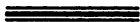


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SEROPROPHYLAXIS IN EXPERIMENTAL RABIES¹

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It is the opinion of most workers in the field of virus diseases that the effectiveness of immune serum ceases once the virus has entered the susceptible cell. Therefore, from the practical viewpoint its use is largely limited to those instances where the time of exposure is known.

Rabies is a virus disease peculiar in two respects: first, because the time of exposure is usually definitely known, and secondly, because the incubation period is often sufficiently prolonged so that an active immunity can be produced before the virus has established itself in the vital centers of the central nervous system.

Theoretically then, because of the known exposure and prolonged incubation period, seroprophylaxis in rabies should be highly effective, provided protection is in part or entirely due to circulating antibodies. However, relatively little consideration has been given to this method of prevention in this country.

Following Babes and Lepp's (1) first preparation of immune rabies serum many experiments were published on the prevention of rabies in animals by the use of immune serum given by various routes both before and after infection (2, 3, 4, 5, 6, 7, 8, 9, 10). All of these experiments were based on only a few animals and were inadequately controlled, and the results varied from complete protection (Fermi (7)) to no protection (Marie (10)).

Later Proca, Babes, and Jonnesco, in a series of publications (11, 12, 13, 14, 15), presented experimental evidence in guinea pigs and rabbits that, following peripherally inoculated fixed and street virus, serum given locally at the site of virus introduction or subcutaneously would prevent rabies. All of their experiments, however, involved small numbers of animals and large doses of serum and the difference

¹ From the Division of Infectious Diseases, National Institute of Health.

between control and treated groups frequently was not great. These same workers also reported on the use of serum alone and combined with vaccine in man as follows:

1934. 40 cases bitten on face and treated with serum with 1 death (2.5 percent);
 47 cases bitten on face and treated with vaccine, with 4 deaths (8 percent).
 1935. 179 cases treated with serum and vaccine, with 4 deaths (2.2 percent).
 1936. 163 cases treated with serum and vaccine, with 5 deaths (3 percent).

They recommended 80 to 160 cc. of subcutaneously administered serum as giving best results in man.

British workers in India (16, 17, 18) have done experimental work in monkeys and have attempted the practical application of seroprophylaxis in man. In two of four adequately controlled monkey experiments they were able to show that serum given on the first and second days following virus inoculation, together with the usual course of vaccine, gave significantly better results than either serum or vaccine alone. In humans, using 20 cc. of serum on the first day and the same dose on the second day, together with a full course of vaccine in alternate class IV (severe bites on head or neck) cases as compared to vaccine alone, the results were:

1935. Serum and vaccine—1,028 cases treated, with 20 deaths (1.9 percent).
 Vaccine alone—340 cases treated, with 9 deaths (2.5 percent).
 1936. Serum and vaccine—948 cases treated, with 16 deaths (1.6 percent).
 Vaccine alone—1,475 cases treated, with 33 deaths (2.2 percent).

The serum used in these British studies was produced in sheep by a long series of large doses of killed and live virus vaccines. The only tests made of serum potency were by complement fixation. An attempt was made to concentrate the rabies immune antibody by ammonium sulfate fractional precipitation. These workers concluded that the antibody was in the euglobulin fraction.

Hoyt et al. (19, 20, 21, 22) in this country, using fixed and street viruses in mice and immune rabbit serums, have shown that serum, to be effective, must be given 24 to 48 hours before virus, if the mice are injected intracerebrally, but that protection is also afforded after inoculation if the virus is given peripherally.

In the most recent contribution to seroprophylaxis of rabies, Yen (23) has worked with fixed virus intramuscularly in mice. Employing serial virus and serum dilutions he has established a quantitative method of testing the potency of antirabies immune serum.

METHODS EMPLOYED IN PRESENT STUDY

COMPARATIVE TESTS IN ANIMALS (PROPHYLAXIS)

Guinea pig tests.—In our work guinea pigs weighing from 250 to 300 gm. were inoculated into the masseter muscle with 0.25 cc. of a

heavy emulsion (usually 20-percent emulsion supernatant) of first passage guinea pig brain street virus.²

The prophylactic treatment was begun at varying intervals following the injection of street virus. Guinea pigs were checked daily for symptoms and when death occurred the brain was examined for Negri bodies. If the brain was Negri negative, Ammon's horn and medulla were emulsified and injected intracerebrally into 4-week-old Swiss mice for confirmation. Mice were observed for 30 days.

All guinea pigs were observed for 2 to 3 months before being discharged.

Mouse tests.—Swiss mice, 1 month of age, were inoculated in the gastrocnemius muscle with 0.03 cc. of either a fixed dilution or serial dilutions of an intramuscular strain of fixed virus. At various intervals the prophylactic inoculations of serum, of vaccine, or of both were begun, the material being given by different routes. All mice were observed for 30 days and only those with typical hind-leg paralysis preceding death were diagnosed as rabies.

Monkey tests.—Street virus after one passage in monkeys was inoculated into the masseter muscle. Treatment was instituted 24 hours after virus inoculations, the doses of serum and vaccine being the same as for humans. Brains of all animals killed, with symptoms or dying, were examined for Negri bodies and as a check portions of the medulla and Ammon's horn were emulsified and inoculated into mice whose brains also were checked for Negri bodies during symptoms or after death. Susceptibility of monkeys to street virus by the intramuscular route varied with body weight so that weights were equalized within all groups on each experiment.

VIRUS NEUTRALIZATION TEST (IN VITRO NEUTRALIZATION OF VIRUS)

Mouse brain fixed virus was made up in a 20-percent emulsion and serial tenfold dilutions made in buffered salt solution from the centrifuged supernatant. Two-tenth of a cubic centimeter of each virus dilution was mixed with 0.2 cc. of undiluted serum, incubated for 1 hour at 37° C., then inoculated intracerebrally into 1-month-old Swiss mice. Fifty percent end-points were determined.

VIRUS PROTECTION TEST (IN VIVO NEUTRALIZATION OF VIRUS)

Brains of mice inoculated intramuscularly with the Rockefeller 15811 strain³ were made to a 1/4 emulsion. Serial twofold dilutions of the supernatant made in buffered salt solution were inoculated into the gastrocnemius muscle of 1-month-old Swiss mice, 0.03 cc.

² Street virus dog brains kindly supplied by Dr. C. N. Leach and Dr. Harald Johnson of the Rockefeller Field Rabies Laboratory.

³ Kindly supplied by Dr. L. T. Webster of Rockefeller Institute for Medical Research.

to the dose. Immediately after the virus inoculation 0.2 cc. of serum was injected intraperitoneally or subcutaneously. Rabies in mice receiving this virus strain in the gastrocnemius muscle almost invariably is preceded by paralysis of one or both hind legs. Fifty percent end points were determined.

COMPLEMENT FIXATION TEST

The technique of Casals and Palacios (24) was followed with the exception that fixation was allowed to take place at 37° C. for 1 hour instead of overnight in the ice box. The usual serum and antigen controls were included in each test and all serums being compared were run in a single test. All serums having a titer of 1/64 or over were rechecked. A 2+ fixation was taken as the end point.

PRODUCTION OF IMMUNE RABBIT SERUMS

Three groups of rabbits were inoculated. The first group received the supernatant prepared by the horizontal centrifuging at 1,000 r. p. m. for 10 minutes of a 10-percent emulsion of mouse-brain fixed virus. The second group received the supernatant of the same virus emulsion after angle centrifuging at 4,000 r. p. m. for 30 minutes. The third group received a 10-percent whole emulsion of the mouse-brain virus. Doses were started at 0.25 to 0.5 cc. and brought up to a maximum of 3 cc. The routes of inoculation and time intervals between doses varied in different groups. When given intracutaneously 0.5 cc. was injected into each site. All bleedings were done from 10 to 14 days following the last dose of virus.

CONCENTRATION OF SERUM

Pooled rabbit serums were heated to 40° C. and anhydrous sodium sulfate added in varying amounts (25). After heating at 37° C. for several hours it was then angle centrifuged. The precipitate was placed in cellophane tubing and dialyzed overnight against running tap water. The dialyzed serum was adjusted to various fractions of its original volume and filtered through a Berkefeld N filter.

VACCINE POTENCY TEST

Vaccine was diluted to 0.5-percent emulsion and 0.25 cc. given intraperitoneally every 2 days for six doses to fifty 1-month-old Swiss mice. Fourteen days from the first dose of vaccine the test dose of fixed virus was given intracerebrally in serial tenfold dilutions. Control mice were included for titering the 50-percent end point of the test virus and results expressed in the number of 50-percent end point MLD against which the vaccinated mice were protected (26).

PRODUCTION OF SERUM

In determining the best schedule of inoculation of virus for the production of immune serum in rabbits, several items of practical importance must be considered, namely, the rapidity of formation, the quality and the persistence of antibody, the ease of administration, and the mortality rate due to the procedure.

From tables 1 and 2 it can be seen that intracutaneously inoculated virus gave the highest protective antibody titers; the antibody titer reached a peak at 11 weeks and was maintained during continuing inoculations. Titers dropped soon after inoculations were discontinued but increased again after two restimulating doses of virus. Two doses a week of virus intracutaneously gave a better response than one weekly dose.

TABLE 1.—Serum antibody response in rabbits, by routes of virus inoculation

| Route of virus inoculation | Number inoculated | Death during inoculation | Method of testing | Results | | | | | |
|---------------------------------|-------------------|-----------------------------------|---|---------------------|---------------------------|--------|--------|---------|--------|
| | | | | Before immunization | After immunization (days) | | | | |
| | | | | | 27 | 56 | 81 | 119 | 145 |
| Subcutaneous ¹ ... | 6 | 2 (rabies)... | Virus neutralization ² | 0 | 100 | 10,000 | 1,000 | 10,000 | |
| | | | Complement fixation..... | 0 | 1/16 | 1/32 | 1/16 | 1/16 | |
| | | | Virus protection ² | 10 | 27 | 15 | 50 | 25 | 35 |
| | | | Virus neutralization ² | 0 | 100 | 1,000 | 1,000 | 10,000 | 10,000 |
| Intraperitoneal ¹ .. | 6 | 1 (rabies)... | Complement fixation..... | 0 | 1/512 | 1/256 | 1/512+ | 1/64 | 1/32 |
| | | | Virus protection ² | 10 | 34 | 34 | 30 | 40 | 50 |
| | | | Virus neutralization ² | 0 | 10,000+ | 10,000 | 10,000 | 10,000+ | 10,000 |
| | | | Complement fixation..... | 0 | 1/64 | 1/64 | 1/32 | 1/64 | 1/32 |
| Intracutaneous ¹ .. | 6 | 0..... | Virus protection ² | 10 | 74 | 64 | 75 | 85 | 80 |
| | | | Virus neutralization ² | 0 | 100 | 100 | ----- | ----- | ----- |
| | | | Complement fixation..... | 0 | 1/512 | 1/512 | ----- | ----- | ----- |
| | | | Virus protection ² | 10 | 29 | 44 | ----- | ----- | ----- |
| Intravenous ¹ | 6 | 1 (rabies)..... 5 (shock)..... | Complement fixation..... | 0 | 1/512 | 1/512 | ----- | ----- | ----- |
| | | | Virus protection ² | 10 | ----- | ----- | ----- | ----- | ----- |

¹ 10 percent mouse brain rabies fixed virus supernatant 0.5-cc., 1.0-cc., 2.0-cc., 3.0-cc. doses weekly.

² Minimum lethal doses in mice.

TABLE 2.—Serum protective antibody response in rabbits. Effect of interval of dose and restimulating dose of virus on height and persistence of antibody

| Schedule of intracutaneous inoculation of virus ¹ | Continuous inoculation (time bled, in weeks) | | | | | Time after last inoculation (weeks) | | After 1 re-stimulating dose | After 2 re-stimulating doses |
|--|--|----|----|----|----|-------------------------------------|-------|-----------------------------|------------------------------|
| | 5 | 11 | 17 | 23 | 29 | 4 | 6 | | |
| 3 cc. weekly..... | MLD 18 | 23 | 9 | 15 | 10 | 5 | 6 | 6 | 25 |
| 1.5 cc. weekly..... | 9 | 42 | 20 | 19 | 15 | ----- | ----- | ----- | ----- |

¹ 10 percent whole emulsion rabies mouse brain fixed virus.

CONCENTRATION OF SERUM

By fractional sodium sulfate precipitation of the complement fixing and the protective antibody from rabies immune rabbit serum all demonstrable antibody of both types was found to be precipitated by 16 percent sodium sulfate.

GUINEA PIG EXPERIMENTS

DOSE OF IMMUNE SERUM

Thirty-five guinea pigs were inoculated in the right masseter muscle with 0.25 cc. of 1/6 supernatant of first guinea pig passage brain street virus. Five additional guinea pigs received the same dose of a 1/600 dilution of the same supernatant. Three hours later unconcentrated immune rabbit serum was given subcutaneously to groups of 10 guinea pigs in doses of 0.5 cc., 2.0 cc., and 5.0 cc., respectively.

Table 3 reveals that guinea pigs receiving 0.5 cc. of serum had a mortality of 12 percent; those receiving 2.0 cc. of serum, 28 percent mortality; all receiving 5.0 cc. of serum survived; there was 100 percent mortality of the controls. Two out of five controls receiving 1/600 of the test dose died of rabies.

TABLE 3.—*Serum prophylaxis of rabies in guinea pigs. Effect of dose*

| | Number of guinea pigs | Deaths | |
|--|-----------------------|--------|-----------|
| | | Rabies | Nonrabies |
| Dose of serum subcutaneously: ¹ | | | |
| 0.5 cc. | 10 | 1 | 2 |
| 2.0 cc. | 10 | 2 | 3 |
| 5.0 cc. | 10 | 0 | 1 |
| Controls: | | | |
| 1/6 dilution | 5 | 5 | 0 |
| 1/600 dilution | 5 | 2 | 0 |

¹ Serum administered 3 hours after 0.25 cc. of 1/6 supernatant of first guinea pig passage street virus in masseter muscle.

The immune rabbit serum used in this experiment had a virus neutralizing titer in mice of 1,000 MLD per 0.03 cc.

COMPARISON OF SERUM AND VACCINE PROPHYLAXIS

Tables 4, 5, and 6 show the results of four tests in which groups of guinea pigs were inoculated in the masseter muscle with early passage street virus followed by unconcentrated serum, by vaccine, or by a combination of the two administered after various intervals.

The serum used in these experiments was administered subcutaneously. Different types of vaccine were used and in tables 4, 5, and 6 is indicated the potency of each vaccine by the mouse test insofar as it was determined.

Table 4 shows a direct comparison of serum alone and vaccine alone when prophylactic therapy was begun at intervals of 3, 24, and 48 hours after the injection of virus. The mortality in serum-treated animals was 11, 33, and 60 percent, and for vaccine-treated animals 80, 100, and 83 percent as the time intervals increased. Thus there was a definite difference in favor of the serum-treated group. This

difference is further brought out by comparing the average time of deaths in the two groups. The relatively large number of nonrabies deaths in the vaccine-treated groups must be considered in interpreting these results.

TABLE 4.—*Serum vs. vaccine prophylaxis of rabies in guinea pigs. Treatment administered at varying intervals after virus inoculation*

| Treatment | Time from virus inoculation ² to treatment (hours) | Number of guinea pigs | Deaths | | Average time of survival (days) |
|---|---|-----------------------|--------|-----------|---------------------------------|
| | | | Rabies | Nonrabies | |
| 2 cc. serum subcutaneously ¹ | 3 | 10 | 1 | 1 | 28 |
| Do..... | 24 | 10 | 3 | 1 | 34 |
| Do..... | 48 | 10 | 6 | 0 | 47 |
| Vaccine ³ | 3 | 10 | 4 | 5 | 13 |
| Do..... | 24 | 10 | 3 | 7 | 14 |
| Do..... | 48 | 10 | 5 | 4 | 13 |
| Controls..... | | 5 | 5 | 0 | 16 |

¹ 1 dose unconcentrated rabbit immune serum.

² 2 cc. 5-percent phenolized vaccine subcutaneously daily for 10 doses. Vaccine potency 1,000 MLD.

³ 0.25 cc. of 1/5 supernatant dog brain street virus in masseter muscle.

In table 5 is shown an attempt to include a combination of serum and vaccine therapy in the comparative testing. All therapy was started 24 hours after the virus had been injected. In group 3 the course of vaccine was commenced on the same day that serum was administered, whereas in group 4 an interval of 4 days was allowed before starting vaccine but only one dose of serum was given in both groups. There was a moderate degree of protection with serum alone,

TABLE 5.—*Serum and vaccine, alone and combined, in rabies prophylaxis in guinea pigs*

| Treatment ¹ | Number of guinea pigs | Number of deaths | | Average time of survival (days) |
|---|-----------------------|------------------|-----------|---------------------------------|
| | | Rabies | Nonrabies | |
| Serum ² | 10 | 6 | 1 | 14 |
| Vaccine ³ | 10 | 9 | 1 | 11 |
| Serum, with vaccine started same day as serum..... | 10 | 3 | 0 | 14 |
| Serum, with vaccine started 4 days after serum..... | 10 | 1 | 0 | 12 |
| Controls..... | 10 | 9 | 0 | 12 |

¹ All treatment started 24 hours after 0.25 cc. 1/5 supernatant of first guinea pig passage street virus in masseter muscle.

² 1 dose of 1 cc. of unconcentrated rabbit immune serum subcutaneously.

³ 0.1 cc. subcutaneously daily for 21 days of 5-percent phenolized vaccine—vaccine potency 56 MLD.

none with vaccine alone, good protection when serum and vaccine were started the same day, and only 1 out of 10 died of rabies when 4 days elapsed between serum and vaccine treatment. Obviously the vaccine used in this experiment was a poor one (potency 56 MLD), yet its use in combination with serum was followed by a definite lowering of the mortality.

The same comparisons as in the previous test are shown in table 6 but here a potent vaccine was used and therapy was started at intervals of 3 and 72 hours after the virus injections. A further comparison was also made in which vaccine therapy was not begun until 6 or 7 days after serum had been administered. This experiment was done in two parts on 2 different days. The serum and vaccine used in both were the same. The test virus emulsion was kept frozen at -70° C. between tests yet there was a difference of between

TABLE 6.—*Serum and vaccine, alone and combined, in rabies prophylaxis in guinea pigs. Treatment started at varying intervals after virus inoculation*

| Treatment | Time from virus inoculation ¹ to treatment (hours) | Number of guinea pigs | Number of deaths | | Average time of survival (days) |
|---|---|-----------------------|------------------|-----------|---------------------------------|
| | | | Rabies | Nonrabies | |
| Vaccine ² | 0 | 10 | 6 | 0 | 13 |
| Serum ³ | 0 | 10 | 5 | 1 | 33 |
| Serum, with vaccine started same day as serum..... | 0 | 10 | 3 | 0 | 25 |
| Serum, with vaccine started 3 days after serum..... | 0 | 10 | 4 | 1 | 34 |
| Serum, with vaccine started 6 days after serum..... | 0 | 10 | 4 | 1 | 19 |
| Vaccine..... | 72 | 10 | 9 | 0 | 15 |
| Serum..... | 72 | 10 | 7 | 1 | 21 |
| Serum, with vaccine started same day as serum..... | 72 | 10 | 6 | 0 | 23 |
| Serum, with vaccine started 3 days after serum..... | 72 | 10 | 7 | 2 | 23 |
| Serum, with vaccine started 7 days after serum..... | 72 | 10 | 4 | 1 | 19 |
| Controls..... | | 10 | 9 | 0 | 14 |
| Do..... | | 10 | 7 | 0 | 19 |

¹ 0.25 cc. 1/10 whole emulsion dog brain street virus in masseter muscle.

² 1.5 percent formalized vaccine; 0.1 cc. subcutaneously daily for 21 days; vaccine potency at least 8,000 MLD.

³ 1 dose of 1 cc. unconcentrated rabbit immune serum subcutaneously.

90 and 70 percent in the controls in the two parts of the experiment. It is apparent that serum alone administered either 3 or 72 hours after the introduction of the virus gave a slightly lower mortality than vaccine alone and a definitely longer average time to death. The interval between the administration of the serum and vaccine did not seem to make much difference when therapy was begun 3 hours after administration of virus, but when therapy was instituted 72 hours after virus the group with an interval of 7 days between serum and vaccine seemed superior from the standpoint of mortality although the average time to death was not increased.

MOUSE EXPERIMENTS (PROPHYLAXIS)

Groups of mice were inoculated into the gastrocnemius muscle with a 1/64 dilution of fixed virus. Due to variability of virulence this dilution in some experiments represented but one MLD and in others up to 13 MLD. The incubation period in control mice in these

experiments usually was about 7 days, the animals dying 4 to 5 days thereafter.

Table 7 shows an experiment in which serum alone locally was compared to serum with vaccine started 7 days later, when treatment was begun at 3, 24, 48, and 72 hours after virus. The virus dose of 1/64 dilution in this experiment represented 14 MLD. Both the mortality rates and the average days of survival are related to the interval from inoculation of virus to treatment in both groups. There are no real differences in mortality rates between serum alone and serum combined with vaccine but a definitely greater increase in survival time for the combined serum and vaccine treatment groups.

TABLE 7.—*Serum vs. serum and vaccine rabies prophylaxis in mice. Effect of interval from virus to treatment*

| Treatment | Time from virus inoculation ¹ to treatment (hours) | Total number of mice | Number developing rabies | Average time of survival (days) |
|---|---|----------------------|--------------------------|---------------------------------|
| Serum ² | 3 | 19 | 8 | 15.8 |
| Do..... | 24 | 24 | 19 | 13.3 |
| Do..... | 48 | 24 | 21 | 13.1 |
| Do..... | 72 | 25 | 24 | 12.2 |
| Serum ² and vaccine ³ | 3 | 23 | 14 | 19.8 |
| Do..... | 24 | 25 | 20 | 15.8 |
| Do..... | 48 | 25 | 23 | 14.0 |
| Do..... | 72 | 25 | 23 | 12.6 |
| Controls..... | | 22 | 22 | 12.0 |

¹ 0.03 cc. 1/64 dilution fixed virus in gastrocnemius muscle—Virus titer 1/891.

² 1 dose of 0.05 cc. of 10 × concentrated rabbit immune serum locally at site of virus inoculation.

³ 5-percent phenolized vaccine 0.05 cc. subcutaneously daily for 14 days starting 7 days after serum inoculation.

A more quantitative method of testing was used in the experiment shown in table 8. Serial dilutions of virus were given to mice and then groups immediately treated with concentrated normal rabbit serum locally, concentrated rabies immune rabbit serum locally, and concentrated immune serum intraperitoneally. Complete protection

TABLE 8.—*Rabies prophylaxis in mice by immune serum injected at site of vaccine inoculation vs. serum intraperitoneally*

| Treatment ² | Virus dilutions ¹ (Rabies/total mice) | | | | | | | | | 50 per- cent end point | MLD protec- tion |
|---|---|-----|------|------|------|-------|-------|-------|--------|---------------------------------|------------------------|
| | 1/4 | 1/8 | 1/16 | 1/32 | 1/64 | 1/128 | 1/256 | 1/512 | 1/1024 | | |
| Normal serum ³ at site of virus inoculation..... | 4/4 | 4/4 | 4/5 | 3/4 | 3/5 | 1/5 | 2/5 | ----- | ----- | 1/79 | 3 |
| Immune serum ³ at site of virus inoculation..... | 0/4 | 0/5 | 0/4 | 0/5 | 0/4 | 0/5 | 0/5 | ----- | ----- | 4 1/4 | 54 |
| Immune serum ³ intraperitoneally..... | 1/5 | 2/5 | 0/5 | 2/5 | 1/4 | 1/4 | 0/4 | 4/5 | 3/5 | 1/7 | 31 |
| Controls..... | | | | | 4/5 | 2/5 | 0/5 | | | 1/216 | ----- |

¹ 0.03 cc. dilution of fixed virus in gastrocnemius muscle.

² All treatment given immediately after virus inoculation.

³ Rabbit serum 10× concentrated, 1 dose of 0.05 cc.

⁴ Less than.

⁵ At least.

to all mice resulted when the immune serum was given at the site of virus inoculation and, although not complete, very good protection was obtained by immune serum given intraperitoneally.

In order to determine the relative immunity produced by the use of serum and vaccine alone and combined, the experiment shown in figure 1 was performed at varying time intervals during treatment. Groups of 150 mice each were started on treatment with serum, vaccine, serum with vaccine started the same day, and serum with vaccine started 6 days later. At 1, 6, and 11 days after the beginning of treatment groups of mice were given serial twofold dilutions of the

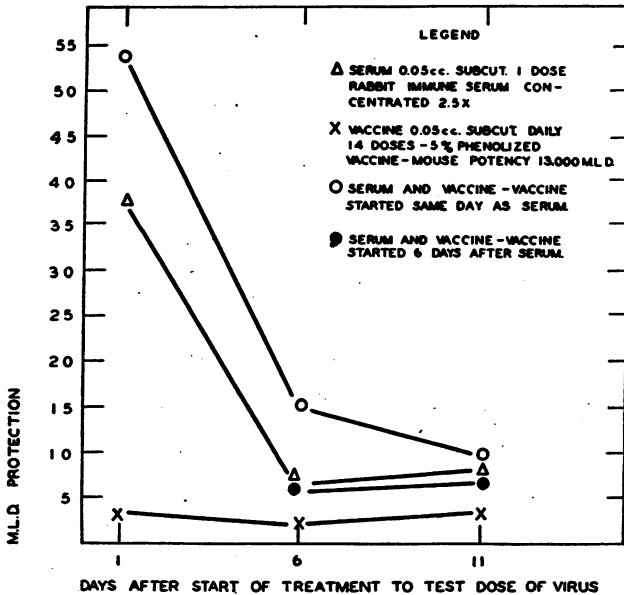


FIGURE 1.—Development of immunity in mice during administration of vaccine, immune serum alone, and combined with vaccine.

intramuscular strain of fixed virus in the gastrocnemius muscle. In those groups receiving vaccine the treatment was continued after the test virus had been given. The number of MLD protection was determined by the 50-percent end point method. Controls of the same age as the treated mice were run each time test virus was inoculated and the test virus was from one lot kept frozen at -70° C. Those mice receiving serum either alone or combined with vaccine had a high level of protection early with a dropping off as time elapsed from the day the serum had been given, but even 11 days later were still protected against more virus than the mice receiving vaccine alone. (See fig. 1.)

In the mouse experiment, the results of which are shown in table 9, serial dilutions of fixed virus from 1/4 to 1/256 dilutions were inoc-

TABLE 9.—*Serum alone and combined with vaccine vs. vaccine alone in postinfectious prophylaxis of rabies in mice*

| Type of treatment | Protection by mouse protection test (50 percent end point) | | |
|---|---|----------|----------|
| | Time interval from virus inoculation ¹ to treatment | | |
| | 3 hours | 24 hours | 48 hours |
| Vaccine ² | 3 MLD | 2 | 2 |
| Serum ³ | 17 | 6 | 13 |
| Serum ³ and vaccine ² started 6 days after serum..... | 11 | 16 | 8 |

¹ 0.03 cc. of twofold dilutions of fixed virus into gastrocnemius muscle; 7 mice inoculated with each dilution (1/4 to 1/256).

² 0.05 cc. of 5 percent phenolized vaccine subcutaneously daily for 10 days; vaccine potency 15,430 MLD.

³ 0.05 cc. of concentrated rabbit immune serum, 1 dose, at site of virus inoculation.

ulated into the gastrocnemius muscle of 4-week-old Swiss mice, 0.03 cc. to a dose. Seven mice in each group were inoculated with each dilution. Mice were treated at 3, 24, and 48 hours after virus inoculation. The serum used had been concentrated but 5 times and only one dose of 0.05 cc. was given locally in the virus inoculation site. The vaccine was a 5-percent emulsion of phenolized virus whose potency by the mouse test was 15,430 MLD. It was administered in doses of 0.05 cc. subcutaneously daily for 10 doses. In the serum-and-vaccine-treated group the course of vaccine was started 6 days after the serum was given. In table 9, where the 50-percent end points of MLD's protection are tabulated, it is seen that serum, either alone or combined with vaccine, gave more protection than vaccine alone no matter at what interval treatment was started over the period tested (3 to 48 hours) and even at 48 hours after infection the serum therapy was effective.

MONKEY EXPERIMENT (PROPHYLAXIS)

In the monkey experiment summarized in table 10, three of the six controls died of rabies. However, no comparison could be made between vaccine and serum with vaccine, since no deaths occurred in

TABLE 10.—*Serum and vaccine, alone and combined, in rabies prophylaxis in monkeys*

| Treatment ¹ | Number of monkeys | Deaths | |
|---|-------------------|--------|-----------|
| | | Rabies | Nonrabies |
| Vaccine ² | 6 | 0 | 0 |
| Serum ³ | 6 | 1 | 1 |
| Serum ³ and vaccine ² started 6 days after serum..... | 6 | 0 | 0 |
| Controls..... | 6 | 3 | 1 |

¹ Treatment started 24 hours after 1.5 cc. 1/10 whole emulsion of first monkey passage brain street virus in each masseter muscle.

² 5 percent phenolized vaccine—2 cc. subcutaneously daily for 21 days; vaccine potency over 2,000 MLD.

³ 1 dose of 10 cc. in thigh muscle of 10X concentrated rabbit immune serum.

these groups. One of six in the group receiving serum alone died of rabies. All monkeys in this experiment were tuberculin negative and were observed for 6 months. The two nonrabies deaths followed bleeding. All monkeys were bled before virus inoculation and at intervals of 5, 10, 15, 20, and 30 days thereafter. The serums of all monkeys drawn after a given interval in each treatment group were

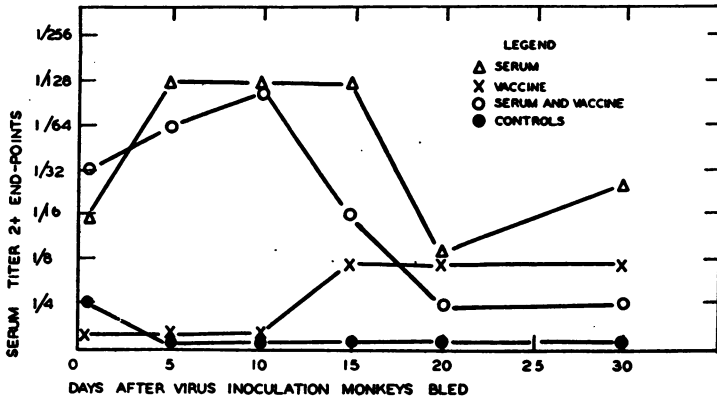


FIGURE 2.—Complement fixing antibody response in serum of monkeys after infection with street virus and during treatment with vaccine, with serum alone, and combined with vaccine.

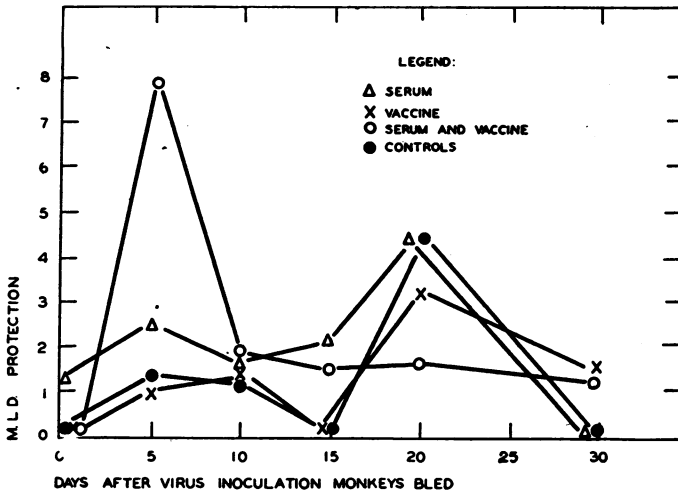


FIGURE 3.—Protective antibody response in serum of monkeys after infection with street virus and during treatment with vaccine, with serum alone, and combined with vaccine.

pooled and tested by complement fixation and the serum-protection mouse test. Figures 2 and 3 show the results. By both methods of testing the serum titers were high early in those groups receiving serum either alone or combined with vaccine. Later they tended to drop to an intermediate level, whereas the serums from monkeys receiving vaccine alone were at a low level early and rose to an inter-

mediate level later. It is interesting to see the relatively high level of protection developed in the serums of the control monkeys at the time they were actually coming down with rabies. These same control serums, however, never developed any complement-fixing antibodies.

DISCUSSION

At first glance the differences in mortality rates and the amount of protection afforded in the groups of animals receiving serum, alone or combined with vaccine, as compared to the controls, would not appear to be great. However, if one is familiar with the experimental results of investigations in rabies from Pasteur to the present, it becomes obvious that when the method of testing rabies prophylaxis corresponds to the method used in humans, namely, treatment begun at intervals after the peripheral introduction of virus, there have rarely been marked differences between control and vaccinated animals (27). Especially has this been true if treatment has been started at an interval of 24 hours or more after virus has been inoculated. A plausible explanation of this difference in results of vaccine prophylaxis in animals and in man would seem to be the usually much shorter incubation period in small animals. This is especially true in mice. In our experiments, using a fixed intramuscular strain of virus given peripherally, symptoms in the control mice appear as early as the seventh day. Webster (28) found that by using a highly potent vaccine (potency tested by preinfection immunization) the dose of fixed virus given intramuscularly had to be reduced to the point where only 50 percent of control mice died before he could show protection by postinfection immunization, giving the vaccine intraperitoneally. (Intraperitoneal immunization, of mice against rabies is always more effective than the same dose given subcutaneously.) Even this small degree of protection could not be demonstrated unless the vaccine was started within a few hours after virus inoculation.

Using this same type of technique, 0.05 cc. of concentrated immune serum has given us as high as 54 MLD protection if given immediately after virus inoculation and 13 MLD when given as long as 48 hours after infection.

The mechanism of infection and of prophylactic immunization in rabies has not as yet been completely explained. Experiments reported from this laboratory (29) have shown that street virus given intramuscularly remains viable locally up to 4 days but may invade the peripheral nerve and spinal cord as early as 2 days after injection. Subsequent spread centrally is slower. In immunized animals or those being immunized after infection, it was found that the virus remained viable locally in the muscle up to 4 days but its presence was not so consistent and it was not found in the nervous tissues.

Kligler and Bernkopf (30) have confirmed these results but state that once the virus has invaded the central nervous system in immunized animals its progression from there on is the same as in the controls. However, we have shown (29) and it has been confirmed by others (31) that the nervous tissue itself from an immunized animal after thorough washing has the ability to neutralize virus as compared to normal tissues. It would seem obvious that vaccine prophylaxis cannot produce immunity before the virus invades nervous tissue, a matter of 3 to 4 days at the most. However, the length of the incubation period of the disease probably depends on the time necessary for spread of virus within the central nervous system to those cells whose invasion results in symptoms and clinical disease. If that period is long enough, then immunity of the nervous tissue itself can be produced to prevent the virus from invading the vital cells.

Serum then could act in two ways, both probably extracellularly. First, the virus could be destroyed locally while still in the muscle. Secondly, the serum could retard the spread of virus within the nervous tissue once it is invaded, as evidenced in our experimental results where the incubation period was prolonged even though the animals were not completely protected. This prolongation of the incubation period is probably just what is needed for the vaccine to be effective, hence the better results in experiments using street virus when serum and vaccine were combined. As further evidence to support this explanation of the mechanism involved it should be pointed out that the limit of effectiveness of the serum, as far as preventing death in experimental animals is concerned, is about 3 days after virus inoculation. This also represents about the length of time that the virus remains viable locally.

These experimental results suggest that rabies serum prophylaxis in man would probably have several advantages. In the first place many of the "vaccine failures" have had a short incubation period (32), the failure probably being due to the fact that there is not sufficient time for the vaccine to produce immunity in the nervous tissue. The ability of the serum to prolong the incubation period in animals suggests that serum might make the vaccine effective in these cases. The use of serum locally at the site of the bite makes possible specific treatment while the virus is still localized. From the experimental results, serum alone would probably suffice in those patients having the type of exposure now requiring 14 doses of vaccine, whereas serum followed by a course of vaccine 6 days later would be indicated in those patients needing the 21-dose course of vaccine. It is well known that a large number of people receiving vaccine prophylaxis against rabies have not had a real exposure to the disease (33) and are thus being needlessly subjected to the discomfort and danger of 14 daily doses of vaccine. This is necessary because early treatment is indicated and

often the diagnosis in the biting animal is not at first definite. By present-day methods of rabies diagnosis in animals a definite answer is obtainable within 6 days after mouse inoculation (34). This interval of 6 days is also used in our combined serum and vaccine prophylaxis so that after a dose of serum at the time of a bite, a diagnosis of rabies could be established by mouse inoculation of the brain of the suspected animal in time to use the vaccine, and in case the mouse inoculation was negative, the patient would have received only 1 dose of serum.

SUMMARY

A method has been described for the production and concentration of rabies immune rabbit serum.

Serum prophylaxis alone as employed in these studies gave consistently better results than vaccine alone in the postinfection treatment of rabies in experimental animals.

Serum prophylaxis was apparent up to 3 days after infection, more effective when given intramuscularly at the site of virus inoculation than subcutaneously elsewhere on the body, and when used against street virus infection the results were better when combined with vaccine prophylaxis.

When combined with a course of vaccine treatment, serum prophylaxis probably is more effective if an interval of 6 days elapses between the dose of serum and the beginning of the vaccine course.

Experimental results warrant a trial of immune serum either alone or combined with vaccine in prophylaxis of rabies in man.

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TESTS OF EPIDEMIC TYPHUS VACCINES¹

By RICHARD DONOVICK and RALPH W. G. WYCKOFF

Large-scale production of vaccine against epidemic typhus fever was begun in this country about two years ago mainly as the result of Cox's demonstration that the causative rickettsiae of this disease

¹ From the Lederle Laboratories, Inc., Pearl River, N. Y. This paper was approved for publication September 11, 1942, and scheduled for publication in PUBLIC HEALTH REPORTS in the issue of October 16, 1942. Because of the subject matter the paper was withheld from publication at that time.

multiply readily in the yolk membrane of developing chicken embryos (1). Since that time steady improvement has been made in the quality of such vaccines, both in the direction of increasing the total infectiousness of the material from which they are prepared and in the methods available for the subsequent detoxification and refinement of this material. Methods of estimating vaccine potency have changed to measure this development.

The most direct laboratory method of testing epidemic typhus vaccine is one in which the immunity of vaccinated guinea pigs is challenged by injecting enough infectious tissue to produce typical guinea pig typhus in control animals. This test is hard to use routinely because it requires several weeks to carry out and because it is very easily invalidated by intercurrent infections since a characteristic febrile response extending over several days is the only clear-cut clinical evidence of epidemic typhus infection in guinea pigs. Bengtson and Topping's development of the complement fixation test for typhus (2, 3, 4) gives one of several other (5) feasible ways for evaluating typhus vaccine. During the past months we have been comparing the complement fixing antibody titres and results of protection tests on guinea pigs injected with many different typhus vaccines. It has been our experience that results of these two tests run parallel in the sense that vaccines which show an especially high degree of protective power also induce a particularly high average complement fixing antibody titre.

This is readily illustrated by table 1 which contains representative data comparing three different vaccines. These vaccines, prepared from a common pool of inactivated yolk membrane, varied in the method used for their refinement. Each corresponds to an initial tissue content of 8 percent. The vaccine designated IA was refined by a development of the phenol method described by Cox (6); a similar procedure was followed in preparing vaccine IIA except that another chemical was used in place of phenol; vaccine IIIA was processed along lines suggested by Dr. N. H. Topping of the National Institute of Health, United States Public Health Service.

It is evident from both the temperature charts and the serum-complement fixation end points that vaccine IIIA is superior to the other two. This has been confirmed by repeated experiments with these vaccines and with duplicate preparations similarly refined. It is hoped that the results of these experiments can be published more fully in the future.

Tests such as the foregoing measure the improvement effected in epidemic typhus vaccines over the last year. It is improbable that any vaccine made a year or more ago would have shown either a demonstrable protection or a complement fixing antibody titre exceeding 1/2 when tested under the conditions reported in table 1.

TABLE 1.—The complement fixation titres of vaccinated guinea pigs and the temperatures of typical animals after challenge injections

| Animal number | Vaccine dose (cc.) | Vaccine | Temperatures (degrees C.) on X days following challenge injections | | | | | | | | | | Average complement fixation end point dilution |
|---------------|--------------------|-----------|--|------|------|------|------|------|------|------|------|------|--|
| | | | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | |
| 954 | 0.1 | IA..... | 39.4 | 39.1 | 40.6 | 39.6 | 40.0 | 39.7 | 39.8 | 40.5 | 39.7 | 39.5 | 1/2 |
| 955 | .1 | IA..... | 39.1 | 39.5 | 39.3 | 39.7 | 40.0 | 39.9 | 39.6 | 39.5 | 39.4 | 39.1 | |
| 956 | .1 | IA..... | 39.1 | 39.5 | 39.5 | 39.7 | 39.9 | 39.8 | 40.2 | 40.1 | 40.0 | 39.9 | |
| 972 | .1 | IIA..... | 39.0 | 39.0 | 39.5 | 39.1 | 38.9 | 39.0 | 39.5 | 37.4 | 37.0 | 39.2 | 1/16 |
| 973 | .1 | IIA..... | 39.2 | 38.7 | 38.9 | 38.8 | 38.7 | 38.6 | 38.4 | 38.8 | 38.5 | 39.5 | |
| 974 | .1 | IIA..... | 39.1 | 39.4 | 39.6 | 40.0 | 39.9 | 40.0 | 39.8 | 40.0 | 39.5 | 40.0 | |
| 991 | .1 | IIIA..... | 39.0 | 39.0 | 38.9 | 38.7 | 38.7 | 38.9 | 38.8 | 38.9 | 38.4 | 38.2 | 1/64 |
| 992 | .1 | IIIA..... | 38.9 | 38.9 | 39.0 | 38.6 | 37.0 | 38.6 | 38.9 | 38.9 | 38.8 | 38.9 | |
| 948 | .25 | IA..... | 38.9 | 38.7 | 38.9 | 38.9 | 38.8 | 39.0 | 38.7 | 38.8 | 38.7 | 38.7 | 1/32 |
| 950 | .25 | IA..... | 39.5 | 39.8 | 39.5 | 39.9 | 39.8 | 39.8 | 40.0 | 39.9 | 39.6 | 40.0 | |
| 968 | .25 | IIA..... | 39.1 | 39.4 | 38.2 | 39.5 | 39.5 | 37.6 | 39.8 | 39.7 | 39.5 | 39.5 | 1/32 |
| 967 | .25 | IIA..... | 39.0 | 38.7 | 38.9 | 38.8 | 39.2 | 38.9 | 39.4 | 39.7 | 39.7 | 39.4 | |
| 968 | .25 | IIA..... | 38.9 | 37.0 | 39.1 | 37.5 | 39.2 | 37.0 | 39.4 | 39.3 | 39.1 | 39.2 | |
| 984 | .25 | IIIA..... | 39.1 | 39.2 | 39.1 | 39.4 | 39.2 | 38.9 | 39.4 | 39.0 | 39.0 | 38.8 | 1/128 |
| 985 | .25 | IIIA..... | 38.4 | 38.7 | 38.8 | 38.4 | 38.9 | 39.1 | 39.1 | 38.9 | 38.6 | 38.8 | |
| 749 | 0 | ..... | 39.5 | 39.5 | 40.6 | 40.1 | 40.1 | 40.5 | 40.4 | 40.5 | 39.5 | 39.8 | ----- |
| 750 | 0 | ..... | 39.4 | 40.0 | 39.9 | 40.1 | 40.6 | 40.6 | 40.7 | 40.4 | 39.4 | 38.7 | ----- |
| 751 | 0 | ..... | 39.4 | 39.5 | 39.5 | 40.0 | 40.0 | 40.1 | 40.4 | 40.2 | 39.8 | 39.5 | ----- |
| 752 | 0 | ..... | 39.7 | 40.0 | 40.0 | 40.6 | 40.0 | 40.5 | 40.4 | 40.0 | 39.6 | 38.9 | ----- |

NOTE.—The challenge injection consisted of 1 cc. (introduced intraperitoneally) of a freshly prepared 10 percent suspension of the brain of a Dreinf typhus-infected guinea pig killed on the third day of fever. Temperatures of 39.7° C. and higher are taken as evidence of a febrile reaction. They are indicated by italics.

The serums used in the complement fixation reactions were obtained from heart bleedings made 10 days after the first (3 days after the second) vaccination. The complement fixation end point dilutions in the table are averages from the serums of more vaccinated guinea pigs than those listed in the table.

Only the best lots then gave complete protection against a challenge inoculum of 1 cc. of a 10 percent suspension of infectious brain when the vaccine dose was 1 cc. (as contrasted with the 0.1-cc. and the 0.25-cc. doses of table 1). The serum-complement fixation titres of table 1 apply to bleedings made 10 days after the first vaccination; such titres are higher after a longer time interval as well as after larger doses of vaccine. Thus the average titre from guinea pigs bled 2 weeks after two 1-cc. vaccinations with vaccine IIIA was 1/512. Our experience indicates that such vaccination with products made a year ago would rarely, if ever, have resulted in serums with titres in excess of 1/16.

Though data such as these make it clear that present typhus vaccines are definitely superior to those prepared a year ago, there is no reason to assume that a limit has yet been reached to this improvement.

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PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

March 25–April 21, 1945

The accompanying table summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in the Public Health Reports under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4 weeks ended April 21, 1945, the number reported for the corresponding period in 1944, and the median number for the years 1940–44.

DISEASES ABOVE MEDIAN PREVALENCE

Diphtheria.—For the 4 weeks ended April 21 there were 1,008 cases of diphtheria reported as compared with 781 during the corresponding period in 1944, and a 5-year (1940–44) median of 903 cases. The New England, East North Central, West South Central, and Pacific sections reported excesses over the preceding 5-year median; in the East South Central section the incidence was about normal, and in the other four geographic regions the numbers of cases fell below the normal seasonal expectancy. For the country as a whole the current incidence is the highest reported during the corresponding weeks in 5 years. Of a total of 82 cases reported from Michigan for the current 4 weeks, 44 occurred in Oakland County during the week ended March 31.

Meningococcus meningitis.—A total of 794 cases of this disease was reported during the current 4-week period. With the exception of the epidemic years of 1943 and 1944 the incidence was the highest recorded for this period since 1936. Of the total cases, New York reported 89, California 81, Illinois 64, Pennsylvania and Texas 47 each, Tennessee 26, Maryland 25, Michigan 24, Massachusetts and Missouri 23 each, and Virginia 22 cases; almost two-thirds of the cases occurred in those 11 States. For the entire reporting area the number of cases was only about 40 percent of the 1944 incidence, but it was more than twice the 1940–44 median for this period. The

incidence in each geographic section was considerably below that of 1944, but the New England section alone reported fewer cases than the median expectancy.

Poliomyelitis.—The current 4-week total of 128 cases of poliomyelitis was the highest number reported for the corresponding period in the 17 years for which these data are available. Of the total cases, New York reported 25, Texas and Alabama 19 each, Michigan and California 6 each, but no other State reported more than 4 cases. For the country as a whole the number of reported cases was about 50 percent above the 1940-44 median level. By geographic regions the disease was relatively high in the Middle Atlantic, East North Central, East South Central, and West South Central regions; about normal in the New England, West North Central, and South

Number of reported cases of 9 communicable diseases in the United States during the 4-week period March 25-April 21, 1945, the number for the corresponding period in 1944, and the median number of cases reported for the corresponding period, 1940-44

| Division | Current period | 1944 | 5-year median | Current period | 1944 | 5-year median | Current period | 1944 | 5-year median |
|-------------------------|--------------------------|-------|---------------|-------------------------------|-------|---------------|-----------------------------|---------|---------------|
| | Diphtheria | | | Influenza ¹ | | | Measles ² | | |
| United States..... | 1,008 | 781 | 903 | 7,352 | 8,650 | 12,335 | 16,857 | 126,484 | 104,809 |
| New England..... | 32 | 29 | 24 | 147 | 108 | 27 | 1,100 | 8,710 | 8,710 |
| Middle Atlantic..... | 129 | 99 | 155 | 140 | 72 | 72 | 1,647 | 20,955 | 20,955 |
| East North Central..... | 166 | 99 | 142 | 180 | 427 | 510 | 1,528 | 26,395 | 26,395 |
| West North Central..... | 70 | 60 | 82 | 46 | 189 | 189 | 636 | 10,424 | 8,226 |
| South Atlantic..... | 131 | 114 | 141 | 1,825 | 2,488 | 4,171 | 1,368 | 22,005 | 11,745 |
| East South Central..... | 85 | 68 | 83 | 278 | 606 | 1,076 | 407 | 3,443 | 3,443 |
| West South Central..... | 169 | 136 | 152 | 4,277 | 3,809 | 4,543 | 2,730 | 15,895 | 8,672 |
| Mountain..... | 50 | 29 | 66 | 450 | 606 | 681 | 1,192 | 4,643 | 4,643 |
| Pacific..... | 176 | 147 | 84 | 119 | 344 | 511 | 6,199 | 14,014 | 7,945 |
| | Meningococcus meningitis | | | Poliomyelitis | | | Scarlet fever | | |
| United States..... | 794 | 2,012 | 389 | 128 | 80 | 74 | 20,892 | 29,089 | 17,096 |
| New England..... | 39 | 130 | 45 | 2 | 1 | 2 | 2,211 | 2,499 | 1,876 |
| Middle Atlantic..... | 155 | 440 | 132 | 30 | 10 | 5 | 5,079 | 6,540 | 5,470 |
| East North Central..... | 152 | 460 | 25 | 15 | 7 | 7 | 5,160 | 7,992 | 5,632 |
| West North Central..... | 72 | 152 | 16 | 5 | 4 | 5 | 1,705 | 3,385 | 1,552 |
| South Atlantic..... | 122 | 259 | 76 | 14 | 9 | 10 | 1,958 | 2,836 | 897 |
| East South Central..... | 68 | 175 | 41 | 30 | 5 | 6 | 509 | 782 | 782 |
| West South Central..... | 73 | 145 | 27 | 24 | 20 | 10 | 617 | 585 | 374 |
| Mountain..... | 10 | 82 | 5 | 1 | 3 | 5 | 907 | 1,309 | 494 |
| Pacific..... | 103 | 169 | 28 | 7 | 21 | 12 | 2,146 | 3,161 | 778 |
| | Smallpox | | | Typhoid and paratyphoid fever | | | Whooping cough ² | | |
| United States..... | 54 | 37 | 105 | 230 | 255 | 299 | 10,035 | 6,805 | 14,201 |
| New England..... | 0 | 0 | 0 | 7 | 7 | 14 | 1,124 | 527 | 1,217 |
| Middle Atlantic..... | 0 | 0 | 0 | 37 | 40 | 47 | 1,997 | 960 | 3,164 |
| East North Central..... | 21 | 5 | 37 | 26 | 27 | 36 | 1,468 | 848 | 2,902 |
| West North Central..... | 12 | 8 | 21 | 5 | 8 | 10 | 243 | 362 | 531 |
| South Atlantic..... | 2 | 3 | 6 | 59 | 63 | 63 | 1,610 | 1,533 | 1,942 |
| East South Central..... | 3 | 4 | 6 | 25 | 19 | 23 | 297 | 463 | 666 |
| West South Central..... | 5 | 8 | 32 | 52 | 39 | 50 | 1,160 | 946 | 1,399 |
| Mountain..... | 5 | 8 | 2 | 13 | 15 | 15 | 474 | 547 | 815 |
| Pacific..... | 6 | 1 | 6 | 6 | 37 | 20 | 1,662 | 619 | 1,722 |

¹ Mississippi and New York excluded; New York City included.
² Mississippi excluded.

Atlantic sections; and below normal in the Mountain and Pacific sections.

Scarlet fever.—For the country as a whole the incidence of scarlet fever (20,892 cases) was about 70 percent of the number of cases reported during the same weeks in 1944. The 1940–44 median for the corresponding period was approximately 17,000 cases. The number of cases was lower than in 1944 in all sections of the country except the West South Central. Compared with the 1940–44 median the disease was more prevalent than might be expected in all geographic regions except the East North Central and East South Central sections.

DISEASES BELOW MEDIAN PREVALENCE

Influenza.—The incidence of this disease was relatively low, the number of cases reported (7,352) being about 85 percent of the 1944 figure for these same weeks, and 60 percent of the preceding 5-year median. The number of cases (147) in the New England section was almost five times the median expectancy, but in each of the other geographic regions the number of cases was lower than the normal seasonal incidence.

Measles.—For the country as a whole the number of cases (16,857) of measles reported for the current 4-week period was the lowest recorded for this period in the 17 years for which these data are available. In 1944 there were 126,484 cases reported for the corresponding 4 weeks and the 1940–44 median was approximately 105,000 cases. The situation was favorable in all sections of the country, each geographic region reporting a decline from the preceding year's figures, as well as from the preceding 5-year median figures.

Smallpox.—For the current 4-week period there were 54 cases of smallpox reported. The number represented a 50-percent decrease from the 1940–44 median. Increases over the 1944 incidence were reported from the East North Central, West North Central, and Pacific regions, but the Mountain section alone reported an excess over the 1940–44 median.

Typhoid and paratyphoid fever.—Typhoid fever continued at a favorably low level. For the 4 weeks ended April 21 there were 230 cases reported as compared with 255 in 1944 and a median of 299 cases for the corresponding period in the preceding 5 years. In the South Atlantic, East and West South Central, and Mountain sections the incidence was about normal, while the New England, Middle Atlantic, East and West North Central, and Pacific sections reported very significant decreases from the seasonal median expectancy.

Whooping cough.—The number of cases (10,035) of this disease reported for the current 4-week period was 1.5 times the 1944 figure

for the corresponding 4 weeks, but it was only about 70 percent of the preceding 5-year median figure. All geographic regions were high in relation to 1944 except the West North Central, East South Central, and Mountain sections, but all sections were low in comparison with the 1940-44 medians.

MORTALITY, ALL CAUSES

For the 4 weeks ended April 21 there were 36,515 deaths from all causes reported by 93 large cities to the Bureau of the Census. The preceding 3-year (1942-44) average was 37,147 deaths. The deaths for each of the first 3 weeks of the period under consideration were lower than the 3-year average, but during the fourth week the number was about 0.7 percent above the average.

INCIDENCE OF HOSPITALIZATION, MARCH 1945

Through the cooperation of the Hospital Service Plan Commission of the American Hospital Association, data on hospital admissions among members of Blue Cross Hospital Service Plans are presented monthly. These plans provide prepaid hospital service. The data cover hospital service plans scattered throughout the country, mostly in large cities.

| Item | March | |
|--|------------|------------|
| | 1944 | 1945 |
| 1. Number of plans supplying data..... | 68 | 82 |
| 2. Number of persons eligible for hospital care..... | 11,605,270 | 17,046,176 |
| 3. Number of persons admitted for hospital care..... | 98,151 | 144,576 |
| 4. Incidence per 1,000 persons, annual rate, during current month (daily rate × 365)..... | 99.5 | 99.8 |
| 5. Incidence per 1,000 persons, annual rate for the 12 months ended March 31..... | 104.6 | 103.6 |
| 6. Number of plans reporting on hospital days..... | 24 | 25 |
| 7. Days of hospital care per case discharged during month ¹ | 8.61 | 8.32 |

¹ Days include entire stay of patient in hospital whether at full pay or at a discount.

DEATHS DURING WEEK ENDED APRIL 21, 1945

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

| | Week ended Apr. 21, 1945 | Correspond- ing week, 1944 |
|---|-----------------------------|----------------------------------|
| Data for 92 large cities of the United States: | | |
| Total deaths..... | 9,032 | 9,216 |
| Average for 3 prior years..... | 8,973 | |
| Total deaths, first 16 weeks of year..... | 182,317 | 189,052 |
| Deaths under 1 year of age..... | 628 | 605 |
| Average for 3 prior years..... | 602 | |
| Deaths under 1 year of age, first 16 weeks of year..... | 10,097 | 10,030 |
| Data from industrial insurance companies: | | |
| Policies in force..... | 67,216,667 | 66,390,649 |
| Number of death claims..... | 14,379 | 13,160 |
| Death claims per 1,000 policies in force, annual rate..... | 11.2 | 10.4 |
| Death claims per 1,000 policies, first 16 weeks of year, annual rate..... | 11.0 | 11.2 |

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

REPORTS FROM STATES FOR WEEK ENDED APRIL 28, 1945

Summary

A total of 28 cases of poliomyelitis was reported for the current week, as compared with 32 last week, 18 for the corresponding week last year, and a 5-year (1940-44) median of 17. States reporting the largest numbers (last week's figures in parentheses) are as follows: New York 6 (6), Florida 5 (2), Texas 6 (11), California 4 (2). The total for the first 17 weeks of the year is 581, as compared with 375 for the same period last year and a 5-year median of 401.

Of the total of 202 cases of meningococcus meningitis, as compared with 190 last week, 94 occurred in 7 States, as follows (last week's figures in parentheses): New York 19 (32), Pennsylvania 13 (11), Ohio 9 (6), Illinois 11 (11), Florida 11 (5), Texas 15 (9), California 16 (28). The cumulative total of 4,009 cases for the first 17 weeks of the year is only 46 percent of the average for the same periods of the past 2 years, but more than 3 times the 5-year median for the period (1,311 cases), and, except the past 2 years, is more than reported for the corresponding period of any other year since 1936.

Figures for the first 17 weeks of the year for certain other diseases (last year's corresponding figures in parentheses) are as follows: Diphtheria 4,927 (3,994), dysentery (all forms) 9,921 (5,247), infectious encephalitis 114 (188), influenza 57,670 (328,181), measles 49,965 (428,804), Rocky Mountain spotted fever 16 (12), scarlet fever 93,885 (105,615), smallpox 175 (198), tularemia 285 (172), typhoid and paratyphoid fever 996 (1,223), endemic (murine) typhus fever 822 (650), whooping cough 42,080 (30,707).

A total of 9,103 deaths was recorded during the week in 93 large cities of the United States, as compared with 9,109 last week, 9,322 for the corresponding week last year, and a 3-year (1942-44) average of 9,375. The cumulative figure is 162,730, as compared with 169,762 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended April 28, 1945, and comparison with corresponding week of 1944, and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

| Division and State | Diphtheria | | | Influenza | | | Measles | | | Meningitis, meningococcus | | |
|--------------------------------|---------------|---------------|----------------|---------------|----------------|----------------|---------------|----------------|----------------|---------------------------|---------------|----------------|
| | Week ended— | | Median 1940-44 | Week ended— | | Median 1940-44 | Week ended— | | Median 1940-44 | Week ended— | | Median 1940-44 |
| | Apr. 28, 1945 | Apr. 29, 1944 | | Apr. 28, 1945 | Apr. 29, 1944 | | Apr. 28, 1945 | Apr. 29, 1944 | | Apr. 28, 1945 | Apr. 29, 1944 | |
| NEW ENGLAND | | | | | | | | | | | | |
| Maine..... | 0 | 0 | 0 | 15 | 1 | 1 | 441 | 148 | 2 | 4 | 3 | |
| New Hampshire..... | 0 | 0 | 0 | 1 | 3 | 60 | 35 | 35 | 1 | 0 | 0 | |
| Vermont..... | 0 | 0 | 0 | — | — | 11 | 109 | 109 | 0 | 0 | 0 | |
| Massachusetts..... | 5 | 2 | 3 | — | — | 215 | 1,017 | 1,190 | 6 | 12 | 5 | |
| Rhode Island..... | 1 | 1 | 1 | 33 | — | 0 | 98 | 98 | 1 | 1 | 1 | |
| Connecticut..... | 2 | 0 | 0 | 3 | — | 128 | 527 | 447 | 2 | 6 | 2 | |
| MIDDLE ATLANTIC | | | | | | | | | | | | |
| New York..... | 14 | 9 | 20 | 12 | 13 | 18 | 62 | 1,836 | 1,836 | 19 | 58 | 18 |
| New Jersey..... | 1 | 5 | 5 | 5 | 2 | 10 | 46 | 1,505 | 1,505 | 6 | 21 | 3 |
| Pennsylvania..... | 3 | 9 | 11 | 1 | 2 | — | 343 | 956 | 1,297 | 13 | 34 | 12 |
| EAST NORTH CENTRAL | | | | | | | | | | | | |
| Ohio..... | 4 | 4 | 7 | 3 | 19 | 19 | 47 | 698 | 568 | 9 | 41 | 1 |
| Indiana..... | 3 | 5 | 5 | 1 | 5 | 8 | 54 | 198 | 198 | 4 | 12 | 0 |
| Illinois..... | 4 | 6 | 19 | 1 | 7 | 9 | 141 | 918 | 918 | 11 | 43 | 3 |
| Michigan ¹ | 5 | 8 | 2 | 1 | 5 | 5 | 169 | 1,078 | 1,078 | 7 | 23 | 0 |
| Wisconsin..... | 2 | 4 | 1 | 54 | 61 | 52 | 70 | 2,816 | 1,703 | 3 | 9 | 2 |
| WEST NORTH CENTRAL | | | | | | | | | | | | |
| Minnesota..... | 4 | 3 | 3 | — | — | 1 | 10 | 904 | 322 | 1 | 1 | 0 |
| Iowa..... | 2 | 2 | 2 | — | 10 | 1 | 59 | 212 | 273 | 4 | 6 | 0 |
| Missouri..... | 1 | 0 | 1 | 3 | 1 | 3 | 20 | 308 | 308 | 7 | 22 | 2 |
| North Dakota..... | 0 | 1 | 1 | — | 1 | 7 | 15 | 70 | 45 | 0 | 0 | 0 |
| South Dakota..... | 3 | 1 | 0 | — | — | — | 16 | 30 | 20 | 0 | 0 | 0 |
| Nebraska..... | 4 | 0 | 1 | 3 | 3 | 3 | 92 | 255 | 255 | 1 | 2 | 0 |
| Kansas..... | 2 | 1 | 3 | — | 7 | 7 | 64 | 723 | 630 | 4 | 9 | 1 |
| SOUTH ATLANTIC | | | | | | | | | | | | |
| Delaware..... | 0 | 0 | 0 | — | — | — | 4 | 15 | 15 | 0 | 2 | 1 |
| Maryland ¹ | 14 | 20 | 4 | 3 | 4 | 8 | 25 | 609 | 409 | 4 | 6 | 6 |
| District of Columbia..... | 0 | 0 | 0 | — | 2 | — | 8 | 229 | 132 | 2 | 4 | 4 |
| Virginia..... | 11 | 2 | 5 | 70 | 108 | 175 | 66 | 613 | 381 | 7 | 10 | 10 |
| West Virginia..... | 3 | 2 | 2 | 2 | 13 | 14 | 45 | 446 | 133 | 2 | 4 | 3 |
| North Carolina..... | 5 | 6 | 5 | — | 1 | 12 | 33 | 1,701 | 686 | 4 | 5 | 2 |
| South Carolina..... | 8 | 6 | 4 | 258 | 267 | 291 | 53 | 371 | 150 | 2 | 4 | 1 |
| Georgia..... | 4 | 3 | 3 | 8 | 5 | 29 | 22 | 79 | 211 | 1 | 10 | 1 |
| Florida..... | 6 | 7 | 3 | 1 | 14 | 14 | 28 | 289 | 289 | 11 | 2 | 1 |
| EAST SOUTH CENTRAL | | | | | | | | | | | | |
| Kentucky..... | 4 | 3 | 4 | — | 3 | 5 | 28 | 169 | 169 | 5 | 12 | 2 |
| Tennessee..... | 3 | 3 | 3 | 30 | 28 | 51 | 70 | 232 | 232 | 6 | 14 | 4 |
| Alabama..... | 14 | 9 | 7 | 13 | 45 | 65 | 19 | 323 | 263 | 8 | 6 | 4 |
| Mississippi ¹ | 4 | 5 | 5 | — | — | — | — | — | — | 3 | 5 | 2 |
| WEST SOUTH CENTRAL | | | | | | | | | | | | |
| Arkansas..... | 3 | 3 | 4 | 40 | 52 | 52 | 61 | 241 | 152 | 4 | 2 | 1 |
| Louisiana..... | 5 | 2 | 5 | 22 | 4 | 3 | 57 | 102 | 67 | 0 | 8 | 1 |
| Oklahoma..... | 3 | 5 | 2 | 17 | 90 | 76 | 33 | 382 | 184 | 1 | 2 | 2 |
| Texas..... | 29 | 29 | 24 | 654 | 711 | 711 | 654 | 4,182 | 1,541 | 15 | 18 | 4 |
| MOUNTAIN | | | | | | | | | | | | |
| Montana..... | 1 | 0 | 2 | 15 | 12 | 12 | 14 | 115 | 115 | 1 | 1 | 0 |
| Idaho..... | 0 | 0 | 0 | 1 | — | — | 52 | 33 | 33 | 2 | 0 | 0 |
| Wyoming..... | 0 | 0 | 0 | — | — | — | 14 | 67 | 67 | 0 | 1 | 0 |
| Colorado..... | 3 | 13 | 11 | 11 | 22 | 22 | 15 | 246 | 308 | 2 | 2 | 0 |
| New Mexico..... | 2 | 2 | 0 | 6 | 7 | 1 | 13 | 111 | 72 | 1 | 0 | 0 |
| Arizona..... | 0 | 0 | 0 | 85 | 58 | 88 | 27 | 322 | 110 | 0 | 0 | 0 |
| Utah ¹ | 0 | 0 | 0 | 11 | — | — | 5 | 270 | 44 | 0 | 0 | 0 |
| Nevada..... | 0 | 0 | 0 | 217 | 100 | — | 2 | 19 | 1 | 0 | 1 | 0 |
| PACIFIC | | | | | | | | | | | | |
| Washington..... | 2 | 1 | 1 | — | — | — | 241 | 256 | 318 | 3 | 5 | 2 |
| Oregon..... | 0 | 3 | 4 | 9 | 20 | 17 | 76 | 163 | 362 | 1 | 1 | 1 |
| California..... | 22 | 23 | 15 | 10 | 24 | 80 | 1,360 | 4,002 | 854 | 16 | 22 | 3 |
| Total..... | 206 | 211 | 211 | 1,594 | 1,734 | 1,741 | 4,913 | 29,995 | 26,526 | 202 | 449 | 80 |
| 17 weeks..... | 4,927 | 3,994 | 4,826 | 57,670 | 328,181 | 159,244 | 49,965 | 428,804 | 314,834 | 4,009 | 9,063 | 1,311 |

¹ New York City only.

² Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended April 28, 1945, and comparison with corresponding week of 1944, and 5-year median—Con.

| Division and State | Poliomyelitis | | | Scarlet fever | | | Smallpox | | | Typhoid and paratyphoid fever ¹ | | |
|--------------------------------|---------------|---------------|----------------|---------------|---------------|----------------|---------------|---------------|----------------|--|---------------|----------------|
| | Week ended— | | Median 1940-44 | Week ended— | | Median 1940-44 | Week ended— | | Median 1940-44 | Week ended— | | Median 1940-44 |
| | Apr. 28, 1945 | Apr. 29, 1944 | | Apr. 28, 1945 | Apr. 29, 1944 | | Apr. 28, 1945 | Apr. 29, 1944 | | Apr. 28, 1945 | Apr. 29, 1944 | |
| NEW ENGLAND | | | | | | | | | | | | |
| Maine..... | 0 | 0 | 0 | 48 | 73 | 18 | 0 | 0 | 0 | 0 | 2 | 0 |
| New Hampshire..... | 0 | 0 | 0 | 5 | 20 | 7 | 0 | 0 | 0 | 0 | 0 | 0 |
| Vermont..... | 0 | 0 | 0 | 20 | 10 | 10 | 0 | 0 | 0 | 0 | 1 | 1 |
| Massachusetts..... | 0 | 1 | 0 | 315 | 426 | 326 | 0 | 0 | 0 | 5 | 2 | 2 |
| Rhode Island..... | 0 | 0 | 0 | 27 | 11 | 11 | 0 | 0 | 0 | 0 | 1 | 0 |
| Connecticut..... | 0 | 1 | 0 | 83 | 102 | 102 | 0 | 0 | 0 | 0 | 1 | 1 |
| MIDDLE ATLANTIC | | | | | | | | | | | | |
| New York..... | 6 | 0 | 0 | 580 | 577 | 577 | 0 | 0 | 0 | 5 | 3 | 7 |
| New Jersey..... | 0 | 0 | 0 | 140 | 359 | 267 | 0 | 0 | 0 | 3 | 3 | 0 |
| Pennsylvania..... | 0 | 0 | 1 | 502 | 844 | 476 | 0 | 0 | 0 | 6 | 1 | 3 |
| EAST NORTH CENTRAL | | | | | | | | | | | | |
| Ohio..... | 1 | 0 | 0 | 397 | 588 | 317 | 0 | 0 | 0 | 4 | 1 | 1 |
| Indiana..... | 0 | 0 | 0 | 95 | 131 | 127 | 0 | 2 | 2 | 1 | 2 | 1 |
| Illinois..... | 0 | 1 | 0 | 277 | 495 | 313 | 0 | 0 | 1 | 0 | 1 | 1 |
| Michigan ² | 1 | 0 | 0 | 251 | 404 | 250 | 1 | 1 | 0 | 1 | 2 | 2 |
| Wisconsin..... | 0 | 1 | 0 | 178 | 394 | 171 | 0 | 0 | 1 | 1 | 1 | 0 |
| WEST NORTH CENTRAL | | | | | | | | | | | | |
| Minnesota..... | 1 | 0 | 0 | 91 | 172 | 72 | 0 | 0 | 0 | 1 | 0 | 0 |
| Iowa..... | 0 | 0 | 0 | 59 | 117 | 50 | 0 | 0 | 1 | 0 | 1 | 1 |
| Missouri..... | 0 | 0 | 0 | 82 | 170 | 87 | 0 | 0 | 1 | 0 | 3 | 1 |
| North Dakota..... | 1 | 0 | 0 | 35 | 49 | 9 | 0 | 0 | 0 | 0 | 0 | 0 |
| South Dakota..... | 0 | 0 | 0 | 17 | 16 | 16 | 0 | 2 | 0 | 0 | 0 | 0 |
| Nebraska..... | 0 | 1 | 0 | 113 | 125 | 19 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kansas..... | 0 | 1 | 0 | 106 | 122 | 75 | 0 | 0 | 0 | 0 | 1 | 1 |
| SOUTH ATLANTIC | | | | | | | | | | | | |
| Delaware..... | 0 | 0 | 0 | 7 | 18 | 18 | 0 | 0 | 0 | 0 | 0 | 0 |
| Maryland ² | 0 | 0 | 0 | 146 | 222 | 96 | 0 | 0 | 0 | 0 | 2 | 2 |
| District of Columbia..... | 0 | 0 | 0 | 23 | 145 | 20 | 0 | 0 | 0 | 0 | 0 | 0 |
| Virginia..... | 0 | 1 | 1 | 81 | 64 | 33 | 0 | 0 | 0 | 0 | 5 | 3 |
| West Virginia..... | 0 | 0 | 0 | 68 | 93 | 44 | 0 | 0 | 0 | 1 | 1 | 2 |
| North Carolina..... | 0 | 0 | 0 | 51 | 37 | 26 | 0 | 0 | 0 | 3 | 2 | 2 |
| South Carolina..... | 0 | 0 | 0 | 13 | 2 | 2 | 0 | 0 | 0 | 2 | 1 | 1 |
| Georgia..... | 0 | 0 | 0 | 20 | 43 | 15 | 0 | 0 | 0 | 5 | 8 | 3 |
| Florida..... | 5 | 0 | 0 | 16 | 9 | 7 | 0 | 0 | 0 | 6 | 2 | 2 |
| EAST SOUTH CENTRAL | | | | | | | | | | | | |
| Kentucky..... | 0 | 0 | 0 | 71 | 83 | 83 | 0 | 1 | 0 | 10 | 0 | 2 |
| Tennessee..... | 1 | 1 | 0 | 45 | 96 | 65 | 0 | 0 | 0 | 3 | 3 | 2 |
| Alabama..... | 0 | 0 | 1 | 25 | 19 | 13 | 0 | 0 | 1 | 0 | 3 | 1 |
| Mississippi ² | 0 | 1 | 1 | 7 | 2 | 7 | 0 | 0 | 0 | 4 | 1 | 1 |
| WEST SOUTH CENTRAL | | | | | | | | | | | | |
| Arkansas..... | 0 | 0 | 0 | 6 | 11 | 7 | 0 | 0 | 1 | 0 | 3 | 1 |
| Louisiana..... | 0 | 4 | 0 | 15 | 12 | 5 | 1 | 1 | 1 | 7 | 3 | 6 |
| Oklahoma..... | 0 | 0 | 0 | 12 | 22 | 12 | 0 | 0 | 0 | 2 | 2 | 0 |
| Texas..... | 6 | 2 | 2 | 100 | 225 | 43 | 0 | 1 | 3 | 17 | 4 | 6 |
| MOUNTAIN | | | | | | | | | | | | |
| Montana..... | 0 | 0 | 0 | 22 | 39 | 29 | 0 | 0 | 0 | 1 | 0 | 0 |
| Idaho..... | 0 | 0 | 0 | 37 | 54 | 11 | 0 | 0 | 0 | 2 | 0 | 0 |
| Wyoming..... | 0 | 0 | 0 | 5 | 13 | 12 | 0 | 0 | 0 | 0 | 0 | 0 |
| Colorado..... | 0 | 0 | 0 | 45 | 44 | 44 | 0 | 0 | 0 | 0 | 2 | 1 |
| New Mexico..... | 0 | 0 | 0 | 12 | 18 | 7 | 0 | 0 | 0 | 1 | 0 | 0 |
| Arizona..... | 0 | 0 | 0 | 55 | 27 | 6 | 0 | 0 | 0 | 1 | 0 | 0 |
| Utah ² | 0 | 0 | 0 | 23 | 79 | 13 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nevada..... | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| PACIFIC | | | | | | | | | | | | |
| Washington..... | 2 | 0 | 0 | 115 | 334 | 41 | 0 | 1 | 0 | 0 | 0 | 0 |
| Oregon..... | 0 | 0 | 0 | 32 | 153 | 13 | 0 | 0 | 0 | 0 | 0 | 1 |
| California..... | 4 | 3 | 3 | 426 | 367 | 133 | 0 | 0 | 0 | 3 | 9 | 5 |
| Total..... | 28 | 18 | 17 | 4,899 | 7,439 | 4,104 | 3 | 9 | 35 | 92 | 77 | 87 |
| 17 weeks..... | 581 | 375 | 401 | 93,885 | 105,615 | 67,902 | 175 | 198 | 459 | 996 | 1,223 | 1,284 |

¹ Period ending earlier than Saturday.

² Including paratyphoid fever reported separately, as follows: Massachusetts 4; New York 2; Georgia 1; California 1.

Telegraphic morbidity reports from State health officers for the week ended Apr. 28, 1945, and comparison with corresponding week of 1944, and 5-year median—Con.

| Division and State | Whooping cough | | | Week ended Apr. 28, 1945 | | | | | | | |
|---------------------------|----------------|---------------|----------------|--------------------------|------------|-------------|--------------------------|-------------------------|-----------|--------------|----------------|
| | Week ended— | | | Dysentery | | | Encephalitis, infectious | Rocky Mt. spotted fever | Tularemia | Typhus fever | Undulant fever |
| | Apr. 28, 1945 | Apr. 28, 1944 | Median 1940-44 | Ambic | Bacillary | Unspecified | | | | | |
| NEW ENGLAND | | | | | | | | | | | |
| Maine..... | 32 | 18 | 18 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| New Hampshire..... | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Vermont..... | 25 | 13 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Massachusetts..... | 129 | 96 | 150 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rhode Island..... | 18 | 8 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Connecticut..... | 65 | 11 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| MIDDLE ATLANTIC | | | | | | | | | | | |
| New York..... | 238 | 100 | 332 | 11 | 9 | 0 | 1 | 2 | 0 | 0 | 6 |
| New Jersey..... | 153 | 58 | 113 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 3 |
| Pennsylvania..... | 205 | 103 | 243 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| EAST NORTH CENTRAL | | | | | | | | | | | |
| Ohio..... | 201 | 59 | 190 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Indiana..... | 17 | 5 | 39 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Illinois..... | 22 | 21 | 114 | 5 | 1 | 0 | 1 | 0 | 2 | 0 | 6 |
| Michigan..... | 72 | 65 | 196 | 0 | 4 | 0 | 1 | 0 | 0 | 0 | 14 |
| Wisconsin..... | 60 | 50 | 119 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| WEST NORTH CENTRAL | | | | | | | | | | | |
| Minnesota..... | 9 | 23 | 41 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 5 |
| Iowa..... | 5 | 20 | 29 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Missouri..... | 19 | 8 | 16 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 |
| North Dakota..... | 5 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| South Dakota..... | 6 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nebraska..... | 12 | 18 | 18 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Kansas..... | 25 | 40 | 43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| SOUTH ATLANTIC | | | | | | | | | | | |
| Delaware..... | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Maryland..... | 65 | 22 | 112 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 |
| District of Columbia..... | 6 | 5 | 22 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Virginia..... | 47 | 62 | 62 | 0 | 0 | 16 | 0 | 1 | 1 | 0 | 1 |
| West Virginia..... | 17 | 6 | 35 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Carolina..... | 160 | 159 | 159 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 |
| South Carolina..... | 92 | 73 | 73 | 3 | 15 | 0 | 0 | 0 | 0 | 1 | 0 |
| Georgia..... | 14 | 12 | 28 | 0 | 2 | 0 | 0 | 0 | 2 | 5 | 2 |
| Florida..... | 15 | 16 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 |
| EAST SOUTH CENTRAL | | | | | | | | | | | |
| Kentucky..... | 28 | 43 | 84 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Tennessee..... | 24 | 26 | 42 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alabama..... | 22 | 10 | 18 | 5 | 0 | 0 | 0 | 0 | 0 | 4 | 3 |
| Mississippi..... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| WEST SOUTH CENTRAL | | | | | | | | | | | |
| Arkansas..... | 15 | 41 | 38 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Louisiana..... | 14 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 2 |
| Oklahoma..... | 8 | 1 | 36 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| Texas..... | 391 | 316 | 318 | 12 | 326 | 55 | 0 | 0 | 1 | 32 | 17 |
| MOUNTAIN | | | | | | | | | | | |
| Montana..... | 16 | 4 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Idaho..... | 8 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Wyoming..... | 0 | 5 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Colorado..... | 15 | 25 | 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| New Mexico..... | 14 | 17 | 33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Arizona..... | 35 | 15 | 24 | 1 | 0 | 27 | 0 | 0 | 0 | 0 | 0 |
| Utah..... | 33 | 47 | 55 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| Nevada..... | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PACIFIC | | | | | | | | | | | |
| Washington..... | 29 | 33 | 56 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Oregon..... | 19 | 30 | 28 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 7 |
| California..... | 425 | 98 | 375 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 6 |
| Total..... | 2,832 | 1,793 | 3,889 | 40 | 361 | 101 | 4 | 8 | 10 | 61 | 96 |
| Same week 1944..... | 1,793 | ..... | ..... | 21 | 323 | 107 | 21 | 5 | 9 | 46 | ..... |
| Average 1942-44..... | 3,254 | ..... | ..... | 24 | 193 | 69 | 14 | 411 | 11 | 420 | ..... |
| 17 weeks: 1945..... | 42,080 | ..... | ..... | 482 | 7,463 | 1,976 | 114 | 16 | 285 | 822 | 1,466 |
| 1944..... | 30,707 | ..... | ..... | 449 | 3,668 | 1,130 | 188 | 12 | 172 | 650 | ..... |
| Average 1942-44..... | 54,785 | ..... | 65,384 | 416 | 2,699 | 843 | 168 | 431 | 253 | 626 | ..... |

¹ Period ended earlier than Saturday.

² 5-year median, 1940-44.

WEEKLY REPORTS FROM CITIES

City reports for week ended April 21, 1945

This table lists the reports from 90 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

| | Diphtheria cases | Erysipelas, infectious, cases | Influenza | | Measles cases | Meningitis, meningococcus, cases | Pneumonia deaths | Pollomyelitis cases | Scarlet fever cases | Smallpox cases | Typhoid and paratyphoid fever cases | Whooping cough cases |
|---------------------------|------------------|-------------------------------|-----------|--------|---------------|----------------------------------|------------------|---------------------|---------------------|----------------|-------------------------------------|----------------------|
| | | | Cases | Deaths | | | | | | | | |
| NEW ENGLAND | | | | | | | | | | | | |
| Maine: | | | | | | | | | | | | |
| Portland | 0 | 0 | 0 | 0 | 1 | 0 | 4 | 0 | 2 | 0 | 1 | 1 |
| New Hampshire: | | | | | | | | | | | | |
| Concord | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Vermont: | | | | | | | | | | | | |
| Barre | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| Massachusetts: | | | | | | | | | | | | |
| Boston | 1 | 0 | 0 | 0 | 65 | 2 | 14 | 0 | 60 | 0 | 0 | 28 |
| Fall River | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 0 | 0 | 1 |
| Springfield | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 12 | 0 | 0 | 1 |
| Worcester | 0 | 0 | 0 | 0 | 2 | 0 | 13 | 0 | 16 | 0 | 0 | 5 |
| Rhode Island: | | | | | | | | | | | | |
| Providence | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 7 | 0 | 1 | 14 |
| Connecticut: | | | | | | | | | | | | |
| Bridgeport | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 4 | 0 | 0 | 0 |
| Hartford | 0 | 0 | 0 | 33 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 4 |
| New Haven | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 7 |
| MIDDLE ATLANTIC | | | | | | | | | | | | |
| New York: | | | | | | | | | | | | |
| Buffalo | 0 | 0 | 1 | 3 | 0 | 7 | 0 | 8 | 0 | 0 | 0 | 3 |
| New York | 18 | 0 | 1 | 53 | 22 | 54 | 1 | 290 | 0 | 0 | 1 | 79 |
| Rochester | 0 | 0 | 0 | 23 | 1 | 3 | 0 | 13 | 0 | 0 | 0 | 14 |
| Syracuse | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 22 |
| New Jersey: | | | | | | | | | | | | |
| Camden | 1 | 0 | 3 | 1 | 2 | 1 | 2 | 0 | 1 | 0 | 0 | 1 |
| Newark | 0 | 0 | 1 | 0 | 3 | 0 | 3 | 0 | 19 | 0 | 0 | 6 |
| Trenton | 0 | 0 | 1 | 0 | 2 | 0 | 1 | 0 | 4 | 0 | 0 | 0 |
| Pennsylvania: | | | | | | | | | | | | |
| Philadelphia | 3 | 0 | 1 | 0 | 168 | 2 | 40 | 0 | 76 | 0 | 1 | 76 |
| Pittsburgh | 0 | 0 | 0 | 5 | 3 | 11 | 0 | 40 | 0 | 0 | 0 | 16 |
| Reading | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 9 | 0 | 0 | 0 | 0 |
| EAST NORTH CENTRAL | | | | | | | | | | | | |
| Ohio: | | | | | | | | | | | | |
| Cincinnati | 0 | 0 | 0 | 2 | 0 | 9 | 0 | 22 | 0 | 0 | 0 | 8 |
| Cleveland | 3 | 0 | 4 | 0 | 2 | 4 | 8 | 0 | 73 | 0 | 1 | 57 |
| Columbus | 0 | 0 | 0 | 2 | 0 | 3 | 0 | 5 | 0 | 0 | 0 | 2 |
| Indiana: | | | | | | | | | | | | |
| Fort Wayne | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 0 | 0 | 0 |
| Indianapolis | 3 | 0 | 1 | 6 | 0 | 6 | 0 | 18 | 0 | 0 | 0 | 2 |
| South Bend | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 |
| Terre Haute | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 |
| Illinois: | | | | | | | | | | | | |
| Chicago | 1 | 0 | 2 | 1 | 104 | 6 | 26 | 0 | 132 | 0 | 0 | 21 |
| Springfield | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 9 | 0 | 0 | 0 |
| Michigan: | | | | | | | | | | | | |
| Detroit | 5 | 0 | 0 | 0 | 109 | 2 | 9 | 0 | 111 | 0 | 0 | 30 |
| Flint | 0 | 0 | 0 | 3 | 0 | 4 | 0 | 11 | 0 | 0 | 0 | 1 |
| Grand Rapids | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 18 | 0 | 0 | 0 | 1 |
| Wisconsin: | | | | | | | | | | | | |
| Kenosha | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| Milwaukee | 0 | 0 | 0 | 15 | 1 | 8 | 0 | 45 | 0 | 0 | 0 | 1 |
| Racine | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 9 | 0 | 0 | 0 | 1 |
| Superior | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 3 | 0 | 0 | 0 | 2 |
| WEST NORTH CENTRAL | | | | | | | | | | | | |
| Minnesota: | | | | | | | | | | | | |
| Duluth | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 |
| Minneapolis | 0 | 0 | 0 | 4 | 1 | 0 | 0 | 20 | 0 | 0 | 0 | 3 |
| St. Paul | 0 | 0 | 0 | 4 | 0 | 2 | 0 | 7 | 0 | 0 | 0 | 0 |
| Missouri: | | | | | | | | | | | | |
| Kansas City | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 22 | 0 | 0 | 0 | 0 |
| St. Joseph | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 0 |
| St. Louis | 2 | 0 | 5 | 0 | 6 | 5 | 6 | 33 | 0 | 0 | 3 | 14 |

City reports for week ended April 21, 1945—Continued

| | Diphtheria cases | Etiology, infectious, cases | Influenza | | Measles cases | Meningitis, meningococcus, cases | Pneumonia deaths | Polymyelitis cases | Scarlet fever cases | Smallpox cases | Typhoid and paratyphoid fever cases | Whooping cough cases |
|-------------------------------------|------------------|-----------------------------|-----------|--------|---------------|----------------------------------|------------------|--------------------|---------------------|----------------|-------------------------------------|----------------------|
| | | | Cases | Deaths | | | | | | | | |
| WEST NORTH CENTRAL—continued | | | | | | | | | | | | |
| North Dakota: | | | | | | | | | | | | |
| Fargo..... | 0 | 0 | | 0 | 1 | 0 | 1 | 0 | 2 | 0 | 0 | 0 |
| Nebraska: | | | | | | | | | | | | |
| Omaha..... | 0 | 0 | | 0 | 25 | 1 | 3 | 0 | 14 | 0 | 0 | 3 |
| Kansas: | | | | | | | | | | | | |
| Topeka..... | 0 | 0 | | 0 | 2 | 0 | 1 | 0 | 5 | 0 | 0 | 2 |
| Wichita..... | 1 | 0 | | 0 | 3 | 0 | 1 | 0 | 5 | 0 | 0 | 9 |
| SOUTH ATLANTIC | | | | | | | | | | | | |
| Delaware: | | | | | | | | | | | | |
| Wilmington..... | 0 | 0 | | 0 | 0 | 0 | 4 | 0 | 1 | 0 | 0 | 0 |
| Maryland: | | | | | | | | | | | | |
| Baltimore..... | 5 | 0 | 1 | 1 | 15 | 5 | 9 | 0 | 77 | 0 | 2 | 70 |
| Cumberland..... | 0 | 0 | | 0 | 0 | 0 | 1 | 0 | 4 | 0 | 0 | 0 |
| Frederick..... | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| District of Columbia: | | | | | | | | | | | | |
| Washington..... | 1 | 0 | | 0 | 12 | 3 | 10 | 0 | 36 | 0 | 1 | 9 |
| Virginia: | | | | | | | | | | | | |
| Lynchburg..... | 0 | 0 | | 0 | 5 | 0 | 2 | 0 | 3 | 0 | 0 | 2 |
| Richmond..... | 0 | 0 | | 0 | 2 | 0 | 0 | 0 | 19 | 0 | 0 | 1 |
| Roanoke..... | 0 | 0 | | 0 | 2 | 0 | 0 | 0 | 4 | 0 | 0 | 1 |
| West Virginia: | | | | | | | | | | | | |
| Charleston..... | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Wheeling..... | 0 | 1 | | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| North Carolina: | | | | | | | | | | | | |
| Raleigh..... | 0 | 0 | | 0 | 19 | 0 | 2 | 0 | 1 | 0 | 0 | 14 |
| Wilmington..... | 0 | 0 | | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 3 |
| Winston-Salem..... | 0 | 0 | | 0 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 0 |
| South Carolina: | | | | | | | | | | | | |
| Charleston..... | 0 | 0 | 3 | 0 | 5 | 0 | 2 | 0 | 2 | 0 | 1 | 0 |
| Georgia: | | | | | | | | | | | | |
| Atlanta..... | 0 | 0 | 3 | 0 | 1 | 0 | 2 | 0 | 12 | 0 | 0 | 1 |
| Brunswick..... | 0 | 0 | | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 4 |
| Savannah..... | 0 | 0 | | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Florida: | | | | | | | | | | | | |
| Tampa..... | 0 | 0 | | 0 | 1 | 0 | 5 | 0 | 1 | 0 | 0 | 5 |
| EAST SOUTH CENTRAL | | | | | | | | | | | | |
| Tennessee: | | | | | | | | | | | | |
| Memphis..... | 0 | 0 | 1 | 1 | 35 | 5 | 6 | 0 | 7 | 0 | 0 | 3 |
| Nashville..... | 0 | 0 | | 1 | 0 | 0 | 3 | 0 | 7 | 0 | 1 | 0 |
| Alabama: | | | | | | | | | | | | |
| Birmingham..... | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4 |
| Mobile..... | 0 | 0 | | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 |
| WEST SOUTH CENTRAL | | | | | | | | | | | | |
| Arkansas: | | | | | | | | | | | | |
| Little Rock..... | 0 | 0 | | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 1 |
| Louisiana: | | | | | | | | | | | | |
| New Orleans..... | 3 | 0 | | 0 | 26 | 3 | 5 | 1 | 2 | 0 | 1 | 2 |
| Shreveport..... | 0 | 0 | | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| Texas: | | | | | | | | | | | | |
| Dallas..... | 1 | 0 | | 0 | 8 | 0 | 4 | 0 | 3 | 0 | 0 | 2 |
| Galveston..... | 0 | 0 | | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 |
| Houston..... | 1 | 0 | | 0 | 0 | 0 | 2 | 1 | 2 | 0 | 0 | 0 |
| San Antonio..... | 1 | 0 | | 1 | 4 | 0 | 5 | 0 | 0 | 0 | 0 | 2 |
| MOUNTAIN | | | | | | | | | | | | |
| Montana: | | | | | | | | | | | | |
| Billings..... | 0 | 0 | | 0 | 1 | 0 | 0 | 0 | 4 | 0 | 1 | 0 |
| Great Falls..... | 0 | 0 | | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 2 |
| Helena..... | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Missoula..... | 0 | 0 | | 0 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| Idaho: | | | | | | | | | | | | |
| Boise..... | 0 | 0 | | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Colorado: | | | | | | | | | | | | |
| Denver..... | 2 | 0 | 4 | 0 | 10 | 1 | 7 | 0 | 18 | 1 | 0 | 13 |
| Pueblo..... | 0 | 0 | | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| Utah: | | | | | | | | | | | | |
| Salt Lake City..... | 0 | 0 | | 0 | 157 | 0 | 0 | 0 | 10 | 0 | 0 | 11 |

City reports for week ended April 21, 1945—Continued

| | Diphtheria cases | Enecephalitis, infectious, cases | Influenza | | Measles cases | Meningitis, meningococcus, cases | Pneumonia deaths | Pollomyelitis cases | Scarlet fever cases | Smallpox cases | Typhoid and paratyphoid fever cases | Whooping cough cases |
|-------------------------------|------------------|----------------------------------|-----------|--------|---------------|----------------------------------|------------------|---------------------|---------------------|----------------|-------------------------------------|----------------------|
| | | | Cases | Deaths | | | | | | | | |
| PACIFIC | | | | | | | | | | | | |
| Washington: | | | | | | | | | | | | |
| Seattle..... | 0 | 0 | 0 | 0 | 24 | 0 | 6 | 0 | 10 | 0 | 1 | 5 |
| Spokane..... | 3 | 0 | 2 | 2 | 1 | 0 | 3 | 0 | 3 | 0 | 0 | 0 |
| Tacoma..... | 0 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 9 | 0 | 0 | 2 |
| California: | | | | | | | | | | | | |
| Los Angeles..... | 1 | 0 | 2 | 1 | 83 | 2 | 6 | 0 | 61 | 0 | 0 | 39 |
| Sacramento..... | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 0 | 14 | 0 | 0 | 2 |
| San Francisco..... | 3 | 0 | 2 | 0 | 73 | 1 | 3 | 0 | 59 | 0 | 0 | 31 |
| Total..... | 59 | 1 | 35 | 13 | 1,220 | 78 | 369 | 3 | 1,558 | 1 | 16 | 672 |
| Corresponding week, 1944..... | 64 | ----- | 59 | 32 | 7,184 | ----- | 404 | ----- | 2,257 | 0 | 10 | 277 |
| Average, 1940-44..... | 61 | ----- | 117 | 131 | 6,763 | ----- | 1,431 | ----- | 1,755 | 2 | 14 | 996 |

¹ 3-year average, 1942-44.

² 5-year median, 1940-44.

Dysentery, amebic.—Cases: New York, 3; Chicago, 1; Baltimore, 1.
Dysentery, bacillary.—Cases: Providence, 1; Buffalo, 1; New York, 2; Rochester, 1; Charleston, S. C., 4; Los Angeles, 3.
Dysentery, unspecified.—Cases: Cincinnati, 1; San Antonio, 33.
Leprosy.—Cases: Los Angeles, 1.
Typhus fever, endemic.—Cases: New York, 1; Chicago, 1 (1 death on April 15; infection acquired in Mexico, stated to be first case in Chicago since 1937); New Orleans, 2; San Antonio, 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 90 cities in the preceding table (estimated population, 1943, 34,394,800)

| | Diphtheria case rates | Enecephalitis, infectious, case rates | Influenza | | Measles case rates | Meningitis, meningococcus, case rates | Pneumonia death rates | Pollomyelitis case rates | Scarlet fever case rates | Smallpox case rates | Typhoid and paratyphoid fever case rates | Whooping cough case rates |
|-------------------------|-----------------------|---------------------------------------|------------|-------------|--------------------|---------------------------------------|-----------------------|--------------------------|--------------------------|---------------------|--|---------------------------|
| | | | Case rates | Death rates | | | | | | | | |
| New England..... | 2.6 | 0.0 | 0.0 | 2.6 | 322 | 7.8 | 91.5 | 0.0 | 290 | 0.0 | 5.2 | 159 |
| Middle Atlantic..... | 10.2 | 0.0 | 2.8 | 1.4 | 121 | 13.9 | 57.4 | 0.5 | 214 | 0.0 | 0.9 | 100 |
| East North Central..... | 7.3 | 0.0 | 3.6 | 1.2 | 152 | 7.9 | 49.3 | 0.0 | 230 | 0.0 | 0.6 | 73 |
| West North Central..... | 6.0 | 0.0 | 9.9 | 0.0 | 97 | 19.9 | 41.3 | 0.0 | 251 | 0.0 | 6.0 | 62 |
| South Atlantic..... | 9.8 | 1.6 | 11.4 | 1.6 | 144 | 13.1 | 70.3 | 0.0 | 370 | 0.0 | 6.5 | 186 |
| East South Central..... | 0.0 | 0.0 | 5.9 | 11.8 | 207 | 29.5 | 64.9 | 0.0 | 94 | 0.0 | 5.9 | 41 |
| West South Central..... | 17.2 | 0.0 | 0.0 | 2.9 | 112 | 8.6 | 63.1 | 5.7 | 26 | 0.0 | 2.9 | 20 |
| Mountain..... | 15.9 | 0.0 | 31.8 | 0.0 | 1,350 | 7.9 | 95.3 | 0.0 | 286 | 7.9 | 7.9 | 222 |
| Pacific..... | 11.1 | 0.0 | 9.5 | 4.7 | 523 | 7.9 | 31.6 | 0.0 | 247 | 0.0 | 1.9 | 125 |
| Total..... | 9.0 | 0.2 | 5.3 | 2.0 | 185 | 11.9 | 56.1 | 0.5 | 237 | 0.2 | 2.4 | 102 |

TERRITORIES AND POSSESSIONS

Virgin Islands of the United States

Notifiable diseases.—January–March 1945.—During the months of January, February, and March 1945, cases of certain notifiable diseases were reported in the Virgin Islands as follows:

| Disease | January | February | March | Disease | January | February | March |
|-----------------------|---------|----------|-------|-------------------------------|---------|----------|-------|
| Chickenpox..... | ----- | 2 | 1 | Mumps..... | 1 | ----- | ----- |
| Filariasis..... | ----- | 2 | ----- | Poliomyelitis..... | ----- | 1 | ----- |
| German measles..... | 1 | ----- | 2 | Schistosomiasis..... | ----- | ----- | 1 |
| Gonorrhoea..... | 6 | 15 | 9 | Syphilis..... | 8 | 11 | 7 |
| Hookworm disease..... | 3 | ----- | 1 | Tuberculosis (pulmonary)..... | 1 | 1 | 3 |
| Malaria..... | ----- | ----- | 1 | Typhus fever (murine)..... | 3 | 1 | ----- |
| Measles..... | 3 | 789 | 310 | Vincent's angina..... | ----- | ----- | 1 |

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended April 7, 1945.—
During the week ended April 7, 1945, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

| Disease | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia | Total |
|------------------------------------|----------------------|-------------|---------------|--------|---------|----------|--------------|---------|------------------|-------|
| Chickenpox..... | | 8 | | 218 | 140 | 25 | 35 | 28 | 51 | 505 |
| Diphtheria..... | | 2 | 1 | 28 | 3 | 2 | 1 | 4 | 1 | 42 |
| Dysentery, bacillary..... | | | | 1 | | | | | | 1 |
| German measles..... | | 20 | | 9 | 18 | | | 8 | 19 | 74 |
| Influenza..... | | 30 | | | 83 | 2 | | | 28 | 143 |
| Measles..... | | 3 | | 80 | 82 | 11 | 26 | 26 | 241 | 469 |
| Meningitis, meningococcus..... | | | 1 | 1 | 1 | | 1 | 1 | 1 | 6 |
| Mumps..... | | 32 | | 170 | 140 | 20 | 52 | 157 | 7 | 578 |
| Poliomyelitis..... | | | | | | | 2 | | 1 | 3 |
| Scarlet fever..... | | 3 | 9 | 59 | 49 | 17 | 5 | 21 | 19 | 182 |
| Tuberculosis (all forms)..... | | 9 | 6 | 104 | 44 | 21 | 3 | 3 | 20 | 210 |
| Typhoid and paratyphoid fever..... | | | | 10 | | | | | 2 | 12 |
| Undulant fever..... | | | | 12 | 4 | | | | | 16 |
| Veneral diseases: | | | | | | | | | | |
| Gonorrhoea..... | 1 | 12 | 18 | 69 | 167 | 48 | 34 | 24 | 46 | 419 |
| Syphilis..... | | 16 | 4 | 90 | 102 | 18 | 5 | 8 | 13 | 256 |
| Other forms..... | | | | 1 | | | | | | 1 |
| Whooping cough..... | | 4 | | 99 | 38 | 2 | 3 | 6 | 4 | 156 |

CUBA

Provinces—Notifiable diseases—4 weeks ended March 24, 1945.—
During the 4 weeks ended March 24, 1945, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

| Disease | Pinar del Rio | Habana ¹ | Matanzas | Santa Clara | Camaguey | Oriente | Total |
|-----------------------|---------------|---------------------|----------|-------------|----------|---------|-------|
| Cancer..... | 2 | 1 | 9 | 5 | 2 | 12 | 31 |
| Chickenpox..... | | 29 | 9 | 2 | 5 | 7 | 52 |
| Diphtheria..... | | 21 | 4 | 1 | 1 | | 27 |
| Hookworm disease..... | 14 | | | | | | 14 |
| Leprosy..... | | | | | | 2 | 2 |
| Malaria..... | 1 | 6 | 1 | 4 | 4 | 238 | 254 |
| Measles..... | | 8 | 2 | 3 | 2 | 10 | 25 |
| Poliomyelitis..... | | | | | 1 | | 1 |
| Tuberculosis..... | 9 | 28 | 31 | 24 | 5 | 55 | 152 |
| Typhoid fever..... | 10 | 59 | 11 | 20 | 14 | 41 | 155 |
| Whooping cough..... | | | | 5 | | | 5 |
| Yaws..... | | | | | | 1 | 1 |

¹ Includes the city of Habana.

GOLD COAST

Cerebrospinal meningitis.—Cerebrospinal meningitis has been reported in the colony of Gold Coast as follows: Week ended February 10, 1945, 525 cases with 93 deaths; week ended February 17, 1945, 826 cases with 91 deaths.

MAURITIUS

Poliomyelitis epidemic.—According to unofficial sources, an epidemic of poliomyelitis was reported on the island of Mauritius during March, with a total of 870 cases notified up to the end of the month. It was stated that assistance was being given by the officials of Kenya, Tanganyika, and Uganda, and that a physician and nurse had been sent to the island from England.

NEW ZEALAND

*Notifiable diseases—4 weeks ended February 24, 1945.*¹—During the 4 weeks ended February 24, 1945, certain notifiable diseases were reported in New Zealand as follows:

| Disease | Cases | Deaths | Disease | Cases | Deaths |
|-------------------------------|-------|--------|-------------------------------|-------|--------|
| Cerebrospinal meningitis..... | 13 | 2 | Scarlet fever..... | 219 | 1 |
| Diphtheria..... | 61 | 3 | Tetanus..... | 1 | ----- |
| Dysentery, bacillary..... | 9 | ----- | Tuberculosis (all forms)..... | 160 | 46 |
| Erysipelas..... | 13 | ----- | Typhoid fever..... | 4 | ----- |
| Malaria..... | 15 | ----- | Undulant fever..... | 2 | ----- |
| Puerperal fever..... | 6 | ----- | | | |

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Cholera

India—Calcutta.—Cholera has been reported in Calcutta, India, as follows: Week ended April 7, 1945, 294 cases, 90 deaths; week ended April 14, 1945, 452 cases, 148 deaths.

Plague

Morocco (French).—For the period April 1-10, 1945, 8 cases of plague were reported in French Morocco.

¹ No report was received for the week ended February 10, 1945.

Smallpox

British East Africa—Tanganyika.—For the week ended March 31, 1945, 510 cases of smallpox with 16 deaths were reported in Tanganyika, British East Africa.

Cameroon (French).—For the period March 21–31, 1945, 195 cases of smallpox were reported in French Cameroon.

French Guinea.—For the period April 1–10, 1945, 195 cases of smallpox were reported in French Guinea.

Nigeria.—For the week ended March 10, 1945, 302 cases of smallpox with 47 deaths were reported in Nigeria.

Sudan (French).—For the period April 1–10, 1945, 101 cases of smallpox were reported in French Sudan.

Union of South Africa.—For the month of January 1945, 394 cases of smallpox with 12 deaths were reported in the Union of South Africa.

Typhus Fever

Morocco (French).—For the period April 1–10, 1945, 558 cases of typhus fever (including 2 cases reported in Casablanca and 3 cases in Rabat) were reported in French Morocco.

Turkey.—For the week ended April 21, 1945, 86 cases of typhus fever (including 4 cases reported in Zonguldak, 1 case in Antalya, 1 case in Istanbul, and 1 case in Adana) were reported in Turkey.

Union of South Africa.—For the month of January 1945, 158 cases of typhus fever with 18 deaths were reported in the Union of South Africa.