	Aug. 3	.....
7.	41	M.	N.	Waiter on steamship.	Aug. 2	2
8.	16	M.	W.	Machinist's helper.	Aug. 7	4
9.	27	F.	N.	Houseworker.	Aug. 16	2
10.	29	F.	W.	Pathologist.	Aug. 23	.....
11.	42	M.	N.	Longshoreman.	Aug. 29	4
12.	70	F.	W.	Houseworker.	Sept. 2	5
13.	17	F.	N.	.....do.....	Sept. 22	5
14.	17	F.	W.	School girl.	Oct. 2	.....
15.	3	M.	W.	.....	Sept. 26	.....
16.	35	M.	N.	Truck driver.	Oct. 4	5
17.	58	M.	W.	Night watchman.	Oct. 17	.....
18.	10	M.	N.	School boy.	Nov. 10	3

<sup>1</sup> Died July 28.

<sup>2</sup> Died July 29.

The age, sex, and race of these patients is summarized in the following table:

TABLE II.—*Age, sex, and race of plague patients.*

Race and sex.	Age.							Total.
	1-10.	11-20.	21-30.	31-40.	41-50.	51-60.	61 and over.	
White:								
Male.....	.1	2					1	4
Female.....		1	1	1				4
Total.....	1	3	1	1		1	1	8
Negro:								
Male.....	.1	1		1	2			5
Female.....		1	2					3
Total.....	1	2	2	1	2			8
Mexican:								
Male.....								
Female.....		1	1					2
Total.....		1	1					2
Total.....	.2	16	4	2	2	1	1	48

The greatest number of cases occurred among adolescents and young adults, although no age period was exempt. Among whites the incidence in the sexes was the same; among Negroes, nearly equal; whereas both Mexican cases were females. An equal number of cases occurred among whites and Negroes, which, since the Negro population here is about 20 per cent of the total, indicates a disproportionately high attack rate among Negroes.

Two cases occurred in June, three in July, six in August, three in September, three in October, and one in November, the peak thus being reached in August. The decline, however, was more gradual than the rise.

The occupations of the patients were diverse, and in most instances they do not reveal any special opportunities favoring the contraction of the infection.

A study of the relationship of the human cases to the rodent epizootic reveals a very close correlation between the two. The geographical distribution of both human and rodent cases of plague, several of the former cases being spotted both according to residence and place of employment, is shown in Fig. 1. The details of the evidence indicative of this correlation are presented in Table III.

TABLE III.—*Relation of human to rodent plague.*

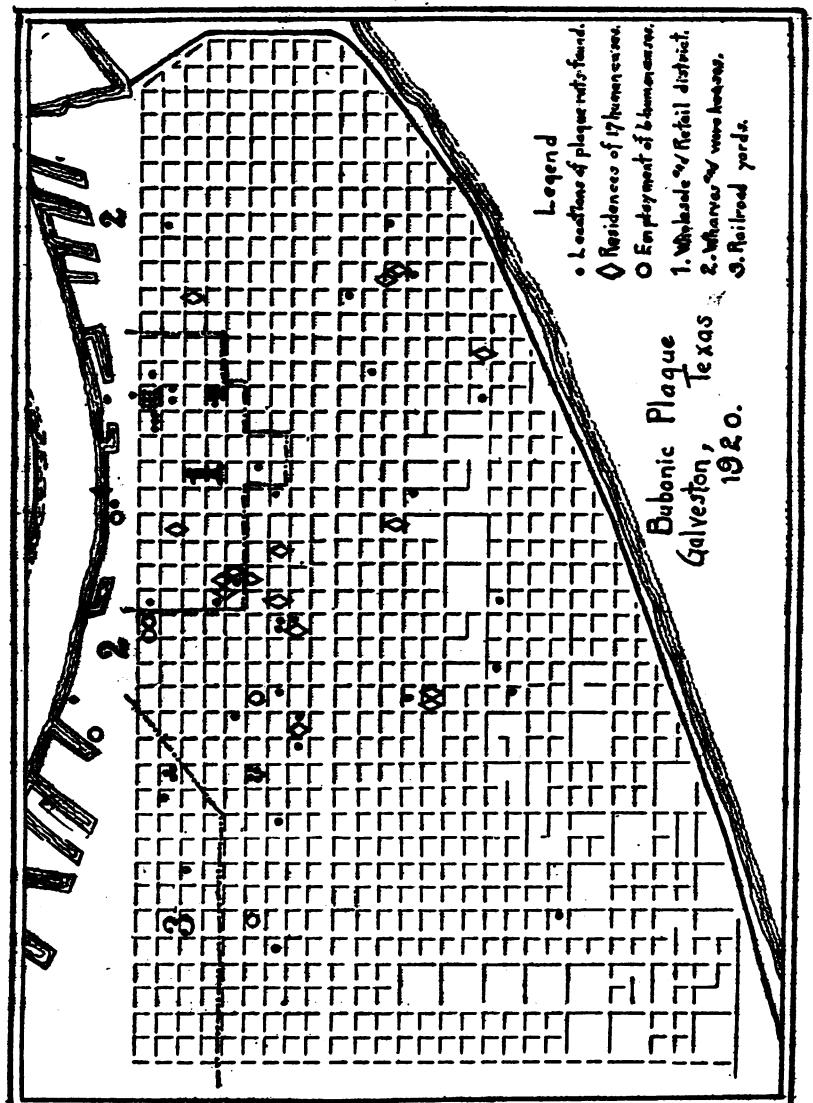
No.	Dead rats found on premise prior to onset.		Plague rats found within one block of—		Plague rats found within two blocks of—	
	Home.	Place of em- ployment.	Home.	Place of em- ployment.	Home.	Place of em- ployment.
1.....		Yes.....		Yes, later.....		
2.....		Yes.....		Yes, later.....	Yes, later.....	
3.....				Yes, later.....		
4.....			Yes, later.....		Yes.....	
5.....			Yes, later.....		Yes.....	
6.....	Yes.....				Yes, later.....	
7.....				Yes, later.....	Yes, later.....	
8.....	Yes.....		Yes, later.....		Yes, later.....	
9.....	Yes.....					
10.....	Yes.....		Yes, later.....			
11.....			Yes.....			
12.....			Yes.....		Yes.....	
13.....						
14.....					Yes.....	
15.....					Yes.....	
16.....					Yes.....	
17.....	Yes.....		Yes.....		Yes.....	
18.....					Yes.....	

<sup>1</sup> Pricked finger while doing autopsy on case 9.

When the incidence of human and rodent plague over the entire city is plotted by weeks, the correlation is still observable, as shown in Fig. 2. We did not possess any knowledge of the extent of rodent plague prior to June 20, on which date the examination of rats was begun, although two human cases had occurred before that time. The week of June 6, in which the onset of the first human case occurred, has been arbitrarily taken as the first week of the epidemic, although from the curve of the epizootic it is evident that rodent plague had existed locally for at least a month previous to the onset of the first known human case of plague. The peak of the epizootic was apparently reached early in July, in the fifth week of the rodent outbreak, and thereafter gradually declined, with more or less fluctuation, until the 25th week, in the latter part of November, when a sharp localized epizootic occurred. After its prompt subsidence, no further cases of rodent plague were recognized in 1920, and up to the date of this writing (Mar. 16, 1921) none has been encountered in 1921. To a certain extent it is noticeable that the peaks of human incidence follow the various major and minor peaks of the epizootic by a lag of from one to four weeks, although the last peak of the epizootic was not followed by any human cases. In most instances, the respective human and rodent cases accumulated in these peaks do not represent the same localized geographic areas. The probable explanation lies in the fact that the plague rats secured by trapping operations represented a somewhat random selection of those rats actually infected with plague at any one time, so that while the curves give us a good general idea of the progress of the epizootic, they should not necessarily be expected to coincide, unless

July 29, 1921.

the trapping operations (and hence the sampling of rats) were more intensive. Further corroboration of this view is given by the following circumstances: In 10 instances the existence of rodent plague was known within a two-block radius of the home or the place of



employment of a human case before the development of the latter, whereas in six instances the existence of such foci was revealed by the occurrence of human plague before the detection of rodent plague, within a zone of the same radius. No human cases could be

credited to 15 such two-block zones around sites where plague rats were caught.

Most of the infected rats were widely scattered, not more than one known plague rat being found to a focus. In three instances, however, over five positive rats were secured from the same block within a short time, indicating the existence of a very brisk epizootic among the rodent population. Two of these occurred in warehouses in the business district. No human cases arose as a consequence, probably for two reasons: (1) The epizootics were recognized in their incipiency,

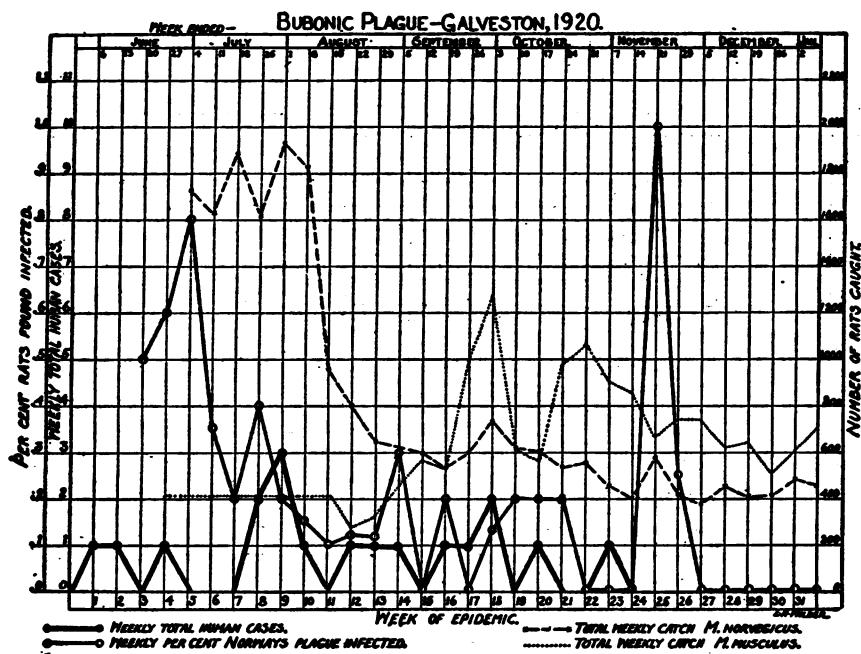


FIG. 2.

before the period when, owing to the ravages of plague, the rat population would have been reduced to such a point that fleas had to seek other hosts for feeding; and (2) the early recognition of these foci permitted the infected buildings to be promptly fumigated with cyanide, so that most, if not all, of the infected rats and fleas were promptly killed.

## II. PROGRESS OF THE HUMAN DISEASE.

All cases recognized as plague before death were isolated in the isolation pavilion of Sealy hospital, though in one or two instances the hospitalization was not accomplished as rapidly as was desirable. Suspected cases were removed to isolation pending diagnosis.

Certain particulars pertaining to the administration of these cases are presented in Table IV.

TABLE IV.—*Administration of patients.*

	Days elapsing between onset and diagnosis.								Days elapsing between diagnosis and hospitalization. <sup>1</sup>								Duration of illness in 10 fatal cases. (Days.)							
	Same day.	2	3	4	5	6	7	8	Same day.	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Number of cases	2	5	3	3	3	1	0	1	8	3	2	0	0	0	0	0	0	2	1	2	3	1	0	1

<sup>1</sup> Died en route to hospital, 1; not hospitalized, 4.

The great length of time elapsing between diagnosis and onset in many instances was due to two factors, chiefly, (1) delay on the part of a patient's family in calling for a physician, and (2) in some instances to the attending physician's not considering plague as a possibility. As the presence of the disease became more widely known, this last factor of delay disappeared. All diagnoses were confirmed microscopically, and, in some instances, including the first case, by cultural study of the organism isolated and by animal inoculation.

Seventeen of these cases were bubonic in type and one was apparently a case of primary pneumonic plague. In 12 instances the primary bubo was in the femoral region, on one side; in two additional instances femoral buboes were present on both sides, and it was impossible to distinguish between the primary and secondary buboes; one patient had a primary inguinal bubo; and in two cases the primary bubo was axillary in situation. One patient had a definite phlyctenule on the leg.

Immediately following the recognition of the first case, a small supply of Mulford's antiplague serum was made available by the State board of health. Later, an abundance of the serum prepared by the Pasteur Institute, Paris, was jointly supplied by the State board of health and the United States Public Health Service. The serum, previously diluted with an equal volume of physiological saline, was administered intravenously. The average dose employed for individuals of 150 pounds weight was 120 c. c., which was repeated every 24 hours if the patient's condition had not improved. One case (10) received a total of 600 c. c. The results secured from its administration are shown in Table V.

TABLE V.—*Cases treated and untreated with plague serum.*

Day of illness on which serum was given.	Number of fatal cases to whom serum was administered.	Number of cases that recovered, to whom serum was administered.
First.....	0	1
Second.....	0	1
Third.....	3	3
Fourth.....	3	0
Fifth.....	0	0
Sixth.....	0	0
Seventh.....	0	0
Eighth.....	0	0
None given.....	6	1
Total.....	12	6

Thus, of the 18 cases, 11 received treatment with antiplague serum. Of these, six died and five recovered. One of the deaths in this series was due to anaphylactic shock. The recovered cases all received their initial dose of serum not later than the third day of their illness. Seven cases did not receive treatment with antiplague serum. Of these, one recovered. Although these observations are limited, they suggest that the antiplague serum is of distinct therapeutic value. No limit should be placed upon the amount employed.

Five white cases recovered and three died, whereas one Negro recovered and seven died.

All the fatal cases whose death took place in Galveston came to autopsy. A study of the post-mortem findings will be published later by Prof. H. O. Hartman, of the University of Texas, and will not receive consideration here.

Case 10 of this series presents some features of unusual interest. This patient, a young physician, pricked her gloved finger (left forefinger) near the nail root, with the needle with which she was sewing up the scalp of case 9, after having performed the autopsy. Two hours later the area was cauterized. On the day following a lymphangitis of the finger and forearm was observed. She was given a prophylactic dose of 50 c. c. of antiplague serum and one dose of Haffkine's vaccine. On the fifth day the onset of plague developed, with general muscular pains, headache, fever, and a chill. Very shortly thereafter there were evident enlarged and painful occipital, submaxillary, cervical, axillary, and femoral glands, of which those in the left axilla were largest. Smears made from gland juice secured by puncture showed organisms morphologically resembling *B. pestis*. Large doses of serum were given until she had received a total of 600 c. c. After a week's illness convalescence was rapid and the patient recovered.

## III. OBSERVATIONS ON PATHOLOGY OF RODENT PLAGUE.

The examination of rats for evidence of plague was initiated under the direction of Passed Asst. Surg. C. L. Williams, of the United States Public Health Service.

The technique of the examinations followed closely the directions given by Surg. Geo. W. McCoy, Director of the Hygienic Laboratory, Washington, D. C.<sup>1</sup>

From the beginning of antiplague operations until the 31st of December, 1920, 46,623 rats were examined in the laboratory. Sixty-seven of these, or 0.14 per cent, were found to be plague infected. Of these, 66 were *Mus norvegicus* and one was a *Mus ratus*.

After the examinations were under way, the rats reported as positive or plague infected were divided into two classes; namely, (1) those reported as positive without animal inoculation, and (2) those reported positive by animal inoculation. The first of these groups comprises for the most part those rodents presenting the five cardinal lesions of rodent plague; namely, injection, bubo, granular liver, congested spleen, and pleural effusion, always with positive microscopical findings, on which basis the diagnosis of rodent plague in a known plague focus is justified without necessarily requiring cultural or virulence confirmation. The second group comprises those rodents in which the manifestations of plague may be considered to be slightly atypical, though highly suspicious, less than five of the cardinal lesions being noted. The suspicions raised by these findings were proved or disproved by animal inoculation.

Thirty-four of these rats were reported positive without animal inoculation. Of these, 21 showed all five lesions, 9 showed four, 2 showed two lesions, and the lesions in 2 were not recorded. The frequency with which these were found is shown in Table VI.

TABLE VI.—*Frequency of cardinal lesions in class 1 rats.*

Rats having—	Particular lesions.				
	Injection.	Bubo.	Liver lesions.	Spleen lesions.	Pleural effusion.
5 lesions.....	21	21	21	21	21
4 lesions.....	8	9	8	8	3
3 lesions.....	1	2	2	1	0
Total.....	30	32	31	30	24

Thirty-three rats were reported positive after animal inoculation. Five showed all five lesions; 11, four lesions; 10, three lesions; 4,

<sup>1</sup> The Technique of the Laboratory Examination of Rats for Plague. Reprint No. 39, from the Public Health Reports, Vol. XXVII, No. 30, July 26, 1912. The reader is referred to this article for an excellent description of the lesions of rodent plague.

two lesions; 2, one lesion; and, presumably, 1, no lesion. The frequency with which these lesions were found is shown in Table VII.

TABLE VII.—*Frequency of cardinal lesions in class 2 rats.*

Rats having—	Particular lesions.				
	Injection.	Injected glands (bubo).	Liver lesions.	Spleen lesions.	Pleural effusion.
5 lesions.....	5	5	5	5	5
4 lesions.....	11	11	5	10	6
3 lesions.....	10	10	5	7	3
2 lesions.....	4	3	0	1	0
1 lesion.....	1	0	0	1	0
Total.....	31	28	15	24	14

In one instance a combination inoculation was made with five rats, all apparently negative, secured at the fumigation of a known plague focus. The guinea pig died on the sixth day and presented typical lesions of plague, indicating that at least one of the five rats was infected.

Thus, of 65 positive rats, subcutaneous and general injection was present in 61, buboes were present in 60, liver lesions were present in 46, splenic lesions were present in 54, and pleural effusion was present in 38.

In the rats of class 1 (positive without animal inoculation) the injection was marked in 25 instances, moderate in 5, and in no instance slight in degree. In the other class (positive by animal inoculation) it was marked in 21 instances, moderate in 9, and slight in 1 instance.

The definite buboes were usually multiple. The application of this term is properly limited to those glands which are enlarged, injected, softened, and microscopically positive. They were found as follows:

	Rats of class 1 (pos. without A. I.).	Rats of class 1 (pos. by A. I.).
Cervical bubo alone.....	13	13
Cervical and axillary buboes.....	2	1
Cervical and inguinal buboes.....	2	1
Axillary bubo alone.....	7	3
Axillary and inguinal buboes.....	4	0
Axillary, inguinal, and pelvic buboes.....	1	2
Inguinal bubo.....	2	5
Inguinal and pelvic buboes.....	1	3

The buboes are thus seen to be chiefly in the anterior half of the body, in the cervical and axillary glands, either or both, in 60 per cent of the rats, and the posterior half alone in 16 per cent.

Twenty-four of the rats of class 1 presented the small foci of necrosis in the liver, known as "granular" liver, which was also seen

in seven of class 2. Three livers, in addition to the "granules," appeared of the so-called "fatty" type. In 20 instances, all told, the liver was distinctly congested; but congestion is not necessarily associated with the presence of focal necrosis. It is probably seen where the rat is examined during the acute stage of infection, but as the convalescence progresses the congestion subsides, whereas the necrosis remains visible indefinitely.

Splenic congestion was noted in 27 of the first group and in 20 of the second group of rats, the organ appearing quite tense. Past acute congestion, as revealed by transverse linear scars of the capsule, was seen in 7 instances. Four rats showed large, solitary abscesses in the spleen. Transverse linear scars of the capsule can not be taken unreservedly as evidence of convalescence from plague or "resolving" plague. We are inclined to believe that any acute infection may produce acute splenic congestion with transverse rupture of the capsule. We noted three nonplague rats, in which *Trypanosoma lewisi* was found, that showed such splenic scars.

Of the first group of rats, pleural effusion was marked in 12, moderate in amount in 5, and scanty in volume in 7. Of the second group, 4 showed a marked effusion, 8 a moderate volume, and 2 only a slight amount of fluid. In most cases the effusion was clear and limpid, though not infrequently it was noted to be blood stained. The possibility of a severe contusion of the thorax by the blow of a spring trap, as a factor in the production of the latter type of effusion, must be borne in mind.

#### IV. RAT FLEAS.

Owing to inability to secure cage traps by which live rats could be secured for flea observations, very few live rats were brought to the laboratory; consequently the flea observations leave much to be desired. The few that were made suggest a very high number of fleas per rat, the bulk of which were *Leomopsylla cheopis*. The only other flea observed was *Ceratophyllus fasciatus*, which was seen only on a few occasions, and then associated with *L. cheopis*.

#### V. ANTIPLAQUE OPERATIONS.

In the foregoing account of Galveston's experience with bubonic plague no reference has been made to the energetic efforts directed toward its control and eradication, for the reason that neither of the writers had personally participated in them, apart from the work done in the laboratory. For the sake of completeness, however, the following should be mentioned:

Early in July, 1920, through the cooperation of the city of Galveston, the Texas State Board of Health, and the United States Public Health Service, active operations against rodents were begun.

These activities comprised (1) the trapping of rodents, (2) the removal of rat harborages, (3) rat-proofing, and (4) the fumigation of buildings and the shipping on the water front included in plague areas. The success of these measures may be gauged by three results:

1. A steady diminution of the number of rats caught in traps, as indicated in Figure 2.
2. An increase in the number of mice caught in traps set in positions likely to be frequented by rats, also shown in Figure 2.
3. The cessation of plague, both human and rodent.

### PREVALENCE OF POLIOMYELITIS.

The following table gives the number of cases of poliomyelitis (infantile paralysis) reported to the Public Health Service by State health officers from May 29 to July 23, 1921, inclusive. These reports are preliminary and necessarily incomplete. The cases are widely scattered. For instance, the 15 cases reported from Illinois for the week ended July 15 were from 13 different places, no more than 2 cases being reported from any one locality.

*Poliomyelitis (infantile paralysis)—Number of cases of poliomyelitis occurring in various States, as reported to the Public Health Service by the State health officers in weekly telegraphic or mail reports.*

[States omitted are those from which no reports have been received or which have reported no poliomyelitis during the period covered. Leaders indicate that reports were received but no cases of poliomyelitis were reported.]

State.	Week ended (1921)—							
	June.				July.			
	4	11	18	25	2	9	16	23
Arkansas				1				
California	1	1	2	5		3	2	6
Connecticut				6	2	3	2	4
District of Columbia					3	4		3
Georgia	1	1		1				
Illinois	2	4	5	10	12	15		24
Indiana			2	1	1	1		6
Iowa					1		3	1
Kansas	1				2	2		
Kentucky	1				1	2		1
Maine	3						1	
Maryland	1	2	3	4	1	4		8
Massachusetts	1	2	1	4	3	6		
Minnesota	1	1	2	10	1	3		5
Mississippi	1							
Missouri		(1)	6		(1)	8		3
Montana	1							
Nebraska		1			3		1	2
New Jersey		2	1	1	2	(1)	3	1
New York <sup>1</sup>				1	2	4		10
North Carolina	1		3		4	3	1	
South Dakota							3	
Vermont						2	1	
Virginia		(1)	(1)	1	(1)	4	2	1
Wisconsin	2				1	4	9	14

<sup>1</sup> No report received.

<sup>2</sup> Exclusive of New York City.

At this season of the year an increase in the number of reported cases of poliomyelitis is usual. The following table gives the median number of cases reported by 38 States for the months of May to November during the years 1913 to 1919, inclusive. This shows a typical seasonal distribution.

*Median number of cases of poliomyelitis reported by 38 States, 1913 to 1919.*

May.....	77
June.....	118
July.....	289
August.....	559
September.....	494
October.....	320
November.....	190

### PRINCIPAL CAUSES OF DEATH.

#### COMPARISON OF DEATH RATES FOR PRINCIPAL CAUSES FOR APRIL AND MAY, 1921, AND FOR THE FIRST QUARTERS OF 1919, 1920, AND 1921, IN A GROUP OF INSURED PERSONS.

The accompanying tables are reprinted from the Statistical Bulletin of the Metropolital Life Insurance Co. for June, 1921. They present the mortality data of the industrial department of the company for the months of April and May, 1921, and for the first quarters of 1919, 1920, and 1921. The figures are based on a strength of approximately 13,000,000 insured persons.

Although these rates apply to a more or less selected group, they are very good indices of the comparative mortality conditions of the general population.

*Death rates (annual basis) per 100,000 lives exposed, for principal causes, April and May, 1921.*

[Industrial Department, Metropolitan Life Insurance Co.]

Cause of death.	Death rate per 100,000 lives exposed.		
	May, 1921.	Apr., 1921.	Year 1920. <sup>1</sup>
Total, all causes.....	855.1	921.5	939.4
Typhoid fever.....	3.8	3.3	6.7
Measles.....	4.8	5.4	8.5
Scarlet fever.....	7.5	9.4	6.0
Whooping cough.....	3.8	3.8	6.6
Diphtheria.....	18.5	18.4	22.1
Influenza.....	9.8	14.8	53.5
Tuberculosis (all forms).....	125.0	133.4	137.9
Cancer.....	69.9	70.0	69.8
Meningitis (all forms).....	6.8	7.1	5.2
Cerebral hemorrhage.....	59.0	57.3	61.3
Organic diseases of heart.....	116.6	124.3	117.0
Pneumonia (all forms).....	71.0	88.0	106.1
Other respiratory diseases.....	13.3	13.1	18.2
Diarrhoea and enteritis.....	9.5	9.6	15.8
Bright's disease.....	69.7	76.8	70.8
Puerperal state.....	17.8	22.0	23.0
Suicides.....	7.8	7.2	6.1
Homicides.....	4.6	6.1	5.8
Other external causes (excluding suicides and homicides).....	48.9	45.1	60.1
Traumatism by automobile.....	9.8	10.2	11.1
All other causes.....	188.4	206.4	188.9

<sup>1</sup> Based upon final tabulations for the year 1920. Changes from preliminary figures are unimportant.

*Death rates (annual basis) per 100,000 lives exposed; first quarters 1919, 1920, and 1921—Comparison, by color, for principal causes of death.*

[Industrial department, Metropolitan Life Insurance Co.]

Cause of death.	Death rate per 100,000 lives exposed.					
	White.			Colored.		
	Jan.-Mar., 1921.	Jan.-Mar., 1920.	Jan.-Mar., 1919.	Jan.-Mar., 1921.	Jan.-Mar., 1920.	Jan.-Mar., 1919.
All causes.....	900.8	1,312.4	1,426.0	1,375.3	1,962.4	2,036.9
Typhoid fever.....	3.8	4.5	4.6	3.8	8.9	9.1
Measles.....	5.5	14.8	3.1	1.8	3.8	2.0
Scarlet fever.....	11.0	9.1	4.9	3.6	( <sup>1</sup> )	.6
Whooping cough.....	5.5	9.4	2.8	7.8	9.2	2.8
Diphtheria and croup.....	30.4	35.6	24.6	5.8	6.7	7.1
Influenza.....	12.3	163.4	298.1	28.5	227.9	331.0
Tuberculosis (all forms).....	108.5	138.4	157.7	265.7	310.1	310.4
Tuberculosis of lungs.....	96.6	125.3	144.2	247.2	286.3	287.7
Tuberculous meningitis.....	5.2	6.4	6.1	5.6	4.8	7.6
Other forms of tuberculosis.....	4.7	6.7	7.5	13.0	18.9	15.0
Meningitis (total).....	5.1	7.0	8.7	2.8	8.6	6.2
Cerebrospinal meningitis.....	4.6	6.7	7.2	3.1	7.5	5.6
Cerebral hemorrhage; apoplexy.....	68.3	70.3	63.8	28.3	28.2	37.4
Organic diseases of heart.....	124.5	146.7	137.1	168.6	200.7	195.7
Total respiratory diseases.....	120.1	260.9	289.5	192.3	429.7	416.8
Bronchitis.....	7.1	14.7	13.1	13.2	19.4	14.7
Bronchopneumonia.....	27.6	77.9	73.9	48.2	95.2	84.1
Pneumonia, lobar and undefined.....	66.2	160.8	192.1	117.7	300.6	308.7
Other diseases of respiratory system.....	9.9	14.4	11.5	13.0	19.4	17.3
Diarrhea and enteritis.....	9.9	9.5	16.2	10.2	10.5	12.7
Under 2 years.....	3.3	4.2	4.4	1.8	4.6	2.3
2 years and over.....	6.5	5.3	5.8	8.4	6.5	10.5
Nephritis and Bright's disease.....	72.6	86.2	86.8	122.1	152.2	141.9
Tuberculosis of state.....	21.6	32.6	29.0	29.5	36.9	28.9
Puerperal septicemia.....	10.6	8.5	5.7	12.7	15.1	16.3
Puerperal albuminuria and convulsions.....	4.1	5.6	5.8	6.4	9.5	5.7
Other diseases of puerperal state.....	6.9	19.1	17.5	10.4	15.4	13.0
Total external causes <sup>2</sup> .....	57.3	64.6	120.2	96.4	99.6	126.1
Suicides.....	7.3	5.3	7.5	6.1	3.5	4.8
Homicides.....	3.3	2.9	3.4	27.2	18.3	28.6
Accidental and unspecified violence <sup>3</sup> .....	46.7	51.6	60.1	63.1	66.6	60.4
Accidental drowning.....	3.3	2.1	( <sup>1</sup> )	2.5	2.4	( <sup>1</sup> )
Automobile accidents.....	8.0	5.7	( <sup>1</sup> )	8.1	2.7	( <sup>1</sup> )
War deaths.....	.1	.9	49.2	( <sup>1</sup> )	.8	26.3
All other and ill-defined causes of death.....	241.4	209.4	244.0	345.1	372.6	345.2

<sup>1</sup> No deaths.

<sup>2</sup> Includes "war deaths."

<sup>3</sup> Excludes "war deaths."

<sup>4</sup> Data unavailable.

## DEATHS DURING WEEK ENDED JULY 16, 1921.

*Summary of information received by telegraph from industrial insurance companies for week ended July 16, 1921, and corresponding week, 1920. (From the "Weekly Health Index," July 19, 1921, issued by the Bureau of the Census, Department of Commerce.)*

	Week ended July 16, 1921.	Corresponding week, 1920.
Policies in force.....	47,107,569	44,133,408
Number of death claims.....	8,142	6,334
Death claims per 1,000 policies in force.....	9.0	7.5

*Deaths from all causes in certain large cities of the United States during the week ended July 16, 1921, infant mortality, annual death rate, and comparison with corresponding week of preceding years. (From the Weekly Health Index, July 19, 1921, issued by the Bureau of the Census, Department of Commerce.)*

City.	Estimated population, July 1, 1921.	Week ended July 16, 1921.		Average annual death rate per 1,000. <sup>1</sup>	Deaths under 1 year.		Infant mortality rate, week ended July 16, 1921. <sup>2</sup>	
		Total deaths.	Death rate. <sup>1</sup>		Week ended July 16, 1921.	Previous year or years. <sup>2</sup>		
Akron, Ohio	229,195	27	6.1	46.5	5	43	48	
Albany, N. Y.	115,071	24	10.9	C 12.8	3	C 8	67	
Atlanta, Ga.	207,473	61	15.3	C 15.9	7	C 9	.....	
Baltimore, Md.	752,963	174	12.1	A 15.4	26	A 44	73	
Birmingham, Ala.	186,133	49	13.7	A 18.5	5	A 8	.....	
Boston, Mass.	757,634	155	10.7	A 14.1	16	A 31	43	
Bridgeport, Conn.	149,967	21	7.3	A 16.4	4	A 12	50	
Buffalo, N. Y.	519,608	119	11.9	C 9.8	19	C 17	73	
Cambridge, Mass.	110,444	26	12.3	A 10.7	4	A 3	72	
Camden, N. J.	119,672	25	10.9	.....	6	.....	90	
Chicago, Ill.	2,780,655	561	10.5	A 12.1	86	A 104	.....	
Cincinnati, Ohio	403,418	118	15.3	C 9.7	13	C 9	86	
Cleveland, Ohio	831,138	153	9.6	C 10.4	22	C 23	59	
Columbus, Ohio	245,358	69	14.7	C 12.4	2	C 6	23	
Dallas, Tex.	165,282	38	12.0	A 14.8	9	A 5	.....	
Dayton, Ohio	158,119	26	8.6	C 9.8	4	C 6	66	
Denver, Colo.	263,152	71	14.1	A 11.2	6	.....	.....	
Detroit, Mich.	1,070,450	176	8.6	C 8.9	50	C 53	94	
Fall River, Mass.	120,668	39	16.9	C 12.1	9	C 5	135	
Grand Rapids, Mich.	141,197	26	9.6	C 10.1	3	C 5	51	
Houston, Tex.	144,340	39	14.1	.....	4	.....	.....	
Indianapolis, Ind.	325,215	73	11.7	C 11.3	13	C 10	101	
Jersey City, N. J.	302,788	71	12.2	C 9.6	20	C 12	138	
Kansas City, Kans.	103,884	23	11.5	C 13.3	4	C 4	95	
Kansas City, Mo.	336,157	91	14.1	C 7.9	19	C 7	.....	
Los Angeles, Calif.	611,921	158	13.5	A 11.4	24	A 12	113	
Louisville, Ky.	230,083	64	14.1	C 9.5	11	C 2	127	
Lowell, Mass.	113,757	17	7.8	A 11.9	1	A 7	16	
Memphis, Tenn.	165,389	61	19.2	C 18.2	6	C 10	.....	
Milwaukee, Wis.	468,386	72	8.0	A 10.3	15	A 15	73	
Minneapolis, Minn.	392,815	91	12.1	C 11.1	8	C 6	46	
Nashville, Tenn.	122,036	45	19.2	C 19.8	4	C 8	.....	
New Bedford, Mass.	125,012	24	10.0	A 12.3	3	A 8	46	
New Haven, Conn.	167,007	36	11.2	C 9.5	5	C 7	60	
New Orleans, La.	394,657	107	14.1	A 19.7	13	A 15	.....	
New York, N. Y.	5,751,867	1,041	9.4	C 9.4	186	C 167	73	
Newark, N. J.	424,885	86	10.6	C 8.9	16	C 12	71	
Norfolk, Va.	121,260	28	12.0	.....	4	.....	71	
Oakland, Calif.	226,472	40	9.2	A 9.8	8	A 3	101	
Omaha, Nebr.	197,066	46	12.2	.....	7	.....	81	
Paterson, N. J.	137,463	27	10.2	.....	6	.....	101	
Philadelphia, Pa.	1,866,212	361	10.1	43.5	52	484	63	
Pittsburgh, Pa.	602,452	142	12.3	C 12.0	31	C 26	110	
Portland, Oreg.	264,850	54	10.6	C 12.4	2	C 5	20	
Providence, R. I.	239,645	36	7.8	C 9.6	10	C 8	81	
Richmond, Va.	175,636	49	14.5	C 12.7	9	C 9	110	
Rochester, N. Y.	305,220	65	11.1	C 11.0	7	C 8	54	
St. Louis, Mo.	786,164	203	13.5	C 10.7	17	C 18	.....	
St. Paul, Minn.	237,781	30	6.6	C 7.1	3	C 1	30	
Salt Lake City, Utah.	121,595	27	11.6	A 10.3	3	.....	46	
San Francisco, Calif.	520,546	115	11.5	C 13.1	6	C 13	35	
Seattle, Wash.	327,227	60	9.6	A 8.4	5	A 5	42	
Spokane, Wash.	104,442	18	9.0	C 12.5	2	C 2	44	
Springfield, Mass.	135,877	15	5.8	C 13.1	1	C 4	15	
Syracuse, N. Y.	177,265	32	9.4	C 9.9	3	C 6	36	
Toledo, Ohio	253,696	63	12.9	A 12.5	7	A 6	71	
Trenton, N. J.	122,760	33	14.0	A 18.2	6	A 8	91	
Washington, D. C.	454,026	89	10.2	A 14.1	10	A 19	58	
Wilmington, Del.	113,408	23	10.6	C 13.1	4	.....	.....	
Worcester, Mass.	184,972	48	13.5	C 12.1	12	C 8	129	
Yonkers, N. Y.	103,324	9	4.5	A 12.1	2	A 4	45	

<sup>1</sup> Annual rate per 1,000 population.

<sup>2</sup> "A" indicates data for the corresponding week of the years 1913 to 1917, inclusive. "C" indicates data for the corresponding week of the year 1920.

<sup>3</sup> Deaths under 1 year per 1,000 births—an annual rate based on deaths under 1 year for the week and estimated births for 1920. Cities left blank are not in the registration area for births.

<sup>4</sup> Data based on statistics of 1915, 1916, and 1917.

# 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.

#### Telegraphic Reports for Week Ended July 23, 1921.

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

ALABAMA.	Cases.	COLORADO.	Cases.	
(Exclusive of Denver.)				
Hookworm.....	55	Cerebrospinal meningitis.....	1	
Malaria.....	16	Chicken pox.....	4	
Measles.....	1	Diphtheria.....	13	
Mumps.....	7	Measles.....	5	
Pellagra.....	5	Mumps.....	2	
Pneumonia.....	5	Scarlet fever.....	8	
Scarlet fever.....	4	Smallpox.....	3	
Smallpox.....	7	Tuberculosis.....	4	
Tuberculosis.....	18	Typhoid fever.....	2	
Typhoid fever:		Whooping cough.....	1	
Jefferson.....	18	FLORIDA.		
Scattering.....	19	Diphtheria.....	14	
ARKANSAS.				
Chicken pox.....	7	Dysentery.....	8	
Diphtheria.....	5	Influenza.....	24	
Hookworm.....	1	Malaria.....	19	
Malaria.....	205	Pellagra.....	4	
Measles.....	3	Pneumonia.....	26	
Pellagra.....	24	Rabies.....	1	
Scarlet fever.....	5	Scarlet fever.....	1	
Smallpox.....	8	Smallpox.....	8	
Trachoma.....	1	Tetanus.....	1	
Tuberculosis.....	10	Typhoid fever.....	13	
Typhoid fever.....	41	GEORGIA.		
Whooping cough.....	25	Cerebrospinal meningitis.....	1	
CALIFORNIA.				
Cerebrospinal meningitis—San Francisco.....	2	Chicken pox.....	2	
Influenza.....	1	Diphtheria.....	12	
Lethargic encephalitis:		Dysentery (amebic).....	5	
Pinole.....	4	Dysentery (bacillary).....	6	
San Francisco.....	1	Hookworm.....	18	
Poliomyelitis:		Influenza.....	1	
Hillsboro.....	1	Malaria.....	45	
Oakland.....	3	Measles.....	1	
Sacramento.....	1	Mumps.....	2	
San Francisco.....	1	Scarlet fever.....	8	
Smallpox.....	13	Septic sore throat.....	2	
Typhoid fever.....	16	Smallpox.....	15	
		Tuberculosis (all forms).....	10	
		Typhoid fever.....	44	
		Whooping cough.....	11	

IDAHO.	Cases.	KANSAS—continued.	Cases.
Measles.....	1	Mumps.....	2
Scarlet fever.....	1	Pneumonia.....	5
Typhoid fever.....	1	Scarlet fever.....	41
Whooping cough.....	1	Smallpox.....	14
ILLINOIS.			
Cerebrospinal meningitis—Chicago.....	2	Trachoma.....	1
Diphtheria:		Tuberculosis.....	41
Chicago.....	82	Typhoid fever.....	36
Scattering.....	35	Whooping cough.....	86
Influenza.....	1	LOUISIANA.	
Lethargic encephalitis—Chicago.....	1	Anthrax.....	1
Pneumonia.....	60	Cerebrospinal meningitis.....	1
Poliomyelitis:		Diphtheria.....	4
Chicago.....	3	Pellagra.....	5
Cook County—Niles Township.....	1	Scarlet fever.....	1
Elgin.....	1	Smallpox.....	10
Fairbury.....	1	Typhoid fever.....	27
Franklin.....	1	Whooping cough.....	5
Galva.....	1	MAINE.	
Iroquois County—Sheldon Township.....	1	Cerebrospinal meningitis.....	1
Lake Forest.....	1	Chicken pox.....	9
Matherville.....	1	Diphtheria.....	18
Oak Park.....	1	Measles.....	2
Ottawa.....	3	Scarlet fever.....	21
Pontiac.....	1	Smallpox.....	1
Rock Island County—Rural Township.....	1	Tuberculosis.....	27
Sangamon County—Woodside Township.....	1	Typhoid fever.....	1
Springfield.....	5	Whooping cough.....	6
Wilmette.....	1	MARYLAND.	
Scarlet fever:		Cerebrospinal meningitis.....	2
Chicago.....	22	Chicken pox.....	5
Scattering.....	21	Diphtheria.....	20
Smallpox.....	9	Dysentery.....	15
Typhoid fever.....	29	Influenza.....	2
INDIANA.			
Cerebrospinal meningitis—Jackson County.....	1	Malaria.....	2
Diphtheria.....	55	Measles.....	30
Poliomyelitis:		Mumps.....	3
Dearborn County.....	1	Ophthalmia neonatorum.....	3
Laporte County.....	5	Paratyphoid fever.....	1
Rabies in animals:		Pneumonia (all forms).....	21
Clay County.....	1	Poliomyelitis.....	8
Marion County.....	1	Scarlet fever.....	9
Rush County.....	1	Septic sore throat.....	2
Scarlet fever.....	25	Smallpox.....	1
Smallpox.....	11	Tuberculosis.....	64
Typhoid fever.....	28	Typhoid fever.....	57
IOWA.			
Diphtheria.....	5	Whooping cough.....	83
Poliomyelitis—Woodburn.....	1	MASSACHUSETTS.	
Scarlet fever.....	10	Cerebrospinal meningitis.....	4
Smallpox.....	6	Chicken pox.....	37
KANSAS.			
Cerebrospinal meningitis.....	1	Conjunctivitis (suppurative).....	10
Chicken pox.....	3	Diphtheria.....	112
Diphtheria.....	28	German measles.....	3
Malaria.....	1	Influenza.....	4
Measles.....	9	Lethargic encephalitis.....	1
Week ended Friday.			
		Malaria.....	1
		Measles.....	164
		Mumps.....	43
		Ophthalmia neonatorum.....	23

MASSACHUSETTS—continued.	Cases.	NEW JERSEY.	Cases.
Pneumonia (lobar).....	16	Chicken pox.....	80
Poliomyelitis.....	4	Diphtheria.....	76
Scarlet fever.....	55	Malaria.....	3
Tetanus.....	4	Measles.....	95
Trachoma.....	4	Pneumonia.....	25
Trichinosis.....	1	Poliomyelitis.....	1
Tuberculosis (all forms).....	143	Scarlet fever.....	44
Typhoid fever.....	15	Trachoma.....	1
Whooping cough.....	123	Typhoid fever.....	14
MINNESOTA.			
Diphtheria.....	37	NEW MEXICO.	
Leprosy.....	2	Diphtheria.....	22
Measles.....	5	German measles.....	1
Ophthalmia neonatorum.....	1	Malaria.....	3
Poliomyelitis.....	5	Measles.....	1
Scarlet fever.....	26	Mumps.....	1
Smallpox.....	40	Pneumonia.....	2
Tetanus.....	1	Scarlet fever.....	5
Tuberculosis.....	76	Septic sore throat.....	2
Typhoid fever.....	28	Tuberculosis.....	9
Whooping cough.....	1	Typhoid fever.....	12
MISSISSIPPI.			
Cerebrospinal meningitis.....	1	NEW YORK.	
Diphtheria.....	6	(Exclusive of New York City.)	
Scarlet fever.....	7	Diphtheria.....	137
Smallpox.....	8	Lethargic encephalitis.....	2
Typhoid fever.....	36	Measles.....	176
MISSOURI.			
Cerebrospinal meningitis.....	4	Pneumonia.....	56
Chicken pox.....	3	Poliomyelitis:	
Diphtheria.....	50	Endicott.....	1
Epidemic sore throat.....	1	Lackawanna.....	1
Influenza.....	2	Oneida.....	1
Measles.....	8	Schenectady.....	3
Mumps.....	2	Utica.....	3
Poliomyelitis.....	15	Vienna.....	1
Scarlet fever.....	15	Scarlet fever.....	65
Smallpox.....	12	Smallpox.....	11
Tetanus.....	1	Typhoid fever.....	31
Trachoma.....	3	Whooping cough.....	238
Tuberculosis.....	65	NORTH CAROLINA.	
Typhoid fever.....	25	Cerebrospinal meningitis.....	1
Whooping cough.....	67	Chicken pox.....	3
MONTANA.			
Diphtheria.....	4	Diphtheria.....	39
Rocky Mountain spotted or tick fever: Hamilton.....	1	German measles.....	1
Scarlet fever.....	1	Measles.....	53
Smallpox.....	11	Scarlet fever.....	24
Typhoid fever.....	10	Septic sore throat.....	2
NEBRASKA.			
Chicken pox.....	1	Smallpox.....	11
Diphtheria.....	4	Typhoid fever.....	123
Lethargic encephalitis—Omaha.....	1	Whooping cough.....	270
Measles.....	1	SOUTH DAKOTA.	
Mumps.....	2	Diphtheria.....	1
Poliomyelitis: Lexington.....	1	Measles.....	1
Shelton.....	1	Scarlet fever.....	4
Scarlet fever.....	7	Smallpox.....	1
Smallpox.....	13	Trachoma.....	5
Typhoid fever.....	5	Tuberculosis.....	63
Whooping cough.....	22	VERMONT.	
		Chicken pox.....	23
		Diphtheria.....	2
		Measles.....	48

VERMONT—continued.		Cases.	WISCONSIN.		Cases.
Mumps.....	1		Milwaukee:	Cerebrospinal meningitis.....	3
Scarlet fever.....	18			Chicken pox.....	4
Smallpox.....	1			Diphtheria.....	6
Typhoid fever.....	2			German measles.....	1
Whooping cough.....	26			Measles.....	1
VIRGINIA.				Poliomyelitis.....	3
Poliomyelitis—Rockingham County.....	1			Scarlet fever.....	6
WASHINGTON.				Smallpox.....	3
Chicken pox.....	9			Trachoma.....	1
Diphtheria.....	22			Tuberculosis.....	15
Measles.....	21			Whooping cough.....	35
Mumps.....	4		Scattering:	Cerebrospinal meningitis.....	2
Scarlet fever.....	7			Chicken pox.....	20
Smallpox.....	24			Diphtheria.....	30
Tuberculosis.....	2			Influenza.....	1
Typhoid fever.....	19			Measles.....	16
Whooping cough.....	21			Ophthalmia neonatorum.....	1
WEST VIRGINIA.				Poliomyelitis.....	11
Cerebrospinal meningitis—Beckley.....	1			Scarlet fever.....	28
Diphtheria.....	5			Smallpox.....	23
Measles.....	8			Tuberculosis.....	13
Scarlet fever.....	3			Typhoid fever.....	4
Smallpox.....	7			Whooping cough.....	143
Typhoid fever.....	9				

## Reports for Week Ended July 16, 1921.

DISTRICT OF COLUMBIA.		Cases.	KENTUCKY—continued.		Cases.
Chicken pox.....	2		Pellagra.....		1
Measles.....	33		Pneumonia.....		4
Poliomyelitis.....	4		Poliomyelitis:		
Tuberculosis.....	22		Boyd County.....		1
Typhoid fever.....	5		Christian County.....		1
Whooping cough.....	23		Scarlet fever.....		6
KENTUCKY.			Smallpox.....		3
Cerebrospinal meningitis:			Tonsilitis.....		1
Lawrence County.....	1		Tuberculosis:		
Chicken pox.....	1		Jefferson County.....		9
Diphtheria.....	10		Scattering.....		8
Dysentery.....	8		Typhoid fever:		
Malaria.....	2		Christian County.....		14
Measles.....	8		Daviess County.....		9
Mumps.....	2		Scattering.....		6
			Whooping cough.....		6

## 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.
1921.										
District of Columbia (June).....	33				340	1		27		10
Idaho (June).....	11				39		1	25	35	5
Illinois (June).....	15	121	58	120	2,360		22	693	403	133
Maine (June).....	66				143		2	90	9	12
Maryland (June).....	2	137	24	16	455	2	8	113	6	78
Michigan (June).....	704				327			538	343	72
Minnesota (June).....	38	180		1	228		14	262	532	41
Oklahoma (June).....	20				56	3	2	29	97	87
Rhode Island (June).....	2	47	5	4	106			64		2
Vermont (April).....	27		5					84	22	10
Vermont (June).....	20							91	8	6
Wisconsin (June).....	5	203	8		311		2	339	394	20

## RECIPROCAL NOTIFICATION.

Minnesota—June, 1921.

Cases of communicable diseases referred during June, 1921, to other State health departments by the Department of Health of the State of Minnesota.

Disease and locality of notification.	Referred to health authority of—	Why referred.
Diphtheria: Duluth, St. Louis County.	Chicago, Cook County, Ill.....	Cultures examined in Duluth laboratory, positive. Patient had diphtheria before leaving Chicago.
Typhoid fever: Austin, Mower County.....	St. Ansgar, Mitchell County, Iowa.....	Widal reaction present in blood specimen from patient. Patient at hospital clinic, Austin.
Minneapolis, Hennepin County.	Gilmanton, Buffalo County, Wis....	Epidemiological data give date of first symptoms in Gilmanton on May 13, 1921. Widal reaction present in blood specimen from patient.
Duluth, St. Louis County.	Steamer <i>K. C. Morse</i> , Lake Superior.	Blood specimen examined in Duluth laboratory showed widal reaction present.
Tuberculosis.....	Estherville, Emmet County, Iowa...	Specimen of sputum sent to Minnesota State board of health found positive.
Thomas Hospital, Minneapolis, Hennepin County.	Webb City, Jasper County, Mo..... Milesville, Haakon County, S. Dak..... Nelson, Lewis and Clark County, Mont.	One improved case, one quiescent, one unimproved, left hospital for their homes.
Mayo Clinic, Rochester, Olmstead County.	Badger, Webster County, Iowa..... Oelwein, Fayette County, Iowa..... Marshalltown, Marshall County, Iowa..... New Hampton, Chickasaw County, Iowa..... Richmond, Wayne County, Ind..... Lawton, Van Buren County, Mich..... Buttzville, Ransom County, N. Dak..... Stillwell, Adair County, Okla..... Racine, Racine County, Wis..... Soo, Ontario, Canada.....	Four advanced cases, five moderately advanced, one stage of disease not given, left Mayo Clinic for their homes.

PLAQUE.<sup>1</sup>

## HUMAN CASES OF PLAGUE REPORTED.

Place.	Period covered.	Cases.	Deaths.	Remarks.
California: San Benito County.....	1921. Feb. 7..... June 11.....	1	1	

<sup>1</sup> A summary of the reports received of the occurrence of plague and the finding of plague-infected rodents in the United States during 1920 was published in Public Health Reports, Jan. 7, 1921, p. 15.

## PLAQUE-INFECTED RODENTS.

Place.	Period covered.	Rodents found plague infected.
California: San Benito County.....	1921. May 22 to June 4.....	18
Florida: Pensacola.....	Jan. 1 to Apr. 18..... Apr. 19 to July 23.....	5 0
Louisiana: New Orleans.....	Jan. 1 to May 26..... May 27 to July 23.....	38 0
Texas: Galveston.....	Jan. 1 to May 28..... May 29 to July 23.....	1 0

<sup>1</sup> Ground squirrels, *Citellus beecheyi*.

## CITY REPORTS FOR WEEK ENDED JULY 9, 1921.

## CEREBROSPINAL MENINGITIS.

The column headed "Median for previous years" gives the median number of cases reported during the corresponding weeks of the years 1915 to 1920, inclusive. In instances in which data for the full six years are incomplete, the median is that for the number of years for which information is available.

City.	Median for pre- vious years.	Week ended July 9, 1921.		City.	Median for pre- vious years.	Week ended July 9, 1921.	
		Cases.	Deaths.			Cases.	Deaths.
California:				Missouri:			
Los Angeles.....	0	1		St. Louis.....	1	1	
San Francisco.....	0	2	1	New Hampshire:			
District of Columbia:				Manchester.....	0		1
Washington.....	0	1		New York:			
Illinois:				Buffalo.....	0	1	
Chicago.....	1			New York.....	6	6	2
Kewanee.....	0		1	Ohio:			
Kentucky:				Cleveland.....	0	2	
Louisville.....	1	1	1	Rhode Island:			
Maryland:				Providence.....	0		1
Baltimore.....	6	1		Tennessee:			
Massachusetts:				Memphis.....	0		1
Boston.....	1	2		Virginia:			
Danvers.....		1		Portsmouth.....	0		1
Michigan:				West Virginia:			
Hamtramck.....			1	Huntington.....	0		2
Minnesota:				Wisconsin:			
St. Paul.....	0	2		Eau Claire.....	0	1	1

## DIPHTHERIA.

See p. 1778; also Telegraphic weekly reports from States, p. 1768, and Monthly summaries by States, p. 1771.

## INFLUENZA.

City.	Cases.	Deaths.	City.	Cases.	Deaths.
California:			Missouri:		
Los Angeles.....	1		Kansas City.....	1	1
District of Columbia:			New York:		
Washington.....	1		Jamestown.....	1	
Illinois:			New York.....	2	1
Chicago.....	1		Ohio:		
Louisiana:			Cincinnati.....	1	1
New Orleans.....		2	Pennsylvania:		
			Philadelphia.....		1

## MALARIA.

Alabama:			Massachusetts—Continued,		
Birmingham.....	1	1	Worcester.....	1	
Montgomery.....	1		New York:		
Arkansas:			New York.....	1	
Little Rock.....	5		Tennessee:		
Georgia:			Memphis.....	6	
Atlanta.....	3		Nashville.....		1
Brunswick.....	11		Texas:		
Savannah.....	2		Beaumont.....	16	
Massachusetts:			Waco.....		1
Boston.....	1				

## MEASLES.

See p. 1778; also Telegraphic weekly reports from States, p. 1768, and Monthly summaries by States, p. 1771.

## CITY REPORTS FOR WEEK ENDED JULY 9, 1921—Continued.

## PELLAGRA.

City.	Cases.	Deaths.	City.	Cases.	Deaths.
Alabama:			South Carolina:		
Mobile.....	..	1	Charleston.....	..	1
Montgomery.....	..	1	Tennessee:		
California:			Memphis.....	2	1
San Francisco.....	..	1	Texas:		
Louisiana:			Waco.....	..	1
New Orleans.....	2	2	Virginia:		
Oklahoma:			Danville.....	2	1
Oklahoma City.....	..	1	Norfolk.....	..	1

## PNEUMONIA (ALL FORMS).

Alabama:			Massachusetts—Continued.		
Birmingham.....	1		Lynn.....	1	
Mobile.....	1		New Bedford.....	2	
Montgomery.....	1		Pittsfield.....	1	
Arizona:			Quincy.....	2	
Tucson.....	2		Springfield.....	1	
California:			Woburn.....	1	
Bakersfield.....	1		Worcester.....	2	
Long Beach.....	2		Michigan:		
Los Angeles.....	14	5	Battle Creek.....	1	
Oakland.....	5		Detroit.....	13	9
Pasadena.....	1		Flint.....	1	
Sacramento.....	1		Grand Rapids.....	2	
San Diego.....	2		Kalamazoo.....	..	1
San Francisco.....	8	4	Port Huron.....	2	
Colorado:			Minnesota:		
Colorado Springs.....	1		Hibbing.....	1	
Denver.....	2		Minneapolis.....	2	
Connecticut:			St. Paul.....	4	
Bridgeport.....	2	1	Missouri:		
Delaware:			Kansas City.....	..	1
Wilmington.....	..	1	Montana:		
District of Columbia:			Great Falls.....	..	1
Washington.....	3		Nebraska:		
Georgia:			Lincoln.....	..	1
Atlanta.....	2		Nevada:		
Savannah.....	1		Reno.....	1	
Illinois:			New Hampshire:		
Chicago.....	66	22	Nashua.....	..	1
Eglin.....	1		New Jersey:		
Le Salle.....	2		Englewood.....	1	
Oak Park.....	1		Hoboken.....	..	1
Peoria.....	1		Jersey City.....	3	
Roch Island.....	2		Kearny.....	13	4
Springfield.....	1		Passaic.....	3	
Indiana:			Trenton.....	..	3
Frankfort.....	1		West New York.....	..	1
Gary.....	2		New York:		
Hammond.....	1		New York.....	1	
Huntington.....	1		Binghamton.....	2	
Indianapolis.....	3		Buffalo.....	6	5
Marion.....	1		Elmira.....	..	1
Muncie.....	1		Ithaca.....	..	1
Richmond.....	1		Jamestown.....	3	
Kansas:			Mount Vernon.....	2	1
Wichita.....	1		New York.....	104	60
Kentucky:			Niagara Falls.....	..	1
Covington.....	4		Rochester.....	..	1
Louisiana:			Syracuse.....	3	1
Monroe.....	1		Troy.....	..	2
New Orleans.....	6		White Plains.....	1	
Maine:			Yonkers.....	..	1
Lewiston.....	2		North Carolina:		
Maryland:			Charlotte.....	..	2
Baltimore.....	5	4	Ohio:		
Massachusetts:			Akron.....	1	
Arlington.....	1		Barberton.....	..	2
Boston.....	10		Cincinnati.....	..	1
Brookline.....	1		Dayton.....	1	
Chelsea.....	2		Newark.....	..	1
Everett.....	1		Toledo.....	..	2
Fall River.....	1		Oklahoma:		
Gardner.....	1		Oklahoma City.....	..	1
Lowell.....	1				

## CITY REPORTS FOR WEEK ENDED JULY 9, 1921—Continued.

## PNEUMONIA (ALL FORMS)—Continued.

City.	Cases.	Deaths.	City.	Cases.	Deaths.
Pennsylvania:			Utah:		
Philadelphia.....	31	17	Salt Lake City.....		1
Rhode Island:			Virginia:		
Providence.....		1	Norfolk.....		3
Tennessee:			Richmond.....		2
Memphis.....		1	West Virginia:		
Texas:			Huntington.....		1
Dallas.....		3	Wisconsin:		
El Paso.....		2	Kenosha.....		1
Waco.....		1			

## POLIOMYELITIS (INFANTILE PARALYSIS).

The column headed "Median for previous years" gives the median number of cases reported during the corresponding weeks of the years 1915 to 1920, inclusive. In instances in which data for the full six years are incomplete, the median is that for the number of years for which information is available.

City.	Median for pre- vious years.	Week ended July 9, 1921.		City.	Median for pre- vious years.	Week ended July 9, 1921.	
		Cases.	Deaths.			Cases.	Deaths.
California:				Michigan:			
San Francisco.....	0	3	.....	Alpena.....		1	.....
Connecticut:				Detroit.....	0	3	2
Hartford.....	0	1	.....	Missouri:			
New London.....	0	.....	1	St. Louis.....	0	4	.....
Norwalk.....		1	.....	Nebraska:			
District of Columbia:				Omaha.....	0	1	.....
Washington.....	0	3	.....	New Jersey:			
Illinois:				East Orange.....	0	1	.....
Aurora.....	0	.....	1	New York:			
Chicago.....	1	3	3	New York.....	4	4	2
Evanston.....	0	1	.....	Ohio:			
Springfield.....	0	2	1	Cleveland.....	1	3	.....
Iowa:				Springfield.....	0	1	.....
Mason City.....	0	1	.....	Pennsylvania:			
Kansas:				New Castle.....	0	1	.....
Salina.....		1	.....	Wisconsin:			
Massachusetts:				Kenosha.....	0	1	1
Boston.....	0	1	.....	Marinette.....	0	2	.....
North Adams.....	0	1	1				

## RABIES IN ANIMALS.

City.	Cases.	City.	Cases.
Minnesota:			
St. Paul.....	1	North Carolina:	
Missouri:		Winston-Salem.....	1
Kansas City.....	2		

## RABIES IN MAN.

City.	Cases.	Deaths.
California:		
Los Angeles.....		1

## ROCKY MOUNTAIN SPOTTED OR TICK FEVER.

Montana:		
Billings.....		1

## SCARLET FEVER.

See p. 1778; also Telegraphic weekly reports from States, p. 1768, and Monthly summaries by States, p. 1771.

## CITY REPORTS FOR WEEK ENDED JULY 9, 1921—Continued.

## SMALLPOX.

The column headed "Median for previous years" gives the median number of cases reported during the corresponding weeks of the years 1915 to 1920, inclusive. In instances in which data for the full six years are incomplete, the median is that for the number of years for which information is available.

City.	Median for pre- vious years.	Week ended July 9, 1921.		City.	Median for pre- vious years.	Week ended July 9, 1921.	
		Cases.	Deaths.			Cases.	Deaths.
Alabama:				Missouri:			
Birmingham.....	0	3	1	Kansas City.....	2	1	
Mobile.....	0			St. Louis.....	3		
Arkansas:				Montana:			
Fort Smith.....	2	1		Great Falls.....	0	7	
California:				Nevada:	0	1	
Los Angeles.....	0	4		Reno.....	0		
Oakland.....	0	1		New Jersey:			
Riverside.....	1	4		Trenton.....	0	1	
San Francisco.....	1	7		New York:			
Colorado:				North Tonawanda.....		1	
Denver.....	4	15		North Carolina:			
Georgia:				Winston-Salem.....	0	1	
Atlanta.....	5	5		Ohio:			
Idaho:				Newark.....	0	3	
Boise.....	2	1		New Philadelphia.....	0	1	
Illinois:				Toledo.....	1	1	
Decatur.....	0	1		Pennsylvania:			
Indiana:				Johnstown.....	0	2	
Bloomington.....	0	1		Tennessee:			
Elkhart.....	3	1		Knoxville.....	0	1	
Gary.....	0	2		Memphis.....	2	1	
Marion.....	0	6		Texas:			
Iowa:				El Paso.....	0	1	
Davenport.....	1	1		Fort Worth.....	0		
Des Moines.....	3	1		Utah:			
Dubuque.....	0	1		Salt Lake City.....	4	5	
Kansas:				Virginia:			
Hutchinson.....	0	1		Norfolk.....	0	2	
Kansas City.....	2	2		Washington:			
Parsons.....	5	2		Aberdeen.....	2	2	
Topeka.....	1	1		Seattle.....	0	4	
Kentucky:				Spokane.....	4	5	
Louisville.....	0	1		Tacoma.....	1	4	
Louisiana:				Vancouver.....	0	2	
New Orleans.....	1	2		Yakima.....	6	1	
Michigan:				West Virginia:			
Battle Creek.....	1	1		Bluefield.....	0	1	
Detroit.....	5	12		Fairmont.....	0	1	
Grand Rapids.....	0	1		Wheeling.....	0	1	
Highland Park.....	1	1		Wisconsin:			
Pontiac.....	2	1		Manitowoc.....	0	2	
Sault Ste. Marie.....	0	2		Milwaukee.....	3	2	
Minnesota:				Sheboygan.....	0	1	
Duluth.....	1	5		Superior.....	0	1	
Hibbing.....	0	3		Wyoming:			
Minneapolis.....	10	4		Cheyenne.....	1	1	
St. Cloud.....	3	2					

## TETANUS.

City.	Cases.	Deaths.	City.	Cases.	Deaths.
California:			New Jersey:		
San Francisco.....	2		Summit.....		1
Connecticut:			New York.....		1
Norwalk.....	2	2	Schenectady.....		1
Illinois:			Tennessee:		
Chicago.....	3	1	Knoxville.....	1	1
Cicero.....	1		Texas:		
Indiana:			Dallas.....	1	1
Kokomo.....		1			

## TUBERCULOSIS.

See p. 1778; also Telegraphic weekly reports from States, p. 1768.

## CITY REPORTS FOR WEEK ENDED JULY 9, 1921—Continued.

## TYPHOID FEVER.

The column headed "Median for previous years" gives the median number of cases reported during the corresponding weeks of the years 1915 to 1920, inclusive. In instances in which data for the full six years are incomplete, the median is that for the number of years for which information is available.

City.	Median for pre- vious years.	Week ended July 9, 1921.		City.	Median for pre- vious years.	Week ended July 9, 1921.	
		Cases.	Deaths.			Cases.	Deaths.
<b>Alabama:</b>				<b>New Jersey:</b>			
Birmingham	28	5	1	Atlantic City	6	2	
Mobile	1		2	Jersey City	0	1	
Montgomery	0	1		Kearny	0	1	
<b>Arkansas:</b>				Perth Amboy	0	1	
Little Rock	0	3		<b>New York:</b>			
<b>California:</b>				Albany	2		
Alameda	0	1		Ithaca	0		
Long Beach	0	1		Mount Vernon	0		
Los Angeles	5	1		New York	15	26	3
Sacramento	0	2		Niagara Falls	0		1
San Bernardino	0	1		Rochester	0	1	
San Francisco	2	1	1	<b>North Carolina:</b>			
<b>Colorado:</b>				Durham	3	9	1
Denver	2	3		Winston-Salem	5	1	
Pueblo	1	1		<b>Ohio:</b>			
<b>Connecticut:</b>				Bueyrus	0		
Hartford	0		1	Cincinnati	1		
New Haven	1	3		Cleveland	3	2	
<b>District of Columbia:</b>				Dayton	0		
Washington	3	8	2	Marion	0		
<b>Georgia:</b>				Niles	0		
Atlanta	2	4		Springfield	0	1	
Brunswick	1	1		Toledo	1	2	1
Savannah	2	1	1	<b>Oklahoma:</b>			
<b>Illinois:</b>				Oklahoma City	0	3	
Blue Island		1		<b>Pennsylvania:</b>			
Chicago	6	3		Canonsburg	0		
Mattoon	0	1		Carbondale	0	2	
<b>Indiana:</b>				Carnegie	0	4	
Indianapolis	1		1	Easton	0		
Logansport	0	1		Erie	1	2	
South Bend	0	1		Harrisburg	0	1	
<b>Kansas:</b>				Jeanette	0	2	
Atchison	0	3		Meadville	0	1	
Coffeyville	0	2	1	New Castle	0	1	
Fort Scott	0	1		Philadelphia	10	10	2
Hutchinson	0	3		Pittsburgh	2	4	
Topeka	2	1		Reading	0	3	
Wichita	0	1		Sharon	0	1	
<b>Kentucky:</b>				Washington	0	2	
Covington	1		1	West Chester	0	1	
Lexington	0	5	2	York	1	2	
Louisville	5	6		<b>South Carolina:</b>			
<b>Maine:</b>				Charleston	6	5	1
Bangor	0	3		Columbia	2	1	
Biddeford	0	1		<b>Tennessee:</b>			
Lewiston	0	1		Chattanooga	4		
Portland	0	1	1	Knoxville	2	1	1
<b>Maryland:</b>				Memphis	3	3	1
Baltimore	6	12	2	Nashville	11	6	
Cumberland	0	1		<b>Texas:</b>			
<b>Massachusetts:</b>				Cerro Christi	0	2	
Boston	2	4	1	Dallas	7	1	
Chelsea	1	1		El Paso	0	1	1
Everett	0	1		Fort Worth	4	1	
Fall River	1	1		Waco	0	1	
Lewell	0	1		<b>Utah:</b>			
New Bedford	2	1		Salt Lake City	0	1	
Newburyport	0	1		<b>Virginia:</b>			
<b>Michigan:</b>				Danville	0	3	
Alpena	1			Lynchburg	0	1	
Detroit	9	6	2	Norfolk	4	1	
Muskegon	6	2		Portsmouth	0	2	
Saginaw	0	1		Richmond	1	1	
<b>Minnesota:</b>				<b>Washington:</b>			
Hibbing	1	2		Tacoma	0	1	
Minneapolis	1	2		<b>West Virginia:</b>			
St. Cloud	0	1		Bluefield	0	1	
St. Paul	0	1		Charleston	3	4	
<b>Missouri:</b>				Fairmont	0	2	
St. Louis	3	5		Huntington	6	4	
<b>Nebraska:</b>				Moundsville	0	2	
Omaha	0	1					

**CITY REPORTS FOR WEEK ENDED JULY 9, 1921—Continued.**  
**DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS.**

City.	Popula- tion Janu- ary 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuber- culosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Alabama:										
Birmingham	178,270	68	2		3	1			1	3
Mobile	60,151	26							4	1
Montgomery	43,464	26	1						7	
Arizona:										
Tucson	20,292	12					1			2
Arkansas:										
Fort Smith	28,811						1			
Little Rock	64,997		1		1		1			
North Little Rock	14,048		1		1		1			
California:										
Alameda	28,806	9								
Bakersfield	18,638	14								3
Berkeley	55,886	8	3							
Eureka	12,923	4							2	1
Long Beach	55,593	13								
Los Angeles	576,673	132	43	1	9		8		34	13
Oakland	216,361	38	6	1					4	1
Pasadena	45,354	8			7		1			
Richmond	16,843	1					1			
Riverside	19,341	2								
Sacramento	65,857	14	5	1	1		2			1
San Bernardino	18,721	8								3
San Diego	74,083	20			38		3		4	
San Francisco	508,410	106	23	3	3		6		20	9
Santa Cruz	10,917	3								
Colorado:										
Colorado Springs	30,105	18					1		10	6
Denver	256,399	64	17	1	2		7			11
Pueblo	42,908		11						1	
Connecticut:										
Bridgeport	143,538	28	3		1		3		5	6
Danbury town	22,325	7		1						
Derby	11,238	2								
Fairfield town	11,475	0			1					
Greenwich town	22,123		1		4					
Hartford	133,036	34	5		14		2			1
Manchester town	18,370	2	1				1		2	
Meriden	28,842						1		1	
Millford town	10,198	2	1				1			
New Haven	162,519	27	5				4		5	2
New London	25,688	5								
Norwalk	27,700	7	1				3			1
Delaware:										
Wilmington	110,168	25					4			5
District of Columbia:										
Washington	437,571	126	3		34		5		18	10
Georgia:										
Atlanta	200,616	60	2		1		2			2
Brunswick	14,413	4	2							
Savannah	82,252	38	1				2			
Valdosta	10,783	1	2						1	
Idaho:										
Boise	21,303	6					2			
Illinois:										
Alton	24,682	5								1
Aurora	36,397	8								1
Bloomington	28,725	10							2	1
Blue Island	11,324	5		1			1			
Centralia	12,491	1								
Chicago	2,701,705	597	127	5	106	3	23		127	26
Cicero	44,995	5	5		3		1			
Danville	32,750						1			
Decatur	42,818	4								
Elgin	27,454	6			1				1	1
Evanston	37,215	13	2	1						
Forest Park	10,768	5	1							
Galesburg	23,534	7								
Jacksonville	15,713	10								
Kewanee	16,026	3					1			
La Salle	13,060	2	1							
Mattoon	12,562	1								1
Oak Park	30,830	10	1		3					
Peoria	76,121	23	4				2		1	
Rock Island	35,177	8							2	2
Springfield	50,183	15	1	1	4		1		2	

## CITY REPORTS FOR WEEK ENDED JULY 9, 1921—Continued.

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

City.	Popula- tion Janu- ary 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuber- culosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Indiana:										
Bloomington.....	11,595	3								
Ekhart.....	24,277	7	3						1	1
Evansville.....	85,284	12	1							
Fort Wayne.....	36,549	21	3					1		2
Frankfort.....	11,585	3								
Gary.....	55,378	15						1		1
Hammond.....	26,004	7	1	1						
Huntington.....	14,000	1	2							
Indianapolis.....	314,194	64	3	1	2		2		5	4
Kokomo.....	30,067	10	1							
La Fayette.....	22,486	7						1		2
Logansport.....	21,626	4								
Marion.....	23,747	6	2							
Mishawaka.....	15,195	5	2							
Muncie.....	36,624	10			1		1			1
Richmond.....	26,765	19						1		
South Bend.....	70,983	21	1	2			1			1
Terre Haute.....	66,093	16								1
Iowa:										
Burlington.....	24,057								1	1
Cedar Rapids.....	45,566		1							
Council Bluffs.....	36,162	11								
Davenport.....	56,727				1		1			
Des Moines.....	126,468		2				1			
Dubuque.....	39,141		3							
Mason City.....	20,055						1			
Muscatine.....	16,068	4								
Kansas:										
Atchison.....	12,630								1	
Coffeyville.....	13,452	4								
Fort Scott.....	10,693	3	1						2	
Hutchinson.....	23,233				2				1	
Kansas City.....	101,177		3						4	
Lawrence.....	12,456	2			2					
Leavenworth.....	16,912		4							
Parsons.....	16,028		3							
Salina.....	15,935	6							1	
Topeka.....	50,622	14						1		
Wichita.....	72,128	19	3				3			1
Kentucky:										
Covington.....	57,121	22				1			2	3
Lexington.....	41,534	18				1			2	2
Louisville.....	234,891	90			8		5		11	10
Paducah.....	24,735						1			
Louisiana:										
Monroe.....	12,675	11								1
New Orleans.....	387,219	122	6				1		23	14
Maine:										
Auburn.....	16,985	1					1			
Biddeford.....	18,008	2								
Lewiston.....	31,791	8					5		1	
Portland.....	69,272	20	2		1					1
Sanford.....	10,691	4								
Waterville.....	13,351		1							
Maryland:										
Baltimore.....	733,826	181	11		24		2		20	27
Cumberland.....	29,837	9								
Massachusetts:										
Adams.....	12,967	4				1				
Amesbury.....	10,036	3								1
Arlington.....	18,665	2				12				
Attleboro.....	19,731	6							1	3
Belmont.....	10,749	1				1				
Beverly.....	22,561	5				1			2	
Boston.....	743,060	149	39	3	85	1	18	1	34	11
Braintree.....	10,580	3	1							1
Brookline.....	37,748	7	1		1				2	
Cambridge.....	109,694	22	3		5		2		5	4
Chelsea.....	43,184	10			1		1			1
Chicopee.....	36,214	8								1
Clinton.....	12,979	0								

**CITY REPORTS FOR WEEK ENDED JULY 9, 1921—Continued.**

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

## CITY REPORTS FOR WEEK ENDED JULY 9, 1921—Continued.

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

City.	Population January 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Nebraska:										
Lincoln.....	54,934	13							1	1
Omaha.....	191,601	39	5		3		10			
Nevada:										
Reno.....	12,016	2								
New Hampshire:										
Berlin.....	16,104	6								
Dover.....	13,029	2	1							
Keene.....	11,210	2								1
Manchester.....	78,384	18	2				3			
Nashua.....	28,379	11							7	1
New Jersey:										
Asbury Park.....	12,400	4							2	
Atlantic City.....	50,682	12	1						2	
Bayonne.....	76,754	2			1			1		
Bloomfield.....	22,019	4	1		4		2		1	
Clifton.....	26,470	4					1			
East Orange.....	50,710	1			11				1	
Elizabeth.....	95,682	8			3		1		1	
Englewood.....	11,627	4					2			
Garfield.....	19,381	1								
Hackensack.....	17,667	6							1	1
Harrison.....	15,721				2					
Hoboken.....	68,186	15	2							
Irvington.....	25,480		2				2			
Jersey City.....	297,864		12		6		4		5	
Kearny.....	26,724	2	1						3	
Montclair.....	28,810	3			2				1	
New Brunswick.....	32,779	2			1		1			
Newark.....	414,216	90	15		39	1	2	1	22	8
Orange.....	33,268	10			6	1			1	
Passaic.....	63,824	11	2				3		1	
Paterson.....	135,896		4		10		3		8	
Perth Amboy.....	41,707	6	1						1	
Philipsburg.....	16,923	2								
Plainfield.....	27,700	6					4			
Summit.....	10,174	3								
Trenton.....	119,269	24	1		23	2	2		8	3
Union.....	20,651		1		1					
West Hoboken.....	49,068	7					1			
West New York.....	29,926	2	1		1		2	1		
West Orange.....	15,573	3			1					
New Mexico:										
Albuquerque.....	15,157	12					1		3	4
New York:										
Albany.....	113,344		9		12				9	
Auburn.....	36,192	13	3				1			
Binghamton.....	66,800	16					3		1	
Buffalo.....	506,775	114	8	2	19		15	2	28	6
Cohoes.....	22,987	6							3	
Elmira.....	45,305	8								
Geneva.....	14,648	1								
Glens Falls.....	16,638	4								
Ithaca.....	17,004	7			1		1		1	
Jamestown.....	38,917	9			62	1			1	
Lockport.....	21,08	8								1
Mount Vernon.....	42,726	9			2				1	1
Newburgh.....	30,366	5			1					1
New York.....	5,621,151	1,069	169	18	133	3	67	5	201	195
Niagara Falls.....	50,760	22	3	1			2			2
North Tonawanda.....	15,482	6	1							
Ogdensburg.....	14,609	3								
Olean.....	20,506	5					1			
Peekskill.....	15,868	1	1		7					
Poughkeepsie.....	35,000	10					2		1	
Rochester.....	295,750	57	8	1	5		2		10	2
Saratoga Springs.....	13,181	7							2	1
Schenectady.....	88,723	16	5		5		1		1	
Syracuse.....	171,717	31	4		14		2	1	2	4
Troy.....	72,013	24	1						6	1
Watervliet.....	15,073	5								
White Plains.....	21,031	3								
Yonkers.....	103,226	16	4		2		3			

\*Pulmonary tuberculosis only.



## CITY REPORTS FOR WEEK ENDED JULY 9, 1921—Continued.

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

City.	Population January 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Pennsylvania—Continued.										
Shenandoah.	24,726		1					1		
Washington.	21,480							1		
West Chester.	11,717							1		
Wilkes-Barre.	73,833		2		1				3	
York.	47,512		6					1		
Rhode Island:										
Cranston.	29,407	5			3					
Newport.	30,255	7					4			1
Pawtucket.	64,248	10	1				2			
Providence.	237,595	35	6		3		3			5
South Carolina:										
Charleston.	67,957	13					2		1	3
Columbia.	57,524		1		1				1	
Tennessee:										
Chattanooga.	57,995				3				2	2
Knoxville.	77,618		1							
Memphis.	162,351	59	2				1		11	10
Nashville.	118,342	46	1		8		2		1	9
Texas:										
Beaumont.	40,422	11					1			
Corpus Christi.	10,522	3	2	1						
Dallas.	158,973	40	1		10		1		7	3
El Paso.	77,543	40	3							8
Fort Worth.	106,482		2		1		1		4	
Galveston.	44,255		6							
Waco.	38,500	19								2
Utah:										
Salt Lake City.	118,110	33	5	2			1		2	3
Vermont:										
Burlington.	22,779	6			1		1			
Rutland.	14,954	2			1					
Virginia:										
Alexandria.	18,060	1								
Danville.	21,539	2	8	1						
Lynchburg.	29,956	9	1		5					1
Norfolk.	115,777		1					3		1
Petersburg.	31,002	13			3					2
Portsmouth.	54,357	16								1
Richmond.	171,667	60	1		20		1		8	4
Roanoke.	50,842	19	1				1			1
Washington:										
Everett.	27,644						1			
Seattle.	315,652		1				4			
Spokane.	104,437		2		17		2			
Tacoma.	96,965		1		11		1		6	
Vancouver.	12,637		1							
Yakima.	18,539				8					
West Virginia:										
Charleston.	39,608	8								
Huntington.	50,177	22	1							1
Martinsburg.	12,515		3							
Moundsville.	10,669	2								
Parkersburg.	20,050	6	1							
Wheeling.	54,322	13	1				4			
Wisconsin:										
Appleton.	19,561		1		1				1	
Beloit.	21,284	5								
Eau Claire.	20,880							2		
Fond du Lac.	23,427	9	4				1			
Green Bay.	31,017	8	4							1
Janesville.	18,293	9				5		1		1
Kenosha.	40,472	4	1							
Le Crosse.	30,363				1					
Madison.	38,378	11	1			1				
Milwaukee.	457,147		10		5		6		48	
Oshkosh.	33,162	12					1			2
Racine.	58,503	11		1				3		
Sheboygan.	30,955		1					6		
Superior.	39,624	7						2		
Wyoming:										
Cheyenne.	13,829	3			1		3			

## FOREIGN AND INSULAR.

### PLAQUE ON VESSEL.

Steamship "Ralph Moller"—At Chefoo, China.<sup>1</sup>

On June 8, 1921, the steamship *Ralph Moller*, from Vladivostok, Siberia, arrived at Chefoo, China, with a history of three fatal cases of plague occurring on board en route. Later information showed that a case of plague which terminated fatally was removed from the vessel at Vladivostok.

### JAMAICA.

#### Infectious Disease (Alastrim or Kaffir Pox).

During the week ended June 25, 1921, 109 new cases of alastrim or Kaffir pox were reported in the island of Jamaica. During the week ended July 2, 1921, 131 new cases of alastrim were reported.

#### Typhoid Fever—Kingston and Vicinity.

During the week ended July 2, 1921, 13 cases of typhoid fever were notified in Kingston, Jamaica, and 22 cases in the surrounding country. The reported prevalence of the disease from January 1 to May 31, 1921, was, for Kingston, 187 cases, and from January 1 to June 30, 1921, for St. Andrew, adjoining Kingston, 49 cases.

### JAPAN.

#### Quarantine Against Smallpox Suspended—Nagasaki.

Quarantine against epidemic smallpox in Nagasaki, Japan, was reported suspended June 18, 1921.

Smallpox was declared epidemic at Nagasaki April 28, 1921.

### MADAGASCAR.

#### Plague—Tananarive.

Plague was reported present, July 11, 1921, at Tananarive, Madagascar.

### MEXICO.

#### Plague—Plague-Infected Rats—Tampico.

During the period July 11 to 17, 1921, four cases of plague with two deaths were reported at Tampico. During the same period 19 plague-infected rats were found out of 2,273 rats taken.

<sup>1</sup> Public Health Reports, July 1, 1921, p. 1534, and July 15, 1921, p. 1655.

## PERU.

## Plague—Yellow Fever—June 1-15, 1921.

During the period June 1 to 15, 1921, there were reported in Peru 10 cases of plague, with 9 deaths, occurring in the departments of Libertad, Lima, and Piura, and 14 cases of yellow fever, with 9 deaths, occurring in the departments of Lambayeque and Libertad.

## RUSSIA.

## Typhus Fever—April-May, 1921.

Typhus fever has been reported in Russia as follows: Province of Estonia, during the month of May, 1921, 41 cases (population, estimated, 1,000,000); Province of Latvia, month of April, 1921, 209 cases (population, estimated, 1,600,000).

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

Reports Received During Week Ended July 29, 1921.<sup>1</sup>

## CHOLERA.

Place.	Date.	Cases.	Deaths.	Remarks.
India:				
Calcutta.....	May 22-28.....	114	97	
Rangoon.....	May 29-June 4.....	1	1	
Indo-China:				
Cholon.....	June 6-12.....	5	4	
Saigon.....	do.....	14	8	
Siam:				
Bangkok.....	May 8-14.....	6	2	

## PLAQUE.

Ecuador:				
Guayaquil.....	June 1-15.....	1		
Egypt:				
Cities:				
Alexandria.....	June 17-21.....	2		
Port Said.....	June 22.....	1	1	
Suez.....	June 18.....	1		
India:				
Calcutta.....	May 22-28.....	1	1	
Karachi.....	June 5-11.....	2	1	
Rangoon.....	May 29-June 4.....	11	9	
Indo-China:				
Saigon.....	May 23-June 12.....	4	1	
Madagascar:				
Tanamalivo.....	July 11.....			Present.
Mexico:				
Tampico.....	June 11-17.....	4	2	Infected rodents found, 19.
Peru:				June 1-15, 1921: Cases, 10; deaths, 9.
Department—				
Libertad—				
Salaverry.....	June 1-15.....	1		
Trujillo.....	do.....	2	3	
Lima—				
Lima.....	do.....	2	3	
Piura—				
Piura.....	do.....	1		
Talara.....	do.....	4	3	
Senegal:				
Dakar.....	May 1-31.....	5	5	

<sup>1</sup> From medical officers of the Public Health Service, American consuls, and other sources.

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

## Reports Received During Week Ended July 29, 1921—Continued.

## PLAGUE—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Burmah:				
Bangkok.....	May 8-14.....	2	2	
Syria:				
Beirut.....	May 31-June 10.....	1	.....	
On vessel:				
S. S. Ralph Moller.....	June 8 .....	4	1	At Chefoo, China, from Vladivostok, Siberia. Three fatal cases en route. One case with fatal termination removed at Vladivostok.

## SMALLPOX.

Brazil:				
Rio de Janeiro.....	May 22-28.....	1	.....	
Canada:				
New Brunswick—				
Westmoreland County.....	June 26-July 2....	2	.....	
Ontario—				
Hamilton.....	July 3-9.....	1	.....	
Ottawa.....	June 26-July 2....	11	.....	
Chile:				
Antofagasta.....	June 6-19.....	82	45	
China:				
Amoy.....	May 22-June 4.....	.....	2	
Foochow.....	May 29-June 11.....	.....		Present.
Manchuria—				
Dairen.....	May 23-June 5....	18	2	
Mukden.....	May 22-June 11.....	.....		Present.
Nanking.....	May 22-June 4.....	.....		Do.
Tientsin.....	May 29-June 4.....	10	.....	
Tsingtao.....	May 30-June 5.....	1	.....	
Chosen (Korea):				
Chemulpo.....	May 1-31.....	7	2	
Fusan.....	do.....	11	3	
Gensan.....	do.....	5	2	
Seoul.....	do.....	1	.....	
Colombia:				
Santa Marta.....	June 26-July 2.....	.....		Do.
Cuba:				
Antilla.....	July 3-9.....	10	.....	
Matanzas.....	do.....	1	.....	
Nuevitas.....	July 4-10.....	6	.....	
Ecuador:				
Guayaquil.....	June 1-15.....	10	.....	
Germany.....				May 22-23, 1921: Cases, 4.
India:				
Calcutta.....	May 22-28.....	1	1	
Karachi.....	June 5-11.....	3	3	
Rangoon.....	May 29-June 4.....	1	.....	
Java:				
West Java—				
Batavia.....	May 20-26.....	2	3	
Lebak.....	do.....	9	1	
Jugoslavia.....				Mar. 7-13, 1921: Cases, 83; deaths, 20.
Mexico:				
Mexico City.....	June 12-18.....	28	.....	Including municipalities in 1 federal district.
Russia:				
Latvia—				
Riga.....	Apr. 1-30.....	26	.....	
Senegal:				
Dakar.....	May 1-31.....	1	1	
Spain:				
Barcelona.....	June 16-22.....	.....	1	
Syria:				
Beirut.....	May 31-June 20.....	1	1	
Turkey:				
Constantinople.....	June 12-18.....	3	.....	

**CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.**
**Reports Received During Week Ended July 29, 1921—Continued.**
**TYPHUS FEVER.**

Place.	Date.	Cases.	Deaths.	Remarks.
Asia Minor:				
Smyrna.....	June 12-18.....	1.....		In district.
Chile:				
Concepcion.....	Apr. 12-June 20.....		8.....	
Valparaiso.....	Mar. 27-May 28.....		4.....	
Chosen (Korea):				
Fusan.....	May 1-31.....	1.....		
Gensan.....	do.....	2.....		
Seoul.....	do.....	1.....		
Czechoslovakia:				
Prague.....	June 5-11.....	4.....	2.....	
Egypt:				
Cairo.....	Apr. 16-22.....	15.....	6.....	
Germany:				
Hamburg.....	May 27-June 4.....	1.....		
Jugoslavia.....				
Mexico:				
Mexico City.....	June 12-18.....	16.....		
Russia:				
Province—				
Estonia.....				
Latvia.....				
Syria:				
Beirut.....	May 31-June 10.....	1.....		
Turkey:				
Constantinople.....	June 12-18.....	4.....		

**YELLOW FEVER.**

Peru:				
Department—				
Lambayeque—				
Chiclayo.....	June 1-15.....	4.....	3.....	
Monsefu.....	do.....	3.....		
Pacora.....	do.....	1.....		
Libertad—				
Caca Grande.....	do.....	1.....		
Pacanga.....	do.....	1.....	1.....	
Paljan.....	do.....	3.....	4.....	
Trujillo.....	do.....	1.....	1.....	

**Reports Received from July 2 to 22, 1921.<sup>1</sup>**
**CHOLERA.**

Place.	Date.	Cases.	Deaths.	Remarks.
India.....				Mar. 6-Apr. 9, 1921: Deaths, 11,158.
Bombay.....	May 1-7.....	1.....	1.....	
Calcutta.....	May 8-21.....	150.....	138.....	
Madras.....	May 15-June 4.....	2.....	1.....	
Rangoon.....	Apr. 24-May 21.....	14.....	13.....	
Indo-China.....				Jan. 1-31, 1921: Cases, 80; deaths, 15.
City—				
Saigon.....	May 9-15.....	51.....	36.....	
Provinces—				
Annam.....	Jan. 1-31.....	42.....		In January, 1920: No cases.
Cambodia.....	do.....	8.....	2.....	January, 1920: Cases, 27; deaths, 14.
Cochin-China.....	do.....	18.....	9.....	January, 1920: Cases, 13; deaths, 10.
Tenkin.....	do.....	12.....	4.....	January, 1920: No cases.

<sup>1</sup> From medical officers of the Public Health Service, American consuls, and other sources. For reports received from Jan. 1 to July 1, 1921, see Public Health Reports for July 1, 1921. The tables of epidemic diseases are terminated semianually and new tables begun.

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

## Reports Received from July 2 to 22, 1921—Continued.

## CHOLERA—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Philippine Islands:				
Manila.....	May 22-23.....	1.....		
Province— Pampanga.....	June 5-11.....	1.....	1.....	
Siam:				
Bangkok.....	Apr. 24-May 7.....	4.....	1.....	

## PLAQUE.

Brazil:				
Bahia.....	May 15-21.....	1.....	1.....	
Maranhao.....	June 28.....	1.....	1.....	
British East Africa:				
Kenya Colony— Kisumu.....	Apr. 24-May 21.....			Present.
Ceylon:				
Colombo.....	May 8-14.....	1.....	1.....	
China:				
Amoy.....	May 15-21.....		2.....	
Foochow.....	do.....			Present.
Manchuria— Harbin.....	May 3-22.....	46.....		
Ecuador:				
Guayaquil.....	May 1-31.....	9.....	1.....	
Egypt:				
Cities— Alexandria.....	May 21-June 16.....	7.....	3.....	Jan. 1-June 16, 1921: Cases, 162; deaths, 76.
Port Said.....	June 16.....	2.....	1.....	
Suez.....	May 20-June 15.....	5.....	4.....	
Provinces— Assiout.....	May 24-June 16.....	9.....	7.....	One case pneumonic.
Gharbieh.....	June 2-14.....	3.....		One case septicæmic.
Minieh.....	May 23-June 10.....	2.....	1.....	
India.....				
Bombay.....	May 1-21.....	196.....	141.....	May 1-21, 1921: Cases, 1,206; deaths, 959.
Calcutta.....	May 8-21.....	7.....	7.....	
Karachi.....	May 8-June 4.....	14.....	11.....	
Madras Presidency.....	May 22-June 4.....	64.....	43.....	
Rangoon.....	Apr. 24-May 28.....	60.....	57.....	
Indo-China.....				
Saigon.....				
Mesopotamia:				
Bagdad.....	Apr. 1-30.....	5.....	2.....	
Mexico:				
Tampico.....	June 11-30.....	33.....		Last case, June 18, 1921. Total from Jan. 1 to June 18, 1921, 145.
Do.....	July 1-10.....	7.....		Mar. 1-31, 1921: Cases, 76; deaths, 44. Apr. 1-30, 1921: Cases, 45; deaths, 20.
Peru.....				
Department— Arequipa.....	Mar. 1-31.....	2.....		At Mollendo.
Callao.....	do.....	7.....	1.....	At Callao.
Lambayeque.....	do.....	2.....	1.....	At Chiclayo.
Libertad.....	do.....	12.....	7.....	In 5 localities.
Lima.....	do.....	32.....	16.....	At Lima city, 20 cases, 13 deaths.
Piura.....	do.....	21.....	19.....	At Payta, Piura, and Sullivan.
Ancachs.....	Apr. 1-30.....	4.....	1.....	At Huarmey.
Arequipa.....	do.....	3.....	3.....	At Mollendo.
Callao.....	do.....	8.....		At Callao.
Lambayeque.....	do.....	1.....	1.....	At Chiclayo.
Libertad.....	do.....	16.....	5.....	In 5 localities.
Lima.....	do.....	6.....	3.....	In Lima city, 3 cases, 1 death.
Piura.....	do.....	5.....	7.....	At Payta, Sullivan, and Talara.
Siam:				
Bangkok.....	Apr. 24-30.....	1.....	1.....	
Straits Settlements:				
Singapore.....	May 8-21.....	2.....	2.....	
On vessel:				
S. S. Kishenev.....	May 2.....	1.....		At Chefoo, China. Plague death en route. Vessel sent to quar- antine, Kentucky Island, where to May 6 a total of 16 deaths was reported. (Public Health Reports, July 1, 1921, p. 1534.)

**CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.**
**Reports Received from July 2 to 22, 1921—Continued.**
**PLAQUE—Continued.**

Place.	Date.	Cases.	Deaths.	Remarks.
On vessel: S. S. Oreland.....				At Genoa, Italy, June 12, 1921, from La Plata, Argentina. Two fatal cases plague in crew en route.

**SMALLPOX.**

Algeria: Algiers.....	May 1-31.....	2	.....	
Asia Minor: Smyrna.....	May 22-28.....	1	.....	On the s. s. Nicholas.
Australia: Melbourne.....	Apr. 9-23.....	4	1	Mild epidemic.
Bolivia: La Paz.....	Apr. 1-30.....	5	4	
Brazil: Pernambuco.....	Mar. 28-May 22.....	28	4	
	May 8-14.....	1	1	
British East Africa: Kenya Colony— Zanzibar.....	do.....	12	4	Origin India.
Bulgaria: Sofia.....	May 15-31.....	6	.....	
Canada: Alberta— Calgary.....	May 26-June 18.....	3	.....	
British Columbia— Vancouver.....	May 29-June 11.....	5	.....	
Manitoba— Winnipeg.....	May 28-June 18.....	.....	5	
New Brunswick— Restigouche County.....	June 19-25.....	1	.....	
	Westmoreland County.....	June 5-11.....	1	
Nova Scotia— Sydney.....	June 5-18.....	2	.....	
	June 26-July 2.....	4	.....	
Ontario— Hamilton.....	June 12-18.....	3	.....	
	June 5-11.....	1	.....	At two localities in vicinity, 2 cases.
	London.....	2	.....	
	Montreal.....	1	.....	
	North Bay.....	3	.....	
	Do.....	1	.....	
	Ottawa.....	1	.....	
	Toronto.....	21	.....	
	do.....	5	.....	
	June 26-July 2.....	3	.....	
Saskatchewan— Regina.....	June 5-25.....	3	.....	
	June 7-27.....	3	.....	
Chile: Antofagasta.....	May 16-June 5.....	146	61	
	May 21.....	2	.....	Present. Also at interior nitrate plants.
	May 30-June 5.....	.....	.....	
China: Amoy.....	May 8-21.....	.....	2	
	May 16-25.....	6	1	
	.....	.....	.....	Present.
Canton.....	Apr. 1-30.....	.....	.....	Do.
Chungking.....	May 1-21.....	.....	.....	Do.
Foochow.....	May 8-21.....	.....	.....	Do.
Hankow.....	May 15-21.....	4	1	
Manchuria— Harbin.....	May 16-29.....	2	.....	
	May 9-22.....	18	2	
	.....	.....	.....	Do.
Nanking.....	May 8-21.....	.....	.....	Mission hospital.
Tientsin.....	May 8-28.....	14	1	
Tsingtau.....	May 8-22.....	2	1	
Colombia: Santa Marta.....	June 5-25.....	.....	.....	Present.

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

## Reports Received from July 2 to 22, 1921—Continued.

## SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Cuba:				
Antilla.....	July 5-25.....	7.....		
Do.....	June 26-July 2.....	4.....		
Cienfuegos.....	.....do.....	1.....		
Matanzas.....	June 12-18.....	1.....	1.....	
Santiago.....	June 1-20.....	10.....	1.....	
Ecuador:				
Guayaquil.....	May 1-31.....	20.....		
Egypt:				
Cairo.....	Mar. 19-25.....	1.....		
Port Said.....	Apr. 2-8.....	1.....		
Finland.....	May 1-15.....	1.....		
France:				
Rouen.....	May 1-29.....	2.....		
Germany.....				
Great Britain:				
Nottingham.....	May 29-June 4.....	1.....		
Greece:				
Saloniki.....	June 6-12.....		1.....	
Haiti:				
Capo Haitien.....	June 19-25.....	24.....	2.....	
India.....				Mar. 20-Apr. 9, 1921: Deaths, 1,944.
Bombay.....	May 1-7.....	32.....	20.....	
Calcutta.....	May 8-21.....	5.....	5.....	
Karachi.....	May 29-June 4.....	15.....	14.....	
Madras.....	May 8-June 4.....	29.....	9.....	
Rangoon.....	Apr. 24-May 28.....	19.....	3.....	
Indo-China:				
City—				Jan. 1-31, 1921: Cases, 102; deaths, 15.
Saigon.....	May 9-15.....	2.....	1.....	
Provinces—				
Anam.....	Jan. 1-31.....	35.....		January, 1920: Cases, 16; deaths, 3.
Cambodia.....	do.....	21.....	3.....	January, 1920: Cases, 139; deaths, 54.
Cochin-China.....	do.....	19.....	12.....	January, 1920: Cases, 8; deaths, 1.
Tonkin.....	do.....	27.....		January, 1920: Cases, 224; deaths, 43.
Italy:				
Catania.....				Province: June 6-20, 1921: Cases, 5.
Genoa.....	Apr. 1-May 31.....	11.....		
Messina.....	May 23-June 5.....	1.....	1.....	
Palermo.....	May 18-June 14.....	6.....	1.....	
Japan:				
Kobe.....	May 24-30.....	1.....		
Nagasaki.....	May 23-June 12.....	5.....	1.....	
Java:				
West Java—				
Batavia.....	May 6-12.....	2.....		
Buitenzorg.....	Apr. 29-May 5.....	10.....		
Garoet.....	May 6-12.....	1.....		
Krawang.....	Apr. 29-May 19.....	26.....	2.....	
Lebak.....	Apr. 29-May 12.....	3.....	1.....	
Mesopotamia:				
Bagdad.....	Apr. 1-30.....	3.....	1.....	
Mexico:				
Chihuahua.....	May 23-June 27.....		3.....	
Mexico City.....	May 15-June 11.....	161.....		
Vera Cruz.....	June 13-19.....		1.....	
Panama:				Jan. 1-June 10, 1921: Cases, 192, of which 32 were in nonresidents.
Canal Zone.....	Jan. 1-June 10.....	2.....		
Colon.....	do.....	111.....		
Panama.....	do.....	47.....		
Poland:				Mar. 1-Apr. 30, 1921: Cases, 1,117; deaths, 142.
Bialystok.....	Mar. 1-Apr. 30.....	3.....		
Cracovia.....	do.....	56.....	6.....	
Kielce.....	do.....	180.....	26.....	
Leopol.....	do.....	52.....	16.....	
Lodz.....	do.....	72.....	9.....	
Lubin.....	do.....	397.....	30.....	
Posen.....	do.....	26.....	2.....	
Silesia.....	do.....	10.....		
Stanislawow.....	do.....	30.....	5.....	
Tarnopol.....	do.....	156.....	31.....	In Teschen.

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

**Reports Received from July 2 to 22, 1921—Continued.**

**SMALLPOX—Continued.**

Place.	Date.	Cases.	Deaths.	Remarks.
Poland—Continued.				
Warsaw.....	Mar. 1-Apr. 30.....	36	4	
Warsaw City.....	do.....	90	13	
Portugal:				
Lisbon.....	May 15-June 4.....		22	
Portuguese East Africa:				
Lourenco Marques.....	May 8-21.....	6	.....	
Rumania:				
Districts—				
Hotin.....	Apr. 1-30.....	40	9	
Orhei.....	Mar. 1-31.....	2	.....	
Russia:				
Province—				
Esthonia.....	Apr. 1-30.....	6	.....	
Spain:				
Barcelona.....	May 12-June 15.....		12	
Malaga.....	May 1-31.....		34	
Tarragona.....	May 9-15.....		1	
Valencia.....	May 22-28.....	1	.....	
Switzerland:				
Zurich.....	May 28-June 11.....	10	.....	
Syria:				
Aleppo.....	Apr. 9-16.....			
Beirut.....	May 10-30.....	1	1	Present.
Tunis:				
Tunis.....	May 30-June 17.....	2	3	
Union of South Africa:				
Cape Province.....	Apr. 24-May 7.....			Outbreaks.
Natal.....	do.....			Do.
Orange Free State.....	do.....			Do.
Transvaal.....	May 22-28.....			Do.

**TYPHUS FEVER.**

Algeria:				
Algiers.....	May 1-31.....	56	8	
Oran.....	May 22-June 20.....	29	39	
Bolivia:				
La Paz.....	Apr. 1-30.....	32	29	
China:				
Antung.....	May 30-June 5.....	1	.....	
Hankow.....	May 22-June 11.....	3	.....	
Manchuria—				
Harbin.....	May 23-29.....	1	.....	
Egypt:				
Alexandria.....	May 21-June 16.....	16	6	
Cairo.....	Mar. 19-Apr. 15.....	54	17	
Port Said.....	Apr. 2-15.....	8	1	
Finland.....	May 1-15.....	5	.....	
Germany.....				Apr. 24-May 7, 1921: Cases, 6.
Great Britain:				
Dublin.....	May 29-June 4.....	1	.....	
Greece:				
Saloniki.....	May 23-June 12.....	20	3	Of these 15 among Russian refugees.
Japan:				
Nagasaki.....	May 23-June 5.....	7	2	
Jugoslavia:				
Belgrade.....	May 1-14.....	6	.....	Jan. 30-Feb. 5, 1921: Cases, 39; deaths, 8.
Mexico:				
Mexico City.....	May 15-June 11.....	70	.....	Including municipalities in Federal district.
Poland.				
District—				
Bialystok.....	Mar. 1-Apr. 30.....	833	45	
Cracovia.....	do.....	603	90	
Kielce.....	do.....	848	62	
Leopol.....	do.....	2,508	277	
Lodz.....	do.....	521	53	
Lublin.....	do.....	1,446	83	
Posen.....	do.....	77	5	
Silesia.....	do.....	26	.....	
Stanislawow.....	do.....	1,557	232	
Tarnopol.....	do.....	1,855	194	
Warsaw.....	do.....	972	61	
Warsaw city.....	do.....	223	29	In Teschen.

July 29, 1921.

1792

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

## Reports Received from July 2 to 22, 1921—Continued.

## TYPHUS FEVER—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Rumania:				
Districts—				
Hotin.....	Apr. 1-30.....	107	10	
Orhei.....	Mar. 1-31.....	80		
Russia:				
Province—				
Estonia.....	Apr. 1-30.....	57		
Siberia—				
Vladivostok.....	Mar. 1-Apr. 30.....	4	1	
Spain:				
Madrid.....	May 1-31.....		1	
Syria:				
Beirut.....	May 20-30.....		1	
Tunis:				
Tunis.....	June 11-17.....		3	
Turkey:				
Constantinople.....	May 22-June 4.....	7		
Union of South Africa:				
Cape Province—				
Capetown.....	May 13-19.....	10	3	Apr. 24—May 28, 1921: Outbreaks. At native cantonment in vicinity.
East London.....	May 22-28.....		1	
Orange Free State.....				Apr. 24—May 28, 1921: Outbreaks.

## YELLOW FEVER.

Mexico:				
Alamo.....	June 1-30.....	10		
Vera Cruz.....	June 13-27.....	7		
Peru:				
Departments—				
Lambayeque—				
Chiclayo.....	Mar. 1-31.....	20	10	
Chongollape.....	do.....	2	2	
Ferrenafe.....	do.....		1	
Lambayeque.....	do.....	15	5	
Monserru.....	do.....	18	4	
Motupo.....	do.....	1	1	
Pomalca.....	do.....	5	1	
Villa Eten.....	do.....	5	1	
Callao—				
Callao.....	Apr. 1-30.....	1		
Lambayeque—				
Chiclayo.....	do.....	23	5	At quarantine station. From Chiclayo.
Chongollape.....	do.....	10	1	
Jayanca.....	do.....	5	2	
Lambayeque.....	do.....	5	2	
Monserru.....	do.....	8	5	
Motupo.....	do.....	45	11	
Olmos.....	do.....	2	4	
Villa Eten.....	do.....	2		
Zana.....	do.....	1		
Libertad—				
Guadalupe.....	do.....	2		
Pueblo Nuevo.....	do.....	1	1	
Trujillo.....	do.....	1	1	Country.