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INCIDENCE OF POLIOMYELITIS IN THE UNITED STATES IN 1945

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In 1945, 13,514 cases of poliomyelitis were reported in the United States.[1] It was the third successive year of above normal expectancy. The case rates per 100,000 population, as shown in table 1, were 90, 190, and 108 percent higher in 1943, 1944, and 1945, respectively, than the average annual rate for the 5-year period immediately preceding. Death rates were only 33 and 83 percent higher in 1943 and 1944, respectively, than for the same 5-year period. The higher than average number of cases reported per death in 1943 and 1944 in the country as a whole probably resulted from the fact that the disease was epidemic in many States which normally report a relatively high ratio of cases to deaths. On the other hand, in the period from 1938 to 1942, inclusive, extensive outbreaks occurred in a large number of States which report comparatively low ratios.

TABLE 1.—*Number of poliomyelitis cases and deaths, case and death rates per 100,000 population, and number of cases reported per death, in the United States, 1938–45*

Year	Total cases reported	Total deaths registered	Case rate	Death rate	Cases reported per death
1938–42	31,993	4,165	[1] 4.9	[1] 0.6	7.7
1943	12,449	1,115	9.3	.8	11.1
1944	19,029	1,433	14.3	1.1	13.3
1945	13,514		10.2		

[1] Average annual rate.

In 1943 (*1*) the disease was most prevalent in the Pacific States and in the southwestern part of the country, while in 1944 (*2*) the northeastern section experienced widespread epidemics, approximately one-third of the cases occurring in New York State. The distribution in 1945, as shown in the accompanying map (fig. 1) was characterized by a relatively large number of small epidemic areas located in all sections of the country.

[1] All data for 1945 used in this report are provisional. For prior years they are from final reports submitted by States to the U. S. Public Health Service.

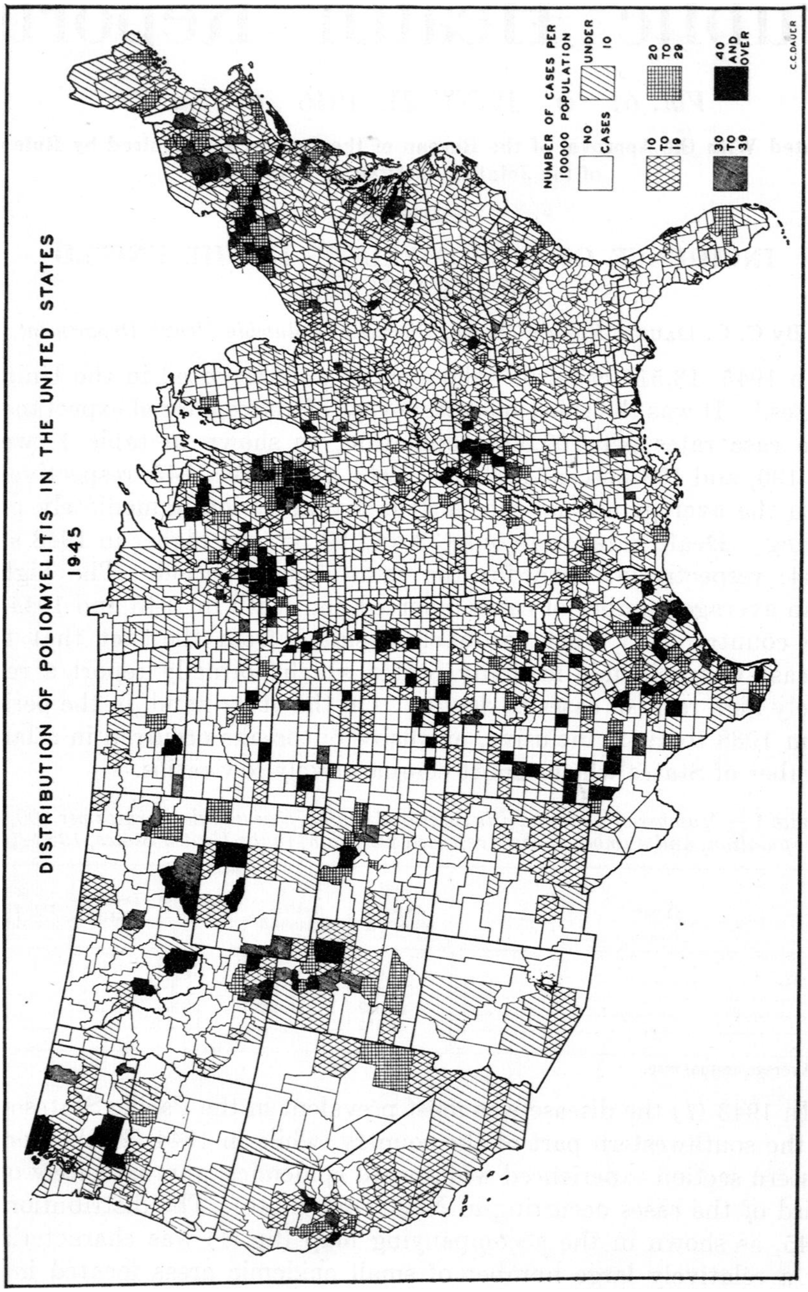
DISTRIBUTION OF POLIOMYELITIS IN THE UNITED STATES
1945
NUMBER OF CASES PER
100000 POPULATION
NO CASES
UNDER 10
10 TO 19
20 TO 29
30 TO 39
40 AND OVER
C.C.DAUER

Figure 1.

Further evidence of the widespread distribution of the disease in epidemic form in 1945 is the fact that the median case rate per 100,000 population for the 48 States and the District of Columbia, was relatively high as compared with previous years. For the years from 1940 to 1945, inclusive, the median case rates were 4.3, 4.8, 4.4, 7.6, and 8.3, respectively.

The highest incidence reported by any State in 1945 (see table 2)

TABLE 2.—*Poliomyelitis morbidity rates per 100,000 population and number of cases reported per death, by States, 1940–45*

	Morbidity rates						Cases reported per death 1940–44
	1940	1941	1942	1943	1944	1945	
United States	7.4	6.8	3.2	9.3	14.3	10.2	11.2
New England:							
Maine	1.3	4.8	5.1	1.8	2.7	9.5	8.7
New Hampshire	.4	6.3	2.3	3.1	15.0	6.6	6.5
Vermont	1.7	3.9	9.1	8.8	13.3	19.0	12.4
Massachusetts	1.0	4.2	.9	6.1	10.6	12.9	22.1
Rhode Island	1.2	5.2	.7	27.2	1.8	1.2	15.3
Connecticut	1.1	6.7	2.8	21.6	12.5	12.1	20.9
Middle Atlantic:							
New York	1.6	8.2	2.1	5.4	48.9	14.4	17.8
New Jersey	1.5	8.4	6.1	2.1	13.5	22.6	11.1
Pennsylvania	1.7	7.4	1.2	1.3	15.7	8.1	11.1
East North Central:							
Ohio	9.5	7.0	2.3	2.7	17.1	6.8	11.5
Indiana	19.8	3.4	2.9	3.2	9.9	5.9	8.1
Illinois	7.6	4.8	6.2	20.8	7.4	14.2	10.1
Michigan	23.0	5.1	3.1	3.2	16.4	3.9	15.8
Wisconsin	15.7	3.1	1.4	7.0	9.3	20.5	10.4
West North Central:							
Minnesota	8.4	10.1	2.9	4.4	22.1	9.7	10.3
Iowa	36.9	1.7	2.9	8.9	9.0	14.1	14.1
Missouri	8.3	1.1	2.3	5.9	5.3	8.3	6.9
North Dakota	3.9	2.6	2.8	4.4	9.9	2.9	14.9
South Dakota	12.7	4.3	2.2	2.7	1.5	3.6	11.5
Nebraska	14.0	1.0	10.7	12.2	5.5	10.0	6.2
Kansas	30.1	2.7	6.1	45.3	6.9	7.6	11.1
South Atlantic:							
Delaware	.8	1.0	6.3	2.5	33.9	10.8	16.0
Maryland	.9	13.1	.8	1.2	25.6	5.0	20.0
District of Columbia	1.2	10.1	.6	1.4	21.5	14.8	11.3
Virginia	9.3	5.9	1.8	2.2	27.3	10.9	11.1
West Virginia	34.8	2.5	2.6	1.7	12.8	3.8	9.2
North Carolina	2.1	4.7	2.2	1.1	25.7	4.5	13.0
South Carolina	1.0	8.7	3.5	1.1	3.1	9.9	8.1
Georgia	.9	23.5	1.8	.9	3.5	3.9	15.5
Florida	1.7	14.4	2.2	1.4	5.0	6.0	7.6
East South Central:							
Kentucky	7.8	7.7	4.8	6.1	30.1	2.6	9.2
Tennessee	1.9	18.4	5.3	.6	4.7	15.2	8.7
Alabama	1.9	30.5	2.6	1.4	3.8	5.4	9.3
Mississippi	2.0	6.9	2.7	1.8	6.4	3.8	7.0
West South Central:							
Arkansas	1.5	3.0	7.8	4.4	2.5	3.5	6.5
Louisiana	5.5	2.9	2.4	3.1	6.8	5.3	5.6
Oklahoma	4.9	2.1	.7	30.0	2.7	9.6	9.9
Texas	2.7	2.0	3.8	20.3	3.8	14.7	5.7
Mountain:							
Montana	19.1	5.3	2.7	5.5	8.3	17.7	8.1
Idaho	13.0	1.9	1.1	3.2	3.2	4.8	16.0
Wyoming	16.3	4.7	6.0	13.1	4.2	9.7	7.1
Colorado	3.5	2.5	3.3	27.1	6.0	13.0	7.4
New Mexico	4.3	1.9	5.1	15.7	4.7	4.5	6.8
Arizona	1.4	3.0	6.8	24.0	6.0	3.8	9.1
Utah	11.3	7.4	5.0	68.3	4.2	41.0	16.6
Nevada	1.0	0	2.7	16.0	7.6	6.8	7.2
Pacific:							
Washington	2.4	4.1	1.8	18.4	10.7	15.6	9.6
Oregon	5.8	7.5	2.5	35.2	20.4	5.7	14.0
California	16.6	6.7	5.1	34.2	6.2	10.6	13.3

was Utah where 253 cases were reported to have occurred or 41 per 100,000 population. However, 204 or 80 percent of the total were reported in three counties (Salt Lake, Utah, and Weber) which have nearly two-thirds of the population of the State.

New Jersey reported a relatively high incidence, a total of 949 cases or a rate of 22.6 per 100,000 population. Sixty percent of these occurred in five heavily populated counties located in the extreme northeastern part of the State.

Wisconsin also reported an incidence in excess of 20 cases per 100,000 population but in this State there were two groups of counties with relatively high rates. In the extreme southern part of the State the epidemic area was part of one centering in northern Illinois. In Wisconsin the disease was not reported in unusual numbers until late in August and the prevalence remained at a fairly high level throughout September, October, and November.

In parts of New York State the incidence of poliomyelitis was relatively high in 1945 but the rates were on the average much less than in 1944. Many counties, including Cattaraugus, Schuyler, Sullivan, and Tioga, which had case rates in excess of 200 in 1944, again experienced a higher than average prevalence in 1945. On the other hand, a group of counties in the eastern part of the State in which the disease was only endemic in 1944 reported epidemic prevalence in 1945.

In Virginia the incidence of the disease was high in the western part of the State in 1944 and in the eastern part in 1945. The District of Columbia and contiguous counties in Virginia and Maryland reported higher than average incidence rates in both 1944 and 1945 but the rates were not excessively high in either year. Within the District of Columbia the distribution with respect to areas of high and low prevalence was essentially the same in each year, and with no increase in incidence during the winter months between the two seasons of high prevalence.

Excessively high incidence rates were reported only in a few counties. In Tennessee, Henderson and Chester Counties, which appeared to be the center of an epidemic, reported incidence rates of 274 and 127 per 100,000 population, respectively. Since in Tennessee the reporting of nonparalytic poliomyelitis is not required (*3*) and when reported is not included in the morbidity reports of the State, rates of 274 and 127 would seem to indicate a relatively high rate of incidence.

The adjoining counties of Winnebago and Boone in northern Illinois reported rates of 254 and 236, respectively, and appeared to be the center of an outbreak which included the northern part of Illinois and the southern part of Wisconsin. The percentage of nonparalytic cases in the two Illinois Counties mentioned is not known. In Iowa several counties in the northern part of the State reported rates in excess of 100 per 100,000 population.

Too much reliance cannot be placed on the actual rates of incidence for any given area as compared with those of other areas because of two factors which affect the number of cases which have been reported. These are the relative completeness of reporting and the inclusion of varying proportions of nonparalytic poliomyelitis in all cases reported by different States, cities, and counties.

Collins (*4*) has recently reported that a name check in the Communicable Disease Study made in 28 large cities in 1936 indicated that only 75 percent of paralytic cases of poliomyelitis were reported to health departments in the large northeastern cities. The disease was epidemic in the northeastern part of the United States one year before the study was made. These data correspond very closely with the findings of Nelson and Aycock (*5*) who found that 77 percent of paralytic cases in Massachusetts were reported to the State Health Department from 1928 to 1941, inclusive. The latter study showed more complete reporting in epidemic periods, and in Collins' report it was indicated that there was less complete reporting (68 percent) in cities located in other geographical sections of the country.

In a previous report (*2*) it was shown that the proportion of paralytic and nonparalytic cases varies widely in different States, cities, and counties. Reports obtained from health departments revealed that some cities included no nonparalytic cases in their totals while some counties and cities had included as many as 80 percent.

These differences in reporting produce wide variations in case-death ratios, whether expressed as the number of cases reported per death or in the form of case fatality rates. In table 3 the total number of cases reported, the total deaths registered, and the number of cases reported per death are tabulated by States for the 5-year period from 1940 to 1944, the States being arranged according to the number of cases reported per death.

It is apparent that the majority of the States in the upper quartile are located in the northeastern part of the country. Three-quarters of those in the lower quartile are located in southern and mountain regions. While there is some evidence of difference in virulence among various strains of poliomyelitis virus in laboratory animals and possibly there are some differences in severity of the disease in different geographical regions, in different groups of individuals or under varying conditions of exposure or routes of infection, these differences do not seem to be of sufficient magnitude to explain the wide variation in the number of cases reported per death. Where there is a wide variation in the number of cases reported per death in adjoining

TABLE 3.—*Number of poliomyelitis cases and deaths reported and number of cases reported per death, by States, 1940–44*

State	Cases per death	Total cases	Total deaths	State	Cases per death	Total cases	Total deaths
Massachusetts	22.1	951	43	Oklahoma	9.9	894	90
Connecticut	20.9	774	37	Washington	9.6	1,113	116
Maryland	20.0	802	40	Alabama	9.3	1,139	122
New York	17.8	8,380	471	Kentucky	9.2	1,501	163
Utah	16.6	515	31	West Virginia	9.2	1,021	111
Delaware	16.0	144	9	Arizona	9.1	236	26
Idaho	16.0	112	7	Maine	8.7	131	15
Michigan	15.8	2,719	172	Tennessee	8.7	909	104
Georgia	15.5	1,009	65	Indiana	8.1	1,338	164
Rhode Island	15.3	261	17	Montana	8.1	219	27
North Dakota	14.9	164	11	South Carolina	8.1	343	42
Iowa	14.1	1,451	103	Florida	7.6	476	62
Oregon	14.0	823	59	Colorado	7.4	458	62
California	13.3	4,083	307	Nevada	7.2	36	5
North Carolina	13.0	1,221	94	Wyoming	7.1	114	16
Vermont	12.4	137	11	Mississippi	7.0	428	61
Ohio	11.5	2,649	230	Missouri	6.9	838	120
South Dakota	11.5	150	13	New Mexico	6.8	163	24
District of Columbia	11.3	295	26	Arkansas	6.5	360	55
Kansas	11.1	1,572	141	New Hampshire	6.5	143	22
New Jersey	11.1	1,296	117	Nebraska	6.2	564	91
Pennsylvania	11.1	2,603	235	Texas	5.7	2,065	362
Virginia	11.1	1,257	113	Louisiana	5.6	498	89
Wisconsin	10.4	1,126	108				
Minnesota	10.3	1,315	127	United States	11.2	53,001	4,728
Illinois	10.1	3,003	296				

States it is even more probable that differences in reporting explain such a variation. For instance, Utah reports 16.6 cases per death while Colorado reports on 7.4 and Vermont reports 12.4 while New Hampshire reports only 6.5, variations which probably are the result of differences in reporting rather than a more severe type of disease in Colorado and New Hampshire as compared with Utah and Vermont.

Part of these differences in reported incidence of poliomyelitis could be corrected if a more uniform system of reporting the disease could be adopted in all the States with reference to nonparalytic and paralytic cases. It is obvious that if such data were available for all States it would be possible to make much more accurate comparisons of incidence and fatality rates by using only paralytic cases as recommended in the most recent edition (6th edition, 1945) of the Control of Communicable Diseases, the official report of the American Public Health Association.

Differences in completeness of reporting of paralytic cases would be much more difficult to correct. Many unreported cases are mild forms of the infection in which paralysis is not always apparent in early stages of the disease and as a consequence such cases are either not recognized or placed under medical care. It has been noted (*4*), (*5*) that unrecognized cases are more common in nonepidemic years and in the outer fringes of an epidemic area.

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PLASMODIUM GALLINACEUM INFECTION CHARACTERIZED BY PREDOMINANCE OF EXO-ERYTHROCYTIC FORMS[1]

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When chicks are inoculated with sporozoites of *Plasmodium galli naceum*, pigmented forms of the parasite appear in the erythrocytes at the end of the prepatent period, and at the same time nonpigmented (exo-erythrocytic) forms become numerous in certain tissues, particularly the capillaries of the brain and leptomeninges (*1*), (*2*). The studies which form the basis of the present report indicate that under certain reproducible conditions these exo-erythrocytic forms may develop with such rapidity that chicks die of infection either before pigmented forms become detectable, or before they become sufficiently numerous to account for a fatal issue.

Initial appearance of infection characterized by predominance of exo-erythrocytic forms.—On June 12, 1944, several cubic centimeters of citrated chicken blood infected with *P. gallinaceum* were received. This blood was used to inoculate a group of chicks on the following day, and passage from chick to chick by intravenous inoculation of infected blood has been continued ever since. After two serial passages by this method, *Aedes aegypti* were fed on selected chicks, and sporozoite transfers were begun; this type of passage has been continuously employed also.[2]

A number of chicks inoculated with sporozoites from the first mosquito passage failed to develop the parasitemia expected (*1*), (*2*); instead, deaths occurred from the ninth to twentieth days after

[1] From the Office of Malaria Investigations, National Institute of Health, Memphis, Tenn.

[2] The infected blood was kindly furnished by Dr. G. R. Coatney of the National Institute of Health, and was stated by him to be strain 8A, as designated by the Committee on Terminology of Avian Malaria of the American Society of Parasitologists. It was drawn from chicks which had previously been inoculated with infected blood and was received at this laboratory a few hours after being drawn.

Except where otherwise stated, all chicks discussed in this report were inoculated when 2 to 5 days old. The strain of chicks used was obtained from a commercial grower; up to March 1945, White Leghorns were used, but since that time White Rocks have been employed.

inoculation, either without parasites having been found in the blood or with very low parasite counts. These chicks were found to have exo-erythrocytic forms of *P. gallinaceum* in their brains at autopsy. The sample protocols shown in table 1 illustrate the nature of these infections. Infections appeared in chicks bitten by mosquitoes as well as in those inoculated with infected salivary glands, and in chicks which were as young as 2 days and as old as 63 days at the time of inoculation. For convenience of discussion, the type of response seen in these chicks is designated in this report as the "exo-erythrocytic type" of infection, whereas the classical disease is designated as the "erythrocytic type."

TABLE 1.—*Parasite counts in the peripheral blood of chicks dying with exo-erythrocytic forms of* P. gallinaceum *in their brains following inoculation with sporozoites from the second mosquito passage after departure from the blood passage series (Five chicks from later mosquito passages are included for comparison)*

Identifying number of chick	Parasitized red blood cells per 10,000 erythrocytes on specified days after inoculation										Day of death
	7	8	9	10	11	12	13	14	15	16	
245 [1]	0	0	--------	--------	--------	--------	--------	--------	--------	--------	9
246 [2]	0	0	0	0	0	(4)	0	--------	--------	--------	14
251 [2]	0	0	0	0	0	(4)	0	0	--------	--------	15
253 [2]	0	0	0	0	0	(4)	0	--------	--------	--------	14
261 [2]	0	0	0	0	0	(4)	0	0	--------	--------	15
263 [2]	0	0	0	20	--------	--------	--------	--------	--------	--------	11
269 [1]	0	0	--------	--------	--------	--------	--------	--------	--------	--------	9
295 [1]	0	0	20	--------	--------	--------	--------	--------	--------	--------	10
296 [1]	0	0	10	--------	--------	--------	--------	--------	--------	--------	10
379 [2]	0	0	0	--------	--------	--------	--------	--------	--------	--------	9
601 [3]	0	0	0	--------	1,670	3,000	5,100	--------	--------	--------	15
765	0	10	--------	80	500	1,250	6,300	5,700	5,000	--------	18
784	0	0	0	0	70	--------	2,200	1,530	160	--------	18
901	5	0	0	30	250	640	--------	3,700	--------	--------	16
902	0	20	20	30	200	500	--------	4,400	--------	--------	17

[1] Infection resulted from bites of 2 infected mosquitoes.
[2] Infection resulted from subcutaneous injection of infected salivary glands from 1 mosquito.
[3] Chicks Nos. 601, 765, 784, 901, 902 included here for comparison of parasite counts with those appearing previously in the table. Each was infected by subcutaneous inoculation of the whole salivary glands from 2 infected mosquitoes, infection having been determined by dissection.
[4] Blood smears not examined on day indicated.

The exo-erythrocytic type of infection was seen among chicks during the first and second serial sporozoite passages (chick to mosquito to chick to mosquito, etc.), and among one group after the third passage through mosquitoes. It was present in 46 out of 58 infected chicks examined from these groups, whereas the erythrocytic type of response was observed in only 12 of the chicks.

After the second serial passage through mosquitoes (except for the one group from the third passage mentioned above) the exo-erythrocytic type of infection disappeared almost completely, being seen in only 3 out of 244 infected chicks studied, comprising 14 serial sporozoite passages. All the rest of the regular sporozoite-passage chicks studied presented the erythrocytic type of response.

Spontaneous appearance and intentional reproduction of exo-erythrocytic type of infection in subsequent passages.—On November 27, 1944, mosquitoes were fed on a chick representing the sixteenth serial passage of *P. gallinaceum* by inoculation with infected blood. Salivary glands from these mosquitoes injected into three chicks [3] produced the same exo-erythrocytic type of infection that was seen in the original sporozoite passages. Again on January 13, 1945, mosquitoes were fed on a chick of the blood passage series, this time representing the twenty-first serial passage; two chicks were inoculated with salivary glands from these mosquitoes, and both developed the exo-erythrocytic type of response. On February 1 and on February 23 the same procedure was repeated, the donor chicks representing the twenty-third and twenty-fifth serial passages by blood inoculation; in each case a single chick was subsequently inoculated with infected salivary glands. (Infection of mosquitoes in every case was determined by dissection of the salivary glands in the usual manner.) One died on the tenth day without visible peripheral parasitemia, but with exo-erythrocytic forms in the brain, while the other died on the ninth day with a parasite count of 1,070 parasitized red blood cells per 10,000 erythrocytes, and with exo-erythrocytic forms in the brain (this latter is regarded as the erythrocytic type of response).

These inoculations had been carried out for other purposes, and the striking similarity of the chick responses to those seen in the earlier sporozoite passages was not considered at the time. It was some months later that an analysis of the records indicated that the appearance of the exo-erythrocytic type of infection in chicks tended to occur after the parasite had undergone a series of direct blood inoculation passages from chick to chick, without intervening passage through mosquitoes.

When this tendency became apparent, its validity was tested by feeding more mosquitoes on chicks of the blood passage series. This was done in July 1945, the donor chicks representing the forty-fourth serial blood inoculation passage. These mosquitoes were used to infect 39 chicks: 2 infected mosquitoes were fed on a chick (infection of mosquitoes determined by dissection after biting occurred), and their salivary glands were then inoculated into another chick. (One chick of the original 20 pairs died of bacterial infection and is not included in the analysis.) Every one of the 39 chicks showed the exo-erythrocytic type of response, quite like that seen in the first two series of sporozoite passages, and later observed in the several mosquito passages made from the blood-inoculated series.

[3] Each chick of this entire group received the whole salivary glands from two infected mosquitoes. In order to infect mosquitoes on chicks of the blood passage series, chicks showing gametocyte densities of 1 to 15 per 30 oil immersion fields were selected. Mosquitoes allowed to engorge became infected in proportions varying from one-fourth to approximately one-half of those which engorged.

It is thus clear that the exo-erythrocytic type of response to sporozoite inoculation in chicks appeared with striking regularity after *P. gallinaceum* had been subjected to continuous blood-inoculation passage just prior to being put through the mosquito, and that it occurred only with extreme rarity in chicks infected with parasites subjected to alternating passage through mosquitoes and chicks. The data summarized in table 2 show this contrast clearly.

TABLE 2.—*The occurrence of two types of response in chicks infected with sporozoites of* P. gallinaceum

Origin of sporozoites used to infect chicks	Number of infected chicks examined	Number which developed erythrocytic type of infection	Number which developed exo-erythrocytic type of infection
Regular mosquito passage series	244	241	3
Original mosquito passages made from blood inoculation series	58	12	46
Later sporadic mosquito passages from blood inoculation series	7	1	6
Mosquito passages from blood inoculation series to test hypothesis	39	0	39
Total mosquito passages from blood inoculation series	104	13	91

Comparison of exo-erythrocytic and erythrocytic types of response in chicks.—For comparison of the two types of infection relative to certain details, 100 chicks taken at random from the 254 showing the erythrocytic response, and the entire 94 showing exo-erythrocytic response were studied. The following points indicate the relationship of the two types of infection:

(*a*) Parasitemia occurred in all chicks of the erythrocytic group, by definition. Of the 94 chicks comprising the exo-erythrocytic group, 43 died without parasites having been found in their blood smears, although every one had been subjected to from 1 to 8 examinations before death. The day on which blood examinations were first made varied from the sixth to the ninth, and 20 chicks of the exo-erythrocytic group died before smears were taken, but in none of these were pigmented parasites observed at autopsy, although rare parasites might have been overlooked. The remaining 31 chicks of the group developed the minimal type of parasitemia indicated in (*c*) below.

(*b*) The day of first detectable parasitemia ranged from the sixth to the fifteenth after inoculation in both groups, but the mean in the exo-erythrocytic group, 10.7 days, was a little earlier than that in the erythrocytic group, 12.1 days.

(*c*) Peak parasite counts ranged from 80 to 8,100 parasitized cells per 10,000 erythrocytes in the erythrocytic group, and from 0 to 290 in the exo-erythrocytic group, the mean peak count being 3,464 in the former, and 18 in the latter. Although the ranges of the parasite counts suggest that there might be an overlapping of the two types of response, the fact is that there was seldom any question about which group a particular chick would fit into, because even though an occasional low peak was encountered in chicks of the erythrocytic group, there would in such cases be a succession of low counts over a period of several days; whereas in the exo-erythrocytic group a count sufficiently high to overlap the lowest range of the erythrocytic group might occur once, but by the next morning the chick would be dead.

(*d*) By definition, all chicks in the exo-erythrocytic group suffered fatal infections. In the erythrocytic group, 64 died during the initial phase of patent infection, 15 were killed within the first 4 weeks after inoculation, and 21 recovered from their initial parasitemia.

(*e*) The day of spontaneous death in the erythrocytic group ranged from the fifteenth to the twenty-fourth day after inoculation, the mean being 17. In the exo-erythrocytic group the range was 7 to 20 days, with a mean of 11. These differences indicate the more rapid development of the exo-erythrocytic type of infection.

It is significant that the mean day of death for the chicks of the exo-erythrocytic group, i. e., the eleventh day, came before the mean day of initial parasitemia, i. e., the twelfth day, in the group characterized by the presence of that feature. This fact suggests that the exo-erythrocytic type of infection represents simply a rapid multiplication of the nonpigmented forms of the parasite to the extent that they cause the death of the chick before an appreciable number of pigmented forms have had time to develop. It may seem at first glance, therefore, that the distinction made herein between the two types of infection is too artificial to merit acceptance; the fact, however, that either type of infection may be produced at will indicates that the difference between the two types of response is a real one.

Production of exo-erythrocytic type of infection in chicks and chick embryos by inoculation with exo-erythrocytic forms.—The chicks of the blood-inoculation series were found to have exo-erythrocytic forms in their brains after the subsidence of the initial parasitemia, in the manner described by James (*3*). By emulsifying such infected brains in physiological saline solution, and inoculating chicks subcutaneously with the suspension, it was possible to produce a type of infection quite similar to that observed in the original sporozoite-inoculated chicks, with few or no parasites visible in blood films, but with exo-erythrocytic forms present in the brain at death. Table 3 illustrates the nature of this infection; the similarity to that of the sporozoite-infected chicks shown in table 1 is evident.

The transfer of this infection serially from chick to chick by inoculation of infected brain emulsion has twice been carried through five consecutive passages, but could not be carried into a sixth series.

TABLE 3.—*Parasite counts in chicks inoculated subcutaneously with saline emulsions of brains infected with exo-erythrocytic forms of* P. gallinaceum; *third serial passage group. Exo-erythrocytic forms present in the brains at autopsy*

Identifying number of chick	Parasitized red blood cells per 10,000 erythrocytes on specified days after inoculation							Day of death
	8	9	10	11	12	13	14	
2851 [1]	0	0	10					11
2852	0	0	0					11
2853	0	0	0	0				12
2854	0	0	0					12
2855	0	0	10	10				12
2856	0	5	20	0	5			12
2857	0	0	0					12
2858	0	0	10	70				12
2859	0	0	0	0				12
2860	0	0	0	0				12

[1] Chicks Nos. 2851–2855 given 0.5 cc. of approximately 1:10 dilution of triturated brain in physiological saline solution; Nos. 2856–2860 given 0.2 cc. of same dilution.

Heavily infected brains taken from moribund or recently dead chicks were infectious in dilutions of approximately 1:100, in doses of 0.2 cc. or more given subcutaneously. The suspension was allowed to stand for one-half hour to permit some settling of the heavier particles, but centrifuging, even at slow speed for only 2 minutes, rendered the supernatant noninfectious. Dilutions of 1:1,000 produced infections in only part of the inoculated chicks, while higher dilutions yielded no evidence of infection. As serial passage progressed, more chicks tended to escape infection, until complete failure supervened in the sixth passage.[4]

Late parasitemia, appearing in the third or fourth week after inoculation, was seen in 10 chicks out of 199 comprising the 5 serial passages. These parasitemias resembled those normally seen in routine sporozoite-induced infections, except for the longer prepatent periods.

In chick embryos, the exo-erythrocytic type of infection was produced by inoculation of chick brains containing these forms into the embryonic yolk. The brains were triturated in the customary way and made up in dilutions of 1:10 and 1:100 in physiological saline solution. From 0.2 to 0.5 cc. of such suspension was inoculated into the yolk of 7- to 9-day-old embryos by the usual technique. As may be seen in table 4, there was considerable mortality within 3 days of inoculation. It is clear, that there is a tendency for this type of response to predominate when embryos are inoculated with exo-erythrocytic forms, and in this respect the reaction of the embryo resembles that seen in the chick infected by the same method.

As in the case of chicks, the exo-erythrocytic forms in the embryo were found most constantly in the brain, although they were seen with

[4] A total of 27 chicks survived a month following inoculation, with no evidence of infection. At the end of a month, each was bitten by 2 infected mosquitoes to determine whether an immunizing inapparent infection might have occurred. No evidence of immunity could be demonstrated.

TABLE 4.—*The reaction of chick embryos inoculated in the yolk with emulsions of chick brain containing exo-erythrocytic forms of* P. gallinaceum

Fate of 506 embryos inoculated into the yolk with brains containing exo-erythrocytic forms	Number of embryos	Number and type of infections developed		
		Exo-erythro-cytic type	Erythro-cytic type	Type not certain [1]
Embryos survived beyond 3 days	219	34	4	8
Embryos died after 3 days but before hatching	163	25	none	4
Embryos hatched	56	9	4	4

[1] These include embryos which were difficult to classify because of parasite counts between 100 and 1,000 per 10,000 erythrocytes, and those in which bacterial contamination or post-mortem decomposition made autopsy diagnosis unsatisfactory.

considerable frequency in liver and spleen, and occasionally in the yolk sac. Several blood smears revealed the exo-erythrocytic forms in large monocytes. For serial passage, the brain of the embryo was used. The route of passage therefore was: chick brain to embryonic yolk sac; embryonic brain to embryonic yolk sac; etc. Successful passage has been accomplished to the fourth serial passage generation up to the time of this writing.

SUMMARY

1. Certain chicks inoculated with sporozoites of *P. gallinaceum* either by mosquito bites or by injection of salivary glands developed fatal infections either before parasites appeared in their red blood cells or before erythrocytic parasites attained sufficient densities to account for the fatalities. Exo-erythrocytic forms of the parasite were found in the brains of these chicks at autopsy.

2. The exo-erythrocytic type of infection apparently represents a rapid reproduction on the part of the nonpigmented forms of the parasite, to such an extent that they cause the death of the chick before the pigmented forms have time to attain appreciable densities.

3. Responses of this type appeared in 91 out of 104 chicks infected by mosquitoes which had acquired infection by feeding on chicks of the blood-inoculation passage series. They were seen in only 3 chicks out of 244 infected by mosquitoes of the chick-to-mosquito-to-chick passage series.

4. A similar type of infection was produced in chicks by inoculating them subcutaneously with emulsions of brains containing heavy infections with exo-erythrocytic forms, and in chick embryos by inoculating similar material into the yolk. Serial passage of the infection was twice accomplished through five consecutive groups of chicks, but could not be carried farther; passage through four consecutive series of embryos has been accomplished up to the time of writing.

5. There is at present considerable interest in the possibility that some phase of infection comparable to the exo-erythrocytic forms of

P. gallinaceum (and certain other avian Plasmodia) may exist in the mammalian malarias. This report suggests a method for the search for comparable forms in the malarias of mammals.

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PREVALENCE OF TYPHUS COMPLEMENT-FIXING ANTIBODIES IN HUMAN SERUMS IN SAN ANTONIO, TEX.[1]

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INTRODUCTION

Murine typhus fever has attracted attention in recent years because of the great increase in reported cases. In Texas in 1933 only 398 cases were reported to the State Health Department. Since then regular increases have occurred each year: In 1943, 1,452 cases were recorded; and in 1944, 1,740 cases were reported. The increase in reported cases in other southern States has been comparable.

In order to determine the importance of typhus as a public health problem it is desirable to know how many persons have had the disease. It is known that there are many cases that are mild or inapparent, and furthermore that there may be negligence in reporting, or errors in diagnosis. Fortunately, the complement-fixation test makes possible a survey of human or rat bloods to determine the presence of antibodies which indicate past infection by the typhus agent.

To make a survey in San Antonio, arrangements were made with the San Antonio Health Department to obtain the serums from blood specimens which were being collected routinely from food handlers. The complement-fixation tests were run on the serums at the Eighth Service Command laboratories at Fort Sam Houston. Only bloods which were negative for syphilis were used in this survey because of a question of specificity (*1*), (*3*). A total of 4,219 individuals was tested between February and June 1945.

The persons examined in this survey are clearly not a random sample

[1] From the Medical Division, Typhus Control Unit, Malaria Control in War Areas, Atlanta, Ga.

of the population of San Antonio. However, these persons live or work in the area which has the highest rat population and greatest amount of typhus. Therefore it can be said that this survey represents a sample of the persons particularly exposed to infection with typhus fever.

No attempt was made to analyze the data on the basis of occupation because most individuals were changing jobs or had recently changed work. No attempt was made to plot the addresses in the city because the address on the record sheet was often the address of employment and not the home.

METHOD

The technique employed in the complement-fixation test for typhus was essentially that which was described by Bengtson and Topping (*2*). The antigen was prepared from chick embryo yolk sacs infected with the Wilmington strain of murine typhus by emulsifying them with alundum and saline. This was then centrifuged at low speed for 5 minutes and the supernatant fluid was then recentrifuged at 3,200 r. p. m. for 1 hour. The resultant sediment was resuspended and this constituted the antigen.

The test was set up with 1:10 dilution of the unknown serum, 2 units of antigen, and 2 units of complement. After an incubation period of 45 minutes at 37° C., amboceptor and sheep red blood cells were added. The results were read after 30 minutes in the 37° C. water bath. A reaction was considered positive only if it showed 4 fixation.

Positive and negative serum controls, antigen controls, and complement controls always were set up simultaneously.

THE OCCURRENCE OF ANTIBODIES

The results of the survey and the percentages of positive serums are shown in table 1 and a summary is given in table 2. In order to give a rough idea of the population, table 2 presents the 1940 census figures. The population of San Antonio has increased by perhaps 50,000 since 1940. The figures for Latin-Americans (Mexicans) were calculated on the assumption that one-fourth of the whites are Latin-Americans (recommended by the Chamber of Commerce).

Examination of tables 1 and 2 shows that about 1 out of 25 persons has complement-fixing antibodies. The male Latin-Americans showed a higher percentage than the females in the lower age groups, which is perhaps correlated with some sex difference in occupation. The high incidence among Negroes is noteworthy, even though based on a small sample, because few cases among Negroes are reported and the idea that there is a natural racial immunity has been expressed.

TABLE 1.—*Presence of typhus antibodies in human serums negative for syphilis*

Race	Sex	10–19 years			20–29 years			30–39 years			40–49 years			50–59 years			60 and older		
		Total	Positive	Percent	Total	Positive	Percent	Total	Positive	Percent	Total	Positive	Percent	Total	Positive	Percent	Total	Positive	Percent
White	M	160	2	1.2	66	4	6.1	99	3	3.0	143	1	0.7	90	3	3.3	4	0	0
	F	279	13	4.7	386	8	2.1	198	6	3.0	143	4	2.8	58	0	0	1	1	100
Latin-American	M	341	15	4.4	155	9	6.2	187	13	6.9	139	7	5.0	95	2	2.1	3	0	0
	F	453	12	2.7	405	14	3.6	246	9	3.7	162	6	3.7	72	2	3.9	2	0	0
Negro	M	39	0	0	24	2	8.3	19	1	5.6	23	1	4.6	9	1	11.1	0	0	......
	F	37	1	2.7	77	2	2.6	60	3	5.0	30	3	10.0	14	0	0	0	0	......

TABLE 2.—*Summary of presence of antibodies for murine typhus fever*

	1940 population		Serums tested		
	Sex	Number	Totals	Number positive	Percent positive
White	Male	91,722	562	13	2.3
	Female	93,879	1,065	32	3.0
Totals			1,627	45	2.8
Latin-American	Male	30,721	920	46	5.0
	Female	31,390	1,340	43	3.2
Totals			2,260	89	3.9
Negro	Male	8,114	114	5	4.3
	Female	10,190	218	9	4.1
Totals			332	14	4.2
Grand totals		266,116	4,219	148	3.5

The rates are not calculated because the serums are not a sample of the total population and because the population has changed so much since the 1940 census. In spite of the fact that rates cannot be calculated, this survey accomplished its aim of demonstrating the large number of typhus fever infections. The survey shows that 3.5 percent of persons tested have complement-fixing antibodies. It must be remembered that these results are the accumulation of an indefinite number of infections over a period of years, as the complement-fixation test remains positive for many years. If we assume that all these infections occurred in the last 10 years, and that the sample comes from a population of 200,000 persons (both assumptions being reasonable and conservative) then roughly 700 persons became infected each year. In contrast, the San Antonio Health Department recorded only 5 cases in 1941, only 16 cases in 1942, only 32 cases in 1943, and only 91 cases in 1944. Hence this survey shows that many more persons become infected than are reported as cases of typhus fever.

SUMMARY AND CONCLUSIONS

A survey of food handlers in San Antonio, Tex., showed that 3.5 percent of 4,219 persons had complement-fixing antibodies to murine typhus fever.

When compared with the number of cases reported, the high incidence of antibodies indicates that many infections are not reported as typhus fever and may be subclinical.

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DEATHS DURING WEEK ENDED MAY 25, 1946

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

	Week ended May 25, 1946	Corresponding week, 1945
Data for 93 large cities of the United States:		
Total deaths	8,875	9,033
Average for 3 prior years	8,945	
Total deaths, first 21 weeks of year	205,142	199,034
Deaths under 1 year of age	638	572
Average for 3 prior years	607	
Deaths under 1 year of age, first 21 weeks of year	12,586	13,042
Data from industrial insurance companies:		
Policies in force	67,185,911	67,333,313
Number of death claims	11,564	13,902
Death claims per 1,000 policies in force, annual rate	9.0	10.8
Death claims per 1,000 policies, first 21 weeks of year, annual rate	10.6	11.0

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 JUNE 1, 1946

Summary

A total of 145 cases of poliomyelitis was reported for the current week, as compared with 77 for the preceding week, bringing the total to date to 1,035 as compared with 811 for the corresponding period in 1945, 545 in 1944, and 599 in 1943. Of the current total, 94 cases, or 65 percent, were reported in four States, as follows (last week's figures in parentheses): Florida, 31 (22); Texas, 26 (23); Alabama, 26 (0); and California, 11 (9). No other State reported more than 6 cases. Of the total cases to date this year (last year's figures in parentheses), Florida has reported 169 (25), California 150 (59), Texas 122 (119), New York State 72 (154), Washington State 48 (28), Louisiana 39 (8), and Alabama 35 (37).

Of 18 cases of smallpox reported during the current week, 7 cases, with 1 death, occurred in Washington State (6 in Port Angeles, a new focus reported during the week of May 18). (See p. 940.)

The incidence of measles is declining slowly, but a total of 542,446 cases has been reported to date, as compared with 537,630 for the same period in 1944, and 723,249 in 1941, the recent prior years of highest reported incidence. Only 74,099 cases had been reported for the corresponding period of 1945.

Diphtheria continues above the median expectancy and recent prior years. Currently, 290 cases were reported, as compared with 277 last week, 211 for the same week in 1945, and a 5-year (1941–45) median of 174. The total reported to date is 7,496, as compared with 5,937 for the same period last year, and a 5-year median of 5,743 cases for the corresponding period.

A total of 8,272 deaths was reported in 93 large cities in the United States, as compared with 8,878 for the preceding week and a 3-year average of 8,708. To date 213,417 deaths have been reported in these cities as compared with 207,714 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended June 1, 1946, and comparison with corresponding week of 1945 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 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45
	June 1, 1946	June 2, 1945		June 1, 1946	June 2, 1945		June 1, 1946	June 2, 1945		June 1, 1946	June 2, 1945	
NEW ENGLAND												
Maine	3	0	0	1	------	------	185	3	95	0	0	2
New Hampshire	0	0	0	------	------	------	54	------	27	1	0	2
Vermont	0	0	0	------	------	------	121	18	88	0	0	0
Massachusetts	4	2	4	------	------	------	2,266	246	810	3	5	5
Rhode Island	0	0	0	------	4	------	140	9	39	1	1	1
Connecticut	5	0	0	------	1	1	602	74	345	3	6	3
MIDDLE ATLANTIC												
New York	30	16	9	(1)	[1] 4	[1] 4	3,636	118	1,144	8	10	18
New Jersey	2	3	3	3	1	1	2,388	51	724	4	9	6
Pennsylvania	14	9	9	------	------	------	2,211	621	949	6	14	17
EAST NORTH CENTRAL												
Ohio	12	4	4	1	2	6	973	73	320	2	7	7
Indiana	9	16	7	1	6	6	430	52	162	1	2	2
Illinois	8	4	16	2	2	5	677	337	396	6	16	16
Michigan [2]	9	20	6	------	1	1	845	283	503	3	11	9
Wisconsin	1	1	1	22	32	22	2,493	119	1,582	2	1	1
WEST NORTH CENTRAL												
Minnesota	15	2	2	------	2	1	83	20	275	5	0	0
Iowa	10	2	3	------	------	------	500	49	115	2	1	1
Missouri	2	7	2	2	2	------	171	28	172	1	7	7
North Dakota	0	0	0	------	3	1	8	3	15	1	1	0
South Dakota	5	0	0	------	------	------	28	9	13	0	0	0
Nebraska	1	1	2	1	4	2	134	16	149	0	4	1
Kansas	13	10	4	------	1	2	117	47	219	1	0	2
SOUTH ATLANTIC												
Delaware	0	1	0	------	------	------	17	4	6	0	2	1
Maryland [2]	12	6	5	------	------	------	596	33	193	2	0	1
District of Columbia	0	0	0	------	------	------	168	6	88	0	3	1
Virginia	8	2	8	72	88	88	708	25	364	2	7	7
West Virginia	3	1	1	6	------	2	63	42	108	2	0	2
North Carolina	11	19	10	------	------	------	338	46	439	5	2	2
South Carolina	1	2	3	123	119	154	325	24	105	0	0	1
Georgia	3	5	2	5	145	12	143	22	96	1	0	0
Florida	6	1	2	------	------	------	135	7	124	5	4	2
EAST SOUTH CENTRAL												
Kentucky	6	2	2	------	1	------	89	36	88	0	7	5
Tennessee	2	3	2	15	21	10	104	12	120	1	4	4
Alabama	2	2	2	8	13	31	145	3	116	3	5	4
Mississippi [2]	7	3	3	------	------	------	------	------	------	2	1	1
WEST SOUTH CENTRAL												
Arkansas	8	2	2	9	5	7	82	38	77	2	1	1
Louisiana	6	2	2	5	------	1	104	12	31	2	7	3
Oklahoma	3	4	2	11	31	28	146	29	57	2	6	1
Texas	29	25	17	313	482	403	1,575	345	423	13	12	3
MOUNTAIN												
Montana	0	1	0	1	19	4	188	7	70	1	1	0
Idaho	0	0	0	20	------	------	48	9	29	0	1	0
Wyoming	0	0	0	------	------	------	36	11	32	0	0	0
Colorado	13	3	6	3	14	31	478	13	336	0	0	0
New Mexico	1	2	1	3	5	------	54	7	44	0	0	0
Arizona	1	0	0	18	54	44	158	21	48	0	2	1
Utah [2]	0	0	0	------	18	2	213	160	94	0	0	0
Nevada	0	0	0	------	------	------	13	1	13	0	0	0
PACIFIC												
Washington	7	9	1	------	------	1	262	137	137	8	2	2
Oregon	0	2	1	------	5	7	214	60	102	0	0	0
California	18	17	13	10	10	33	1,883	1,308	1,308	7	11	11
Total	290	211	174	655	1,095	1,026	26,347	4,594	16,646	108	173	173
22 weeks	7,496	5,937	5,743	185,879	63,628	76,059	542,446	74,099	444,654	3,608	4,877	4,877

[1] New York City only.
[2] Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended June 1, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [3]		
	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45
	June 1, 1946	June 2, 1945		June 1, 1946	June 2, 1945		June 1, 1946	June 2, 1945		June 1, 1946	June 2, 1945	
NEW ENGLAND												
Maine	1	0	0	27	52	24	0	0	0	1	1	0
New Hampshire	0	0	0	11	6	6	0	0	0	0	0	0
Vermont	0	0	0	4	16	14	0	0	0	0	0	0
Massachusetts	0	0	0	174	255	244	0	0	0	3	0	2
Rhode Island	0	0	0	1	13	9	0	0	0	0	0	0
Connecticut	0	0	0	28	58	56	0	0	0	1	0	0
MIDDLE ATLANTIC												
New York	4	3	1	381	543	389	0	0	0	2	3	5
New Jersey	0	4	0	98	109	109	0	0	0	1	0	0
Pennsylvania	1	3	0	230	442	285	0	0	0	2	3	3
EAST NORTH CENTRAL												
Ohio	1	0	0	296	300	232	0	0	0	2	2	1
Indiana	1	1	0	55	75	75	3	0	0	2	3	2
Illinois	5	1	1	155	232	179	1	0	1	1	2	2
Michigan [2]	1	0	0	139	254	182	0	0	0	2	0	0
Wisconsin	0	0	0	81	254	253	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	2	0	0	53	77	51	0	0	0	1	0	0
Iowa	3	0	0	42	26	26	0	0	0	0	0	1
Missouri	0	0	0	26	70	70	1	2	1	4	4	4
North Dakota	0	0	0	7	15	5	0	0	0	1	0	0
South Dakota	0	0	0	12	11	12	0	3	0	0	0	0
Nebraska	0	0	0	12	48	22	0	0	0	0	0	0
Kansas	1	0	0	33	53	42	1	1	0	0	1	0
SOUTH ATLANTIC												
Delaware	1	0	0	2	1	4	0	0	0	0	0	0
Maryland [2]	0	0	0	39	115	73	0	0	0	0	1	2
District of Columbia	0	0	0	8	25	11	0	0	0	0	0	0
Virginia	0	5	0	77	55	20	0	0	0	1	1	1
West Virginia	0	1	0	16	33	20	0	0	0	1	0	1
North Carolina	5	4	0	24	74	16	0	0	0	0	2	2
South Carolina	1	4	0	4	12	6	0	0	0	7	0	2
Georgia	0	5	0	10	30	12	1	1	0	3	10	9
Florida	31	0	3	0	3	3	0	0	0	1	2	3
EAST SOUTH CENTRAL												
Kentucky	1	1	1	16	24	27	0	0	0	0	1	1
Tennessee	0	0	0	13	11	27	0	0	0	6	3	2
Alabama	26	3	2	10	9	9	0	0	0	1	13	2
Mississippi [2]	5	1	1	2	6	3	0	0	0	2	4	3
WEST SOUTH CENTRAL												
Arkansas	1	1	1	12	5	4	0	0	0	4	2	2
Louisiana	3	0	0	13	8	5	0	0	0	10	5	7
Oklahoma	3	1	0	10	13	11	0	0	0	0	0	1
Texas	26	24	3	45	56	35	1	0	0	13	6	10
MOUNTAIN												
Montana	2	0	0	5	15	11	0	0	0	0	0	0
Idaho	0	0	0	16	15	15	1	0	0	3	0	0
Wyoming	0	0	0	1	6	11	0	0	0	0	0	0
Colorado	6	0	0	35	36	36	0	0	0	1	2	2
New Mexico	0	0	0	4	4	2	0	0	0	0	0	0
Arizona	0	0	0	11	24	6	0	0	0	1	2	0
Utah [2]	2	5	0	22	9	9	0	0	0	0	0	0
Nevada	0	0	0	3	0	0	2	0	0	0	0	0
PACIFIC												
Washington	1	1	0	21	56	22	7	0	0	2	2	1
Oregon	0	0	0	27	22	14	0	0	0	1	0	1
California	11	3	5	147	313	138	0	0	0	6	4	4
Total	145	71	46	2,458	3,889	2,844	18	7	8	86	79	83
22 weeks	1,035	811	545	75,274	116,718	85,342	232	218	507	1,180	1,321	1,686

[2] Period ended earlier than Saturday.
[3] Including paratypoid fever reported separately, as follows: Massachusetts 2; Connecticut 1; New York 1; Minnesota 1; South Carolina 1; Georgia 2; California 6.

Telegraphic morbidity reports from State health officers for the week ended June 1, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough: Week ended— June 1, 1946	Whooping cough: Week ended— June 2, 1945	Whooping cough: Median, 1941–45	Week ended June 1, 1946: Dysentery, Amebic	Dysentery, Bacillary	Dysentery, Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	13	68	25								
New Hampshire	4		3								
Vermont	1	13	15								
Massachusetts	124	114	114		4						2
Rhode Island	9	22	19								
Connecticut	49	35	35	1			1				2
MIDDLE ATLANTIC											
New York	131	192	215	3							8
New Jersey	88	82	82	2				1			1
Pennsylvania	180	137	233					2			2
EAST NORTH CENTRAL											
Ohio	87	91	131			1					2
Indiana	30	9	47								2
Illinois	103	76	101	7			5	1			8
Michigan [2]	125	60	130		2						4
Wisconsin	127	38	113						1		11
WEST NORTH CENTRAL											
Minnesota	22	3	31	1					1		3
Iowa	27	3	16	1							
Missouri	19	11	26								1
North Dakota		1	5								
South Dakota		3	4								
Nebraska	7		14								
Kansas	11	32	63								9
SOUTH ATLANTIC											
Delaware											
Maryland [2]	7	83	83			1		1			1
District of Columbia	10	11	11								
Virginia	133	38	64	1		56		7	5		1
West Virginia	30	4	41								
North Carolina	109	194	194		1			3		1	
South Carolina	31	71	76		19						
Georgia	4	37	37		9			1		7	2
Florida	45	17	21	1	1					3	
EAST SOUTH CENTRAL											
Kentucky	25	34	56				1		1		
Tennessee	45	6	48		1		1	1	4	1	
Alabama	31	15	44	1			1			8	1
Mississippi [2]										1	
WEST SOUTH CENTRAL											
Arkansas	2	12	17	1	2					2	4
Louisiana	5	2	2	4						4	2
Oklahoma	7	11	15					2			1
Texas	172	330	297	8	455	124	6			25	17
MOUNTAIN											
Montana	5	1	12						1		
Idaho	21	4	8								
Wyoming	20	1	3					1	1		
Colorado	12	26	43		1			3			
New Mexico	13	8	5	2	1						
Arizona	24	15	18	1		66					
Utah [2]	7	21	47						2		
Nevada											
PACIFIC											
Washington	43	15	23								1
Oregon	25	17	17								
California	96	403	365	3	2		1				6
Total	2,079	2,366	3,765	37	498	248	16	23	16	52	91
Same week, 1945	2,366			53	483	114	9	24	20	90	100
Average, 1943–45	2,752			44	436	102	13	[4] 23	20	[4] 50	
22 weeks: 1946	41,019			858	7,212	2,503	193	88	392	1,015	1,860
1945	54,758			681	9,362	2,518	149	75	351	1,173	1,967
Average, 1943–45	61,181		[4] 84,303	640	6,659	1,767	211	[4] 84	325	[4] 999	

[2] Period ended earlier than Saturday.

[4] 5-year median, 1941–45.

WEEKLY REPORTS FROM CITIES

City reports for week ended May 25, 1946

This table lists the reports from 87 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	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	39	0	2	0	1	0	1	------
New Hampshire:												
Concord	0	0	------	0	3	0	0	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	1	0	2	0	0	0	0	------
Massachusetts:												
Boston	1	0	------	0	305	2	7	0	36	0	0	10
Fall River	0	0	------	0	124	0	1	0	4	0	0	------
Springfield	0	0	------	0	156	0	0	0	4	0	1	2
Worcester	0	0	------	0	421	0	4	0	1	0	0	41
Rhode Island:												
Providence	0	0	------	0	99	0	0	0	8	0	0	25
Connecticut:												
Bridgeport	0	0	------	0	1	0	0	0	2	0	0	------
Hartford	0	0	------	0	7	0	1	0	2	0	0	3
New Haven	0	0	------	0	143	0	1	0	1	0	0	------
MIDDLE ATLANTIC												
New York:												
Buffalo	6	0	------	0	56	0	3	0	7	0	0	6
New York	11	1	2	3	1,017	10	59	0	250	0	1	44
Rochester	0	0	------	0	163	0	2	1	34	0	0	------
Syracuse	0	0	------	0	13	0	3	0	12	0	1	2
New Jersey:												
Camden	1	0	------	0	14	0	1	0	4	0	0	------
Newark	0	0	------	0	288	3	4	0	11	0	0	17
Trenton	1	0	------	0	100	0	0	0	5	0	1	3
Pennsylvania:												
Philadelphia	2	0	2	0	343	4	19	0	50	0	2	12
Pittsburgh	0	0	1	2	33	1	6	0	20	0	0	7
Reading	0	0	------	0	12	0	0	0	6	0	0	7
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	3	0	------	0	97	1	6	0	6	0	0	6
Cleveland	0	0	------	0	176	1	5	0	38	0	1	11
Columbus	0	0	------	0	15	0	2	0	11	0	0	6
Indiana:												
Fort Wayne	0	0	------	0	10	0	0	0	2	0	0	------
Indianapolis	3	0	------	0	104	2	5	0	9	0	0	7
South Bend	0	0	------	0	1	0	0	0	2	0	0	------
Terre Haute	0	0	------	0	22	0	0	0	1	0	0	------
Illinois:												
Chicago	0	0	1	0	172	3	25	0	113	0	0	41
Springfield	0	0	------	0	11	2	0	0	1	0	0	------
Michigan:												
Detroit	5	1	------	1	157	1	13	0	53	0	0	60
Flint	0	0	------	0	9	0	0	0	10	0	0	------
Grand Rapids	0	0	------	0	174	0	1	0	9	0	0	13
Wisconsin:												
Kenosha	0	0	------	0	195	0	0	0	2	0	0	------
Milwaukee	0	0	1	1	901	0	1	0	21	0	0	42
Racine	0	0	------	0	118	0	0	0	1	0	0	------
Superior	0	0	------	0	------	0	3	0	1	0	0	2
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	18	0	2	1	3	0	0	------
Minneapolis	2	0	------	0	17	1	5	1	26	0	0	2
Missouri:												
Kansas City	1	0	1	0	3	1	5	0	5	0	0	5
St. Joseph	0	0	------	0	1	0	0	0	4	0	1	------
St. Louis	1	0	4	1	99	1	6	0	4	0	1	5

City reports for week ended May 25, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis 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	3	0	0	0	0	0	0	------
Nebraska:												
Omaha	0	0	------	0	41	0	1	0	1	0	0	1
Kansas:												
Topeka	0	0	------	0	------	0	3	0	5	0	0	3
Wichita	0	0	------	0	45	1	3	1	5	0	0	2
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	11	0	2	0	0	0	0	------
Maryland:												
Baltimore	17	0	2	2	570	3	15	0	21	0	0	12
Cumberland	0	0	------	0	------	0	1	0	2	0	0	------
Frederick	0	0	------	0	------	0	0	0	1	0	0	------
District of Columbia:												
Washington	0	0	------	0	219	1	2	0	12	0	0	8
Virginia:												
Lynchburg	0	0	------	0	27	0	0	0	1	0	0	------
Richmond	0	0	------	0	106	2	3	1	3	0	1	3
Roanoke	0	0	------	0	38	0	1	0	1	0	0	------
West Virginia:												
Charleston	0	0	------	0	------	0	0	0	1	0	0	------
Wheeling	1	0	------	0	2	0	1	0	0	0	0	14
North Carolina:												
Raleigh	1	0	------	0	16	0	0	0	1	0	0	1
Winston-Salem	0	0	------	0	12	0	0	0	4	0	0	13
South Carolina:												
Charleston	0	0	------	0	2	0	1	0	2	0	0	3
Georgia:												
Atlanta	0	0	------	0	38	0	3	0	0	0	0	------
Brunswick	0	0	------	0	1	0	1	0	0	0	0	------
Savannah	0	0	------	0	8	0	1	0	0	0	0	------
Florida:												
Tampa	2	0	------	0	35	0	1	3	1	0	0	1
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	------	1	25	0	9	0	3	0	0	4
Nashville	0	0	------	1	1	0	2	0	2	0	0	6
Alabama:												
Birmingham	0	0	2	0	11	0	1	0	1	0	0	------
Mobile	0	0	1	0	4	1	1	0	0	0	0	------
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	1	0	------	0	24	0	0	0	1	0	0	------
Louisiana:												
New Orleans	2	0	1	0	22	0	2	5	2	0	1	------
Shreveport	0	0	------	0	------	1	4	0	0	0	2	------
Texas:												
Dallas	3	1	------	0	42	0	1	0	8	0	0	4
Galveston	1	0	------	0	5	0	0	0	1	0	0	------
Houston	3	0	------	0	5	0	2	0	1	0	1	------
San Antonio	1	0	------	0	21	0	7	11	1	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0	------	0	2	0	0	0	0	0	0	------
Great Falls	0	0	------	0	17	0	2	0	1	0	0	------
Helena	0	0	------	0	4	0	0	0	0	0	0	------
Missoula	0	0	------	0	14	0	0	0	0	0	0	------
Idaho:												
Boise	0	0	------	0	------	0	0	0	0	0	0	2
Colorado:												
Denver	5	1	2	0	443	1	4	2	7	0	0	18
Pueblo	1	0	------	0	41	0	0	0	6	0	0	------
Utah:												
Salt Lake City	0	0	------	0	116	0	2	0	6	0	0	1

City reports for week ended May 25, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	0	0	------	0	36	0	1	0	13	0	0	7
Spokane	0	0	------	0	8	0	1	0	0	0	0	6
Takoma	0	0	------	0	2	0	0	0	0	0	0	11
California:												
Los Angeles	1	0	6	0	333	0	2	2	44	0	0	9
San Francisco	2	0	------	0	104	1	3	0	14	0	0	2
Total	78	4	26	12	8,092	44	277	28	952	0	15	511
Corresponding week, 1945	51	------	22	5	1,772	------	314	------	1,519	0	10	695
Average, 1941–45	55	------	44	[1] 16	[2] 5,194	------	[1] 322	------	1,273	1	17	937

[1] 3-year average, 1943–45.
[2] 5-year median, 1941–45.

Anthrax.—Cases: Philadelphia, 1.
Dysentery, amebic.—Cases: New York, 4; Newark, 2; Chicago, 1; Kansas City, 1; St. Louis, 1; Los Angeles, 3.
Dysentery, bacillary.—Cases: New York, 4; Syracuse, 2; Philadelphia, 2; Baltimore, 1; Charleston, S. C., 4; Memphis, 1.
Dysentery, unspecified.—Cases: San Antonio, 19.
Typhus fever, endemic.—Cases: Houston, 1.

***Rates** (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (estimated population, 1943, 33,949,100)*

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles, case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis 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	0.0	3,395	5.2	47.1	0.0	154	0.0	5.2	212
Middle Atlantic	9.7	0.5	2.3	2.3	944	8.3	44.9	0.5	185	0.0	2.3	45
East North Central	6.7	0.6	1.2	1.2	1,315	6.1	37.1	0.0	170	0.0	0.6	114
West North Central	8.9	0.0	11.1	2.2	505	8.9	55.7	6.7	118	0.0	4.5	40
South Atlantic	34.9	0.0	3.3	3.3	1,801	10.0	53.1	6.6	83	0.0	1.7	91
East South Central	0.0	0.0	17.7	11.8	242	5.9	76.7	0.0	35	0.0	0.0	59
West South Central	31.6	2.9	2.9	0.0	341	2.9	45.9	45.9	40	0.0	11.5	14
Mountain	47.7	7.9	15.9	0.0	5,059	7.9	63.5	15.9	159	0.0	0.0	167
Pacific	4.9	0.0	9.8	0.0	792	1.6	11.5	3.3	116	0.0	0.0	57
Total	12.0	0.6	4.0	1.8	1,246	6.8	42.7	4.3	147	0.0	2.3	79

PLAGUE INFECTION IN VENTURA COUNTY, CALIF.

Plague infection has been reported demonstrated, on May 20, 1946, in rodents and fleas from rodents in Ventura County, Calif., as follows: In tissue from 1 rat found dead and from 2 rats trapped on April 9; in tissue from 3 rats trapped on April 11; in 30 fleas from 14 rats trapped on April 9; in 6 fleas from 1 rat found dead on April 8 (all *Rattus rattus*); in 28 fleas from 3 mice *(Peromyscus maniculatus)* trapped on April 12; in bone marrow from 1 ground squirrel (*Citellus* *beecheyi*) found dead April 12—all on the Conterno Ranch, 2 miles east of Santa Paula; in tissue from 1 ground squirrel (*C. beecheyi*) trapped on April 11, on the Newport Ranch, 1½ miles south and 1 mile east of Santa Paula.

SMALLPOX IN THE UNITED STATES

During the week ended June 1, 7 cases of smallpox, with 1 death, were reported in Washington State—6 cases with 1 death in Port Angeles, Clallam County, and 1 case in Republic, Ferry County, the latter with onset on May 1, not related to the cases in the Seattle area. The total for the State to date is 68 cases and 20 deaths. Onset of last case, May 24, in Port Angeles.

During the current week, 11 cases were reported in other States—3 in Indiana, 2 in Nevada, and 1 each in Illinois, Missouri, Kansas, Georgia, Texas, and Idaho.

A total of 232 cases has been reported in the United States to date this year as compared with 218 for the same period last year and a 5-year (1941–45) median of 507 for the period.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended May 4, 1946.—During the week ended May 4, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Bruns-wick	Que-bec	On-tario	Mani-toba	Sas-katch-ewan	Al-berta	British Colum-bia	Total
Chickenpox		15		155	256	12	28	18	84	568
Diphtheria		2		35		1	1		3	42
Dysentery, unspecified					5					5
German measles		6		55	21		3	8	7	100
Influenza		26			5					31
Measles		108	19	969	878	34	10	115	11	2,144
Meningitis, meningococcus					3		1		2	6
Mumps		2		52	310	57	117	68	193	799
Poliomyelitis				1						1
Scarlet fever		5	3	115	51	3	8	14	6	205
Tuberculosis (all forms)		5	16	119	51	10	21	42	27	291
Typhoid and paratyphoid fever		1		17	3		1		4	26
Undulant fever				2	2	1				5
Venereal diseases:										
Gonorrhea	2	21	10	89	153	63	35	54	84	511
Syphilis	2	7	5	89	103	10	11	11	29	267
Other forms							2			2
Whooping cough		36		55	73	2		5	1	172

FINLAND

Notifiable diseases—March 1946.—During the month of March 1946, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	13	Paratyphoid fever	233
Diphtheria	1,020	Poliomyelitis	8
Dysentery, unspecified	18	Scarlet fever	233
Gonorrhea	1,358	Syphilis	563
Malaria	2	Typhoid fever	68

NEW ZEALAND

Notifiable diseases—4 weeks ended March 23, 1946.—During the 4 weeks ended March 23, 1946, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	12		Ophthalmia neonatorum	4	
Diphtheria	78	2	Poliomyelitis	7	
Dysentery:			Puerperal fever	3	
Amebic	13		Scarlet fever	140	
Bacillary	13	1	Tetanus	2	
Erysipelas	17		Trachoma	2	
Food poisoning	26		Tuberculosis (all forms)	176	40
Influenza	1		Typhoid fever	13	
Malaria	8		Undulant fever	4	

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-mentioned diseases, except yellow fever, during recent months. 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 in each month.

Typhus Fever

Mexico.—For the month of April 1946, 121 cases of typhus fever were reported in Mexico. States reporting the highest incidence are: Federal District, 37 cases; Mexico State, 11; Nuevo Leon, 10; Quintana Roo, 9.

Morocco (French).—For the period May 11–20, 1946, 192 cases of typhus fever were reported in Morocco. No specific locations were given in the report.

Peru.—For the month of March 1946, 55 cases of typhus fever were reported in Peru. Departments reporting the highest incidence are: Cuzco, 20; Junin, 11; Puno, 9; Ayacucho, 7.

Turkey.—For the week ended May 25, 1946, 60 cases of typhus fever were reported in Turkey, all cases being in the interior of the country.