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LYMPHOCYTIC CHORIOMENINGITIS

Report of Two Cases, With Recovery of the Virus from Gray Mice (*Mus musculus*) Trapped in the Two Infected Households [1]

By CHARLES ARMSTRONG, *Senior Surgeon, National Institute of Health, United States Public Health Service* and LEWIS K. SWEET, M. D., *Chief Medical Officer in Pediatrics, Gallinger Municipal Hospital, Washington, D. C.*

The virus of lymphocytic choriomeningitis, first isolated at the National Institute of Health in 1934 (*1*), has since that time been isolated in several localities of the United States (*1, 2, 3, 4, 6, 15*) and in England (*5*), France (*7, 13, 14*), and Japan (*8*), and there is evidence pointing to its presence in Africa (*9*) and Ireland (*10*). The serum-virus protection test performed by Wooley and Armstrong (*11*) on 1,248 sera collected from persons in various parts of the United States, moreover, indicated the existence of immunity in 1·1 percent of them. The great majority of these positive findings were secured with sera from persons giving no history of a central nervous system infection. It is possible, therefore, that there is an unrecognized systemic or possibly asymptomatic type of infection without meningeal manifestations. This concept is in harmony with the results secured in experimental animals inoculated with the virus by routes other than directly into the central nervous system and also with the results secured by Laigret and Durand (*9*) and by Kreis (*12*) in the inoculation of human volunteers. In view of the indicated wide distribution of this virus, the two established cases of lymphocytic choriomeningitis observed in the service of L. K. S. at the Gallinger Municipal Hospital, Washington, D. C., and presented below, are deemed worthy of reporting.

CASE 1—E. P. (87094)

C. F., 23, housewife, was admitted to the Gallinger Municipal Hospital on November 15, 1938, complaining of a severe headache of 4 days' duration. There was no relevant information in either her past or family history.

Four days before admission she developed a severe and persistant frontal headache. The next day she noticed that light "hurt" her eyes, and on November 13, 1938, 2 days after onset, she became

[1] From the National Institute of Health, Washington, D. C., and the Isolation Service of Gallinger Municipal Hospital, Washington, D. C.

nauseated and vomited several times. These symptoms continued until the time of admission.

The patient was a well-developed and well-nourished colored female who was critically ill. Her temperature was 102° F.; pulse rate, 120 per minute; respirations, 26 per minute; systolic blood pressure, 105 mm. of mercury, diastolic, 55 mm. She had marked nuchal rigidity, bilaterally positive Kernig's signs, reduced biceps and triceps tendon reflexes, and absent knee and ankle jerks. She complained of photophobia. There were no other significant physical abnormalities. The ocular fundi were normal.

At the time of admission the patient's blood showed changes characteristic of a slight secondary anemia. The erythrocytes numbered 3.8 million per cubic millimeter and the hemoglobin level was 12.3 grams percent. The leucocytes numbered 8,500 per cubic millimeter.

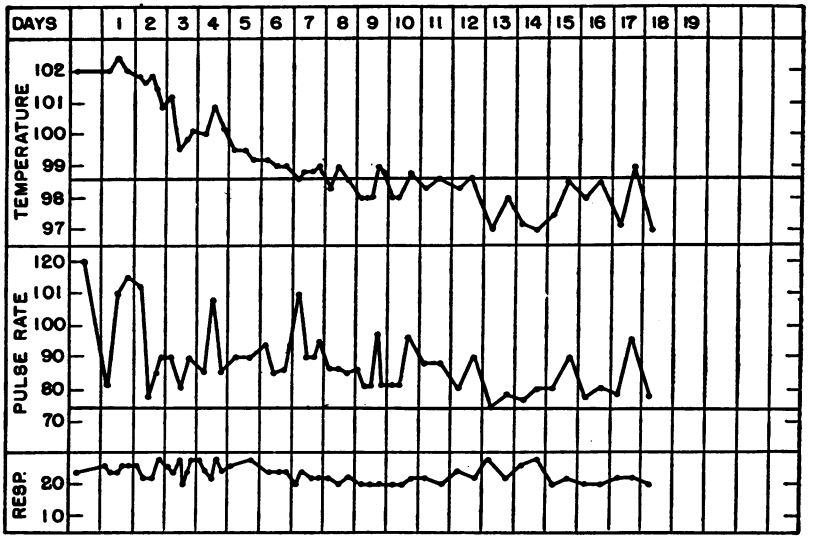

CHART 1 (case 1).

A stained film showed 60 percent of the leucocytes to be polymorphonuclear neutrophiles, 1 percent basophiles, 29 percent lymphocytes, and 10 percent monocytes. Kahn reactions on the blood serum and spinal fluid were negative. The urine was normal.

The spinal fluid on admission was opalescent in character and flowed freely, as if it were under increased pressure. It contained 1,200 cells per cubic millimeter, all of which were lymphocytes. The spinal fluid protein level was 210 milligrams percent; sugar, 40 mg. percent; chloride level, 593 mg. percent. On November 16, 1938, 36 hours after admission of the patient, the spinal fluid contained 1,500 cells, of which 96 percent were lymphocytes and 4 percent were polymorphonuclear cells. Chemical studies were not repeated at that time. A film of the sediment of the initial spinal fluid, stained at Gallinger Hospital,

showed what appeared to be small pleomorphic Gram-negative bacilli, which, however, could not be recovered on culture. This apparent finding led to the institution of sulfanilamide therapy, an initial dose of 50 grains followed by 25 grains every 4 hours being given. An equal amount of sodium bicarbonate was given also. After 2 days the daily dose of sulfanilamide and sodium bicarbonate was reduced to 120 grains each; 4 days after admission they were reduced to 100 grains each per day; and on the sixth day the two drugs were discontinued.

The patient's temperature remained at 102° F. for 2 days, after which time it returned to normal by lysis. It was normal on and after the fifth hospital day. Thereafter, the patient made a rapid and uneventful recovery. She was discharged in good condition on December 3, 1938, and appeared to be in good health when last seen on February 27, 1939.

Virus isolated from case 1.—Spinal fluid, blood, and a specimen of catheterized urine were secured on the fifth day of illness (November 16), chilled, and immediately taken to the National Institute of Health, where animals were inoculated. Six white mice (Swiss strain reared at the N. I. H.) each received 0.03 cc. of spinal fluid (sterile to culture) intracerebrally and 0.25 cc. subcutaneously.

Three of the mice died on the sixth day, two on the seventh, and one on the eighth day, with typical symptoms and pathology (as reported by Dr. R. D. Lillie) of lymphocytic choriomeningitis. The infection has now been carried through seven mouse transfers and has been identified by cross-protection tests as immunologically identical with our original strains. Spontaneous infection with choriomeningitis has never been encountered in this strain of mice; moreover, six mice from the same cage similarly inoculated with normal serum remained well. Spontaneous mouse infection is thus eliminated. Furthermore, guinea pig 909–1 inoculated intraperitoneally with 3 cc. of the same spinal fluid developed symptoms and was bled from the heart on November 23; it died during the following night. Five mice each inoculated intracerebrally with 0.03 cc. of the defibrinated blood diluted with an equal volume of saline developed typical symptoms and died on the sixth to eleventh days with the symptoms and pathology of choriomeningitis.

A second guinea pig, 909–2, was inoculated subcutaneously on November 16 with 7 cc. of urine and intraperitoneally with 2 cc. of defibrinated blood from the patient. The animal developed fever and appeared ill on the ninth day and was etherized on the eleventh day. Guinea pig 909–4, inoculated subperitoneally with heart blood from 909–2, developed fever on the fourth day and was etherized on the ninth day. The pathology as reported by Dr. R. D. Lillie was consistent with lymphocytic choriomeningitis and emulsion of organ extract conveyed the typical disease to five mice.

Virus neutralizing antibodies present.—Samples of serum collected from the patient on November 16 and December 12, 1938, and February 27, 1939, were submitted to the serum-virus protection test (table 1) and clearly demonstrated the development of specific antibodies in the patient following recovery, thus conclusively establishing the case as one of lymphocytic choriomeningitis. For the technique of the serum-virus protection test see previous article by Wooley and Armstrong (*11*).

CASE 2—C. P. (A–86881)

C. M., 17, general cleaner in a well-kept apartment house, had been well until November 5, 1938, when he was seen by Dr. Wm. C. Gaines. He complained of pain in the region of the gall bladder, his temperature was 102.5° F., and appendicitis was suspected. Two days later this pain was gone, but severe headache was present and he had difficulty in remaining awake even while talking; temperature was 99° F., and the Kernig and Babinski were negative. The following day, November 8, 1938, he was found in his room in a semicomatose state. At that time he was very lethargic and was unable to walk. On November 9 his neck was stiff and the Kernig was positive on both sides. A lumbar puncture was attempted. The needle was broken off in the patient's back, and he was transferred immediately to the Gallinger Municipal Hospital.

At the Gallinger Municipal Hospital the patient was found to be a well-developed and well-nourished but critically ill colored male who was in a semicomatose condition. He would not respond to questions. His temperature on admission was 102° F.; pulse rate, 105 per minute; respirations, 24 per minute; systolic blood pressure, 120 mm. of mercury, and diastolic, 90 mm. He showed evidence of photophobia, and exhibited marked nuchal rigidity. Kernig's and Brudzinski's signs were positive; the other reflexes were very sluggish. There was slight edema of the left optic disk; the fundus of the right eye was normal. There were no other physical abnormalities.

The patient's leucocyte count was 5,400 per cubic millimeter of blood. A stained film showed that 80 percent of the leucocytes were neutrophilic polymorphonuclear cells, and 20 percent were lymphocytes. The erythrocyte count was 5.2 million per cubic millimeter; the hemoglobin level was 14.0 grams percent. The urine was normal. Kahn reactions on the blood and spinal fluid were negative.

On admission the spinal fluid was opalescent and blood-tinged. It contained 710 leucocytes per cubic millimeter, of which 95 percent were lymphocytes. The spinal fluid sugar was 29 mg. percent, and the chloride level was 544.5 mg. percent. Two days later the sugar and chloride levels had risen to 45 and 658 milligrams percent, respectively. The colloidal gold reaction of the spinal fluid on November 12 was

2-2-2-2-1-0-0-0-0-0. The specimen of spinal fluid on which the test was performed was contaminated with blood, however.

A stained film of the sediment from the spinal fluid, on admission, showed what appeared to be small pleomorphic Gram-negative bacilli, which could not be recovered on culture. This finding, however, led to the institution of sulfanilamide therapy, an initial dose of 75 grains followed by 25 grains every four hours. An equal amount of sodium bicarbonate was given also. After 4 days this therapy was discontinued.

Repeated spinal and cisternal punctures revealed blood-tinged spinal fluid of the same character as that obtained on admission. A roentgenogram of the lumbar spine showed the tip of the embedded

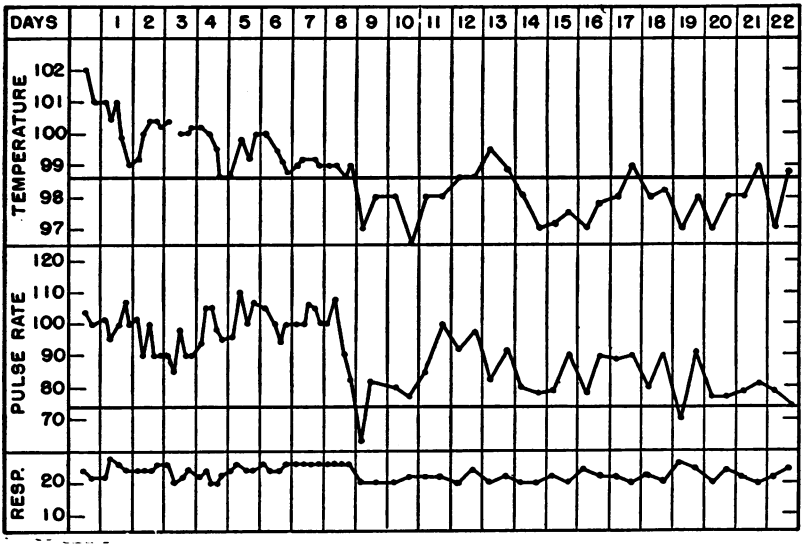

CHART 2 (case 2).

needle to be in the spinal canal slightly posterior to the posterior border of the tip of the body of the adjacent lumbar vertebra. It was thought that this needle was causing sufficient trauma to the tissue to be responsible for the blood in the spinal fluid and to warrant its removal. Accordingly, it was removed 2 days after admission. Subsequent spinal fluid studies were not made.

The patient ran a low-grade fever with a temperature from 99° to 101° F., and a pulse rate varying from 90 to 110 per minute for a week after entry. The temperature and pulse were normal thereafter. He made a rapid recovery, and was discharged in good condition on December 1, 1938.

One week later he returned to his home in West Virginia, where he was visited by C. A. on March 4, 1939. He stated that he felt "funny" on the trip home, and the following day he had a severe

headache, vomited, and things looked blurred. His mother says that he talked "out of his head." He states that his visual disturbances have persisted and that he has had several very severe spells accompanied by vomiting. During these attacks his mother states that he sometimes "shakes all over" and has occasionally wet the bed. His appetite is good, the bowels are regular, and sleep is normal.

On December 13 the patient went to the Stevens Clinic Hospital, Welch, W. Va., for an eye examination. The pupils were found to react rather sluggishly; otherwise the examination was negative. On December 23, 1938, he was admitted to the Stevens Clinic Hospital complaining of headache. His temperature was 99° F. on admission, normal thereafter. He appeared drowsy but answered questions readily. There was suggestive rigidity of neck, negative Kernig sign, blood pressure 120 mm. of mercury systolic, and 80 mm. diastolic. A spinal tap revealed a clear fluid under extreme pressure, 30 mm. of mercury, cell count normal. The headache and drowsiness gradually cleared and he was discharged on January 4, 1939. When seen on March 4, he stated that his headache was still almost constant but not so severe as previously. No neurological abnormalities were detected by gross tests. Dr. H. A. Bracey of the Stevens Clinic Hospital made a more thorough examination on March 18 and kindly supplied us with the following report:

The patient still complained of slight headache, mostly occipital. It is more marked on arising, but improves after being up and about for several hours. He stated that he had always been nearsighted but was worse since his illness and cannot now see distinctly at a distance and cannot read fine print. He has some pain in his eyes, especially after reading. Diplopia is present when headache is most marked. Occasionally he has pains in left arm. His appetite is unusually good. He thinks he is too weak to work. After walking long distances he claims that his legs become weak although he can walk to the store, 1 mile, without any weakness.

Examination.—His general appearance and mental condition were markedly improved since he was discharged on January 4. He is now alert and answers questions readily. Blood pressure 140 mm. of mercury systolic, and 80 mm. diastolic; pulse 100, temperature 99° F. The heart, lungs, and abdomen were negative. The patient was nervous and excited.

Neurological.—No weakness or paralysis of facial or extraocular muscles was noted. The biceps, radio-periosteal, and patellar reflexes were active and equal. No abnormal toe reflexes were elicited. The gait was normal; no muscular atrophy was noted in the extremities. The skin was normal.

Ophthalmological.—Vision: O. D., 20/50–2; O. S., 20/50–2.

There was slight blurring of disk margins, with slight disturbance of pigment surrounding the disks. There were several minute areas of exudate in the macula; the vessels appeared normal.

Blood.—Hemoglobin, 64 percent; erythrocytes, 3,350,000 per cubic millimeter; white blood cells, 11,450 per cubic millimeter; polymorphonuclear cells, 77 percent; small lymphocytes, 21 percent; large lymphocytes, 2 percent; color index 0.9.

Urine.—Normal except for rare hyalin cast; 1 to 2 pus cells and occasional red blood cells; much mucus.

Failure to isolate the virus from case 2.—An attempt to secure spinal fluid from this case on the eleventh day of illness was unsuccessful, probably owing to the stiffness of the back and to the extensive edema occasioned by the recent operative removal of a portion of a broken lumbar puncture needle. Samples of blood and catheterized urine were, however, secured. Defibrinated blood diluted with an equal volume of saline was injected into six white mice, 0.03 cc. intracerebrally and 0.25 cc. subcutaneously. None of these mice developed any symptoms; neither did subinoculations carried out on the eighth day with freshly removed brains occasion illness in any of six mice. Guinea pig 910 was also inoculated with 7 cc. of urine,[2] subcutaneously, and 2 cc. of defibrinated blood, intraperitoneally. The animal developed fever on the seventh day and died of pneumonia on the thirteenth day. Heart blood drawn on the tenth day was transferred to guinea pig 910–2, which died of secondary infection on the seventh day after inoculation, while six mice were killed by intracerebral inoculation of the blood in from 24 to 36 hours. The failure to recover the virus is probably due to the fact that the serum and urine were collected after the acute symptoms had subsided (eleventh day). That the patient was actually suffering from choriomeningitis is, however, indicated by the symptoms and by the fact that antibodies, while absent in serum drawn November 16, 1938, were found to be present in moderate and marked degrees in serum collected on December 2, 1938, and March 4, 1939, respectively.

ANTIBODIES IN THE BLOOD OF FAMILY CONTACTS

Sera from the husband, L. P., and a brother-in-law, J. P., of case 1, both of whom had occupied, for 8 months, the house where the illness developed, were tested for neutralizing antibodies, with negative results. Serum from a second brother-in-law, E. P., who had occupied the affected home for several years was, however, strongly protective (table 1).

Case 2 roomed with a married couple, whose sera were also examined for choriomeningitis antibodies. Blood from the landlady, A. B., contained potent antibodies, while serum of the husband was moderately potent in the same test (table 1).

HOME CONDITIONS

The home where case 1 (E. P.) was taken ill is located on the outskirts of the District of Columbia and consisted of a flimsy, slovenly kept shed, attached to which was an open toilet in poor sanitary condition. Water was hauled from the city supply and stored in a container. The house was unscreened.

[2] Urine contaminated.

TABLE 1.—*Results of serum-virus protection tests with sera from cases 1 and 2 and from dwellers in their respective homes*

Date serum collected	Dilution of virus [1]	Number of mice surviving [1]	Survivors from 16 mice	Remarks
Case 1, E. P. (11-16-38)	1 : 50	0	3	No immunity.
	1 : 250	0		
	1 : 1250	1		
	1 : 5000	2		
Case 1 (12-2-38)	1 : 50	1	7	Partial immunity.
	1 : 250	1		
	1 : 1250	3		
	1 : 5000	2		
Case 1 (2-27-39)	1 : 50	2	13	Immunity.
	1 : 250	3		
	1 : 1250	4		
	1 : 5000	4		
L. P., husband of case 1 (12-17-38)	1 : 50	0	0	No immunity.
	1 : 250	0		
	1 : 1250	0		
	1 : 5000	0		
E. P., brother of case 1 (12-17-38)	1 : 50	4	16	Immunity.
	1 : 250	4		
	1 : 1250	4		
	1 : 5000	4		
J. P., brother of case 1 (2-8-39)	1 : 50	0	3	No immunity.
	1 : 250	0		
	1 : 1250	1		
	1 : 5000	2		
Case 2, C. P. (11-16-38)	1 : 50	0	5	Questionable immunity.
	1 : 250	1		
	1 : 1250	0		
	1 : 5000	4		
Case 2 (12-2-38)	1 : 50	1	11	Partial immunity.
	1 : 250	2		
	1 : 1250	4		
	1 : 5000	4		
Case 2 (3-4-38)	1 : 50	4	15	Immunity.
	1 : 250	3		
	1 : 1250	4		
	1 : 5000	4		
A. B., landlady, case 2 (1-25-39)	1 : 50	4	16	Immunity.
	1 : 250	4		
	1 : 1250	4		
	1 : 5000	4		
R. L. B., landlord, case 2 (1-25-39)	1 : 50	0	7	Partial immunity.
	1 : 250	0		
	1 : 1250	3		
	1 : 5000	4		

[1] 4 mice inoculated to each dilution.

NOTE.—1 part of each dilution of virus was added to 2 parts of undiluted serum and the mixture incubated for 2 hours at 37° C. Each mouse received 0.03 cc. intracerebrally.

Case 2 (C. P.) roomed with a couple on the third floor of a brick house in one of the better colored sections of the city. The home was clean and orderly and was equipped with sanitary plumbing which was in good condition. The patient took his meals at various restaurants and states that he never brought food into his room.

INFECTION FOUND IN GRAY MICE (MUS MUSCULUS)

Inquiry at the house of case 1 elicited the information that many mice had been noted in September and October but that the occu-

pants had gotten rid of them by trapping, poisoning, and the burning of sulfur. No evidence of recent infestation was found; a number of boxtraps were, nevertheless, set.

A large female (932–2) and a half-grown male mouse (932–1) were captured in the kitchen on December 20, 1938. The following day both were etherized and a 1:20 emulsion of one-half the spleen and one kidney was made from each mouse. Two groups each of seven white mice (from same lot) were inoculated intracerebrally with 0.03 cc. and subcutaneously with 0.25 cc. of the respective organ emulsions. Tissues from the smaller mouse produced no symptoms in any of the inoculated mice and reinjection with our original strain of virus on February 28, 1939, indicated that no immunity had been induced.

All of the mice inoculated from the larger mouse, however, developed typical symptoms; five died and two were etherized for transfer on the sixth day.[3]

We have never encountered spontaneous choriomeningitis virus in the strain of Swiss mice employed in these tests; however, in order to rule out the possibility of such an occurrence, the portion of spleen and one kidney from mouse 932–2, which had been held in glycerine since February 21, 1939, were emulsified and inoculated into five fresh mice as above. All developed typical symptoms and either died or were etherized on the sixth day of illness while controls inoculated with normal mouse brains remained well. This strain has now been through six serial transfers in white mice and gives cross-protection with the virus isolated from the patient, E. P., and with our original strain of choriomeningitis virus. A third mouse captured in the long grass approximately 75 feet from the patient's home contained no demonstrable virus.

Mice from home of case 2.—At the rooming house of case 2 it was learned that mice had been especially prevalent during the early summer, but that many had been destroyed by trapping.

Box traps were set and an adult male mouse was captured in the patient's bedroom on January 23, 1939. It was etherized and an emulsion of its spleen and kidney was injected intracerebrally and subcutaneously into five mice.

These mice remained well, and on the eighth day a subtransfer, brain emulsion, was made to a group of fresh mice. No symptoms resulted. Nine mice, from both groups, which survived to February 28, 1939, were inoculated with our original strain of virus and proved not to be immune. All died on the seventh and eighth days.

A large female, No. 945, and a less than half-grown female, No. 947, were caught on January 25 in the kitchen. Emulsions were made from

[3] Armstrong (*1*) had previously demonstrated that wild mice were experimentally susceptible to infection and white mice were found spontaneously infected by Traub (*5*), and Lépine and Sautter (*7*).

one-half spleen and one kidney of each mouse, and two groups of five mice were inoculated, respectively, with each suspension as previously described.

Mice inoculated from No. 945 developed roughened fur, and one died on the seventh day with typical symptoms and the pathology of choriomeningitis. Two with typical symptoms were etherized on the eighth day for transfer. Two mice survived, and when tested for immunity on February 28, 1939, they withstood an intracerebral inoculation of approximately 100 minimal fatal doses of our original strain of virus.

The portion of spleen and the kidney from No. 945, which had been held in glycerine to March 7, 1939, was emulsified and inoculated intracerebrally into seven fresh mice. One died on the following day, three died with typical symptoms on the seventh day (two of which were etherized just before death for transfer), and one survived. This strain has now been carried through several passages and is immunologically similar to our known strains.

The mice inoculated from No. 947 also developed characteristic symptoms; one died on the sixth and one on the eighth day, one was etherized for transfer, one was lost, and one survived to February 28, when it was found to be immune to intracerebral inoculation, 100 M. L. D. of our original strain. This strain has now been carried through six transfers and proved to be immunologically similar to our known strains.

SOURCE OF THE HUMAN INFECTION

The finding of active choriomeningitis virus in 3 of 5 mice trapped in the 2 homes wherein proved human cases of the disease appeared and the failure to find the infection in 21 mice trapped in 8 homes and buildings wherein human cases had not occurred, indicated that the association between the human cases and the infected mice is more than a coincidence. It is believed that the mice constituted the source of the human infection since—

1. In each instance the human case was ill in the home for only 4 days before being removed to the hospital, and it would appear rather remarkable for both cases to have infected the mice of their respective abodes. On the other hand, if the disease was primary in the mice, the occurrence of the infected rodents in association with the cases is explained.

2. The housewife in both households apparently suffered infection while one mate escaped and the only evidence of infection in the others was a moderate degree of immunity as judged by serum-virus neutralization test. These findings suggest an exposure to infection in the home, rather than a human-contact infection.

3. The capture of a less than half-grown infected mouse in the home 87 days after the patient in case 2 had been removed from

the house, indicated the existence of an active infection in the mice independent of the presence of a recognized human case.

4. The presence, in the home of case 1, of a person who possessed strongly developed antibodies at a time when the patient's immunity was but partially developed suggests that the case did not constitute the initial introduction of the virus into the household.

The reported findings suggest that gray mice constitute a reservoir of choriomeningitis infection from which human cases may be contracted. Methods by which the effective exposure may be accomplished are being investigated.

SUMMARY

1. Two established cases of lymphocytic choriomeningitis are described.

2. Choriomeningitis virus was isolated from 1 of 2 mice trapped in the home of case 1 and from 2 of 3 mice trapped in the home of case 2. No infection was found in 21 mice trapped in 8 different abodes wherein no human cases of choriomeningitis had occurred.

3. The gray mouse, *Mus musculus*, is incriminated as a reservoir for choriomeningitis virus from which man is probably infected.

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MATERNAL MORTALITY IN RURAL AND URBAN AREAS *

By HAROLD F. DORN, *Statistician, United States Public Health Service*

Until recently almost no success had been achieved in preventing death from complications of pregnancy and childbirth if the recorded maternal mortality rate is accepted as the measure of success. Prior to 1929 the death rate from puerperal causes fluctuated around an average rate of 6.5 to 7.0 (deaths per 1,000 live births). However, since 1929 the rate has continuously declined and for 1937 it was 4.9 per 1,000 live births, the lowest on record and representing a decline of 30 percent since 1929.

It has not been possible to determine how universal this decline has been throughout the total population owing to the method of tabulation of mortality records. For many years it has been apparent that an increasing proportion of the total number of deaths, and more especially deaths from certain specific diseases, occurs away from the place of residence of the deceased. In England and Wales this situation was recognized nearly 30 years ago and arrangements were made for tabulating mortality records according to the place of residence of the deceased instead of according to the place of occurrence of the death. But in the United States, even though mortality reports based upon deaths tabulated by place of occurrence contain an unknown error which, in certain cases, may lead to incorrect conclusions, the detailed tabulation of mortality records for urban and rural communities is still being made by place of occurrence of the death.

Beginning with the year 1935 the Division of Vital Statistics of the United States Bureau of the Census has made an annual tabulation of the total number of births and deaths by place of residence and has also made a special tabulation of deaths due to cancer, tuberculosis, and the puerperal state for 1935 only. These special tabulations present an opportunity to evaluate the effect of nonresident deaths upon the mortality rates obtained by using the official reports based upon deaths tabulated by place of occurrence. It is the purpose of this paper to discuss the relative number of deaths from conditions of pregnancy and childbirth in rural and urban areas [1] after the mortality records have been corrected for nonresidents.

* From the Division of Public Health Methods, National Institute of Health.
[1] Urban territory is defined as all places with 10,000 or more population in 1930.

The trend in the recorded maternal mortality rate in the expanding birth registration area is shown in figure 1. These data, which are derived from deaths tabulated by place of occurrence, indicate that not only is the maternal mortality rate as thus defined higher in urban than in rural communities, but also that this difference has been in-

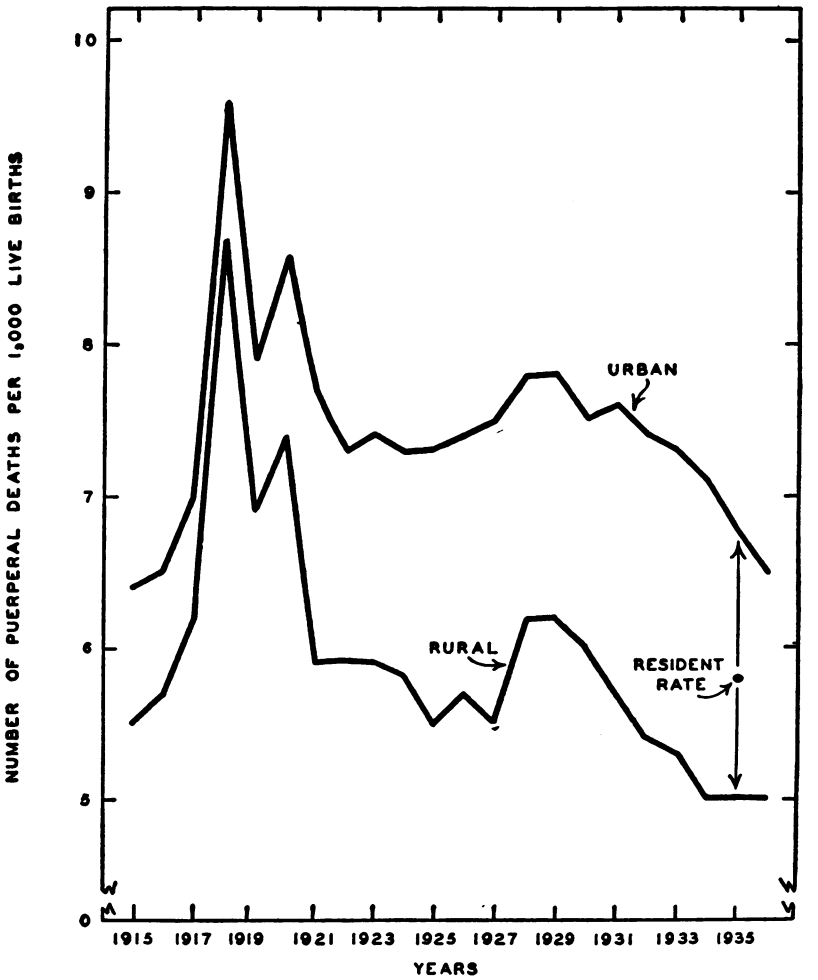

FIGURE 1.—Number of puerperal deaths per 1,000 live births, urban and rural population of the expanding birth registration area of the United States, 1915-36 (recorded rate).

creasing. In 1915 the urban maternal mortality rate was about 16 percent higher than the corresponding rural rate, while in 1936 it was 30 percent higher, a difference nearly twice as great as in 1915.

This seems anomalous, since there are conditions in rural areas which would be expected to increase the maternal mortality rate. The proportion of colored females, among whom the maternal mor-

tality rate is nearly twice that among white females, is much larger in the rural than in the urban population. A larger proportion of urban than of rural mothers are confined in hospitals, where they presumably receive better medical care. Seventy-two percent of all births in urban areas occurred in a hospital in 1936 as compared with 14 percent of all births in rural areas. It should be remembered, however, that many rural mothers are delivered in urban hospitals, and so the difference in hospital use between these groups is not as great as these figures suggest. Moreover, the underregistration of births is considerably greater in rural than in urban areas, a circumstance which produces an apparent increase in the maternal mortality rate in rural communities unless there is a corresponding underregistration of puerperal deaths.

The maternal mortality rate is especially influenced by the inclusion of nonresident cases, since this inclusion changes both the numerator and the denominator of the fraction used in computing the rate. That is, the number of deaths from puerperal causes and the total number of births, as well, are affected by the inclusion of nonresident cases. Consequently, the maternal mortality rates for urban and rural women, based upon data tabulated by place of occurrence of births and deaths, contain errors of unknown size.

A maternal mortality rate for the residents of a given community should be based upon the births to women living in that community and the deaths from puerperal causes of women living in the same community regardless of where the births and deaths occur. Such resident maternal mortality rates can be calculated from the special tabulations of births and maternal deaths for 1935 made by the Division of Vital Statistics of the United States Bureau of the Census.

The number of maternal deaths registered in urban areas in 1935 was 6,765, but the number of women living in urban territory who died from causes arising from pregnancy and childbirth was only 5,270, or 78 percent of this number. In other words 22 percent of the total number of women dying from puerperal causes in urban areas in 1935 lived in rural communities. On the other hand, 5,779 maternal deaths were registered in rural areas, but 7,274 actual residents of rural areas died of puerperal causes. Thus only about 80 percent of the rural maternal deaths occurred in a rural community.

Table 1 presents maternal mortality rates in 1935 for each State based upon recorded births and deaths and upon resident births and deaths. The former will be referred to as the recorded rate and the latter will be termed the resident rate. The urban recorded rate for the United States, 6.8 per 1,000 live births, was 36 percent greater than the corresponding rural rate, 5.0 per 1,000 live births. The resident rates, however, were equal. The urban recorded rate was higher than the

rural recorded rate in 41 of the 48 States; the urban resident rate was higher than the rural resident rate in only 29 of the 48 States.

TABLE 1.—*Number of deaths from puerperal causes per 1,000 live births in rural and urban communities by States, 1935, arranged by geographical division*

Division and State	Recorded rate		Resident rate		Ratio of recorded to resident rate	
	Urban	Rural	Urban	Rural	Urban	Rural
NEW ENG.						
Maine	5.3	5.9	3.7	6.4	1.43	0.92
New Hampshire	6.4	5.6	4.6	8.7	1.39	.64
Vermont	12.4	5.0	11.2	5.2	1.11	.96
Massachusetts	6.0	3.2	8.0	2.3	.75	1.39
Rhode Island	4.6	2.4	4.9	3.7	.94	.65
Connecticut	4.7	1.9	4.6	3.4	1.02	.56
MID. ATL.						
New York	5.4	4.4	5.1	5.5	1.06	.80
New Jersey	5.0	3.1	4.9	4.1	1.02	.76
Pennsylvania	6.6	4.1	6.2	4.8	1.06	.85
E. NO. CENT.						
Ohio	8.0	3.4	6.6	5.3	1.21	.64
Indiana	5.9	4.6	5.3	4.5	1.11	1.02
Illinois	5.1	4.7	4.5	5.8	1.13	.81
Michigan	6.3	3.6	5.5	4.9	1.15	.73
Wisconsin	4.6	3.4	3.4	4.4	1.35	.77
W. NO. CENT.						
Minnesota	5.6	4.0	4.8	4.5	1.17	.89
Iowa	7.8	4.0	6.2	5.0	1.26	.80
Missouri	7.3	4.5	6.4	5.3	1.14	.85
North Dakota	4.6	5.5	1.9	5.8	2.42	.95
South Dakota	9.5	5.8	6.0	6.3	1.58	.92
Nebraska	7.8	5.0	6.7	5.7	1.16	.88
Kansas	7.7	5.3	6.2	6.0	1.24	.88
SO. ATL.						
Delaware	3.1	10.8	3.4	9.0	.91	1.20
Maryland	7.0	3.0	5.8	5.1	1.21	.59
District of Columbia	6.7		6.1		1.10	
Virginia	11.1	4.1	7.8	5.0	1.42	.82
West Virginia	11.5	3.9	6.0	4.8	1.92	.81
North Carolina	14.8	4.8	9.3	6.0	1.59	.80
South Carolina	18.0	8.1	9.0	9.6	2.00	.84
Georgia	10.6	6.3	8.2	6.9	1.29	.91
Florida	9.5	8.1	7.0	9.6	1.36	.84
E. SO. CENT.						
Kentucky	8.5	4.6	7.8	5.0	1.09	.92
Tennessee	11.8	4.9	7.5	6.1	1.57	.80
Alabama	10.8	5.1	8.8	5.8	1.23	.88
Mississippi	15.3	5.6	9.5	6.3	1.61	.89
W. SO. CENT.						
Arkansas	16.5	4.9	12.2	5.6	1.35	.88
Louisiana	12.5	5.6	8.7	7.6	1.44	.74
Oklahoma	8.1	5.1	7.1	5.6	1.14	.91
Texas	8.3	6.8	6.7	7.5	1.24	.91
MOUNTAIN						
Montana	4.4	5.5	3.1	6.0	1.42	.92
Idaho	5.3	6.5	5.5	5.8	.96	1.12
Wyoming	4.3	4.1	3.0	4.5	1.43	.91
Colorado	6.2	8.2	5.4	8.4	1.15	.98
New Mexico	12.6	6.1	5.6	7.3	2.25	.84
Arizona	6.2	5.6	5.9	5.8	1.05	.97
Utah	5.4	4.1	3.5	5.4	1.54	.76
Nevada	12.4	6.8	11.3	5.7	1.10	1.19
PACIFIC						
Washington	5.3	4.2	5.2	5.1	1.02	.82
Oregon	5.7	5.1	4.4	5.8	1.30	.88
California	4.4	4.6	3.8	5.5	1.16	.84
Total, United States	6.8	5.0	5.8	5.8	1.17	.86

With the exception of 4 States the urban recorded rate was higher than the urban resident rate. In 3 States the recorded rate was more than twice as high as the resident rate. On the other hand, the rural recorded rate was less than the resident rate in all but 5 States, in some

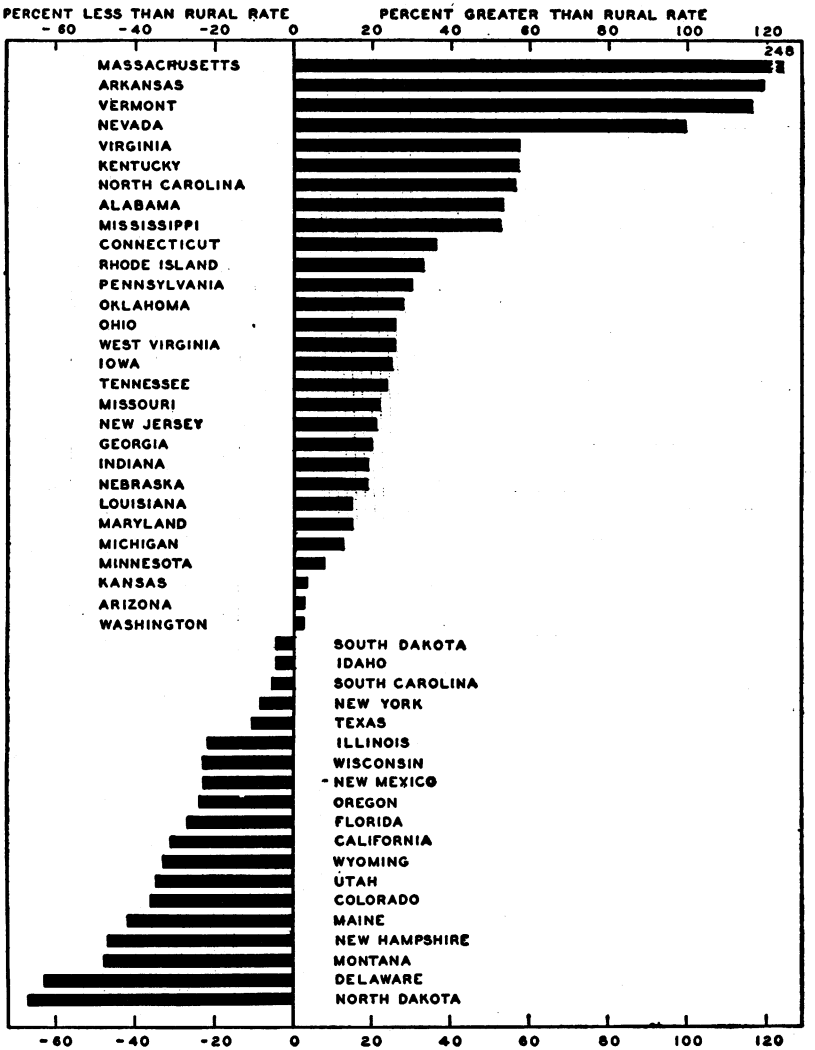

FIGURE 2.—Relative difference between urban and rural resident maternal mortality rate, by States, 1935 (rural rate=100).

instances being only about 60 percent of the rate based on resident births and deaths.

The relative difference in urban and rural resident maternal mortality rates in each State is shown in figure 2. These differences are affected, in certain States, by differences in the relative proportion of

colored women in the two populations and by differences in the completeness of birth registration. The rural rates, especially in the southern and western States, are too high, owing to underregistration of births.

The difference between the urban and rural maternal mortality rate in each State seems to depend more on local conditions than on any one general condition. With a few exceptions, the States in which the rural rate is higher than the urban rate are among the States where birth registration has been estimated to be incomplete.[2] If there is underregistration of births it is probably greater in rural than in urban communities. Consequently, in States where this is true, the

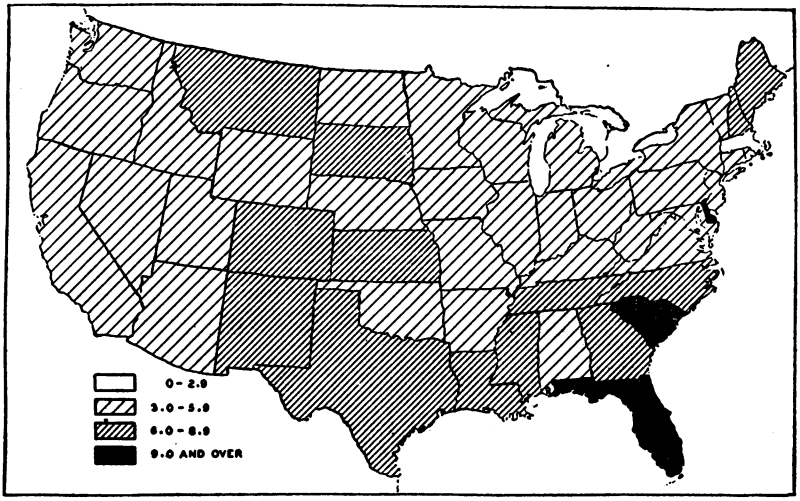

FIGURE 3.—Death rate for puerperal causes (per 1,000 live births) in the *urban* population, by States, 1935 (nonresidents excluded).

rural maternal mortality rate is spuriously increased relative to the corresponding urban rate.

As shown in figures 3 and 4, maternal mortality rates are higher in the southern States in both urban and rural areas than in other parts of the country. Although the underregistration of deaths and the proportion of Negroes in the population are both greater in these States than elsewhere, a fact which increases the mortality rates, nevertheless, approximate corrections for these conditions indicate that, while the geographic differences are overemphasized in figures 3 and 4, the general impression conveyed is substantially correct.

The data presented here plainly indicate that maternal mortality rates computed from data tabulated by place of occurrence give an erroneous impression of the actual situation. It is to be hoped that

[2] Whelpton, P. K.: The completeness of birth registration in the United States. J. Am. Stat. Assoc., June 1934.

the present procedure of tabulating births and deaths will soon be revised so that it will be possible to study many aspects of mortality concerning which the present tabulations lead to incorrect conclusions.

It may be concluded that for the country as a whole there is practically no difference between maternal mortality rates in urban and rural areas, but that there is considerable variation among the States in this respect. Moreover, it is probably true that the maternal mortality rate is decreasing more rapidly in urban than in rural communities. This situation results, in part at least, from the increasing

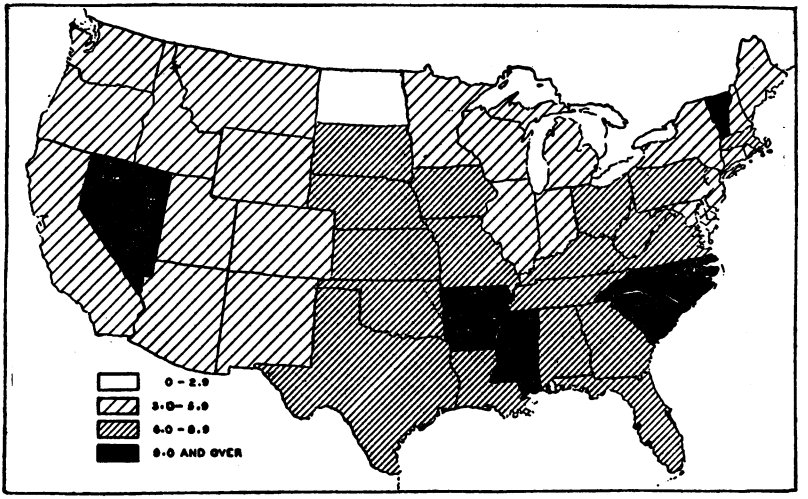

FIGURE 4.—Death rate for puerperal causes (per 1,000 live births) in the *rural* population, by States, 1935 (nonresidents excluded).

emphasis placed upon pre- and post-natal care of mothers and from the provision of better medical care at the time of delivery. Such services and facilities are undoubtedly more extensively available to women living in urban than in rural areas. Complications of pregnancy and childbirth must be included in an increasing list of diseases and other manifestations of ill health which are being brought under control by the widespread application of modern medical knowledge and public health principles. The more general availability of these services to residents of urban communities is beginning to counterbalance the more healthful rural environment, so that mortality rates for several diseases among rural residents are now equal to or greater than the corresponding rates among urban residents.

DISABLING INDUSTRIAL MORBIDITY, THIRD AND FOURTH QUARTERS OF 1938 AND THE ENTIRE YEAR[1]

By WILLIAM M. GAFAFER, *Senior Statistician, United States Public Health Service*

Population exposed.—The material presented in this paper, dealing with the frequency of sickness and nonindustrial injuries causing disability lasting more than 1 week, is based on the reported experience of the male memberships of industrial sick-benefit organizations comprising mutual sick-benefit associations, group-insurance plans, and company-relief departments. In 1938 the same number of organizations reported as in 1937, the total in each instance being 26. The comparison period 1933–37 draws on the reports of the same 26 organizations and a few additional ones. More than 150,000 males are represented, and these were employed in plants located in Pennsylvania, Illinois, Massachusetts, Connecticut, New York, Ohio, Maine, South Dakota, New Jersey, and Canada.

The year 1938 with particular reference to the rheumatic group of causes.—According to table 1 the frequency for 1938 of all sickness and nonindustrial injuries causing disability for 8 consecutive calendar days or longer was 80.8 per 1,000 men, which is not only 19 percent below the corresponding rate for 1937 (99.8) but is the lowest rate since 1934, when 78.1 cases per 1,000 were recorded. This favorable observation is accounted for principally by the decrease in frequency of influenza and grippe from 21.0 per 1,000 in 1937 to 9.7 in 1938.

The digestive diseases as a group occurred at approximately the same rate in 1938, 1937, and 1933–37. With the exception of the decreases shown by diarrhea and enteritis, and appendicitis, the rates for the specific digestive diseases show little differences among the three time periods.

Nonindustrial injuries as well as the group of nonrespiratory-nondigestive diseases show slight decreases when compared with the experience of either 1937 or of 1933–37. Noteworthy is the decrease in the frequency of the rheumatic group of diseases, which may be defined by a summation of the frequencies shown for rheumatism, acute and chronic; neuralgia, neuritis, and sciatica; and diseases of the organs of locomotion, except diseases of the joints. This group yielded 8.4 cases per 1,000 in 1938 and 9.3 for 1937 as well as for the period 1933–37, the change in frequency representing a decrease of approximately 10 percent with respect to either period of time. In this connection attention should also be directed to the decreases in the frequency of the rheumatic group of diseases for the fourth ahd third quarters of 1938 in relation to the corresponding quarters of 1937. These observations raise the question of how the rheumatic group

[1] From the Division of Industrial Hygiene, National Institute of Health, Washington, D. C. For the second quarter and first half of 1938, see PUBLIC HEALTH REPORTS for October 28, 1938 (53: 1910–1911).

TABLE 1.—*Frequency of disabling cases of sickness and nonindustrial injuries lasting 8 consecutive calendar days or longer among MALE employees in various industries, by cause; the third and fourth quarters of 1938 compared with the third and fourth quarters of 1937, and the full year of 1938 compared with the full years of 1933–37, inclusive* [1]

[Male morbidity experience of industrial companies which reported their cases to the U. S. Public Health Service]

Cause (numbers in parentheses are disease title numbers from the International List of the Causes of Death, 1929)	Annual number of cases per 1,000 men						
	Full year			Fourth quarter		Third quarter	
	1938	1937	1933–37	1938	1937	1938	1937
Sickness and nonindustrial injuries [2]	80.8	99.8	88.3	75.4	87.3	70.6	80.1
Nonindustrial injuries (169–198)	10.9	11.9	11.6	10.0	12.7	12.1	13.2
Sickness [2]	69.9	87.9	76.7	65.4	74.6	58.5	66.9
Respiratory diseases	26.1	40.4	31.9	26.2	30.9	16.6	19.5
Influenza and grippe (11)	9.7	21.0	15.2	10.1	11.7	4.4	5.2
Bronchitis, acute and chronic (106)	4.2	4.7	3.9	4.8	4.5	2.6	3.1
Diseases of the pharynx and tonsils (115a)	4.5	5.3	4.7	3.6	4.8	4.0	4.4
Pneumonia, all forms (107–109)	2.2	2.9	2.4	2.5	3.1	1.2	1.6
Tuberculosis of the respiratory system (23)	.8	.8	.9	.6	.7	.8	.9
Other respiratory diseases (104, 105, 110–114)	4.7	5.7	4.8	4.6	6.1	3.6	4.3
Nonrespiratory diseases	41.7	44.3	42.4	37.2	41.7	39.4	43.6
Digestive diseases	13.2	13.9	13.2	12.2	13.5	13.3	14.7
Diseases of the stomach, except cancer (117, 118)	4.0	4.0	3.6	3.7	4.2	4.0	4.0
Diarrhea and enteritis (120)	1.0	1.4	1.2	1.0	1.2	1.3	2.3
Appendicitis (121)	3.9	4.5	4.1	3.2	4.2	3.9	4.6
Hernia (122a)	1.6	1.5	1.5	1.3	1.4	1.5	1.4
Other digestive diseases (115b, 116, 122b–129)	2.7	2.5	2.8	3.0	2.5	2.6	2.4
Nondigestive diseases	28.5	30.4	29.2	25.0	28.2	26.1	28.9
Diseases of the heart and arteries, and nephritis (90–99, 102, 130–132)	4.0	4.1	3.7	3.7	4.3	3.5	3.6
Other genitourinary diseases (133–138)	2.2	2.3	2.4	1.8	2.3	2.3	2.1
Neuralgia, neuritis, sciatica (87a)	2.1	2.2	2.2	2.0	2.3	1.7	2.0
Neurasthenia and the like (part of 87b)	.9	1.1	1.0	1.0	1.0	.8	1.2
Other diseases of the nervous system (78–85, part of 87b)	1.1	1.0	1.2	1.0	1.1	1.1	1.0
Rheumatism, acute and chronic (56, 57)	3.6	4.1	4.2	3.1	3.4	3.0	3.9
Diseases of the organs of locomotion, except diseases of the joints (156b)	2.7	3.0	2.9	2.7	3.2	2.4	2.7
Diseases of the skin (151–153)	3.0	3.1	2.8	2.4	3.1	3.7	3.4
Infectious and parasitic diseases (1–10, 12–22, 24–33, 36–44)	2.1	2.7	2.5	1.4	1.4	1.5	1.9
All other diseases (45–55, 58–77, 88, 89, 100, 101, 103, 154–156a, 157, 162)	6.8	6.8	6.3	5.9	6.1	6.1	7.1
Ill-defined and unknown causes (200)	2.1	3.2	2.4	2.0	2.0	2.5	3.8
Average number of males covered in the record	167,719	185,315	156,287	167,698	186,727	164,877	190,287
Number of organizations	26	26	----	26	26	26	26

[1] In 1938 and 1937 the same 26 organizations are included. Seven are located in Pennsylvania, 4 in Illinois 3 each in Massachusetts, Connecticut, and New York, 2 in Ohio, and 1 each in Maine, South Dakota, New Jersey, and Canada. The rates for the years 1933–37 are based on the records from the 26 organizations and some additional reporting organizations.

[2] Exclusive of disability from the venereal diseases and a few numerically unimportant causes of disability.

behaved over a longer period of time. The appropriate rates were calculated by quarters for the period 1934–38, and these are shown graphically in figure 1A. The frequencies fluctuate about an arithmetic mean rate of 9.0 and it will be observed that the upper and lower limits for the 5 years are 10.9 and 7.1. Furthermore the frequency

peaks correspond to the first or second quarters of each year and the lowest levels to the third or fourth quarters. Figure 1B shows this graphically in the general downward trend of the superimposed years in the interval including the first, second, and third quarters. Figure 1B also shows that the second and third quarter rates for 1938 are the lowest of all corresponding rates of the previous years shown. The unique behavior of the quarterly rates disclosed by the graph for 1937 in figure 1A may be accounted for by the epidemic of influenza which occurred during the first quarter of the year, some of the rheumatic complaints possibly having been diagnosed as influenza.

The third and fourth quarters of 1938.—An examination of the rates for the third and fourth quarters of the years 1937 and 1938 as shown

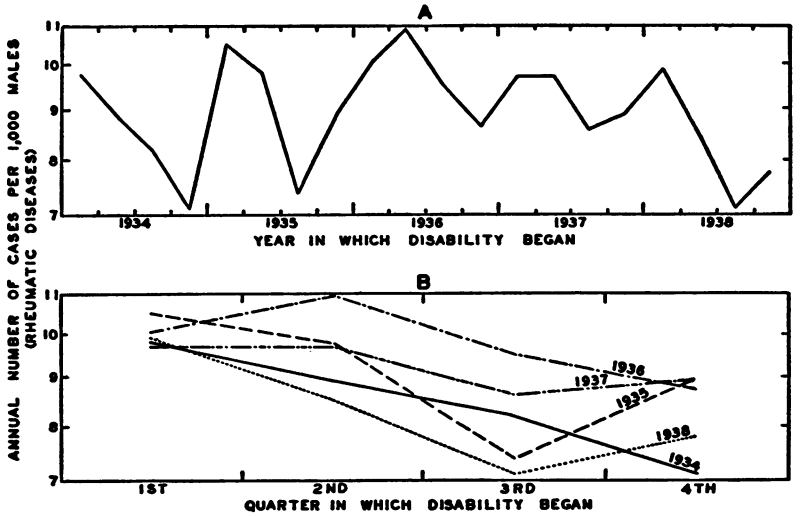

FIGURE 1.—Frequency (logarithmic) of disability lasting 8 consecutive calendar days or longer caused by the rheumatic group of diseases (rheumatism, acute and chronic; neuralgia, neuritis, and sciatica; and diseases of the organs of locomotion except diseases of the joints) by quarter-year of onset, 1934-38, inclusive; (A) quarterly variation from 1934 through 1938, and (B) quarterly variation for each of the years 1934-38 with the years superimposed. (Male morbidity experience of industrial companies which reported their cases to the United States Public Health Service.)

in table 1 reveals the favorable position of 1938. It will be observed that the rates for the broad cause groups of either quarter of 1938 are consistently lower than the corresponding rates of 1937, the rates for the few specific causes which are not lower being only slightly higher.

The quarter-years of 1934–38, inclusive.—The rates by quarter years corresponding to all sickness and nonindustrial injuries and to three broad cause groups are shown for the years 1934 through 1938 in table 2, and graphically in figure 2. Of interest is the level trend shown by the rates for the nonrespiratory causes and those for nonindustrial injuries, the first group fluctuating between 37.8 and 49.7 cases per 1,000, and the second group between 9.6 and 15.0 cases per

TABLE 2.—*Frequency of disabling cases of sickness and nonindustrial injuries lasting 8 consecutive calendar days or longer among MALE employees in various industries, by broad cause groups and by quarter years, 1934–38, inclusive*

[Male morbidity experience of industrial companies which reported their cases to the U. S. Public Health Service]

Year and quarter in which disability began	Annual number of cases per 1,000 men				Average number of males covered
	Total, sickness and nonindustrial injuries	Respiratory diseases	Nonrespiratory diseases [1]	Nonindustrial injuries	
1934					
First	93.0	36.2	45.0	11.8	145,728
Second	72.8	20.9	42.3	9.6	158,873
Third	74.1	15.9	43.2	15.0	157,771
Fourth	78.3	27.7	37.8	12.8	153,194
1935					
First	104.0	48.6	45.2	10.2	138,234
Second	84.0	27.4	47.0	9.6	138,214
Third	73.5	16.6	44.1	12.8	140,627
Fourth	82.0	26.8	43.7	11.5	143,877
1936					
First	113.1	53.8	48.0	11.3	145,701
Second	89.0	29.7	49.0	10.3	150,248
Third	76.8	17.0	46.2	13.6	162,721
Fourth	87.0	34.5	41.9	10.6	167,298
1937					
First	147.1	87.5	49.5	10.1	176,209
Second	88.6	27.6	49.7	11.3	188,038
Third	80.1	19.5	47.4	13.2	190,287
Fourth	87.3	30.9	43.7	12.7	186,727
1938					
First	99.6	39.2	49.5	10.9	172,061
Second	77.2	22.3	44.5	10.4	166,239
Third	70.6	16.6	41.9	12.1	164,877
Fourth	75.4	26.2	39.2	10.0	167,698

[1] A small percentage of cases of ill-defined and unknown causes of disability are included.

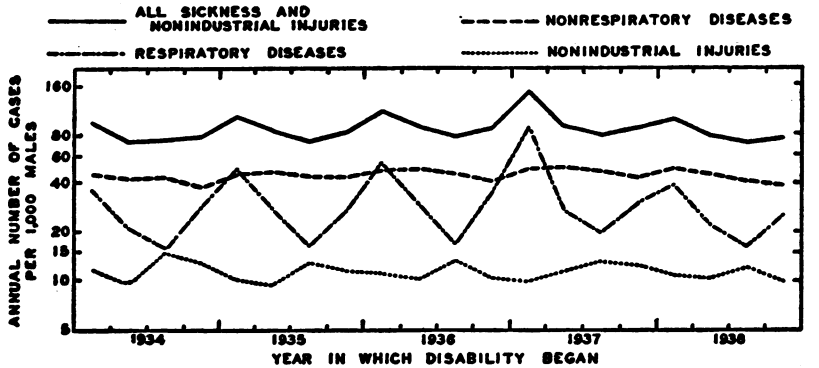

FIGURE 2.—Frequency (logarithmic) of disability lasting 8 consecutive calendar days or longer caused by respiratory diseases, nonrespiratory diseases, and nonindustrial injuries, by quarter-year of onset, 1934–38, inclusive. (Male morbidity experience of industrial companies which reported their cases to the United States Public Health Service.)

1,000. It will be observed that the upper and lower limits of variation in the instance of the nonindustrial injuries are determined by the third and second quarters, respectively, of the same year, namely,

1934. The group of respiratory causes shows the usual seasonal variation with the peak of the epidemic of 1937 clearly in evidence. Of the respiratory rates for the fourth quarters, that for 1938 is the lowest, while of the third quarter rates only the one for 1934 is lower than that for 1938. As might be expected from preceding statements, the behavior of the graph of the quarter rates for all sickness and nonindustrial injuries is determined principally by the fluctuations of the respiratory group of diseases. Worthy of noting is the fact that when the total sickness and nonindustrial injury rates for the first and second quarters of 1934 [2] are excluded, the quarterly rates of 1938 covering all disabilities were lower than the corresponding rates of all previous years shown.

THE EFFECTIVENESS OF CERTAIN TYPES OF COMMERCIAL AIR FILTERS AGAINST BACTERIA (*B. subtilis*)

By J. M. DALLAVALLE, *Passed Assistant Sanitary Engineer*, and ALEXANDER HOLLAENDER, *Biochemist, United States Public Health Service**

Of particular interest to many engineers is the effectiveness of ordinary air filters in removing air-borne bacteria. It is generally assumed that filters having a high dust removal efficiency, as determined by usual standards (*1*), are correspondingly efficient against bacteria. The fallacy of this reasoning, which can be directly applied to the air-bacteria problem, has been discussed by Hatch (*2*). Industrial air-borne dusts and bacteria are of the same order of size. Since the mass of a particle varies as the cube of its dimension, gravimetric methods emphasize the efficiency in removing large particles.

Drinker and Wells (*3*) early recognized the value of using pollens and bacteria for testing air filters. These investigators pointed out the identifiable character of these substances. However, no extensive tests were discussed or data presented to prove the value of the technique.

This paper is concerned with a new method developed for the determination of the efficiency of air filters. It employs the use of a technique recently developed by the authors (*4*). A specific organism, *B. subtilis* (hay bacillus), was employed. The average size of the spore is approximately two microns. The spore is resistant to both heat and extreme cold. The organism is easily cultured and grows well on standard agar plates at 37° C.

[2] According to an earlier report in the present series the frequency of disability was lower in 1934 than in any other year since the reporting began in 1921. See PUBLIC HEALTH REPORTS for November 1, 1935 (50: 1538).

* Division of Industrial Hygiene, National Institute of Health.

TEST PROCEDURE

The equipment used in testing air filters is illustrated in figure 1. The arrangement is identical with that described by Dill (*b*) for testing the dust efficiencies of various commercial-type air filters, and consists of the following parts: (*a*) An elutriator for settling out large particles, (*b*) an adapter for fitting in filters of different construction, (*c*) an orifice for gaging the volume of air flow, (*d*) an air flow regulating damper, and (*e*) a constant feed blower fan having a capacity up to 2,000 cubic feet per minute. The bacteria used in the test [1] were introduced at the fresh air inlet by means of an ordinary spray gun operating at approximately 10 pounds per square inch. The nozzle of the gun was adjusted to give a fine diffuse spray. The air containing the bacteria passed beyond the baffle arrangement shown in figure 1, and into the elutriator proper, where the large droplets were removed. Throughout the series of tests conducted, the air volumes handled were within the ratings stipulated by the manufacturer.

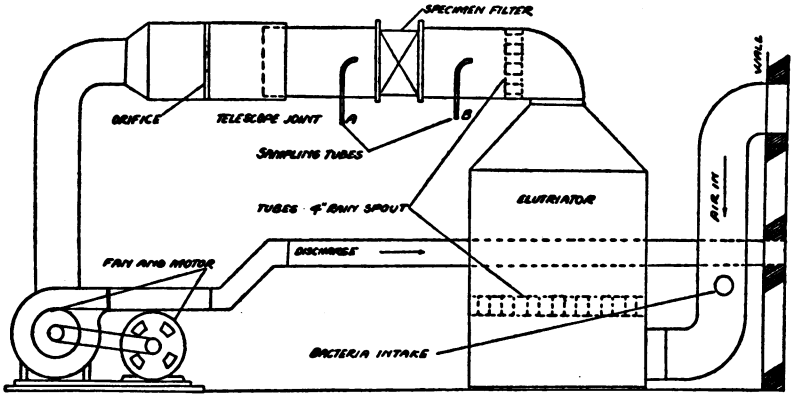

FIGURE 1.—Arrangement of apparatus for testing air filters.

The sampling of air-borne bacteria in a ventilating system entails many difficulties. The use of tubes to convey the air samples to a point of collection is always a cause of concern. This is due to the impingement of bacteria on the walls of the tube. However, tests made by the authors indicate that the use of tubes as shown in figure 1 does not materially affect the results obtained with the technique used.

In sampling, air is drawn through both tubes simultaneously by means of impinger motors. The rate of sampling is set at 1 cubic foot per minute,[2] which has been found most efficient for impinging bacteria. The sampling device illustrated in figure 2 consists of a

[1] The cultured organisms were prepared as described previously (*4*) and diluted with city water. No attempt was made to estimate the number of bacteria in the fluid, since only those passing the elutriator are of interest.

[2] Correction for velocity of approach found negligible.

brass cup fitted with an inverted 60°, 3-inch diameter glass funnel. The latter fits into a Petri dish containing nutrient agar. Thus, air entering through the sampling tube impinges on the agar and then passes on through the pump. This method of sampling has been described elsewhere (*4*). It has been found to be efficient and to compare favorably with the Wells' centrifuge (*6*), giving slightly higher results when the bacteria density is low. The arrangement used in these tests is simple and offers a minimum of interference to the flow of air in front of and beyond the filters tested.

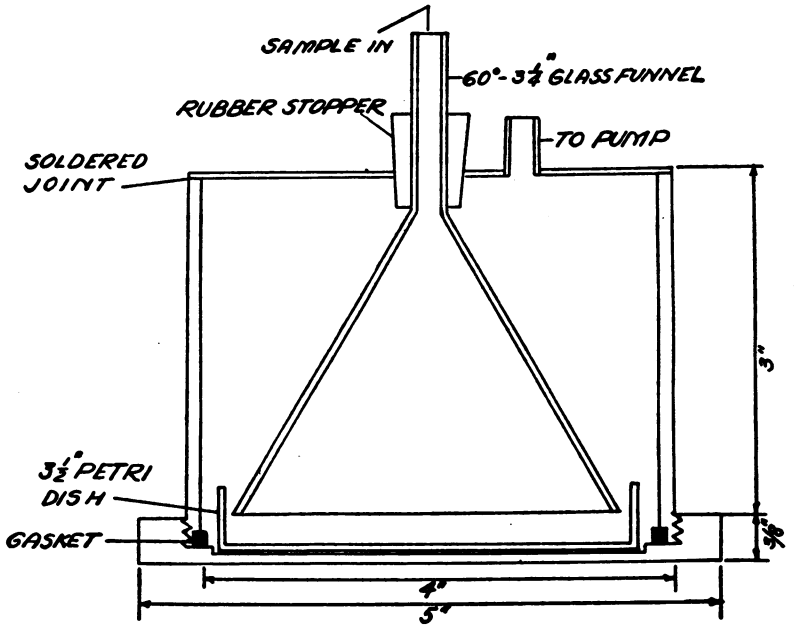

FIGURE 2.—Funnel device used for sampling air-borne bacteria.

All samples taken in the tests described were for three minutes each. The plates exposed were incubated for 48 hours and all colonies per plate counted.

RESULTS OF TESTS

Eight types of commercial filters were tested. The results of these tests are given in table 1. It will be noted that the efficiencies are remarkably high considering the smallness of the organism. However, it must be held in mind that the efficiencies are not absolute. They apply to the conditions under which the tests were conducted. It must not be concluded that the efficiencies obtained will hold for all types of bacteria. When the longevity of the filter is considered, attention should be given to the nature of the medium itself with regard to its ability to favor or prevent bacterial growth.

TABLE 1.—*Results of filter tests* [1]

Test No.	Type of filter	Number of tests	Average number of colonies per cubic foot of incoming air	Efficiency (percent)	Remarks
1	Felt cloth	6	71.5±12.9	63.5± 6.5	
2	do	6	42± 9.3	67.3± 6.5	
3	X-ply paper	3	[2] 76.0	[3] 71.4	Treated with oil.
4	do	8	92±30.7	74.8± 5.6	Do.
5	Y-ply paper	8	78.6±25.0	75.5± 8.0	Do.
6	Viscous impinging paper	7	33.5± 5.1	69.3±10.3	Treated with grease.
7	Steel wool (A)	7	20.5± 2.1	82.9± 7.6	3-inch thickness. Treated with germicidal oil.
8	do	8	26.3± 7	85.4± 9.5	Do.
9	Steel wool (B)	3	[4] 40.7	[5] 77.6	Do.
10	do	8	31.9±10.3	73.5±12.6	Do.
11	Glass wool	7	27.6± 2.9	66.5±11.2	Oiled.
12	Glass fabric	6	72.7± 8.1	32.6± 8.3	
13	Animal hair	8	26.4± 5.3	45.8±12.3	

[1] Sampling rate of 1 cubic foot per minute. All samples are for 3 minutes and are in triplicate.
[2] Values of 60, 71, and 98 colonies per cubic foot.
[3] Values of 62.1, 72.3, and 79.9 percent.
[4] Values of 31.5, 40.7, and 50.4 colonies per cubic foot.
[5] Values of 67, 81.1, and 84.6 percent.

Table 1 further indicates that the variation in efficiencies for given filters does not vary greatly. Such variations as are noted in the table are due principally to inherent difficulties in handling and culturing bacteria. It is indeed doubtful whether filter efficiencies based on dust counts would be within such narrow limits. Variations in the initial concentration of bacteria upstream of the filter are also within fairly narrow limits. The concentrations are ideal for the conditions of the tests. Likewise, the effect of wide variations in concentration on efficiency does not appear to be marked. This is borne out by reference to test 4 where the standard deviation of concentration is ±30.7 colonies, while the corresponding standard deviation of efficiencies based on the samples is ±5.6 percent. Similar variations are to be noted in test 5.

ACKNOWLEDGMENTS

The cooperation of the Bureau of Standards for the use of the equipment described in this paper is gratefully acknowledged. Through the kindness and assistance of Richard Dill, much of the work undertaken in the conduct of tests was facilitated. The authors also acknowledge the assistance given by Under Biological Aide Roy C. Meinzer, who made many of the tests included in this paper.

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DEATHS DURING WEEK ENDED APRIL 8, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Apr. 8, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	8,877	[1] 8,517
Average for 3 prior years	[1] 9,061	
Total deaths, first 14 weeks of year	132,157	124,977
Deaths under 1 year of age	498	[1] 511
Average for 3 prior years	[1] 565	
Deaths under 1 year of age, first 14 weeks of year	7,717	7,640
Data from industrial insurance companies:		
Policies in force	67,615,322	69,667,038
Number of death claims	15,639	13,403
Death claims per 1,000 policies in force, annual rate	12.1	10.0
Death claims per 1,000 policies, first 14 weeks of year, annual rate	11.4	10.1

[1] Data for 86 cities.

PREVALENCE OF DISEASE

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

UNITED STATES

CURRENT WEEKLY STATE REPORTS

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

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (----) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended Apr. 15, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Apr. 15, 1939, rate	Apr. 15, 1939, cases	Apr. 16, 1938, cases	1934–38, median	Apr. 15, 1939, rate	Apr. 15, 1939, cases	Apr. 16, 1938, cases	1934–38, median	Apr. 15, 1939, rate	Apr. 15, 1939, cases	Apr. 16, 1938, cases	1934–38, median
NEW ENG.												
Maine	12	2	2	2	948	157	19	10	91	15	114	114
New Hampshire	0	0	0	0	----	----	----	----	172	17	18	29
Vermont	13	1	0	0	----	----	----	----	643	48	67	67
Massachusetts	4	3	6	7	----	----	----	----	1,214	1,032	317	714
Rhode Island	8	1	0	0	----	----	1	----	389	51	----	75
Connecticut	0	0	5	3	47	16	4	6	2,436	821	46	91
MID. ATL.												
New York [2]	12	30	34	44	[1] 19	[1] 27	[1] 5	[1] 11	736	1,839	3,769	2,842
New Jersey	11	9	15	14	15	13	11	9	68	57	977	977
Pennsylvania	12	23	33	33	----	----	----	----	71	139	5,932	4,816
E. NO. CEN.												
Ohio	12	15	12	21	----	----	----	81	19	25	2,994	1,191
Indiana	9	6	15	15	147	99	5	30	39	26	1,090	284
Illinois	22	33	23	30	37	57	23	33	17	26	3,412	1,784
Michigan [3]	13	12	7	11	16	15	2	2	342	324	4,027	179
Wisconsin	0	0	7	3	271	154	29	45	1,021	581	2,521	1,255
W. NO. CEN.												
Minnesota	2	1	2	6	4	2	1	1	1,462	754	121	239
Iowa	32	16	2	10	36	18	----	2	571	282	196	196
Missouri	4	3	15	18	23	18	48	103	18	14	711	711
North Dakota	7	1	0	1	278	38	13	10	190	26	42	42
South Dakota	75	10	1	2	90	12	----	----	1,796	239	----	----
Nebraska	34	9	0	1	53	14	----	----	256	67	100	100
Kansas	11	4	8	9	78	28	18	6	131	47	662	859
SO. ATL.												
Delaware	0	0	2	2	----	----	----	----	59	3	31	31
Maryland [3]	6	2	11	6	74	24	5	9	1,357	440	56	247
Dist. of Col	32	4	2	7	16	2	2	1	1,617	200	19	68
Virginia	17	9	11	11	722	385	----	----	911	486	835	769
West Virginia	13	5	7	9	640	238	28	51	22	8	507	166
North Carolina	18	12	11	19	63	43	7	28	786	538	2,582	253
South Carolina [2]	22	8	3	4	2,439	893	181	331	131	48	253	42
Georgia [3]	10	6	6	8	1,267	763	----	55	257	155	305	----
Florida [3]	12	4	4	4	27	9	2	2	286	95	364	82

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Apr. 15, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Apr. 15, 1939, rate	Apr. 15, 1939, cases	Apr. 16, 1938, cases	1934–38, median	Apr. 15, 1939, rate	Apr. 15, 1939, cases	Apr. 16, 1938, cases	1934–38, median	Apr. 15, 1939, rate	Apr. 15, 1939, cases	Apr. 16, 1938, cases	1934–38, median
E. SO. CEN.												
Kentucky	16	9	16	14	137	79	12	21	49	28	526	344
Tennessee [3]	9	5	6	7	522	296	41	80	109	62	309	82
Alabama [3]	21	12	10	10	1,227	697	80	80	236	134	693	286
Mississippi [3] [5]	10	4	6	5	------	------	------	------	------	------	------	------
W. SO. CEN.												
Arkansas	10	4	11	5	695	280	69	69	154	62	205	75
Louisiana [3]	39	16	5	13	206	85	7	26	479	198	15	62
Oklahoma	14	7	7	7	360	179	127	127	587	292	146	146
Texas [3]	10	12	33	42	834	1,007	358	358	327	395	535	535
MOUNTAIN												
Montana [4]	0	0	1	1	384	41	------	42	2,200	235	16	16
Idaho	0	0	1	1	20	2	7	4	959	94	16	24
Wyoming [4] [5]	0	0	0	0	------	------	------	------	2,007	92	46	44
Colorado [4] [5]	67	14	9	5	169	35	------	------	2,581	536	435	315
New Mexico	0	0	4	3	284	23	4	15	846	28	100	80
Arizona	61	5	2	2	1,853	151	53	38	466	38	40	65
Utah [3] [4]	0	0	6	0	417	42	------	------	1,093	110	374	23
PACIFIC												
Washington	0	0	4	1	31	10	------	1	2,458	797	18	121
Oregon [4]	10	2	3	0	219	44	55	43	348	70	43	142
California	13	16	30	20	119	145	40	57	2,856	3,482	541	688
Total	13	335	398	419	290	6,141	1,257	1,712	608	15,056	36,126	33,002
15 weeks	19	7,242	8,547	8,872	407	129,527	37,297	95,046	529	196,334	488,032	377,601

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Apr. 15, 1939, rate	Apr. 15, 1939, cases	Apr. 16, 1938, cases	1934–38, median	Apr. 15, 1939, rate	Apr. 15, 1939, cases	Apr. 16, 1938, cases	1934–38, median	Apr. 15, 1939, rate	Apr. 15, 1939, cases	Apr. 16, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	0	0	0	0	0	0	121	20	15	18
New Hampshire	0	0	0	0	0	0	0	0	30	3	7	10
Vermont	0	0	0	0	0	0	0	0	188	14	13	9
Massachusetts	1.2	1	2	2	0	0	0	0	235	200	428	308
Rhode Island	0	0	0	1	0	0	0	0	107	14	18	18
Connecticut	0	0	0	2	0	0	0	0	303	102	133	105
MID. ATL.												
New York [3]	1.2	3	10	10	0	0	0	1	241	601	1,065	1,034
New Jersey	0	0	2	2	0	0	0	0	255	214	100	214
Pennsylvania	3	16	7	7	0	0	0	0	150	295	625	755
E. NO. CEN.												
Ohio	0	0	3	14	0	0	0	0	314	408	389	419
Indiana	3	2	0	3	0	0	0	0	256	172	117	210
Illinois	0.7	1	3	8	0.7	1	2	1	337	514	565	789
Michigan [3]	3	3	4	4	0	0	0	0	501	474	481	481
Wisconsin	1.8	1	0	1	0	0	1	1	308	175	164	289

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Apr. 15, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Apr. 15, 1939, rate	Apr. 15, 1939, cases	Apr. 16, 1938, cases	1934–38, median	Apr. 15, 1939, rate	Apr. 15, 1939, cases	Apr. 16, 1938, cases	1934–38, median	Apr. 15, 1939, rate	Apr. 15, 1939, cases	Apr. 16, 1938, cases	1934–38, median
W. NO. CEN.												
Minnesota	0	0	1	1	0	0	0	0	101	52	113	163
Iowa	0	0	2	2	0	0	1	0	377	186	204	204
Missouri	1.3	1	0	5	1.3	1	0	0	87	68	178	167
North Dakota	7	1	0	0	0	0	0	0	95	13	17	42
South Dakota	0	0	1	0	0	0	0	0	173	23	10	14
Nebraska	0	0	1	1	0	0	0	0	103	27	36	36
Kansas	0	0	1	1	2.8	1	0	0	226	81	153	153
SO. ATL.												
Delaware	0	0	0	0	0	0	0	0	138	7	12	11
Maryland [2]	8	1	1	4	0	0	0	0	145	47	63	63
Dist. of Col	0	0	1	3	0	0	0	0	146	18	26	21
Virginia	0	0	4	10	0	0	0	0	54	29	41	41
West Virginia	5	2	6	6	2.7	1	0	0	78	29	24	56
North Carolina	0	0	2	2	0	0	0	1	26	18	33	22
South Carolina [2]	0	0	0	0	22	8	0	0	16	6	6	4
Georgia [2]	0	0	1	1	0	0	0	0	23	14	8	8
Florida [2]	0	0	3	3	0	0	0	0	27	9	6	6
E. SO. CEN.												
Kentucky	3	2	5	7	0	0	0	0	139	80	45	46
Tennessee [2]	0	0	1	3	1.8	1	2	1	116	66	24	28
Alabama [2]	0	0	3	3	0	0	1	0	21	12	15	7
Mississippi [2 3]	0	0	2	2	0	0	1	1	5	2	1	6
W. SO. CEN.												
Arkansas	2.5	1	0	2	0	0	1	0	7	3	3	3
Louisiana [2]	2.4	1	0	1	0	0	1	0	29	12	6	12
Oklahoma	4	2	0	3	0	0	1	0	48	24	19	19
Texas [2]	1.7	2	1	6	1.7	2	1	1	33	40	118	118
MOUNTAIN												
Montana [4]	0	0	0	0	0	0	0	0	84	9	18	18
Idaho	0	0	0	0	0	0	0	0	61	6	8	11
Wyoming [4 5]	0	0	0	0	0	0	0	0	65	3	7	7
Colorado [4 5]	10	2	0	1	0	0	0	0	164	34	43	43
New Mexico	12	1	0	1	0	0	0	0	62	5	14	14
Arizona	0	0	0	0	12	1	0	0	25	2	11	16
Utah [3 4]	10	1	1	0	0	0	0	0	209	21	40	40
PACIFIC												
Washington	0	0	0	1	0	0	0	0	120	39	34	50
Oregon [4]	0	0	0	0	0	0	0	1	129	26	53	53
California	2.5	3	1	2	2.5	3	2	4	157	192	181	213
Total	1.9	47	69	158	0.8	19	14	20	175	4,409	5,690	7,138
15 weeks	2	766	1,295	1,984	0.6	230	307	307	206	77,735	90,774	103,233

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Apr. 15, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Apr. 15, 1939, rate	Apr. 15, 1939, cases	Apr. 16, 1938, cases	1934–38, median	Apr. 15, 1939, rate	Apr. 15, 1939, cases	Apr. 16, 1938, cases	1934–38, median	Apr. 15, 1939, rate	Apr. 15, 1939, cases	Apr. 16, 1938, cases
NEW ENG.											
Maine	0	0	0	0	12	2	3	3	471	78	57
New Hampshire	0	0	0	0	0	0	0	0	41	4	6
Vermont	0	0	0	0	0	0	0	0	483	36	8
Massachusetts	0	0	0	0	1	1	0	1	226	192	86
Rhode Island	0	0	0	0	0	0	0	0	496	65	0
Connecticut	0	0	0	0	0	0	0	0	329	111	46
MID. ATL.											
New York [1]	0	0	0	0	4	9	5	6	172	430	418
New Jersey	0	0	0	0	5	4	1	0	392	329	88
Pennsylvania	0	0	0	0	2	3	7	8	156	308	305
E. NO. CEN.											
Ohio	15	19	13	2	1	1	0	4	121	157	235
Indiana	49	33	61	3	1	1	3	2	85	57	28
Illinois	7	10	33	5	2	3	4	6	170	260	96
Michigan [3]	3	3	13	0	2	2	1	4	157	149	253
Wisconsin	0	0	7	12	0	0	1	2	337	192	192
W. NO. CEN.											
Minnesota	8	4	12	6	2	1	0	0	95	49	27
Iowa	95	47	46	46	0	0	2	0	34	17	27
Missouri	46	36	23	19	3	2	3	3	32	25	22
North Dakota	37	5	16	4	7	1	0	0	22	3	21
South Dakota	83	11	9	14	8	1	0	0	8	1	16
Nebraska	118	31	3	18	0	0	1	0	8	2	4
Kansas	8	3	45	37	3	1	1	1	59	21	92
SO. ATL.											
Delaware	0	0	0	0	0	0	0	1	315	16	12
Maryland [3]	0	0	0	0	3	1	1	1	71	23	44
Dist. of Col	0	0	0	0	8	1	2	2	218	27	7
Virginia	0	0	0	0	6	3	2	3	105	56	122
West Virginia	5	2	0	0	0	0	1	3	153	57	65
North Carolina	0	0	1	1	4	3	2	1	324	222	415
South Carolina [2]	0	0	0	0	8	3	0	3	224	82	55
Georgia [2]	0	0	1	0	2	1	3	3	53	32	76
Florida [2]	0	0	4	0	15	5	3	1	93	31	2
E. SO. CEN.											
Kentucky	16	9	16	1	9	5	2	4	17	10	47
Tennessee [2]	2	1	2	0	0	0	2	5	53	30	36
Alabama [2]	0	0	0	0	14	8	0	2	26	15	60
Mississippi [2 3]	0	0	1	0	0	0	5	5			
W. SO. CEN.											
Arkansas	2	1	4	0	2	1	7	0	60	24	25
Louisiana [2]	2	1	0	0	24	10	6	13	27	11	9
Oklahoma	68	34	17	3	2	1	1	1	2	1	90
Texas [2]	14	17	32	11	13	16	7	10	75	90	303
MOUNTAIN											
Montana [4]	9	1	10	9	0	0	0	0	47	5	37
Idaho	31	3	21	2	0	0	0	0	41	4	18
Wyoming [4 5]	0	0	2	4	0	0	0	0	109	5	6
Colorado [4 5]	5	1	6	6	0	0	1	1	327	68	35
New Mexico	0	0	0	0	12	1	0	0	111	9	20
Arizona	0	0	2	0	12	1	1	0	294	24	69
Utah [3 4]	0	0	0	0	0	0	0	0	288	29	27
PACIFIC											
Washington	12	4	27	15	3	1	0	1	68	22	128
Oregon [4]	20	4	20	4	15	3	0	2	60	12	11
California	21	26	85	4	2	8	5	4	158	193	446
Total	12	306	532	246	4	99	83	130	145	3,584	4,192
15 weeks	14	5,421	8,171	3,282	5	1,741	1,777	1,777	167	61,897	62,360

[1] New York City only.
[2] Typhus fever, week ended Apr. 15, 1939, 25 cases as follows: New York, 1; South Carolina, 3; Georgia, 6; Florida, 1; Tennessee, 1; Alabama, 1; Mississippi, 1; Louisiana, 2; Texas, 9.
[3] Period ended earlier than Saturday.
[4] Rocky Mountain spotted fever, week ended Apr. 15, 1939, 8 cases as follows: Montana, 2; Wyoming, 1; Colorado, 2; Utah, 2; Oregon, 1.
[5] Colorado tick fever, week ended Apr. 15, 1939, 6 cases as follows: Wyoming, 4; Colorado, 2.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningitis, meningococcus	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
March 1939										
Arkansas	2	34	5,310	127	320	40	1	48	10	18
Florida	0	20	27	19	436	13	3	55	0	12
Maine	1	10	227	----	66	1	0	80	0	15
Maryland	5	16	294	----	3,615	----	0	189	0	6
Missouri	3	50	1,918	1	68	1	2	404	47	13
Nebraska	5	7	32	----	308	----	0	143	55	0
New Jersey	5	22	58	2	138	----	0	842	0	13
Pennsylvania	31	214	----	----	791	----	1	2,137	0	40

March 1939

	Cases
Anthrax:	
New Jersey	2
Pennsylvania	1
Chickenpox:	
Arkansas	276
Florida	258
Maine	208
Maryland	420
Missouri	273
Nebraska	158
New Jersey	1,521
Pennsylvania	4,982
Diarrhea:	
Maryland	9
Dysentery:	
Arkansas (amoebic)	3
Florida (amoebic)	7
Florida (bacillary)	3
Maryland (amoebic)	3
Maryland (bacillary)	3
Missouri (amoebic)	1
Pennsylvania (bacillary)	4
Encephalitis, epidemic or lethargic:	
Maryland	1
Missouri	1
Nebraska	1
New Jersey	1
Pennsylvania	5
German measles:	
Florida	7
Maine	8
Maryland	16
New Jersey	67
Pennsylvania	68

March 1939—Continued

	Cases
Hookworm disease:	
Arkansas	10
Florida	666
Impetigo contagiosa:	
Maryland	14
Mumps:	
Arkansas	113
Florida	103
Maine	91
Maryland	292
Missouri	709
Nebraska	139
New Jersey	766
Pennsylvania	3,330
Ophthalmia neonatorum:	
Arkansas	1
Maryland	1
New Jersey	12
Pennsylvania	5
Puerperal septicemia:	
Arkansas	1
Rabies in animals:	
Arkansas	33
Florida	1
New Jersey	87
Rabies in man:	
Missouri	2
Septic sore throat:	
Arkansas	80
Florida	9
Maine	3
Maryland	51
Missouri	54
Nebraska	7
New Jersey	44

March 1939—Continued

	Cases
Tetanus:	
Florida	3
New Jersey	1
Trachoma:	
Arkansas	10
Missouri	31
Tularaemia:	
Arkansas	15
Florida	1
Maryland	1
Missouri	1
Typhus fever:	
Florida	8
Maryland	1
Undulant fever:	
Arkansas	4
Florida	4
Maine	3
Missouri	3
New Jersey	3
Pennsylvania	11
Vincent's infection:	
Florida	20
Maine	2
Maryland	11
Whooping cough:	
Arkansas	125
Florida	203
Maine	206
Maryland	97
Missouri	121
Nebraska	14
New Jersey	1,854
Pennsylvania	1,633

PLAGUE INFECTION IN FLEAS FROM GROUND SQUIRRELS IN ADAMS COUNTY, WASH.

Under date of April 15, 1939, Senior Surg. C. R. Eskey reported plague infection proved in a pool of 51 fleas collected from 11 ground squirrels, *C. washingtoni* (*C. townsendi*), shot on March 28, 1939, 7 miles west of Ralston, near Pizzaro, Adams County, Wash.

CASES OF VENEREAL DISEASES REPORTED FOR FEBRUARY 1939

These reports are published monthly for the information of health officers in order to furnish current data as to the prevalence of the venereal diseases. The figures are taken from reports received from State and city health officers. They are preliminary and are therefore subject to correction. It is hoped that the publication of these reports will stimulate more complete reporting of these diseases.

Reports from States

	Syphilis		Gonorrhea	
	Cases reported during month	Monthly case rates per 10,000 population	Cases reported during month	Monthly case rates per 10,000 population
Alabama	1,430	4.94	248	0.86
Arizona	219	5.32	107	2.60
Arkansas	816	3.98	214	1.04
California	1,722	2.80	1,134	1.84
Colorado	97	.91	43	.40
Connecticut	180	1.03	67	.38
Delaware	227	8.70	34	1.30
District of Columbia	529	8.44	242	3.86
Florida	1,569	9.40	96	.57
Georgia	1,965	6.37	1.98	.64
Idaho	25	.51	12	.24
Illinois	2,617	3.32	1,368	1.74
Indiana	495	1.42	95	.27
Iowa	220	.86	109	.43
Kansas	684	3.67	236	1.27
Kentucky	889	3.04	267	.91
Louisiana	1,047	4.91	76	.36
Maine	34	.40	25	.29
Maryland	1,128	6.72	251	1.49
Massachusetts	343	.77	285	.64
Michigan	973	2.01	459	.95
Minnesota	229	.86	158	.60
Mississippi	2,252	11.13	2,546	12.59
Missouri	683	1.71	153	.38
Montana	26	.48	30	.56
Nebraska	75	.55	55	.40
Nevada [1]				
New Hampshire [1]				
New Jersey	759	1.75	174	.40
New Mexico	128	3.03	40	.95
New York	5,555	4.29	1,616	1.25
North Carolina	5,751	16.47	601	1.72
North Dakota	21	.30	23	.33
Ohio [1]				
Oklahoma	308	1.21	28	.11
Oregon	146	1.42	111	1.08
Pennsylvania	1,177	1.16	138	.14
Rhode Island	110	1.62	50	.73
South Carolina [1]				
South Dakota	18	.26	8	.12
Tennessee	1,032	3.57	421	1.46
Texas	3,136	5.08	495	.80
Utah	51	.98	26	.50
Vermont [1]				
Virginia	1,628	6.02	235	.87
Washington	423	2.55	322	1.94
West Virginia	386	2.07	116	.62
Wisconsin	57	.19	136	.46
Wyoming [1]				
Total	41,160	3.45	13,048	1.09

See footnotes at end of table.

Reports from cities of 200,000 population or over

	Syphilis		Gonorrhea	
	Cases reported during month	Monthly case rates per 10,000 population	Cases reported during month	Monthly case rates per 10,000 population
Akron, Ohio [2]				
Atlanta, Ga	306	10.19	74	2.46
Baltimore, Md	649	7.77	165	1.98
Birmingham, Ala	310	10.53	48	1.63
Boston, Mass	115	1.45	103	1.29
Buffalo, N. Y	154	2.56	11	.18
Chicago, Ill	1,843	5.03	1,030	2.81
Cincinnati, Ohio	180	3.81	119	2.52
Cleveland, Ohio	191	2.02	56	.59
Columbus, Ohio	92	2.93	58	1.85
Dallas, Tex.[1]				
Dayton, Ohio	79	3.56	12	.54
Denver, Colo	55	1.83	27	.90
Detroit, Mich	596	3.28	284	1.56
Houston, Tex	328	9.15	111	3.10
Indianapolis, Ind	20	.52	24	.62
Jersey City, N. J	26	.80	10	.31
Kansas City, Mo.[1]				
Los Angeles, Calif.[1]				
Louisville, Ky	278	8.20	51	1.50
Memphis, Tenn	284	9.72	99	3.39
Milwaukee, Wis.[2]				
Minneapolis, Minn	64	1.28	47	.94
Newark, N. J	277	6.10	109	2.40
New Orleans, La.[1]				
New York, N. Y	3,476	4.64	1,329	1.77
Oakland, Calif	61	1.95	66	2.11
Omaha, Nebr	44	1.97	22	.98
Philadelphia, Pa	451	2.25		
Pittsburgh, Pa	207	2.94	16	.23
Portland, Ore	24	.75	35	1.09
Providence, R. I.[1]				
Rochester, N. Y	30	.88	31	.91
St. Louis, Mo	282	3.35	76	.90
St. Paul, Minn	42	1.46	22	.77
San Antonio, Tex	124	4.74	50	1.91
San Francisco, Calif	156	2.26	166	2.41
Seattle, Wash	111	2.87	109	2.82
Syracuse, N. Y	86	3.81	6	.27
Toledo, Ohio [1]				
Washington, D. C	529	8.44	242	3.86

[1] No report for current month.
[2] Not reporting.

WEEKLY REPORTS FROM CITIES

City reports for week ended Apr. 8, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5 year average	171	294	88	8,305	850	2,514	24	407	22	1,435	------
Current week [1]	95	544	81	3,998	613	1,405	13	361	19	1,023	------
Maine:											
Portland	0	5	1	0	4	2	0	0	1	18	32
New Hampshire:											
Concord	0	------	0	0	3	0	0	0	0	0	22
Manchester	0	------	0	0	0	0	0	1	0	0	34
Nashua	0	------	0	0	1	0	0	0	0	0	9
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	2	11
Rutland	0	------	0	0	3	0	0	1	0	0	10
Massachusetts:											
Boston	0	------	2	151	42	48	0	8	0	17	256
Fall River	0	------	0	1	2	0	0	0	0	0	29
Springfield	0	------	0	69	2	2	0	1	0	0	38
Worcester	0	------	0	0	7	12		1	0	60	54
Rhode Island:											
Pawtucket	0	------	0	2	0	0	0	0	0	0	15
Providence	0	------	2	16	10	5	0	1	0	52	69
Connecticut:											
Bridgeport	0	2	1	0	4	3	0	1	0	1	40
Hartford	0	------	0	165	5	12	0	0	0	7	48
New Haven	0	1	0	243	1	8	0	0	0	18	22
New York:											
Buffalo	0	------	0	152	12	42	0	9	0	28	152
New York	12	22	7	116	121	293	0	88	1	74	1,643
Rochester	0	1	0	115	4	23	0	0	0	11	80
Syracuse	0	------	0	140	5	8	0	0	0	31	56
New Jersey:											
Camden	4	------	0	0	2	11	0	0	0	7	30
Newark	0	------	0	8	2	50	0	1	0	48	96
Trenton	0	------	0	0	1	10	0	2	0	4	30
Pennsylvania:											
Philadelphia	1	4	4	37	21	42	0	22	2	61	456
Pittsburgh	3	5	3	1	20	27	0	13	0	22	175
Reading	3	------	0	0	0	0	0	1	0	5	30
Scranton	0	------	------	0	------	10	0	------	0	3	------
Ohio:											
Cincinnati	3	------	4	0	6	22	0	7	0	6	137
Cleveland	0	29	1	5	16	41	0	12	0	21	206
Columbus	2	2	2	0	4	9	0	3	0	9	88
Toledo	0	1	1	2	2	25	0	2	0	16	71
Indiana:											
Anderson	0	------	0	0	0	4	1	0	0	0	4
Fort Wayne	------	------	------	------	------	------	------	------	------	------	------
Indianapolis	2	------	2	30	16	45	2	7	0	21	109
Muncie	0	------	0	0	3	2	0	0	0	0	18
South Bend	0	------	0	1	1	0	0	0	0	1	13
Terre Haute	0	------	0	0	1	0	0	0	0	0	22
Illinois:											
Alton	0	------	0	1	1	1	0	0	0	0	7
Chicago	7	19	4	10	31	244	0	37	1	109	725
Elgin	0	------	0	1	2	1	0	0	0	5	14
Moline	0	------	0	0	1	2	0	0	0	1	12
Springfield	0	------	0	1	4	2	0	0	0	5	20
Michigan:											
Detroit	12	3	1	8	11	112	0	16	1	90	257
Flint	0	------	1	47	5	24	0	0	0	0	31
Grand Rapids	0	------	2	1	3	22	0	0	0	1	46
Wisconsin:											
Kenosha	0	------	0	1	0	1	0	0	0	11	8
Madison	0	------	0	2	0	3	0	0	0	20	13
Milwaukee	0	3	1	4	6	48	0	3	1	84	102
Racine	0	------	0	2	1	4	0	0	0	7	20
Superior	0	------	0	1	0	2	0	0	0	0	8

[1] Figures for Barre, Fort Wayne, Tampa, and Boise estimated; reports not received.

City reports for week ended Apr. 8, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0	------	0	0	1	1	0	0	0	0	22
Minneapolis	1	------	0	118	4	9	3	1	0	12	94
St. Paul	0	------	0	92	12	10	0	1	0	3	66
Iowa:											
Cedar Rapids	0	------	--------	0	-------	1	0	-------	0	2	--------
Davenport	0	------	--------	0	-------	3	1	-------	0	0	--------
Des Moines	1	------	0	2	0	14	5	0	0	0	45
Sioux City	0	------	--------	1	-------	0	0	-------	0	7	--------
Waterloo	11	------	--------	0	-------	19	0	-------	0	2	--------
Missouri:											
Kansas City	3	------	1	2	6	13	0	1	0	0	112
St. Joseph	0	------	0	2	6	1	0	2	0	2	20
St. Louis	0	3	2	3	14	33	5	7	1	22	210
North Dakota:											
Fargo	0	------	0	1	0	0	0	0	0	0	9
Grand Forks	0	------	--------	1	-------	1	0	-------	0	0	--------
Minot	0	------	0	1	0	0	0	0	0	0	7
South Dakota:											
Aberdeen	0	------	--------	23	-------	0	5	-------	0	0	--------
Sioux Falls	0	------	0	0	0	3	0	0	0	0	10
Nebraska:											
Lincoln	0	------	--------	105	-------	0	0	-------	0	7	--------
Omaha	0	------	1	3	9	7	1	3	0	1	66
Kansas:											
Lawrence	0	3	--------	0	-------	1	0	-------	0	0	4
Topeka	0	------	0	1	0	4	0	0	0	2	9
Wichita	0	1	0	6	4	0	0	0	0	1	37
Delaware:											
Wilmington	0	------	0	6	3	3	0	0	0	2	27
Maryland:											
Baltimore	0	2	1	404	9	14	0	10	1	10	225
Cumberland	0	------	0	0	0	0	0	1	0	1	15
Frederick	0	------	0	1	0	0	0	0	0	0	3
Dist. of Col.:											
Washington	5	6	3	167	8	18	0	10	0	33	166
Virginia:											
Lynchburg	1	------	0	155	1	0	0	0	0	9	6
Norfolk	1	1	0	10	3	5	0	1	0	2	26
Richmond	1	------	2	124	2	2	0	0	0	0	53
Roanoke	0	------	0	3	2	0	0	0	0	2	6
West Virginia:											
Charleston	0	8	0	0	7	0	0	1	0	0	27
Huntington	0	------	--------	0	-------	1	0	-------	0	0	--------
Wheeling	0	1	1	3	3	0	0	3	0	4	26
North Carolina:											
Gastonia	0	------	--------	0	-------	0	-------	-------	0	0	--------
Raleigh	1	------	0	2	2	0	0	0	0	2	20
Wilmington	0	------	0	7	0	0	0	0	2	2	5
Winston-Salem	0	------	0	122	0	0	0	0	0	0	7
South Carolina:											
Charleston	0	40	--------	0	1	0	0	0	0	2	11
Florence	0	------	0	12	0	0	0	0	0	0	3
Greenville	0	------	0	0	2	0	0	0	0	1	8
Georgia:											
Atlanta	0	223	5	5	16	3	0	4	1	0	108
Brunswick	0	------	0	10	1	0	0	0	0	0	3
Savannah	1	61	1	2	0	0	0	2	0	5	28
Florida:											
Miami	0	2	0	0	3	0	0	5	0	6	36
Tampa	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
Kentucky:											
Ashland	1	7	0	0	1	0	0	0	0	0	11
Covington	1	------	0	0	5	8	0	2	0	0	16
Lexington	0	------	0	0	2	4	0	0	0	3	18
Louisville	1	11	1	11	2	16	0	10	0	4	78
Tennessee:											
Knoxville	0	2	0	0	0	1	0	0	0	0	21
Memphis	0	18	1	1	11	16	0	8	1	7	83
Nashville	1	------	1	0	6	14	0	4	0	0	75
Alabama:											
Birmingham	0	42	1	3	9	3	0	5	0	0	62
Mobile	1	6	4	11	3	0	0	0	0	3	21
Montgomery	0	12	--------	0	-------	2	0	-------	0	1	--------
Arkansas:											
Fort Smith	0	------	--------	6	-------	0	0	-------	0	0	--------
Little Rock	0	------	2	0	4	1	0	1	0	0	8

City reports for week ended Apr. 8, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths all causes
		Cases	Deaths								
Louisiana:											
Lake Charles	0	-----	0	16	4	0	0	0	0	0	8
New Orleans	8	8	3	33	18	1	0	7	4	0	133
Shreveport	1	-----	2	5	5	0	0	1	0	1	46
Oklahoma:											
Oklahoma City	1	7	1	0	7	3	1	1	0	0	39
Tulsa	0	-----	-----	29	-----	7	0	-----	0	0	-----
Texas:											
Dallas	0	1	1	13	5	2	0	4	0	0	55
Galveston	0	-----	0	0	1	0	0	0	0	0	16
Houston	0	-----	1	31	8	2	0	5	0	0	66
San Antonio	0	2	2	3	6	0	0	6	0	0	71
Montana:											
Billings	0	-----	0	1	2	1	0	1	0	0	8
Great Falls	0	-----	0	9	2	0	0	0	0	0	11
Helena	0	-----	0	16	0	0	0	0	0	0	1
Missoula	0	-----	0	20	0	0	0	0	0	0	1
Idaho:											
Boise	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Colorado:											
Colorado Springs	0	-----	0	41	0	5	0	1	0	0	11
Denver	8	-----	3	38	7	6	0	4	0	24	87
Pueblo	1	-----	1	81	2	1	0	0	0	14	10
New Mexico:											
Albuquerque	0	-----	0	4	0	1	0	3	0	0	11
Utah:											
Salt Lake City	0	-----	0	6	2	6	0	1	0	3	35
Washington:											
Seattle	0	-----	0	146	2	2	0	2	0	1	94
Spokane	0	1	1	188	2	2	0	0	0	0	25
Tacoma	0	-----	0	2	0	0	2	1	0	0	25
Oregon:											
Portland	2	2	2	0	3	11	2	5	0	0	74
Salem	0	3	-----	3	-----	3	0	-----	1	4	-----
California:											
Los Angeles	12	21	1	468	22	34	0	21	1	15	376
Sacramento	0	-----	0	188	0	2	0	1	0	0	27
San Francisco	1	4	0	98	5	14	0	7	0	4	167

State and city	Meningitis meningococcus		Poliomyelitis cases	State and city	Meningitis meningococcus		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
New York:				South Carolina:			
Buffalo	1	1	1	Charleston	0	0	1
New York	0	0	1	Tennessee:			
Rochester	2	0	0	Nashville	0	1	0
Pennsylvania:				Alabama:			
Philadelphia	1	0	0	Birmingham	2	0	0
Scranton	1	0	0	Louisiana:			
Wisconsin:				Shreveport	0	3	0
Madison	1	0	0	Texas:			
Kansas:				Dallas	1	1	0
Wichita	1	0	0	Houston	1	0	0
West Virginia:				Washington:			
Charleston	1	1	0	Spokane	1	0	0

Encephalitis, epidemic or lethargic.—Cases: Springfield, Mass., 1; New York, 1; Duluth, 1; Minneapolis, 1
Pellagra.—Cases: Wilmington, N. C., 1; Charleston, S. C., 1; Atlanta, 6; Savannah, 1; Montgomery, 1; Los Angeles, 1.
Typhus fever.—Cases: Savannah, 1; Lake Charles, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended March 25, 1939.—During the week ended March 25, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis			1	1	1					3
Chickenpox		36	6	103	286		31	7	127	546
Diphtheria	1	1	3	63	1	4		1	3	77
Dysentery					1					1
Influenza		891		187	806	40	65		25	2,014
Measles		34		336	879	12	4	15	9	1,289
Mumps				52	120	29	5	7	1	214
Pneumonia		15			41	4	1	2	5	68
Scarlet fever		3	17	48	172	34	17	37	21	349
Smallpox						14		2		16
Tuberculosis	1	9	6	71	41	2	2	1	11	144
Typhoid and paratyphoid fever			1	7	3	2	2	1		16
Whooping cough		12		67	196	9	10	1	79	373

CUBA

Habana—Communicable diseases—4 weeks ended April 8, 1939.—During the 4 weeks ended April 8, 1939, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	11		Tuberculosis		3
Malaria	4		Typhoid fever	35	3
Scarlet fever	2				

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

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

CHOLERA

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

Place		Aug. 28–Sept. 24, 1938	Sept. 25–Oct. 29, 1938	Oct. 30–Nov. 26, 1938	Nov. 27–Dec. 31, 1938	Week ended—												Apr. 1, 1939
						January 1939				February 1939				March 1939				
						7	14	21	28	4	11	18	25	4	11	18	25	
Afghanistan: Kabul	C			18														
China:																		
Amoy	C			7														
	D			3														
Canton	C	19	12															
	D	4																
Foochow	C	95	40	77	118	6												
	D	41	21	5	7	2												
Hankow	C	73	2															
Hong Kong	C	68	46	29	11	2	2	1										
	D	42	21	20	9			2										
Kwantung Province	C	2,870	142															
	D	752	26															
Macao	C	113	112	43	1													
	D	41		10	1													
Shanghai	C	988	401	32	10													
Swatow	C	37	12	7	1													
Tientsin	C	5																
Yunnanfu [1]																		
Chosen (Korea)	C	47	2															
	D	27	1															
India	C	45,668	34,396	11,391	6,004	612	594	744	1,921	1,606	1,254	975						
	D	20,788	17,568	6,516	3,978	270	354	341	959	847	640	499						
Allahabad	C			2										[2]1				
Assam	C	1,093	2,253	3,555	2,863	194	157	62	14	51	13	32	17	37	51	77	73	
	D	555	921	1,980	1,838	121	121	44	9	32	12	14	9	10	19	27	42	
Bassein	C															1		
Bengal Presidency	C	4,598	9,443	12,553	14,235		1,970	1,476	1,031	917	832	689	719	818	1,107	1,411	1,605	
	D	2,288	5,048	7,175	8,073		987	804	516	492	431	353	330	392	508	641	756	
Bombay Presidency	C	1,478	1,496	1,037	513	61	33	82	82	135	42		28					
	D	684	663	452	181	19	21	34	37	56	18		13					

[1] Information dated Nov. 30, 1938, stated that cholera had appeared in villages near Yunnanfu, China. In one village of approximately 1,000 persons, 500 were said to have died.
[2] Suspected.

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

CHOLERA—Continued

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

Place		Aug. 28–Sept. 24, 1938	Sept. 25–Oct. 29, 1938	Oct. 30–Nov. 26, 1938	Nov. 27–Dec. 31, 1938	Week ended— January 1939 7	14	21	28	February 1939 4	11	18	25	March 1939 4	11	18	25	Apr. 1, 1939
India—Continued.																		
Calcutta	C	89	114	136	114	14	11	18	16	4	29	34	51	48	71	87	109	147
Cawnpore	C	26	4												1	1	1	
	D	8	1														1	
Central Provinces and Berar	C	24,285	8,028	1,135	228	33	48		14	8	18	1	34	4	3	18	46	17
Chittagong	C				1											[3] 1	1	2
Howrah	C	137	126	32	168	12	42	19	25	51	75							
Madras Presidency	C	1,842	1,663	253	568	251	227	491	495	405	290	199	103					
	D	731	733	115	211	75	117	203	232	201	135	98	62					
Madras	C	2	4	4	3							1	2	1			1	
	D		2	2	1							1	1					
Negapatam	C			5	7	2												
	D			1	2													
Northwest Frontier Province	C	114	26	6														
Orissa Province	C	12	33	2	20	13		11	12	7	22	14	30	11	15	14	16	11
Punjab	C	15																
Rangoon	C	1	1															
Sind State	C	1																
Tirumalaivasal	C									3		2						
India (French):																		
Chandernagor Territory	C	1		1				2				1			12			
Karikal Territory	C		1		1	1		1	3		25	15	1					
Pondichery Province	C		3															
India (Portuguese): Damao	C	7																
Indochina (French):																		
Annam Province	C	35	7															
Tonkin Province	C	7	77															
Japan:																		
Fukuoka Prefecture—Wakamatsu	C		3															
Hiroshima Prefecture—Fukuyama	C		3															
Siam: [4]																		
Bangkok. [4]																		
Smud Prakar Province [4]	C																5	
On vessel: S. S. *Ethiopia* at Madras	C	1																

[3] Imported.

[4] During the week ended Apr. 8, 1939, 1 imported case of cholera was reported in Bangkok and 7 cases of cholera were reported in Smud Prakar Province, Siam.

PLAGUE[1]

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

Place		Aug. 28–Sept. 24, 1938	Sept. 25–Oct. 29, 1938	Oct. 30–Nov. 26, 1938	Nov. 27–Dec. 31, 1938	Week ended—												Apr. 1, 1939
						January 1939				February 1939				March 1939				
						7	14	21	28	4	11	18	25	4	11	18	25	
Algeria: Algiers	C															1		
Argentina. (See table below.)																		
Belgian Congo	C	1			1										1	2		
Bolivia. (See table below.)																		
Brazil. (See table below.)																		
British East Africa:																		
Kenya	C	2	1		1							3						
Uganda	C	53	63	27	9	3	1	1	9	11	5	8	6	6	5	3		
	D	50	62	28	9	3	1	1	9	11	5	7	6	5	5	4		
Dutch East Indies: Java and Madura	C	120	150	98	135													
	D	120	145	97	135													
Ecuador:																		
Guayaquil	C			2										1				
	D			2														
Plague-infected rats				3						1				1			2	
Loja	C									[2] 4								
Pueblo Viejo	C											3						
Riobamba	C											[3] 16						
	D											15						
Egypt: Asyut Province	C								1	1	4	1	[4] 26	10	6	2	4	5
Hawaii Territory: Plague-infected rats:																		
Hawaii Island—Hamakua District:—																		
Hamakua Mill Sector			6	13	40													
Kaiwiki					1													
Kukaiau					10	2		4		1				2		1		
Paauhau Sector			10	12	7			3				1			1			
India	C	1,223	2,139	1,723	1,931	474	397	546	598	589	739	1,033						
	D	498	975	737	872	165	196	272	337	277	361	304						
Allahabad	D												[5] 1					
Bassein	C	2												1		2		
Plague-infected rats				1												1		
Bombay Presidency	C	83	106	136	101	7	11	24	9	17	2		8					
	D	40	63	65	61	5	4	12	8	8	3		2					

[1] Including plague in the United States and its possessions.
[2] Unofficially reported.
[3] Pneumonic.
[4] Includes 4 cases of pneumonic plague.
[5] Imported.

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

PLAGUE—Continued

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

Place		Aug. 28–Sept. 24, 1938	Sept. 25–Oct. 29, 1938	Oct. 30–Nov. 26, 1938	Nov. 27–Dec. 31, 1938	Week ended— January 1939 7	14	21	28	February 1939 4	11	18	25	March 1939 4	11	18	25	Apr. 1, 1939
India—Continued.																		
Central Provinces and Berar	C	412	584	430	677	213	195	142	165	170	343	480	421	440	585	522	509	454
Cochin	C		1	2														
	D			2														
Plague-infected rats		10	13	6	6				1									
Madras Presidency	C	195	382	215	135	40	25	40	35	55	49	27	33					
	D	88	156	93	61	15	13	10	15	19	20	10	15					
Rangoon	C	2				1		1	1				[6]1					
	D	2				1			1									
Indochina. (See table below.)																		
Madagascar. (See table below.)																		
Peru. (See table below.)																		
Siam:																		
Bisnulok Province	C								1	14	11	4	4	1				
	D								1	1	1	2	1					
Lampang Province	C										1							
Prae	C						1	2										
Svargalok Province	C								11	13	2	1	1	1	1			
Tak Province	C				3			4	3		1	1	1					
Tunisia: Tunis	C		2	2	2													
Plague-infected rats				1				2			3							
Union of South Africa (see also table below)	C	3			2		[6]6		[6]2		[6]9		[6]9		[6]11			
Cape Province—Port Elizabeth	C	1	1		1													
	D				1													
Orange Free State	C				5													
United States.[7]																		

Place		September 1938	October 1938	November 1938	December 1938	January 1939	February 1939
Argentina: Salta Province	C	1					
Bolivia	C	[8]103		1			
Brazil:							
Alagoas State	C		1		5		
Parahiba State	C				1		
Pernambuco State	C	4	20	17	17		
Rio de Janeiro State	C			11	1		
Indochina: Cambodia	C						2
Madagascar (central region)	C	60	70	73	107	79	
	D	60	64	64	102	42	
Peru	C	7	6	6	7	14	9
Lambayeque Department	C				1	2	
Libertad Department	C			3	2	11	4
Lima Department	C	6	6	2	4	1	4
Piura Department	C						1

[8] For 2 weeks.

[7] Last reported human case, Aug. 30, 1937, Fresno County, Calif. Intensive plague work is being conducted in the Western States and detailed reports of plague-infection found in animals and insect hosts are published currently in the PUBLIC HEALTH REPORTS. The following summarizes recent reports for 1938 and 1939: *Arizona*—Insects, Sept. 27; *California*—Ground squirrels, October, December, 1938, Mar. 1, 1939; insects, October, December, 1938, Mar. 3, 1939; *New Mexico*—Prairie dogs, August, September; insects, August, September; *Washington*—Insects, Mar. 14 and 28, 1939; *Wyoming*—Insects, August.

[8] For the period Sept. 8–Oct. 7, 1938.

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

SMALLPOX

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

Place		Aug. 28–Sept. 24, 1938	Sept. 25–Oct. 29, 1938	Oct. 30–Nov. 26, 1938	Nov. 27–Dec. 31, 1938	Week ended— January 1939				February 1939				March 1939				Apr. 1, 1939
						7	14	21	28	4	11	18	25	4	11	18	25	
Algeria: Algiers Department	C		1															
Angola. (See table below)																		
Arabia: Aden	D											1						
Belgian Congo. (See table below.)																		
Bolivia. (See table below.)																		
Brazil. (See table below.)																		
British East Africa: Tanganyika	C	30	38	46		1				144	1	21	8	57	18			
Canada:																		
Alberta	C											36	1			3	2	
British Columbia	C				[1]1	5	1	2			4			8				
Manitoba	C											1				8	14	
Ontario	C		1	2	2								1					
Saskatchewan	C	[1]1	[1]2	9	5	8	1	7	1	10								
China (see also table below):																		
Amoy	C			2														
Dairen	C				2		1								1			
Foochow	C					5			3									
Hankow	C		1															
Hong Kong	C			2	30		5	7	6	8	4	7	26	15	11	13	6	
	D				23		2	6	5	5	5	5	8	16	11	15	7	
Macao	C										2	1						
Shanghai	C	4	53	318	1,264	247	242	188	157	107	64	48	55	29	24	34	15	10
Swatow	C							1		2	1							
Tientsin	C				2								1					
Chosen (Korea). (See table below.)																		
Colombia (see also table below): Cartagena	D											1		1		1		
Dahomey. (See table below.)																		
Dutch East Indies:																		
Batavia	C	[2]1																
Surabaya	C				[2]1													
Ecuador: Guayaquil (see also table below)	C													3		1		
	D															1		
France. (See table below.)																		
Great Britain: England and Wales—																		
Liverpool	C				1		1											
York County	C			3														
Greece. (See table below.)																		

Guatemala. (See table below.)																	
India	C	1,206	1,225	1,628	5,335	1,611	1,384	1,868	2,934	2,658	2,644	2,851					
	D	330	259	401	1,377	357	286	448	686	540	644	660					
Allahabad	C								1						2		
Assam	C	10	33	39	80	27	19		21	6	26	21	5	32	31	17	41
Bengal Presidency	C	123	146	160	300	58	213	188	113	377	376	466	516	610	462	534	546
	D	51	49	29	83	20	78	84	21	140	171	151	170	259	186	183	96
Bombay Presidency	C	281	361	214	681	295	233	356	454	489	362		663				
	D	37	51	27	91	39	38	63	47	59	65		96				
Bombay	C	9	5		2	2		3	7	4	3	7	6	6	9	10	28
	D	3			1	2		2	4	3	2	2	4	5	4	3	9
Calcutta	C	28	10	42	116	71	89	100	140	196	194	184	202	221	174	190	221	184
	D	18	7	17	66	30	48	76	77	99	137	103	112	151	120	119	158	141
Cawnpore	C								4	1		1			2	1	2	4
Central Provinces and Berar	C	15	14	3	46	21	5	34	21	41	40	39	78	92	126	152	170	245
Chittagong	C									1								
Cochin	C				1							2	2					
Delhi	C	1		5	23	14	25	18	39	26	15	31	41	39	47	22	25	38
Howrah	C	27	18	5	21	13	23	10	21	32	33	43	40					
Jodhpur	C	1																
Karachi	C			[2]1	[2]3	1		1	1	1		2				1	[2]2	1
Madras Presidency	C	306	281	363	893	176	187	328	367	345	353	317	374					
	D	64	50	55	168	29	229	54	58	39	66	66	62					
Madras	C	100	81	160	186	26	17	57	71	60	99	73	72	81	60	43	52	49
Moulmein	C			4				1										
Northwest Frontier Province	C	24	37	75	290	96	20	39		21	16	33	43	23	31	44	16	15
Orissa Province	C	119	46	35	208	40	45	126	127	77	134	119	135	152	148	221	178	192
Punjab	C	13	10	57	135	43	31	38	84	92	65	118	54	55	57	38	30	63
Rangoon	C	4	3	5	2	4	2	2	1	1		1	3	7	3	4		5
Sind State	C	63	29	119	302		73	85		85	83	39	92	48	97	68	66	58
India (French):																		
Chandernagor Territory	C				1						2							
Pondichery Territory	C									2	3	1		4				
	D									1	2	1		2				
Indochina (French) (see also table below):																		
Tonkin Province	C	46	34	95	267	57	19	68	70	35	59	49	40	31	96	50	34	29
Haiphong	C									2								
Hanoi	C								1	1	3	2	4	3	1	1	1	1
Saigon-Cholon	C	7	9		12	3		1	2		[2]1	2						
Iran	C		3		1			1										
Iraq	C	3			1	5		1					1					
Ivory Coast. (See table below.)																		
Japan:																		
Kanagawa Prefecture	C							1										
Kobe	C				3	1		1	2	2	38	15	11	4	1	3	8	
Kyoto	C						3		10		1							
Nagasaki	C				7													
Okayama Prefecture	C			1	1													
Osaka	C											1						
Taiwan.[3]																		
Tokyo	C				2					2	1	1	1					

[1] For 2 weeks. [2] Imported. [3] Information dated Apr. 6, 1939, states that up to Mar. 31, 1939, 61 cases of smallpox were reported in Taiwan, Japan.

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

SMALLPOX—Continued

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

Place		Aug. 28–Sept. 24, 1938	Sept. 25–Oct. 29, 1938	Oct. 30–Nov. 26, 1938	Nov. 27–Dec. 31, 1938	Week ended— January 1939 7	14	21	28	February 1939 4	11	18	25	March 1939 4	11	18	25	Apr. 1, 1939
Malta. (See table below.)																		
Mexico (see also table below):																		
Mexico, D. F.	C				1				1		1	1	1	6				
Monterrey	C								4	1		1			1			
Piedras Negras	D																1	
San Luis Potosi	D										2	2	1		1	2		
Tampico	C			1						1		2	4	7	9	4	2	1
Morocco. (See table below.)																		
Nigeria	C		156	87	182	170	59	91		212	449	148	175	145				
Calabar	C					1					3		3	2				
Lagos	C	13	7															
Port Harcourt	C							3					1					
Niger Territory. (See table below.)																		
Northern Rhodesia	C	6	9		6													
Nyasaland	C	6	3															
Portugal (see also table below).																		
Lisbon	C	5	8	20	6	2	3	12	25	2	12	3	4	9	5	4	3	
Oporto	C	1	10		5		4	1		3	3	3	5	1			1	
Salvador. (See table below.)																		
Senegal. (See table below.)																		
Siam	C	33			6	25	22	1							1		1	
Sierra Leone	C				2				[1]4		[1]1							
Southern Rhodesia	C	97	57	125	30		7	24	6	18	6	10	14					
Straits Settlements: Singapore	C														1			
Sudan (Anglo-Egyptian)	C	2	30	20	31	4	12	6	6		16		2	4	6	6	1	5
Syria: Aleppo	C														1			
Turkey. (See table below.)																		
Union of South Africa. (See table below.)																		
Venezuela. (See table below.)																		

[1] For 2 weeks.

On vessels:

S. S. *Conte Biancamano* at Suez from Shanghai, Colombo, Bombay, and Massowah	1 case	Sept.	10, 1938
S. S. *Hartlebury* bound for New York via Durban [4]	1 case	Dec.	1, 1938
S. S. *Nagasaki Maru* at Nagasaki from Shanghai	1 case	Dec.	7, 1938
S. S. *Pyrrhus* at Yokohama from Shanghai	1 case	Dec.	10, 1938
S. S. *Westpoint* at sea en route Surabaya	1 death	Do.	
S. S. *Tyles* at Yokohama from Hong Kong and Shanghai	1 case	Dec.	13. 1938
S. S. *Nagasaki Maru* at Nagasaki from Shanghai	1 case	Dec.	16, 1938
S. S. *Bellerophon* at Hong Kong from Yokohama, Kobe, and Shanghai	1 case	Dec.	22, 1938
S. S. *Selandia* at Singapore from Saigon	1 case	Jan.	15, 1939

On vessels—Continued.

S. S. *Pottedam* at Singapore from Yokohama	1 case	Jan.	17, 1939
S. S. *E. Sang* at Swatow from Shanghai	1 case	Jan.	18, 1939
S. S. *Maihar* at Aden from Calcutta	1 case	Jan.	30, 1939
S. S. *Alavi* at Aden from Bombay	1 case	Feb.	2, 1939
S. S. *Orange Moor* at Saigon from Shanghai	1 case	Do.	
S. S. *Queen Victoria* at Victoria from Shanghai	1 death	Feb.	6, 1939
S. S. *Rugeley* at Williamshead from Shanghai	10 cases	Feb.	19. 1939
Pilgrim ship *Tantalus* at Penang from Jeddah	1 case	Feb.	27, 1939
Pilgrim ship *Ajax* at Penang from Jeddah	1 case	Mar.	2, 1939
S. S. *Gneisenan* at Genoa	1 case	Mar.	5, 1939
S. S. *Riley* at Fremantle from Shanghai	1 case	Mar.	5, 1939

Place		September 1938	October 1938	November 1938	December 1938	January 1939	February 1939
Angola	C			4	27		
Belgian Congo	C	185	354	357	211		
Bolivia:							
Cochabamba Department	C	[5] 1		[6] 4			
La Paz Department	C	[5] 16		[6] 19			
Oruro Department	C	[5] 4		[6] 1			
Potosi Department	C			[6] 15			
Santa Cruz Department	C	[5] 7		[6] 2			
Tarija Department	C			2			
Brazil: Bahia	C		5	1	1		
China: Harbin	C					2	
Chosen (Korea)	C			1			
Colombia	C	60	74	[7] 122			
Dahomey	C			15	14	12	
Ecuador: Guayaquil and vicinity	C		3	6	2		
France	C	1				1	
Greece	C			3	5	12	1
Guatemala	C			16			5
Indochina (French) (see also table above)	C	113	166	174	475		
	D	35	25	14	65		
Ivory Coast	C			25		18	
Malta	C				9		
Mexico (see also table above):							
Aguascalientes State—Aguascalientes	C	2	6		6		
Colima State	C	1					
Hidalgo State	C		30	7	36		
Mexico, D. F	C	2		2	6		
Queretaro State	C	3					
San Luis Potosi State—San Luis Potosi	C			7			
Morocco	C			3	4	2	
Niger Territory	C					48	15
Portugal (see also table above)	C	78	72	169	62		
	D	3	7	12	12		
Salvador	C		1				
Senegal	C						8
Turkey	C					58	
Union of South Africa:							
Cape Province	C	1			1		
Natal	C	1					
Transvaal	C	18			37		
Venezuela	D	3	1		1	2	

[4] Patient removed from vessel and died in hospital in Iloilo district, P. I.
[5] For the period Sept. 8–Oct. 7, 1938.
[6] For the period Oct. 8 to Nov. 30, 1938.
[7] For November and December.

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

TYPHUS FEVER

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

Place		Aug. 28–Sept. 24, 1938	Sept. 25–Oct. 29, 1938	Oct. 30–Nov. 26, 1938	Week ended— December 1938					January 1939				February 1939				March 1939		
					3	10	17	24	31	7	14	21	28	4	11	18	25	4	11	18
Algeria:																				
Algiers Department	C	2	6	6	7	-----	13	-----	7	1	2	1	5	10	-----	2	2	7	5	13
Algiers	C	-----	-----	3	5	-----	-----	-----	-----	-----	-----	1	1	-----	-----	-----	-----	-----	-----	-----
Constantine Department	C	25	8	6	5	17	11	1	10	6	13	28	68	32	20	26	12	36	18	53
Bone	C	-----	1	1	-----	-----	-----	-----	-----	-----	-----	-----	4	-----	-----	-----	-----	-----	-----	2
Constantine	C	1	-----	1	-----	3	-----	-----	4	-----	-----	11	-----	7	-----	-----	1	1	-----	-----
Philippeville	C	11	3	1	3	-----	-----	-----	-----	-----	1	1	1	1	-----	-----	-----	-----	-----	-----
Oran Department	C	1	5	4	-----	-----	-----	1	4	16	7	3	2	5	16	4	4	4	10	9
Southern Territories	C	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	7	2	1	17
Basutoland	C	1	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Belgium. (See table below.)																				
Bolivia. (See table below.)																				
British East Africa: Kenya	C	2	-----	3	-----	-----	-----	1	2	-----	-----	-----	-----	-----	-----	-----	1	-----	-----	-----
Bulgaria. (See table below.)																				
Chile	C	81	72	112	19	27	38	45	18	16	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Antofagasta Province	C	-----	5	2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Concepcion Province	C	-----	2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Curico Province	C	-----	-----	-----	-----	-----	-----	-----	-----	[1] 23	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Llanquihue Province	C	16	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Los Angeles	C	-----	-----	-----	-----	-----	-----	-----	-----	[1] 9	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Nuble Province	C	10	1	6	1	1	-----	1	-----	1	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Santiago Province	C	39	61	70	15	19	18	17	12	7	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valdivia Province	C	4	2	1	-----	-----	-----	2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Valparaiso	C	2	4	4	-----	-----	1	1	3	-----	-----	-----	-----	-----	-----	1	-----	-----	-----	-----
China (see also table below):																				
Dairen	C	-----	-----	1	-----	-----	-----	1	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Shanghai	C	8	7	-----	-----	-----	-----	-----	-----	-----	-----	5	1	-----	-----	-----	-----	-----	-----	-----
Tientsin	C	-----	-----	-----	-----	-----	-----	-----	-----	-----	2	-----	-----	-----	-----	-----	-----	-----	-----	-----
Chosen (Korea). (See table below.)																				
Egypt:																				
Alexandria	C	1	-----	-----	-----	-----	-----	1	1	-----	-----	-----	-----	-----	-----	-----	-----	1	-----	-----
Asyut Province	C	2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1	2	-----	-----	2	-----	-----	-----
Beheira Province	C	10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1	1	3	12	8	14	14	10
Cairo	C	1	-----	-----	-----	-----	1	-----	1	-----	1	1	1	1	1	13	3	7	14	9
Dakahliya Province	C	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	11	14	30	16
Gharbiya Province	C	8	8	-----	-----	-----	-----	-----	-----	-----	-----	-----	15	7	23	13	8	82	53	43

Girga Province	C	5	1										4	7	11	18	22	17	12	5
Giza Province	C													1	10	2	6	8	2	6
Kalyubiya Province	C													8	3	15	7	25	28	11
Minufiya Province	C												3	14	13	13	27	36	16	18
Minya Province	C		1																	
Sharkiya Province	C	1												3	8	5	1	14	10	17
Provinces	C	28	32	8			18	11	14	2	9	34	25	43	90	98	92	212	155	145
Greece. (See table below.)																				
Guatemala. (See table below.)																				
Hawaii Territory: Honolulu	C	4	5	8	3	1		2	1		1			1					1	
Hungary	C						1	1	1				1							
Iran	C			1													1			
Iraq	C	3	1		1		1									1				
Baghdad	C																	1		
Kirkuk Province	C															1				
Latvia. (See table below.)																				
Libya: Suani Benaden	C										3									
Lithuania. (See table below.)																				
Mexico (see also table below):																				
Guadalajara	D				1															
Mexico, D. F	C	6	10	10	4		1	3	1		4	1			3	1		1		
Monterrey	C		1																	
Nuevo Laredo	D			2																
San Luis Potosi	D							1												
Torreon	D		2				1										1			
Morocco	C	11	9	82		41	20	19	37	31	27	34	19	13	43	39	57	35	44	51
Casablanca	C											1			1	1	4	4	1	1
Palestine:																				
Haifa	C	3	3	2	1												1			
Jaffa	C	9	9			3		2	1				3							
Poland	C	37	64	94	67	43	47	104	60	77	62	79	119	121	138	111	93	139	135	
	D	1	3	6	2	1	5	6	6	7	2	3	2	5	6	6	3	5	7	
Portugal. (See table below.)																				
Rumania. (See table below.)																				
Straits Settlements: Singapore	C			1									2	2		1	2		1	
Sumatra: Medan	D																1			
Syria:																				
Aleppo	C														1	1				
Beirut	C		1		1															
Lebanese Republic	C		1																	
Trans-Jordan	C		1	1																
Tunisia:																				
Tunis	C	9	19	11	32			8	2	8	13	7	15	7	6	12	8	16	14	12
Provinces	C	73	40	12		49	117	49	46	106	112	84	134	41	182	173	110	109	191	206
Turkey. (See table below.)																				
Union of South Africa. (See table below.)																				
Yugoslavia	C	7	14	5	3	16	3	3			5	6	10	13	10	9	6		11	

[1] For 3 weeks.

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

TYPHUS FEVER—Continued

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

Place		September 1938	October 1938	November 1938	December 1938	January 1939	February 1939
Belgium: Brussels	C	2					
Bolivia:							
La Paz Department	C	[1]6		[2]14			
La Paz	C	[1]3		[2]11			
Oruro Department	C	[1]1		[2]3			
Santa Cruz Department	C			[2]1			
Bulgaria	C	2		2	2	8	
China: Manchuria—Harbin	C	5	2	16		5	
Chosen (Korea)	C	12		21		78	
Greece	C	11	4	10	8		
Guatemala	C	6	3	38	2	9	22
Latvia	C			1		2	
Lithuania	C			3		30	42
Mexico (see also table above):							
Aguascalientes State—Aguascalientes	C		1		2		
Hidalgo State	C	1	5	1	1		
Jalisco State—Guadalajara	C	1					
Mexico—Continued.							
Mexico State	C	4	6	7			
Mexico D. F.	C	10	10	13	6	2	
Nayarit State	C			1			
Oaxaca State	C		2	3			
Puebla State—Puebla	C	1	2	3			
Queretaro State	C	1	1	2	1		
San Luis Potosi State—San Luis Potosi	C	1	2	1	5		
Portugal	C	2		7	3		
Rumania	C	8	27	77	100	144	
Turkey	C	17	13	21	49	32	
Istanbul	C	5	2	2	4	6	
Union of South Africa:							
Cape Province	C	165		91	93	23	
Natal	C	4		8	1	1	
Orange Free State	C	7		2			
Transvaal	C					26	

[1] For the period Sept. 8–Oct. 7, 1938.
[2] For the period Oct. 8–Nov. 30, 1938.

YELLOW FEVER

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

Place		Aug. 28–Sept. 24, 1938	Sept. 25–Oct. 29, 1938	Oct. 30–Nov. 26, 1938	Week ended—															
					December 1938					January 1939				February 1939				March 1939			
					3	10	17	24	31	7	14	21	28	4	11	18	25	4	11	18	25
Belgian Congo: Buta	C			[1]1																	
Brazil:[2]																					
Espirito Santo State	D												4	4	6	13	19	5	6	4	
Minas Geraes State	D														4	1	3	2			
Rio de Janeiro State	D										1	1								1	
French Equatorial Africa:																					
Chad—Fort Lamy	C										1										
Bosso	C			1																	
Gold Coast	C	3	4														[1]1				
	D	1	1																		
Ivory Coast [3]	C		3	[4]8	[4]2		[4]3								1		2				
	D						2								1						
Nigeria [5]	C	1	1	4		[1]1	[1]1	1			2			[1]2							[1]1
	D										1			2							
Port Harcourt	C			1																	
Sudan (French):																					
Kona	C			[1]1	3																
Kouy	C	[1]1																			
Sangha	C					1															
Tougan	C		3																		
On vessel: S. S. *St. Octave* at Grand Bassam Roadstead from Bordeaux, Dakar, Konakry, Tabou, and Sasrandra	C			[1]1																	

[1] Suspected.
[2] See also reports of yellow fever in Brazil in preceding issues of the PUBLIC HEALTH REPORTS.
[3] Week ended Apr. 1, 1939, 1 suspected case of yellow fever at Man, Ivory Coast.
[4] Includes 1 suspected case.
[5] Week ended Apr. 1, 1939, 1 case of yellow fever at Warri, Nigeria.

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