Public Health Reports

Vol. 61 • MARCH 29, 1946 • *No. 13*

Printed With the Approval of the Bureau of the Budget as Required by Rule 42 of the Joint Committee on Printing

CEREBROSPINAL MENINGITIS

A CHRONOLOGICAL RECORD OF REPORTED CASES AND DEATHS

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The reported incidence of meningococcus meningitis in the United States reached a record high in 1943, followed by an almost equally high level in 1944. During the current and three prior epidemics of meningococcus meningitis which have been recorded for this country, the reported case rate was 7.5 in 1918, 9.6 in 1929, 5.5 in 1936, and 14.1 per 100,000 in 1943.

Although epidemics of meningitis are not limited to wartime they are known to accompany war and the mobilization of troops. Reports of outbreaks in the United States are recorded in histories of the War of 1812, the Mexican War, and the Civil War. United States Army records (*12*) show that "the incidence rate in the Army increased noticeably in 1907 at the time of the Cuban occupation, in 1913 during the mobilization on the Mexican border, and again in 1917 and 1942 when the United States entered the first and second World Wars."

The annual number of deaths from cerebrospinal meningitis is not large; during the past decade, 1930–39, the number in the United States was approximately the same as from scarlet fever, less than from measles, whooping cough, or diphtheria, and more than those caused by poliomyelitis.[2] The current epidemic is relatively high judged by

[1] From the Division of Public Health Methods.

[2] Number of deaths in the 10-year period, 1930–39, reported in the Registration Area as due to the following causes:

10-year period	Measles	Scarlet fever	Whooping cough	Diphtheria	Poliomyelitis	Cerebrospinal (meningococcus) meningitis
	Number of deaths					
1930–39	30,281	21,670	47,875	40,230	10,484	21,246

the number of reported cases, 3,356 in 1942 and 16,491 in 1943 contrasted with 10,212 cases in 1929 (40 States). The number of deaths from meningococcus meningitis during 1943, however, was only 2,621 compared with 5,651 in 1929 (40 States), the use of sulfonamide drugs having greatly reduced the fatality of the disease. The prophylactic use of sulfonamide drugs has also proved effective in the reduction of carriers and the prevention of cases in Army camps.

Hirsh (*4*), from a study of medical literature, and Bruce-Low (*1*), from statistical reports of cases and deaths, have traced the occurrence of epidemic meningitis from about 1805 to 1915 throughout the world. The years 1915 to 1930 include two major epidemics in the United States; one in 1917–18 associated with World War I, and a later epidemic rise which reached its peak in 1929. Hedrich (*3*), has summarized the reported cases and deaths for this period in the United States and foreign countries reporting numbers of current cases of communicable disease to the League of Nations.

Reported cases of cerebrospinal meningitis.—Cases of cerebrospinal meningitis in the United States are reported by physicians either directly to State health departments, or through local health officers. In all except eight[3] of the States meningitis (epidemic cerebrospinal) has been reportable by law since 1919 or earlier, and in all States since 1932 (*2*). Moreover, all State health departments, since approximately 1915 or earlier, have maintained laboratories and provided clinical and diagnostic service to private physicians and local health officers (*8*). To what extent a diagnosis of meningococcus meningitis is confirmed by a laboratory report is unknown and undoubtedly varies throughout the different States.

Since 1913 a varying number of State health departments have forwarded monthly reports of cases and deaths from communicable disease to the United States Public Health Service (*15*); 20 States reported in 1913, and all States reported from 1928 on. It has been possible to select 40 States which have furnished continuous reports of cerebrospinal meningitis from 1926 on, and to compute rates for an expanding number of States from 1916 to 1925 (see table 2, footnote 1).

Classification of deaths from meningitis.—Cerebrospinal meningitis has been recorded as a cause of death in this country since approximately 1870 and occurs in the State records of New York and Massachusetts, for example. Howard (*5*) records deaths from cerebrospinal meningitis for Baltimore from 1872 and states that prior to that time "meningitis of various types was probably classified for the most part under such indefinite headings as inflammation of the brain, dropsy of the brain, and convulsions." Since 1900 deaths

[3] Georgia, Kentucky, Missouri, New Mexico, North Dakota, Oklahoma, Tennessee, and Wyoming.

have been classified according to the International List of Causes of Death.

The International List has undergone five revisions but no changes of consequence have occurred in the method of distributing deaths from meningitis until the 1938 revision (*13*). However, there has been some obscurity in the classification of deaths from meningitis and therefore the procedure will be given in more or less detail. Related titles for meningitis through all International List revisions are given in footnote 1 to table 1.

Tuberculous meningitis has always been a separate International List title grouped with tuberculosis of specified organs. According to the 1900 classification, only two groups of meningitis other than tuberculous meningitis were tabulated, namely, a total of meningitis and a subdivision or "epidemic cerebrospinal meningitis." Simple meningitis, tabulated separately since the 1909 revision, comprises meningitis not recorded as cerebrospinal or stated to be due to some organism other than the meningococcus. This group includes such diagnoses as pneumococcic, streptococcic, or purulent meningitis, and also meningitis unqualified. Cerebrospinal meningitis, according to the 1909, 1920, and 1929 revisions, was roughly divided into epidemic and nonepidemic categories designated as (*a*) cerebrospinal fever, meningococcus meningitis or epidemic cerebrospinal meningitis, and as (*b*) cerebrospinal meningitis, undefined, or nonepidemic cerebrospinal meningitis, in the three revisions, respectively. In the above three revisions cerebrospinal meningitis, unqualified, was classified as nonepidemic cerebrospinal meningitis. Cerebrospinal meningitis in the 1938 revision is subdivided as due or not due to the meningococcus; cerebrospinal meningitis unqualified being classified with meningococcus meningitis. Other items of less importance numerically have also been transferred to meningococcus meningitis. For convenience, in this study, the two subdivisions of cerebrospinal meningitis have been called (*a*) cerebrospinal (meningococcus) meningitis and (*b*) cerebrospinal meningitis not due to meningococcus.

A tabulation made by the Division of Vital Statistics, Bureau of the Census (*14*), of deaths in 1940 according to both the 1938 and 1929 revisions shows 694 deaths attributed to cerebrospinal (meningococcus) meningitis when classified by the 1938 revision and 582 by the 1929 revision. The transfer of terms from one International List title to another amounts to an increase of 19.2 percent in the rate for cerebrospinal (meningococcus) meningitis according to the 1938 revision compared with the rate based on the prior classification. Data from the Bureau of the Census show that 98.5 percent comparability in classification can be obtained if the two subdivisions of cerebrospinal meningitis in the 1929 and earlier revisions are combined for comparison with cerebrospinal (meningococcus) meningitis in the 1938 revision.

TABLE 1.—*Mortality from meningitis* [1] *in the Death Registration States of the United States, 1900–43*

Year	Tuberculous meningitis	Simple meningitis	Cerebrospinal meningitis			Year	Tuberculous meningitis	Simple meningitis	Cerebrospinal meningitis		
			Total	Meningococcus	Not due to meningococcus				Total	Meningococcus	Not due to meningococcus
	Death rate per 100,000						Death rate per 100,000				
1900	9.43	33.77	6.82	----	----	1922	4.35	2.67	1.86	0.94	0.92
1901	9.10	27.11	5.85	----	----	1923	4.07	2.69	2.05	1.05	1.00
1902	9.20	24.48	5.34	----	----	1924	3.96	2.53	1.71	.95	.76
1903	9.56	21.90	6.04	----	----	1925	3.60	2.57	1.74	1.05	.69
1904	9.79	21.45	12.66	----	----	1926	3.58	2.36	1.99	1.33	.66
1905	9.86	18.49	20.39	----	----	1927	3.23	2.21	2.14	1.56	.58
1906	9.85	15.94	8.48	----	----	1928	2.99	2.27	3.12	2.55	.57
1907	9.77	15.52	8.59	----	----	1929	2.66	2.37	5.17	4.48	.69
1908	9.39	12.90	4.68	----	----	1930	2.52	2.08	4.03	3.56	.47
1909	9.15	10.88	4.35	----	----	1931	2.26	1.95	2.73	2.37	.36
1910	8.82	9.88	4.16	0.35	3.81	1932	1.92	1.68	1.66	1.39	.27
1911	9.01	7.88	4.19	.79	3.40	1933	1.76	1.68	1.42	1.18	.24
1912	8.50	6.25	4.76	2.00	2.76	1934	1.67	1.66	1.22	1.01	.21
1913	8.74	5.83	4.36	1.58	2.78	1935	1.54	1.84	2.42	2.09	.33
1914	8.22	4.95	3.91	1.66	2.25	1936	1.44	1.98	2.68	2.36	.32
1915	8.09	4.24	3.24	1.42	1.82	1937	1.28	1.83	2.02	1.71	.31
1916	7.91	3.56	3.48	2.12	1.36	1938	1.28	1.73	.98	.79	.19
1917	8.00	3.57	5.09	3.53	1.56	1939	1.12	1.58	.72	.66	.06
1918	7.28	3.92	5.26	2.86	2.40	1940	.99	1.65	.59	.53	.06
1919	6.14	3.06	3.40	1.81	1.59	1941	1.01	1.60	.59	.54	.05
1920	5.60	3.01	2.98	1.62	1.36	1942	.91	1.64	.78	.73	.05
1921	4.79	3.00	2.52	1.44	1.08	1943	.87	1.89	2.24	2.18	.06

[1] Related titles for meningitis through all International List revisions:

International List title	Tabulated for the years—				
	1900–09	1910–20	1921–29	1930–38	1939–
	International List number				
Tuberculous meningitis	28	30	32	24	14
Simple meningitis	61 (pt. 1)	61 (1)	71 (a)	79 (a)	81 (a)
Cerebrospinal meningitis, total	61 (pt. 2)				
Meningococcus	----	61 (3)	24	18	6
Not due to meningococcus	----	61 (2)	71 (b)	79 (b)	81 (b)

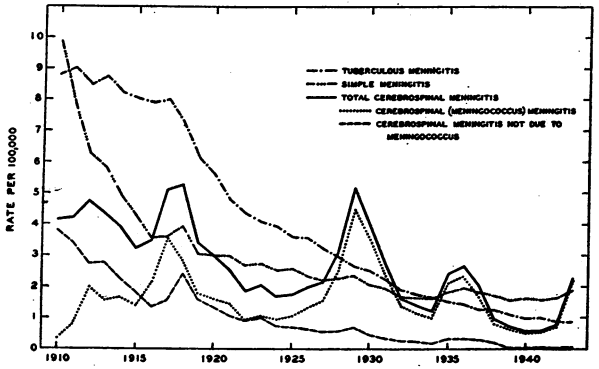

FIGURE 1.—The course of meningitis in the United States, for all subdivisions of the International List, 1910–43.

A tabulation change which affects urban and rural comparisons of mortality is allocation of deaths to place of residence. This has been done by the Bureau of the Census since 1938.

Recorded mortality from meningitis is shown for the Death Registration States in table 1 and figure 1. Tuberculous meningitis shows a continuous decline which is more rapid from 1917 on; a decline which could have been caused by any of a number of sanitary or health measures. Simple meningitis has also been declining since 1900; the decline was more rapid from 1900 to about 1915 than after that time. The decline in the total of cerebrospinal meningitis is accompanied by four distinct epidemic waves, 1910–42, not seen in tuberculous or simple meningitis (fig. 1). The broken and dotted lines of figure 1

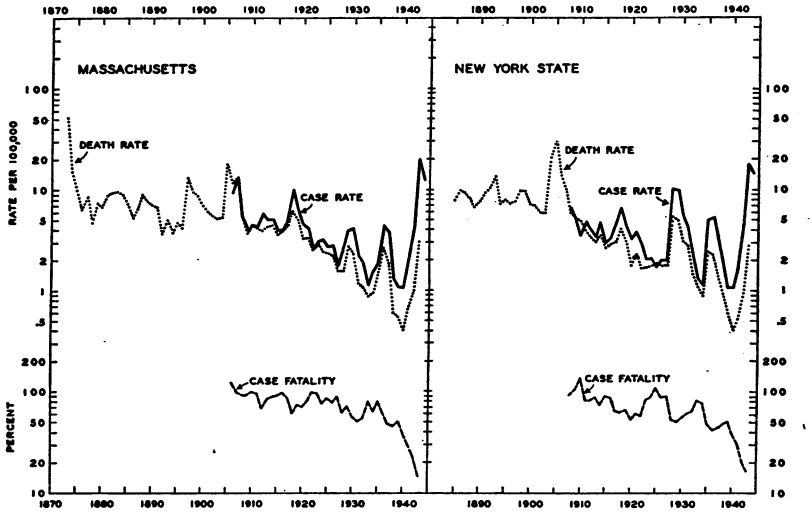

FIGURE 2.—The course of morbidity, mortality, and case fatality from cerebrospinal meningitis in Massachusetts, 1873–1944; and in New York State, 1880–1944. Deaths are for the total of cerebrospinal meningitis.

represent the subdivisions of cerebrospinal meningitis which the Bureau of the Census recommends be combined, 1910–38, for comparability with the classification group cerebrospinal (meningococcus) meningitis of the 1938 revision. It is clear from figure 1 that prior to approximately 1925 a transfer of deaths took place from the one classification title to the other, probably the result of a decreasingly smaller percentage of death certificates on which the cause of death was stated to be merely cerebrospinal meningitis unqualified. After approximately 1925 cerebrospinal meningitis not due to meningococcus is a relatively small percentage of the total rate.

Annual morbidity, mortality, and case fatality.—State records of deaths from cerebrospinal meningitis for Massachusetts (*9*) and New York (*10*) (fig. 2) show no particular trend prior to 1905. Several rela-

tively small epidemics occurred during the early years which did not synchronize in the two States except for the marked epidemic of 1905. Since 1905 there has been a decline in the death rate and case rate in both Massachusetts and New York. Although the decline in mortality, 1905 to 1940, is slightly more than in morbidity the difference is probably no greater than could be accounted for by an increase in reporting of cases. The decline in reported case fatality amounted to approximately 3 percent annually, or from about 80 percent in 1925 to 55 percent in 1935. Since 1940 and during the recent major epidemic, however, the drop in case fatality has been greatly acceler-

TABLE 2.—*Annual incidence of cerebrospinal meningitis as reported in the United States and in each of nine geographic sections*,[1] 1916–44

Year	All sections	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
	Case rate per 100,000									
1916	2.84	4.40	2.68	2.83	2.49	5.08	1.84	1.43	3.01	1.54
1917	7.23	9.05	7.48	7.61	12.60	8.85	2.52	2.38	2.04	3.38
1918	7.52	9.05	6.54	6.03	6.04	11.56	8.12	22.18	4.65	5.57
1919	3.40	4.94	3.65	2.38	2.62	4.42	3.17	4.30	2.46	2.69
1920	3.28	4.58	2.91	3.01	2.98	3.87	1.66	3.86	5.11	4.62
1921	2.77	4.08	2.88	2.64	2.85	2.14	1.04	2.12	2.19	3.26
1922	2.22	3.38	2.40	1.99	1.77	2.01	.82	1.71	3.34	2.42
1923	2.19	3.41	1.98	1.72	1.40	3.10	1.51	3.89	4.27	2.27
1924	1.89	2.87	2.36	1.82	1.40	1.99	1.19	1.31	1.37	2.04
1925	1.94	2.63	1.85	1.62	1.27	1.75	2.29	1.40	3.17	3.68
1926	2.14	2.42	1.55	1.60	1.36	1.62	1.46	1.45	5.42	7.58
1927	2.99	1.83	1.74	3.63	3.00	1.62	1.53	1.59	11.22	7.30
1928	5.33	2.56	6.74	4.97	5.57	1.50	1.92	2.49	26.64	6.21
1929	9.59	3.95	7.84	12.64	9.38	2.80	3.35	7.82	44.12	13.85
1930	7.24	3.81	5.25	8.89	7.60	3.80	14.60	4.89	19.88	6.16
1931	4.73	2.30	4.49	5.27	4.68	3.61	8.77	3.14	8.56	3.80
1932	2.68	1.80	2.44	3.69	2.40	2.35	2.82	1.49	3.70	2.42
1933	2.39	1.26	1.72	3.51	2.80	2.20	2.04	2.26	2.52	2.15
1934	1.94	1.41	1.33	2.48	2.37	2.02	1.80	1.70	3.66	1.61
1935	4.89	2.02	3.79	5.26	5.56	8.41	4.69	4.00	5.50	4.48
1936	5.48	4.07	4.38	4.41	4.06	12.50	6.00	5.57	7.73	4.29
1937	4.15	3.40	3.18	2.83	2.58	9.37	7.49	4.32	4.80	3.45
1938	2.19	1.42	1.80	1.36	1.70	3.78	5.15	2.28	3.92	1.62
1939	1.47	1.12	1.69	.90	1.02	2.05	2.44	1.52	2.67	1.19
1940	1.27	1.08	1.40	.84	1.03	1.74	2.11	1.29	1.74	1.04
1941	1.52	1.84	1.60	.88	.84	2.68	2.61	1.60	1.37	1.25
1942	2.97	5.74	3.90	1.05	1.16	5.21	2.60	1.85	2.18	4.03
1943	14.09	25.61	16.35	9.77	9.17	17.75	12.41	7.14	12.47	17.55
1944	12.64	13.78	14.11	12.92	10.65	11.88	14.51	7.14	7.32	14.24

[1] Rates are based on the following 40 States except for the omissions noted (records are continuous for the 40 States from 1926 on):

New England: Maine, Massachusetts, Rhode Island, and Connecticut. Maine omitted, 1916; Rhode Island omitted, 1925.
Middle Atlantic: New York, New Jersey, and Pennsylvania. New Jersey omitted, 1916, 1917; Pennsylvania omitted, 1924, 1925.
East North Central: Ohio, Indiana, Illinois, Michigan, and Wisconsin. Michigan omitted, 1916–23; Wisconsin omitted, 1919.
West North Central: Minnesota, Iowa, Missouri, North Dakota, Nebraska, and Kansas. Iowa omitted, 1916–23; Missouri omitted, 1916–23; North Dakota omitted, 1916–23; Nebraska omitted, 1916, 1917.
South Atlantic: Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, and Florida. Delaware omitted, 1916–23; Virginia omitted, 1921, 1922: West Virginia omitted, 1916–23; North Carolina omitted 1916, 1917, and 1922; Florida omitted, 1916, 1917.
East South Central: Tennessee, Alabama, and Mississippi. Tennessee omitted, 1916–23; Mississippi omitted 1918.
West South Central: Arkansas, Louisiana, and Oklahoma. Arkansas omitted, 1916–23; Oklahoma omitted, 1916–24.
Mountain: Montana, Idaho, Wyoming, Colorado, Arizona, and Utah. Idaho omitted, 1916–25; Wyoming omitted, 1921; Colorado omitted, 1916–23; Arizona omitted, 1916–23; Utah omitted, 1916–24.
Pacific: Washington, Oregon, California; Washington omitted, 1920.

Because of the above selection of States the rates in this table may vary to a slight extent from similar rates published by Hedrich and others.

ated, namely, from approximately 40 percent in 1940 to 15 percent in 1943, or a decline of about 20 percent annually for the 3-year period.

In the country as a whole (tables 2 and 3) morbidity and mortality during the present epidemic were not as high relative to earlier epidemics as in Massachusetts and New York. The decline in case fatality, however, has been similar, that is, from about 4 percent annually or from an average of 85 percent in 1925 to 53 percent in 1935, to about 20 percent annually, or from 39 percent in 1940 to 17 percent in 1943 (table 4). The case fatality among cases treated

TABLE 3.—*Annual mortality from cerebrospinal meningitis*[1] *in the United States and in each of nine geographic sections,*[2] *1916–44*

Year	All sections	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
	Death rate per 100,000									
1916	3.19	4.24	2.83	3.12	3.04	3.96			4.93	2.77
1917	4.19	6.23	5.25	5.56	6.68	5.21			4.36	2.51
1918	4.96	5.99	5.04	4.15	3.98	6.81		5.85	7.09	3.94
1919	3.18	4.28	3.22	2.79	2.54	3.72	1.62	2.51	4.07	3.15
1920	2.85	3.63	2.66	2.45	2.54	3.30	1.94	3.58	4.01	3.77
1921	2.34	2.83	2.44	2.13	2.20	2.69	2.03	.81	2.01	2.47
1922	1.76	1.86	2.19	1.51	1.19	1.71	.92	.96	2.27	1.82
1923	1.99	2.60	1.99	1.83	1.40	2.26	1.13	1.89	3.07	2.15
1924	1.73	2.05	1.93	1.52	1.31	2.13	1.89	1.50	2.25	1.79
1925	1.72	1.81	1.81	1.49	1.42	1.98	1.54	.97	1.71	2.82
1926	1.98	1.88	1.70	1.63	1.36	2.35	1.75	1.51	3.31	5.95
1927	2.14	1.57	1.58	2.24	1.81	1.94	1.60	1.40	6.46	4.14
1928	3.26	1.76	4.00	3.20	2.92	1.55	1.71	1.96	13.89	3.50
1929	5.30	2.48	4.27	6.73	5.09	2.41	2.68	4.42	23.15	7.11
1930	3.99	1.78	2.88	4.49	4.43	2.55	7.59	3.66	12.07	3.23
1931	2.71	1.18	2.54	2.99	2.43	2.43	4.15	2.17	5.93	2.45
1932	1.65	1.14	1.56	2.05	1.41	1.58	1.55	1.45	2.85	1.40
1933	1.44	.74	1.13	1.63	1.68	1.55	1.33	1.89	2.55	1.24
1934	1.20	.73	.97	1.31	1.55	1.50	1.12	1.23	1.92	.87
1935	2.45	1.40	1.98	2.58	2.51	3.98	2.40	2.42	2.68	2.19
1936	2.56	2.25	2.06	2.18	2.03	5.20	2.54	2.80	3.90	1.95
1937	2.00	1.75	1.58	1.50	1.51	4.07	3.18	2.07	2.34	1.61
1938	.94	.54	.90	.63	.71	1.50	2.00	.99	1.39	.72
1939	.60	.45	.64	.32	.45	.98	1.08	.54	1.32	.50
1940	.50	.46	.55	.31	.40	.81	.68	.54	.82	.31
1941	.53	.63	.51	.24	.41	.96	1.13	.50	.63	.32
1942	.75	1.01	.90	.35	.38	1.45	.68	.53	.95	.87
1943	2.26	3.46	2.83	1.89	1.48	2.71	1.76	1.03	2.01	2.40
1944	2.19	2.28	2.47	2.36	1.78	2.15	2.49	1.27	2.11	1.92

[1] The following International List Titles were used: 61 (2) and (3), 1916–20; 24 and 71 (b), 1921–29; 18 and 79 (b), 1930–38; 6, 1939–43. Deaths for 1942 and 1943 are resident. Deaths for 1944 are from Notifiable Diseases (*15*).

[2] Rates are based on the following 40 States except for the omissions noted (records are continuous for the 40 States from 1928 on):

New England: Maine, Massachusetts, Rhode Island, and Connecticut. Maine omitted, 1916; Rhode Island omitted, 1925.

Middle Atlantic: New York, New Jersey, and Pennsylvania. New Jersey omitted, 1916, 1917; Pennsylvania omitted, 1924, 1925.

East North Central: Ohio, Indiana, Illinois, Michigan, and Wisconsin. Illinois omitted, 1916, 1917; Michigan omitted, 1916–23; Wisconsin omitted, 1919.

West North Central: Minnesota, Iowa, Missouri, North Dakota, Nebraska, and Kansas. Iowa omitted, 1916–23; Missouri omitted, 1916–23; North Dakota omitted, 1916–23; Nebraska omitted, 1916–19.

South Atlantic: Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, and Florida. Delaware omitted, 1916–23; Virginia omitted, 1921, 1922; West Virginia omitted 1916–24 North Carolina omitted, 1916, 1917; Florida omitted, 1916–18.

East South Central: Tennessee, Alabama, and Mississippi. Tennessee omitted, 1916–23; Alabama omitted, 1916–24; Mississippi omitted, 1916–18.

West South Central: Arkansas, Louisiana, and Oklahoma. Arkansas omitted, 1916–26; Louisiana omitted, 1916, 1917; Oklahoma omitted, 1916–27.

Mountain: Montana, Idaho, Wyoming, Colorado, Arizona, and Utah. Idaho omitted, 1916–25; Wyoming omitted, 1916–21; Colorado omitted, 1916–23; Arizona omitted, 1916–25; Utah omitted, 1916–24.

Pacific: Washington, Oregon, California. Washington omitted, 1920; Oregon omitted, 1916, 1917.

Because of the above selection of States the rates in this table may vary to a slight extent from similar rates published by Hedrich and others.

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at Gallinger Municipal Hospital, Washington, D. C., (7) during the spring of 1943 is reported as 10.2 percent.

During the First World War fatality from cerebrospinal meningitis in the United States Army is reported to have been 39 percent with 5,839 cases and 2,279 deaths occurring in 33 months from April 1917 to December 1919 *(12)*; during the present epidemic case fatality has been cut, by the use of sulfa compounds, to as low as 3.3 percent among cases occurring in the Fourth Service Command during the first 6 months of 1943 *(11)*.

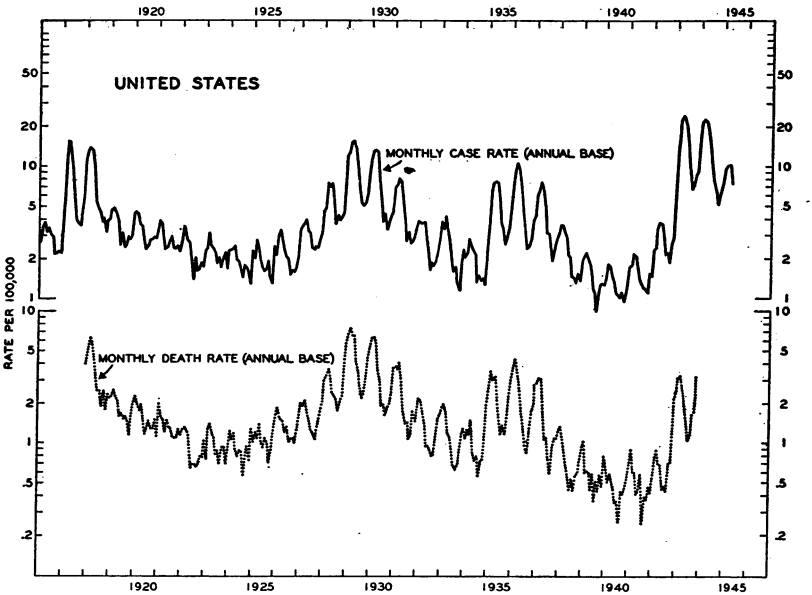

FIGURE 3.—Monthly morbidity and mortality (annual base) from cerebrospinal meningitis in the United States, 1916–44. Deaths are for cerebrospinal (meningococcus) meningitis.

The records of cases and deaths in Massachusetts and New York indicate a direct relationship between the percentage of cases reported and the presence of an epidemic. In New York State, for example, 1925–26 and 1933–34 were interepidemic while 1928–29 and 1935–36 were epidemic years. During these epidemic years recorded case fatality was roughly 50 percent, whereas, during interepidemic years it rose to 80 percent or more; this probably indicates a substantial increase in the number of minor cases reported during epidemics which escape detection in interepidemic years.

Cerebrospinal meningitis in the United States.—Figure 3 shows the monthly incidence and mortality from cerebrospinal meningitis as reported in the United States. Rates are based on the records of 40 States which supplied continuous reports of cases from 1926 on; from 1916 to 1925 the records of cases are less complete and the rates are based on an expanding area (see table 2, footnote 1). Monthly

deaths are for cerebrospinal (meningococcus) meningitis and do not include cerebrospinal meningitis not due to meningococcus.

The course of meningitis is a series of epidemic waves extending over varying numbers of years. The rates rise from a relatively low level to epidemic proportions and fall again to an insignificant amount. The word "epidemic" may perhaps be used to describe these periods of high incidence even though in the case of meningitis an "epidemic" is of several years' duration. Since 1916 there have been four distinct epidemic waves of meningitis in the United States. The first (fig. 3) began prior to 1916, reached a maximum in 1917, and descended slowly through 1924; the second period was of 10 years' duration, 1925 to 1934, with the peak in 1929; the third cycle extended from 1935 to 1940 with 1936 as the peak year; the current epidemic reached its peak in 1943 and is subsiding at the present time.

TABLE 4.—*Annual deaths per reported cases of cerebrospinal meningitis*[1] *in the United States,*[2] *1916–44*

Year	Case fatality	Year	Case fatality	Year	Case fatality	Year	Case fatality	Year	Case fatality	Year	Case fatality
	Percent		*Percent*		*Percent*		*Percent*		*Percent*		*Percent*
1916	106.9	1921	82.8	1926	90.9	1931	57.3	1936	46.7	1941	34.4
1917	67.1	1922	77.9	1927	71.0	1932	61.4	1937	48.1	1942	25.3
1918	65.2	1923	91.2	1928	61.1	1933	60.2	1938	43.0	1943	16.0
1919	92.8	1924	89.2	1929	55.3	1934	61.8	1939	41.1	1944	17.3
1920	85.3	1925	87.8	1930	55.1	1935	50.0	1940	39.2		

[1] See table 3, note 1, for International List titles used for deaths from cerebrospinal meningitis.
[2] See table 3, note 2, for the States included.

A seasonal cycle in meningitis is superimposed upon the longer cyclical movement. The seasonal peak usually occurs in March although it is frequently in February or April; in half of the 29 years (1916–44) March was the peak month, in the remainder of the time the peak occurred in February or April. From July to November meningitis rates are comparatively low. A calendar year includes by far the major portion of an individual seasonal cycle, although October to September would be a somewhat better annual period for meningitis. The rate of increase in the rates from the low period in August, September, and October to the peak in February, March, and April is somewhat greater at the crest than at the trough of an epidemic cycle. The epidemic and seasonal cycles are evident in both cases and deaths from cerebrospinal meningitis.

Regional differences in the United States.—Quarterly case rates and annual case and death rates (fig. 4) show the course of cerebrospinal meningitis in nine geographic regions of the United States. The four epidemic periods seen in the country as a whole are also evident in each of the sections. Neither the peak nor the low years are identical in all sections and the relative importance of a specific epidemic varies with section; nevertheless, the general appearance of the curves is the

TABLE 5.—*Monthly incidence of cerebrospinal meningitis as reported in the United States,[1] 1916–45 (September)*

Year	January	February	March	April	May	June	July	August	September	October	November	December
	Case rate per 100,000 (annual base)											
1916	2.65	2.74	3.45	3.75	3.16	3.37	3.06	2.95	2.18	2.20	2.28	2.22
1917	3.15	5.64	11.44	15.69	13.62	10.05	5.83	3.88	3.67	3.53	4.28	5.91
1918	11.19	12.94	13.65	13.08	10.21	5.39	4.84	4.47	3.77	4.09	3.15	3.85
1919	3.96	4.63	4.81	4.43	3.82	2.52	3.07	2.46	2.50	2.90	2.80	2.95
1920	4.31	4.53	4.37	3.62	3.51	2.76	2.36	2.52	2.78	2.81	2.92	2.81
1921	3.13	3.80	3.68	2.84	2.34	2.42	2.67	2.93	2.42	2.37	2.47	2.26
1922	2.60	3.57	3.02	2.74	2.62	1.91	1.38	2.03	1.61	1.64	1.86	1.73
1923	2.25	2.39	3.10	2.56	2.39	2.17	1.82	2.02	1.69	2.06	2.20	1.65
1924	2.28	2.31	2.35	2.47	1.93	1.91	1.64	1.47	1.75	1.70	1.61	1.28
1925	2.28	2.02	2.72	2.32	1.95	1.70	1.58	1.63	1.90	1.45	1.27	2.44
1926	2.12	2.93	3.23	2.72	2.30	2.03	1.97	1.52	1.63	1.57	1.67	2.02
1927	3.31	3.45	3.66	3.88	3.14	3.10	2.40	2.33	2.39	2.40	2.77	3.13
1928	4.53	4.78	7.38	6.87	7.31	5.41	3.58	4.25	3.88	4.04	4.36	7.40
1929	11.66	12.80	15.22	15.29	13.68	9.59	6.61	5.23	4.99	5.27	6.25	8.68
1930	11.32	12.91	13.27	12.98	7.87	4.97	3.80	4.41	3.31	3.64	4.20	4.59
1931	6.94	7.23	8.13	7.72	5.59	3.86	2.70	3.17	2.62	2.73	2.89	3.39
1932	3.78	3.68	3.70	3.73	2.72	2.30	1.65	1.86	1.75	1.88	2.25	2.83
1933	3.80	3.29	4.15	3.28	2.60	1.78	1.57	1.73	1.29	1.15	1.76	2.30
1934	2.06	2.41	2.77	2.56	2.30	2.12	1.31	1.48	1.36	1.39	1.26	2.30
1935	3.49	6.38	7.36	7.60	7.50	5.72	3.70	3.29	2.56	3.03	3.51	4.68
1936	7.05	8.96	10.43	9.41	6.86	4.26	3.14	2.42	2.44	2.78	3.81	4.21
1937	5.96	6.58	7.45	6.54	4.73	3.13	3.10	2.40	1.92	2.43	2.72	3.04
1938	3.58	3.54	3.22	2.91	2.12	2.00	1.46	1.42	1.32	1.52	1.34	1.89
1939	2.08	2.18	2.03	1.83	1.54	1.20	1.10	.80	1.09	1.26	1.27	1.24
1940	1.40	1.80	1.75	1.43	1.32	1.07	1.04	1.01	1.10	.94	1.08	1.26
1941	1.70	1.76	2.12	2.08	1.67	1.40	1.26	1.16	1.13	1.07	1.53	1.43
1942	2.29	2.40	3.26	3.70	3.64	3.14	2.16	2.21	1.86	2.57	2.83	5.47
1943	12.61	17.24	22.46	24.00	21.05	15.15	9.80	6.81	7.15	8.60	9.11	15.40
1944	22.13	23.09	21.90	19.52	15.09	9.93	7.80	6.49	5.23	6.22	7.01	7.94
1945	9.50	10.25	10.23	7.45	6.92	5.94	4.76	3.41	3.58	-------	-------	-------

[1] See table 2 note 1 for the States included.

TABLE 6.—*Monthly mortality from cerebrospinal (meningococcus) meningitis [1] in the United States,[2] 1918–44*

Year	January	February	March	April	May	June	July	August	September	October	November	December
	Death rate per 100,000 (annual base)											
1918	4.16	5.23	6.38	5.96	4.48	3.09	2.53	2.50	1.96	2.53	1.86	2.38
1919	2.25	2.31	2.56	2.28	2.12	1.66	1.72	1.54	1.59	1.50	1.18	1.72
1920	2.10	2.33	2.05	1.77	1.98	1.48	1.19	1.35	1.47	1.32	1.33	1.53
1921	1.14	1.99	1.65	1.52	1.25	1.50	1.34	1.32	1.14	1.12	1.12	1.27
1922	1.17	1.28	1.33	1.23	1.14	.66	.70	.70	.68	.69	.80	.79
1923	1.06	.78	1.29	1.42	1.23	1.11	.85	.89	.72	.94	.94	.71
1924	.87	1.25	1.07	1.21	.91	.80	.88	.88	.59	.77	.95	.76
1925	1.28	1.07	1.23	1.12	1.40	1.05	.95	1.08	1.01	.74	.89	1.20
1926	1.49	1.84	1.59	1.53	1.51	1.24	1.34	1.04	1.10	1.09	1.06	1.27
1927	1.59	2.04	1.98	2.16	1.81	1.52	1.27	1.19	1.10	1.22	1.39	1.67
1928	2.06	2.98	3.27	3.71	3.24	2.44	2.30	2.19	1.80	2.16	2.25	3.88
1929	5.44	6.78	7.56	6.70	6.64	4.19	3.50	2.70	2.24	2.53	3.22	4.49
1930	5.34	6.35	6.37	5.83	3.80	3.03	2.01	2.01	1.67	1.91	2.03	2.46
1931	3.80	3.85	3.71	4.08	2.95	1.77	1.45	1.46	1.10	1.20	1.77	1.52
1932	1.88	2.20	2.11	1.82	1.53	.97	.96	.91	.82	.84	1.11	1.56
1933	1.69	1.91	2.00	1.75	1.22	1.12	.88	.69	.66	.70	.91	1.21
1934	1.27	1.10	1.28	1.17	1.51	.86	.76	.81	.58	.73	.78	1.17
1935	2.03	2.56	3.57	3.13	3.22	2.18	1.55	1.19	1.38	1.23	1.58	2.26
1936	3.00	3.61	4.30	3.68	2.87	1.77	1.43	.98	.88	1.19	1.75	1.95
1937	2.83	2.95	3.17	3.13	1.83	1.08	1.11	.79	.61	.95	1.07	1.08
1938	1.26	1.34	1.10	.91	.70	.61	.46	.54	.45	.58	.61	.74
1939	.95	1.05	.61	.63	.60	.45	.59	.38	.52	.44	.58	.48
1940	.80	.74	.52	.58	.53	.46	.36	.37	.26	.43	.42	.49
1941	.59	.71	.90	.62	.61	.42	.44	.58	.25	.39	.38	.47
1942	.49	.65	.92	1.00	.79	.77	.48	.52	.48	.80	.86	1.29
1943	2.21	2.61	3.36	3.39	2.85	1.98	1.66	1.19	1.10	1.84	1.75	3.18
1944	4.25	3.54	3.43	3.16	2.38	1.80	1.23	1.02	.91	1.21	1.75	1.71

[1] See table 1, note 1, for International List titles.
[2] See table 2, note 1, for the States included.

same in all regions. In separate States, also, the incidence is generally similar to that for all areas. During the epidemic which reached its peak in 1929 for all States combined, the peak occurred in 1928 for 5 States, in 1929 for 24 States, in 1930 for 9 States, and in 1931 for 2 States. During the 1936 epidemic, 12 States had a peak rate in 1935, 22 in 1936, and 6 in 1937. Low rates extend over a longer period in single States than in the entire country but the trough tends to occur at approximately the same time in every State.

In each epidemic of meningitis for which there is a record, all sections of the country were affected. The epidemic of 1917 appeared early in the Eastern States; the peak occurred in 1917 in the New England, Middle Atlantic, and North Central sections, and in 1918 in the remainder of the Southern and Western sections. In the Mountain and Pacific regions the epidemic of 1917 occurred late and was relatively less important there than in the rest of the country. Following the 1917 epidemic the South Central sections reached a low incidence of meningitis at about 1921 or 1922, and the Pacific in 1924; while the rate in the Central, Eastern, and Southern sections continued to decline until 1925 or later. The epidemic of 1929 was of major importance in all sections except the South Atlantic. The epidemic appeared first in the Pacific and Mountain sections but reached its peak (deaths) in 1929 in all sections except the South Atlantic and East South Central where the maximum rate occurred in 1930. The year 1934 was a low year for the incidence of meningitis in all sections. The epidemic of 1936 was of less importance than that of 1929 in all sections except the South Atlantic and possibly New England. The South Atlantic section experienced a relatively severe epidemic in 1936. The peak occurred in 1935 in the North Central and Pacific sections and in 1937 in the East South Central; in all other regions the maximum rate (deaths) occurred in 1936. Low rates of meningitis occurred in 1940 and 1941 in all sections. The current epidemic has been severe in all regions, particularly in the New England and Middle Atlantic, where the rates have been greatly in excess of those recorded during any other epidemic. In the remainder of the sections the current epidemic is approximately of the magnitude of that of 1929 with the exception of the South Atlantic where it was somewhat greater than the epidemic of 1936. The 1943 epidemic started earlier and reached a peak earlier (1943) in the coast sections, namely, in the New England, Middle Atlantic, South Atlantic, and Pacific and Mountain areas. In the North Central and South Central regions the maximum rate occurred in 1944. Indications are that the peak of the present epidemic has been passed in all regions.[3]

[3] Reported cases of cerebrospinal meningitis for October and November of the year 1945 have been received since this article was submitted. For the entire country they show a seasonal increase in the disease which is on a general level somewhat above the 5-year median but well below the level of last year. The incidence in each section also, during October and November 1945, is consistently lower than last year.

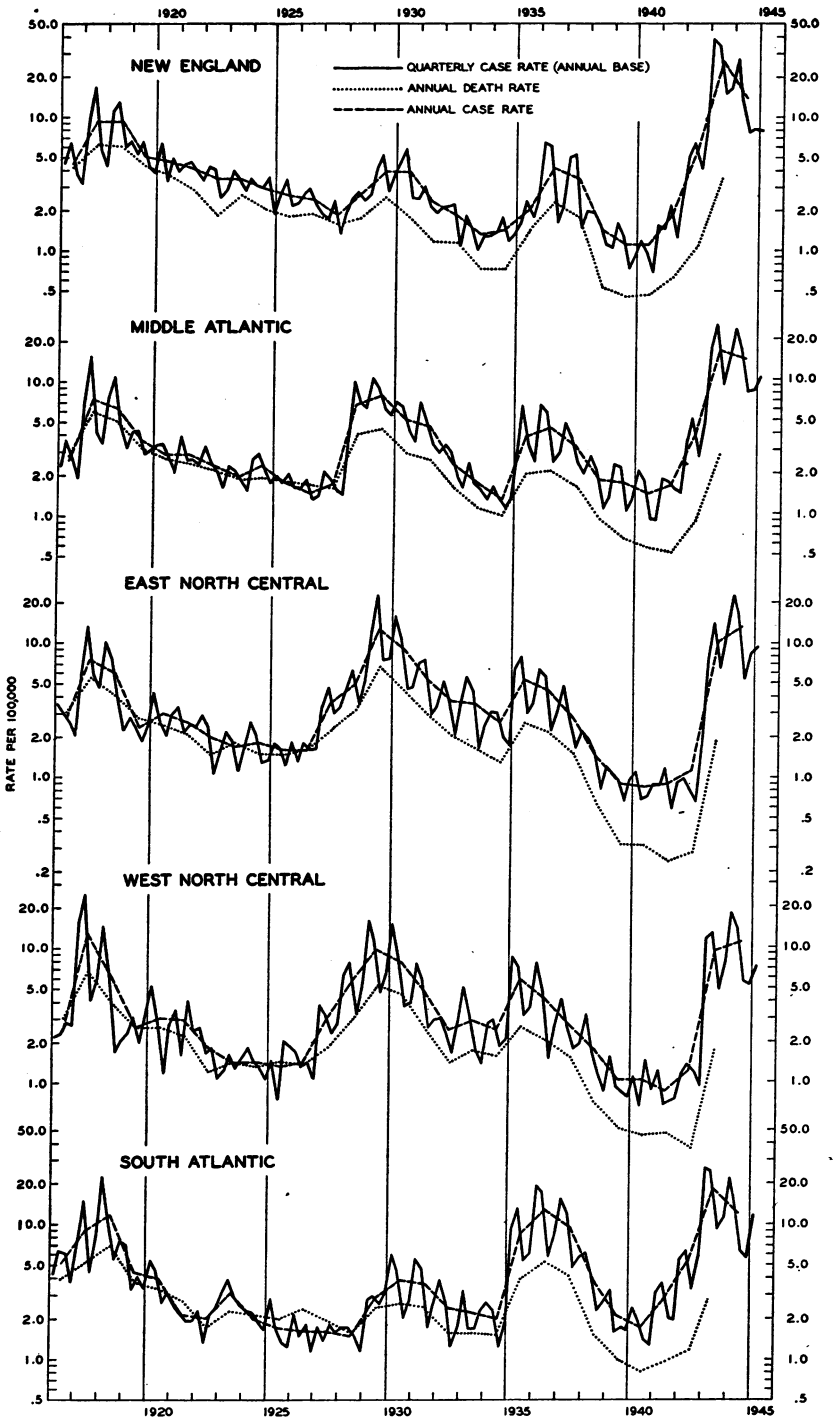

FIGURE 4a.—Quarterly morbidity (annual base) and annual morbidity and mortality from cerebrospinal meningitis in nine geographic sections of the United States, 1916–44. Deaths are for the total of cerebrospinal meningitis.

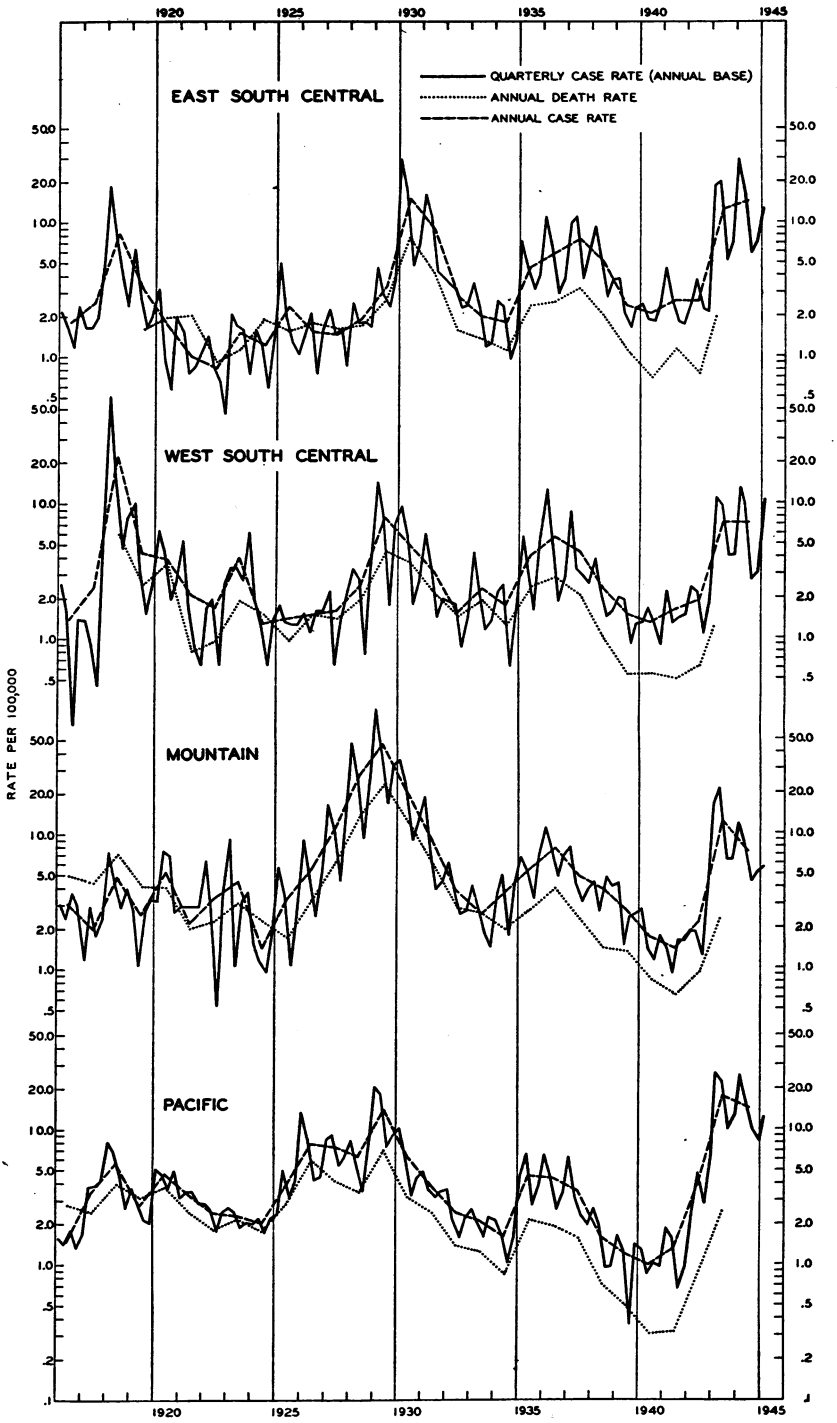

FIGURE 4b.—Quarterly morbidity (annual base) and annual morbidity and mortality from cerebrospinal meningitis in nine geographic sections of the United States, 1916–44. Deaths are for the total of cerebrospinal meningitis.

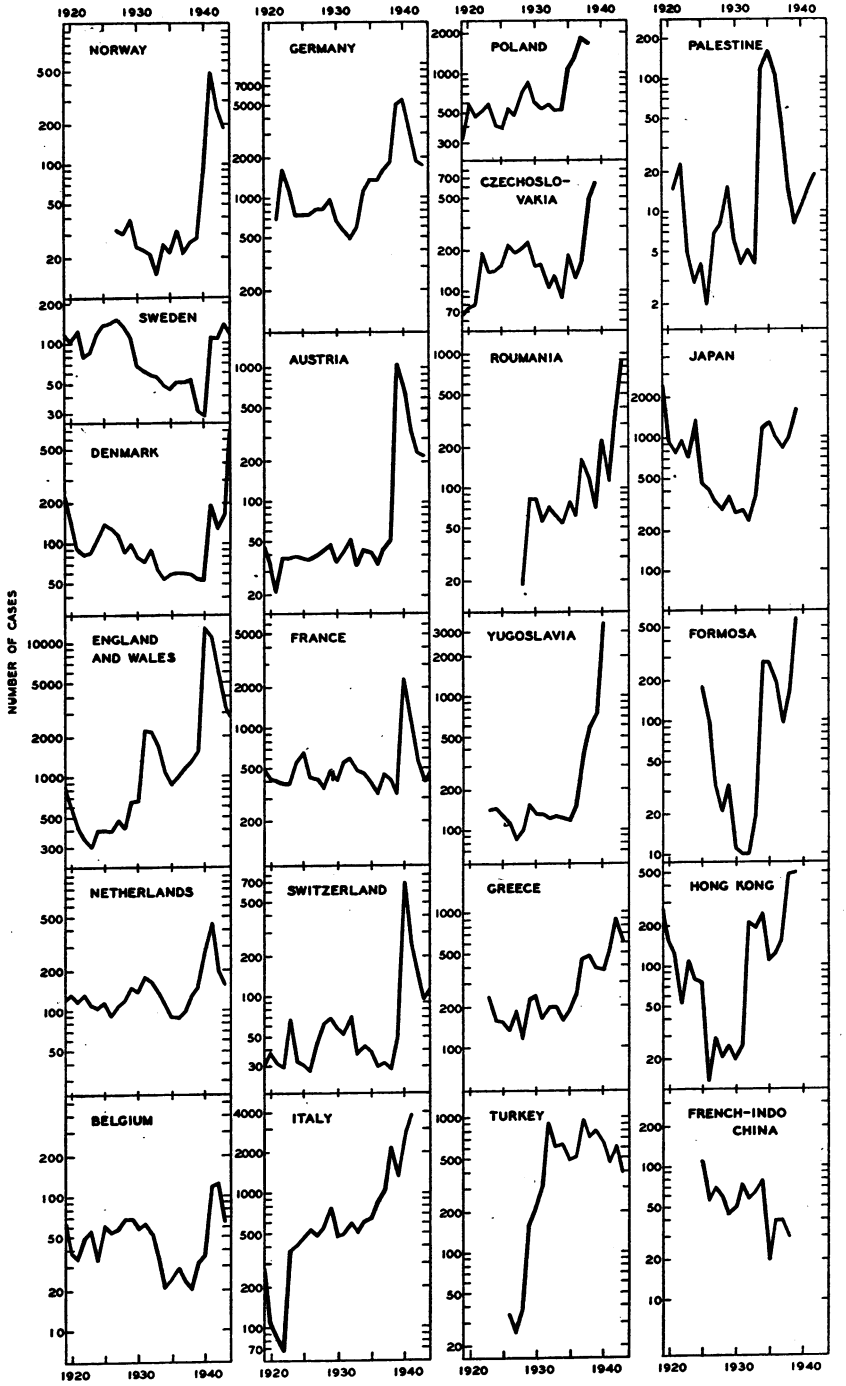

FIGURE 5a.—Number of reported cases of cerebrospinal meningitis in foreign countries, 1919–44. Current reports of cases of communicable diseases to the Health Section of the League of Nations.

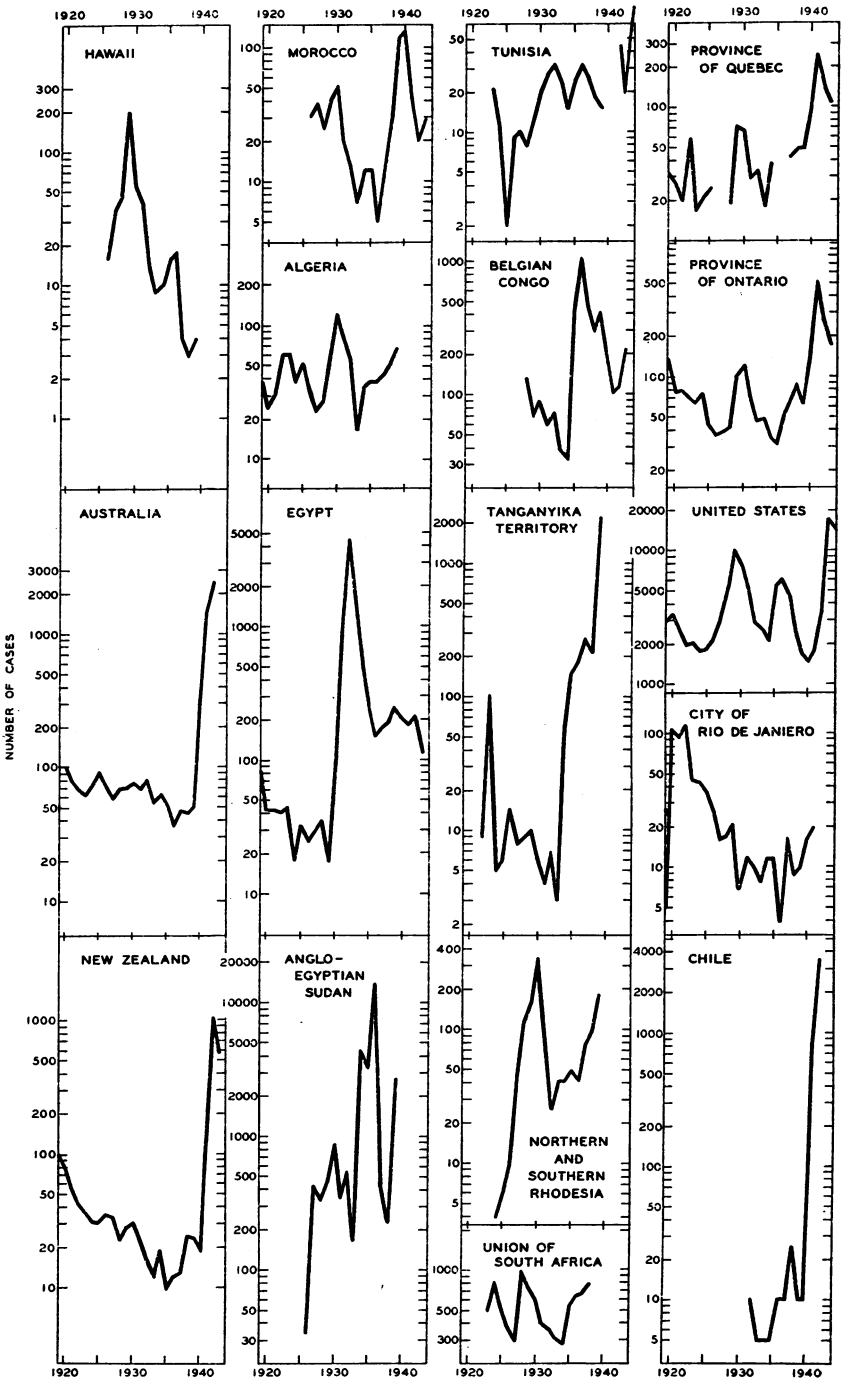

FIGURE 5b.—Number of reported cases of cerebrospinal meningitis in foreign countries, 1919–44. Current reports of cases of communicable diseases to the Health Section of the League of Nations.

Cerebrospinal meningitis in foreign countries.—Figure 5 shows the incidence of cerebrospinal meningitis during a number of years for a large proportion of the countries which furnished the Health Section of the League of Nations (*6*) with a report of current cases. The graphs are of numbers of cases plotted on semilogarithmic paper. Rates for foreign countries have not been computed since the level of reported cases could not be compared for various countries, in any case; and both numbers of cases and case rates would give identical lines plotted on a logarithmic scale, except for possible changes in population over a period of years.

The earliest records are for 1919 and so do not include the period of the first World War. In special articles which have appeared from time to time in the monthly Epidemiological Report of the Health Section of the League of Nations the statement is made that there was "universal increase in cerebrospinal meningitis during the war years and immediately after." The very marked increase associated with the second World War is obvious from the chart; maximum rates occurred in the various countries from 1939 to 1943 or the year of the last report. Following the First World War the incidence of cerebrospinal meningitis declined in foreign countries and remained relatively constant for several years as it did in the United States. During the remainder of the period between the two World Wars there have occurred one, two, or possibly three periods of increased incidence which more or less synchronize over large areas. Inspection of the chart will give the available details for specific countries. On the whole, however, the first epidemic increase to follow World War I was in the United States and Canada, in 1929. Countries of Eastern Europe, for example Poland, also showed increases at about that time. Western Europe, however, experienced increases somewhat later, approximately 1931; Northern Africa in 1930; Egypt in 1932. The 1936 epidemic in the United States has no counterpart in Europe; in the relatively few countries which represent Asia and in Southern Africa, however, there were periods of increased incidence centering about 1935. Australia and New Zealand were relatively free from cerebrospinal meningitis from 1919 to 1940.

It is noteworthy that in African countries a period of exceptionally high incidence of meningitis is followed by a rate which is practically zero. Although cases are better reported during epidemics than during the periods between them the differences in the numbers of cases in epidemic and nonepidemic periods are so great that this fact would seem to be only a partial explanation of the difference.

SUMMARY

Cerebrospinal meningitis became increasingly prevalent in the United States at the end of 1942 after the United States entered the second World War. The number of reported cases in 1943 and 1944 is the largest ever recorded for the entire country.

State reports of cerebrospinal meningitis for Massachusetts and New York (1873–1942) show a series of epidemic waves which have had a downward trend since about 1905 in both cases and deaths. Case fatality shows a marked decrease since 1940. In the country as a whole the case fatality of cerebrospinal meningitis, based on reported cases, has declined from 55 percent in 1930 to 39 percent in 1940, and 16 percent in 1943; a case fatality of 3 percent in 1943 is reported for some Army camps.

A continuous record of reported cases is available for a majority of the States (40 States from 1926 on); and shows four distinct epidemic periods since 1916, each wave extending over a series of years. All sections of the country contributed to each epidemic rise although the peak year, the length of the epidemic period, and the severity of the epidemic vary in the several sections.

Reports of foreign countries to the Health Section of the League of Nations show a very marked rise in the incidence of meningitis at the beginning of World War II in practically every country where records are available. Between 1919 and the opening of World War II most of the countries of the world experienced one, two, or possibly three minor epidemic waves which tended to synchronize over large areas.

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SOME PHYSICAL PROPERTIES OF DDT AND CERTAIN DERIVATIVES [1]

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In a previous report the ultraviolet absorption spectrum and the X-ray diffraction pattern (*1*) of DDT were described and applied to the detection of low concentrations in air and in biological materials. Since the publication of that information certain derivatives have proved to be of particular interest in studies of the mode of action and the fate of ingested DDT. The present report extends the ultraviolet absorption studies to four DDT derivatives, and includes the infrared absorption spectra and the X-ray diffraction patterns of the five compounds. A crystallographic analysis of DDT is also presented.

In the previous work the DDT used was supplied by Dr. H. L. Haller, Bureau of Entomology and Plant Quarantine, Department of Agriculture. In the present study the DDT was recrystallized, melting point 108.6° to 109.5° C, supplied by the Insect Control Board of the Office of Scientific Research and Development as Standard DDT. The four derivatives were synthesized (*2*) in this laboratory by T. R. Sweeney and W. C. White:

1. 2,2 bis(p-chlorophenyl)1,1 dichloroethylene (dichlordiphenyl-dichlorethylene), melting point 89° C.
2. Di(p-chlorophenyl)acetic acid (dichlordiphenyl acetic acid), melting point 166.0° to 166.5° C.
3. 4,4′ dichlorodiphenylmethane (dichlordiphenyl methane) melting point 55° C.
4. p,p′ dichlorobenzophenone (dichlordiphenyl ketone) melting point 147° to 148° C.

[1] From the Industrial Hygiene Research Laboratory, National Institute of Health.

ULTRAVIOLET ABSORPTION SPECTROSCOPY

In the previous work on DDT an ether-alcohol mixture was used as a solvent and determinations were made with a Hilger Spekker spectrophotometer and a Beckman spectrophotometer. In the present work the Beckman spectrophotometer was used exclusively with 2, 2, 4 trimethyl pentane (isooctane) as the solvent.

The data obtained are presented in figure 1. DDT is characterized by one main band with its peak at 237.5 mμ. There is evidence of a weaker band at 221 mμ and several much weaker bands between 260 and 280 mμ. Using the main band at 237.5 it appears that in the absence of interfering substances 0.5 microgram can be detected and 3.0 micrograms accurately measured.

Dichlordiphenyl dichlorethylene shows a rather general absorption throughout the ultraviolet. There is a suggestion of an absorption maximum at 242 mμ which may be the 237.5 band of DDT displaced. There is no evidence of the structure found in DDT between 260 and 280 mμ.

Dichlordiphenyl acetic acid shows an absorption band with a maximum at 229.5 mμ which is probably the 237.5 DDT peak displaced. The molecular extinction is slightly greater in DDT but the difference is not large. The four low intensity bands found in DDT between 260 and 280 mμ are also present in the acetic acid derivative but occur at slightly different wave lengths. The acetic acid compound shows no sign of the 221-mμ peak found in DDT, but it is possible that this has been shifted to a wave length below the range of the instrument.

A prominent peak is also found in dichlordiphenyl methane but is shifted to 228.5 mμ. In the DDT absorption curve there is evidence of several bands in this region which are only partially resolved. In the methane compounds there is evidence of still more unresolved bands below 228 mμ. Here again the 221-mμ band is missing but has probably been displaced to a shorter wave length. In the methane compound the structure in the longer wave length region is more prominent and two additional bands can be seen.

Dichlordiphenyl ketone shows an absorption distinctly different from DDT. There is one very broad band with a peak at 261 mμ with no evidence of any partially resolved bands. As might be expected there is no resemblance to the absorption curves for diphenyl and diphenyl methane.

As can be seen from figure 1 the maximum values of molecular extinction fall within a narrow range and hence the lower limits of detection will be nearly the same for each of the pure compounds. For some combinations, notably the ketone and DDT, the components of a mixture can be determined, but for other combinations separation is

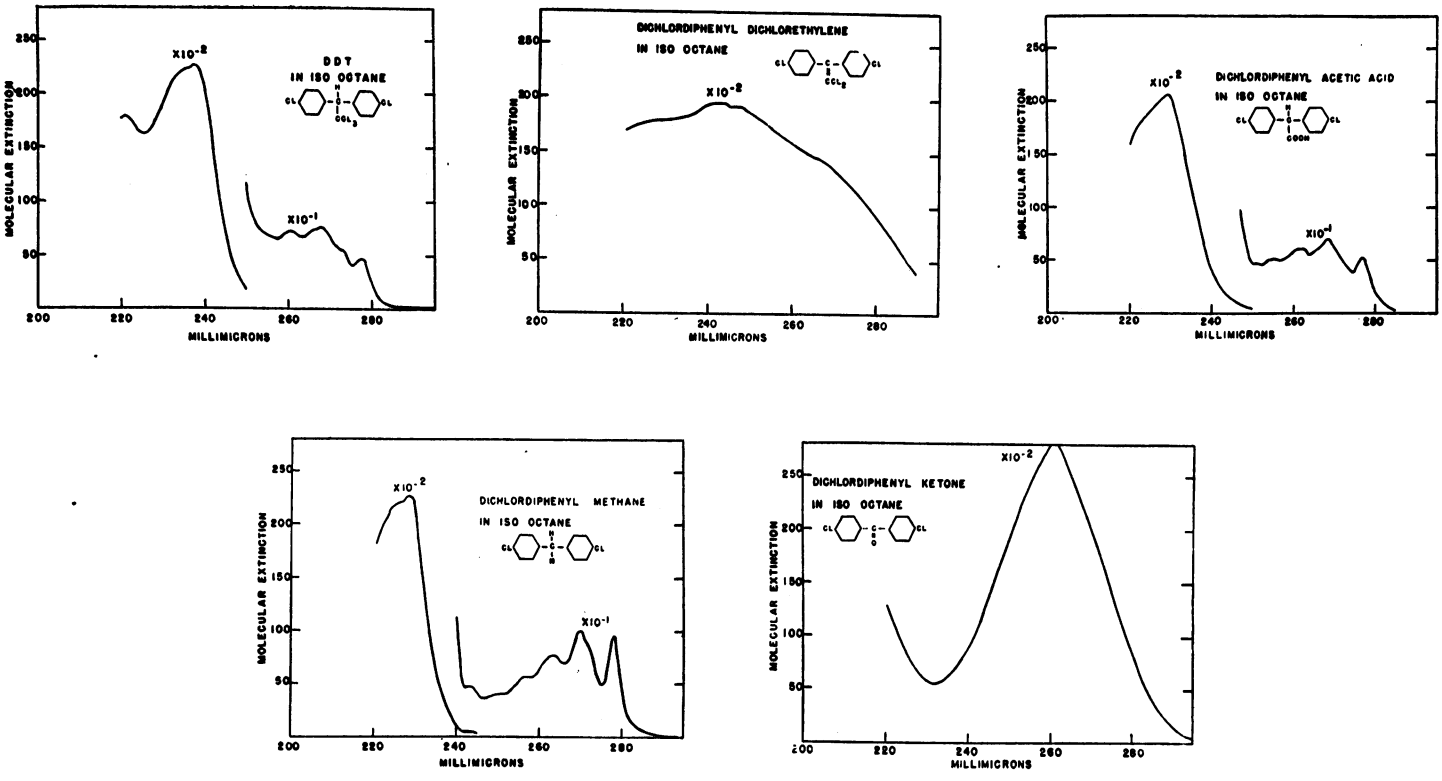

FIGURE 1.—Ultraviolet absorption spectra of DDT and four related compounds.

impossible. The striking differences between the ethylene and ketone curves and those for the other compounds emphasize the profound effect of double bonds on ultraviolet absorption spectra.

INFRARED ABSORPTION SPECTROSCOPY

All of the infrared spectra reported here were taken on a Perkin-Elmer Model 12A infrared spectrometer with a double passage of light through a 60° sodium chloride prism. All measurements covered the wave-length range from 1 to 13 microns. The slit widths were kept as narrow as was consistent with adequate galvanometer deflections. A series of 10 slit widths was used to cover the entire wave-length range and always had the same value at any given wave length. Some data in the 1–4-micron region has been obtained with a double prism spectrometer with lithium fluoride optics but is not presented here since the increased dispersion makes comparisons with other data difficult, and only a small portion of the spectrum can be studied.

Attempts were made to obtain crystalline layers with sufficiently high optical quality to permit direct absorption measurements. In no case could such a film be obtained, the crystals always forming in random orientations so that light scattering was severe. It was therefore necessary to study the absorption in suitable solvents. Carbon tetrachloride was used from 1 to 8 microns but is not satisfactory at longer wave lengths because of its own intense absorption bands. Carbon disulphide was used from 7 to 13 microns. These solvents are not ideal but appear to be the best available.

The absorption curves are shown in figure 2. The spectra are quite complex and only a few correlations can be made between them and the chemical structures.

All the compounds show a band at approximately 3.2 microns (3,100 $cm.^{-1}$), which is characteristic of aromatic C-H band stretching. In DDT, dichlordiphenyl methane, and dichlordiphenyl acetic acid there is evidence of a second band at about 2,950 $cm.^{-1}$ which is associated with an aliphatic C-H band stretching, and these three compounds all have a C-H band outside a ring.

Dichlordiphenyl acetic acid and dichlordiphenyl ketone show prominent sharp bands at 1,750 $cm.^{-1}$ and 1,700 $cm.^{-1}$, respectively. These bands fall within the range commonly associated with the C-O linkage and these two compounds are the only ones in this series having this group.

All five compounds show a band at about 1,500 $cm.^{-1}$ which is probably the second harmonic of the C-Cl vibration which usually occurs at 750 $cm.^{-1}$. The fundamental frequency of this band lies beyond the long wave-length limit of the present data.

All five compounds show a strong band near 9.2 microns, and this is

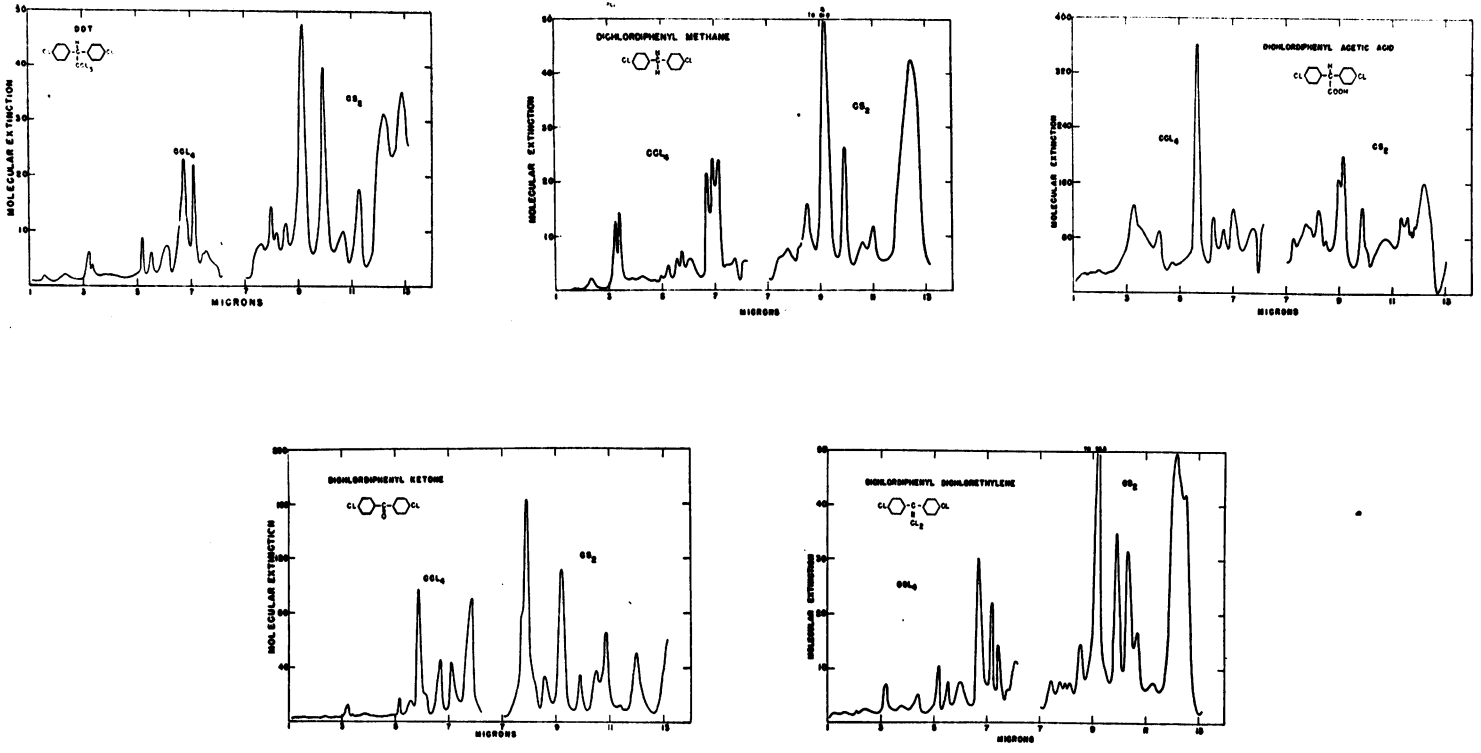

FIGURE 2.—Infrared absorption spectra of DDT and four related compounds.

found in other diphenyl compounds described in the literature (*3*). All have a rather complex structure from 9 to 13 microns with several bands which have not been correlated with known linkages.

The 9.2-micron band offers the best possibility for the detection of DDT in the absence of interfering substances. From the intensity of this band it appears that about 200 micrograms of DDT are required for measurement. The limits of detection for the other four compounds studied vary somewhat but are of the same order of magnitude as for DDT.

There are enough differences between the absorption curves to permit the determination of any one of the five compounds in the presence of any combination of the others.

As can be seen from the figure, the curves with the two solvents do not agree in the overlapping wave-length region. This is probably due to interaction and emphasizes that the same solvent must be used if comparable results are to be obtained. If a technique for obtaining suitable crystalline layers can be developed, this will be the method of choice since the solvent difficulties will be eliminated.

DDT CRYSTALLOGRAPHY

DDT crystallizes from most of its solvents in colorless, acicular crystals, usually twinned along their length. The crystals are very soft and friable with no evident cleavage plane and with uneven and somewhat splintery fracture. The specific gravity as measured in a 25-ml. pycnometer, using an aerosol wetting agent to assure complete removal of occluded air bubbles, is 1.52. Studies with the polarizing microscope show that DDT crystals are biaxial and optically positive. They show parallel extension and 2 V is large. The indices of refraction were measured with sodium light by the immersion method, using solutions of potassium mercuric iodide as immersion media. The indices are: $\alpha=1.628$; $\beta=1.64$; $\gamma=1.695$. These values agree fairly well with crystallographic data by E. L. Gooden (*4*) and I. Fankuchen, M. Schneider, and J. Singer (*5*).

The X-ray diffraction patterns of DDT (*1*) and dichlordiphenyl acetic acid (*2*) have been previously reported but will be repeated here for comparison with the other derivatives in this series. The X-ray diffraction patterns (fig. 3) were obtained, using the powder-wedge technique in a cylindrical camera with 7.16-cm. radius exposed to radiation from a copper anode X-ray tube with a nickel-foil filter giving essentially Cu_{K_α} radiation. The interplanar spacings (d) and the relative intensities (as measured on a microphotometer) for DDT and the four derivatives studied are given in table 1. There are enough differences between the patterns to permit the detection of individual components in mixtures in some cases. The DDT pattern, although somewhat weaker than the others, is sufficiently distinctive for easy identification.

The X-ray diffraction pattern of DDT is of sufficient intensity to permit its identification in a dust sample when present in a concentration of 10 percent or more. The actual amount of DDT detectable by its diffraction pattern is about 1 mg. The other compounds can be detected in somewhat smaller concentrations.

TABLE 1.—*X-ray powder diffraction data for DDT, dichlordiphenyl dichlorethylene, dichlordiphenyl acetic acid, dichlordiphenyl methane, and dichlordiphenyl ketone*

DDT		Dichlordiphenyl dichlorethylene		Dichlordiphenyl acetic acid		Dichlordiphenyl methane		Dichlordiphenyl ketone	
d	I/Io	d	I/Io	d	I/Io	d	I/Io	d	I/Io
9.6	0.54	8.9	0.23	13.3	0.07	6.9	0.08	4.87	0.60
5.9	.88	8.3	.07	5.66	.33	6.6	.05	4.80	.43
5.4	.50	7.7	.11	4.73	1.00	5.5	.17	4.51	.15
4.98	1.00	6.9	.04	4.38	.53	4.9	.11	4.34	.11
4.81	.21	6.1	.04	4.18	.45	4.58	1.00	3.84	.11
4.43	.96	4.85	1.00	3.84	.28	4.27	.25	3.69	1.00
4.20	.79	4.65	.44	3.70	.30	3.76	.11	3.14	.65
4.10	.42	4.36	.30	3.54	.27	3.56B	.60	3.02	.43
3.86B [1]	.38	4.20	.46	3.40	.17	3.42	.02	2.90B	.15
3.78B	.25	4.04	.49	3.28	.38	3.35	.19	2.80	.04
3.60	.46	3.89B	.47	3.18	.05	3.20	.02	2.48	.10
3.51	.50	3.82	.33	3.06	.57	3.15	.14	2.43	.06
3.35	.67	3.70B	.21	2.96	.03	3.07	.30	2.34	.07
3.25	.21	3.56	.46	2.89	.07	3.00	.16	2.24B	.10
3.16	.38	3.46	.56	2.80	.08	2.91	.13	2.15	.15
3.05B	.83	3.37	.11	2.66	.13	2.86	.14	2.11	.11
2.94B	.67	3.27B	.51	2.55	.13	2.73B	.04	2.08	.11
2.83	.33	3.08	.30	2.47	.05	2.49	.04	2.03	.15
2.78	.46	3.02	.53	2.39	.07	2.43	.05	1.96	.06
2.73	.69	2.95	.44	2.28	.06	2.39	.04	1.90	.30
2.68	.13	2.86B	.12	2.18	.07	2.30	.04	1.812	.10
2.60	.15	2.79	.07	2.14	.12	2.27	.04	1.794	.10
2.52B	.25	2.70	.05	2.10	.03	2.24	.04	1.741	.10
2.47	.08	2.58	.07	2.06	.05	2.20	.04	1.722	.10
2.40	.19	2.49	.12	1.90	.12	2.12B	.02	1.540	.10
2.30	.25	2.44	.06			2.02	.04	1.397	.05
2.25B	.29	2.26B	.11			1.95	.04	1.356	.05
2.19	.10	2.17	.16			1.90	.04	1.218	.05
2.17	.06	2.12	.04			1.855	.04	1.190	.05
2.04	.38	2.09	.16			1.824	.04		
2.01	.29	2.05	.04			1.784	.04		
1.98	.15	1.98	.16			1.705	.04		
1.93	.10	1.96	.10			1.682	.02		
1.888B	.15	1.92	.10			1.654	.04		
1.856	.06	1.88	.10			1.583	.02		
1.839	.10	1.828	.10						
1.786	.06	1.801	.10						
1.768	.06	1.770	.10						
1.744	.38	1.720	.07						
1.691	.06	1.682	.07						
1.675	.10	1.571	.04						
1.629	.10	1.505	.10						
		1.445	.07						
		1.411	.07						

[1] B designates a broad line.

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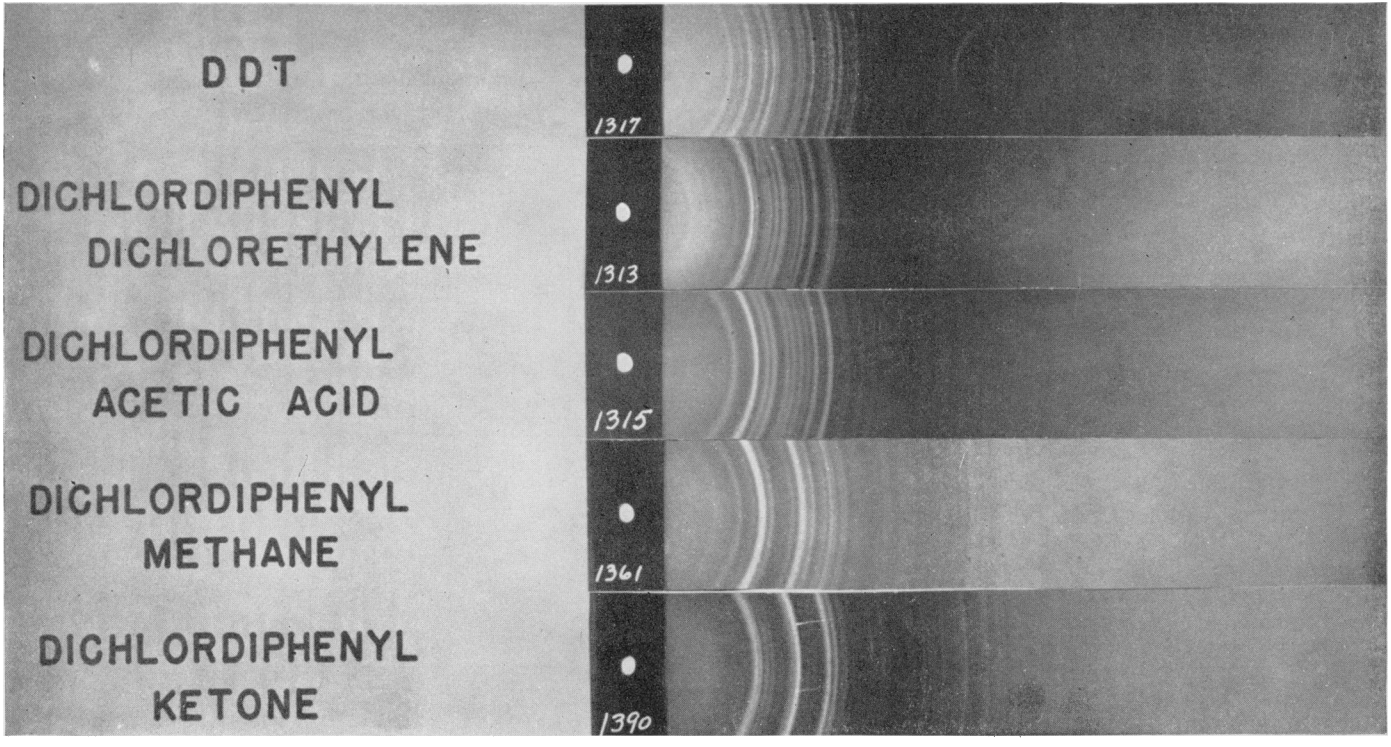

FIGURE 3.—X-ray diffraction pattern.

DEATHS DURING WEEK ENDED MARCH 2, 1946

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

	Week ended Mar. 2, 1946	Corresponding week, 1945
Data for 93 large cities of the United States:		
Total deaths	10,371	9,866
Average for 3 prior years	9,850	
Total deaths, first 9 weeks of year	94,375	88,258
Deaths under 1 year of age	625	689
Average for 3 prior years	673	
Deaths under 1 year of age, first 9 weeks of year	5,479	5,752
Data from industrial insurance companies:		
Policies in force	67,181,267	67,079,160
Number of death claims	15,894	16,293
Death claims per 1,000 policies in force, annual rate	12.3	12.7
Death claims per 1,000 policies, first 9 weeks of year, annual rate	11.3	10.7

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 MARCH 9, 1946

Summary

A total of 5,532 cases of influenza was reported for the week, as compared with 5,337 last week and a 5-year median of 4,744. Decreases occurred in all geographic areas except the South Atlantic and West South Central. The increase in the latter area was accounted for chiefly by an increase in Texas from 1,792 last week to 2,830 for the current week. The total for the year to date is 165,882, as compared with 43,198 and 310,953, respectively, for the corresponding periods of 1945 and 1944, and a 5-year median of 49,557.

The incidence of diphtheria declined from 361 cases last week to 325 cases for the current week. The largest number reported for a corresponding week of the past 5 years is 340 cases in 1942. States reporting more than 9 cases each are Texas (48), New York (23), Pennsylvania (21), Ohio (20), Illinois and California (18 each), Maryland (17), Indiana (14), Mississippi (12), and North Carolina and Michigan (11 each). The total to date is 3,898, as compared with 3,160 for the same period last year and a 5-year median of 2,951.

Of the total of 28,440 cases of measles reported, as compared with 24,790 last week and 21,511 for the 5-year median, 15,395, or 54 percent, occurred in the Middle Atlantic and East North Central areas. Increases occurred in 4 of the 6 States reporting more than 1,000 cases each—New Jersey, Michigan, Texas, and California. A total of 122,429 cases has been reported for the year to date, as compared with 20,173 for the corresponding period last year, and 207,252 in 1944. The latter figure is the largest number reported for the corresponding period of any of the past 5 years. The 5-year median for the period is 136,443.

Of the total of 37 cases of poliomyelitis reported for the week, as compared with 52 last week and a 5-year median of 19, California

reported 8, Texas 7, and Florida 3. The total to date, 443 cases, is more than reported for the corresponding period of any of the past 5 years.

The total of 202 cases of meningitis was the same number as reported last week. Of these, California reported 23, Texas 19, New York 17, Pennsylvania and Ohio 16 each, and Illinois 14. The cumulative total is 2,047, as compared with 2,548 and 5,590, respectively, for the corresponding periods of 1945 and 1944, and a 5-year median of 2,548.

Deaths registered during the week in 92 large cities of the United States aggregated 9,855, as compared with 10,355 last week, 9,549 and 9,510, respectively, for the corresponding weeks of 1945 and 1944, and a 3-year (1943–45) average of 9,740. The total to date is 103,879, as compared with 97,466 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended Mar. 9, 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
	Mar. 9, 1946	Mar. 10, 1945		Mar. 9, 1946	Mar. 10, 1945		Mar. 9, 1946	Mar. 10, 1945		Mar. 9, 1946	Mar. 10, 1945	
NEW ENGLAND												
Maine	1	0	0	11	-------	-------	23	8	205	0	0	2
New Hampshire	0	0	0	-------	-------	-------	-------	5	18	0	0	0
Vermont	0	0	0	-------	-------	-------	4	15	17	0	1	1
Massachusetts	5	4	4	-------	-------	-------	484	117	594	4	6	7
Rhode Island	0	0	0	1	59	17	9	5	38	[4]1	0	0
Connecticut	1	0	0	9	2	3	143	191	307	0	4	4
MIDDLE ATLANTIC												
New York	23	9	19	[1] 2	[1] 4	[1] 12	3,677	94	1,941	17	29	29
New Jersey	1	2	3	10	9	9	1,660	44	1,417	6	10	10
Pennsylvania	21	11	10	4	3	2	2,833	149	1,323	16	26	26
EAST NORTH CENTRAL												
Ohio	20	10	10	8	12	19	349	28	450	16	16	11
Indiana	14	10	5	54	5	12	728	40	222	2	7	7
Illinois	18	2	14	9	2	21	1,939	80	887	14	16	16
Michigan [2]	11	10	5	2	4	8	3,383	53	630	4	14	12
Wisconsin	0	0	1	81	27	44	826	41	873	3	3	3
WEST NORTH CENTRAL												
Minnesota	7	2	2	3	-------	1	41	11	45	2	2	2
Iowa	4	5	3	-------	-------	6	47	80	244	0	7	0
Missouri	6	4	4	6	2	7	442	4	365	9	8	8
North Dakota	2	4	1	8	1	9	-------	3	102	1	2	0
South Dakota	1	6	4	-------	-------	-------	82	15	15	0	2	0
Nebraska	2	1	2	17	1	4	85	25	153	1	1	1
Kansas	1	10	5	4	1	17	912	25	460	0	3	3
SOUTH ATLANTIC												
Delaware	3	0	0	-------	-------	-------	38	10	22	0	0	0
Maryland [2]	17	5	5	8	3	10	320	59	104	3	4	4
District of Columbia	0	0	0	2	-------	2	152	12	72	2	0	2
Virginia	7	2	9	467	743	696	531	51	650	3	8	10
West Virginia	5	3	4	16	18	19	94	50	338	3	5	5
North Carolina	11	10	8	-------	-------	16	323	25	649	6	4	4
South Carolina	7	6	5	830	522	705	463	24	194	3	1	3
Georgia	7	7	6	67	25	119	459	55	320	3	2	2
Florida	3	11	1	11	1	10	89	81	207	2	10	3
EAST SOUTH CENTRAL												
Kentucky	9	4	4	88	1	20	739	4	95	9	4	4
Tennessee	4	7	7	47	70	155	246	98	330	3	11	11
Alabama	5	9	6	244	229	229	175	11	132	1	6	6
Mississippi [2]	12	8	8	-------	-------	-------	-------	-------	-------	6	4	4
WEST SOUTH CENTRAL												
Arkansas	1	11	6	128	107	147	128	47	152	6	9	2
Louisiana	5	7	4	152	2	27	286	110	136	6	7	5
Oklahoma	3	5	5	99	231	107	113	20	36	1	5	3
Texas	48	27	40	2,830	1,689	1,653	1,541	736	1,261	19	15	15
MOUNTAIN												
Montana	1	1	0	28	12	14	23	1	80	0	1	1
Idaho	1	5	0	40	2	-------	36	1	85	0	0	0
Wyoming	0	0	0	1	25	14	35	7	48	0	0	0
Colorado	4	4	6	35	24	42	331	14	256	0	0	0
New Mexico	1	2	1	1	-------	3	10	2	50	0	0	0
Arizona	4	0	0	122	78	142	70	8	170	1	0	0
Utah [2]	0	0	0	5	43	29	545	93	93	2	0	0
Nevada	0	0	0	-------	8	5	1	9	9	0	0	0
PACIFIC												
Washington	8	9	3	-------	4	7	881	129	180	3	6	6
Oregon	3	3	1	18	8	27	296	45	97	1	5	3
California	18	25	19	64	21	104	2,848	953	953	23	20	20
Total	325	261	265	5,532	3,998	4,744	28,440	3,688	21,511	202	284	284
10 weeks	3,898	3,160	2,951	165,882	43,198	49,557	122,429	20,173	136,443	[4]2,047	2,548	2,548

[1] New York City only.
[2] Period ended earlier than Saturday.
[4] Correction: Meningococcus meningitis, week ended Feb. 23, Rhode Island 1 case (instead of 0).

Telegraphic morbidity reports from State health officers for the week ended Mar. 9, 1946 and comparison with corresponding week of 1944 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [2]		
	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1940–44
	Mar. 9, 1946	Mar. 10, 1945		Mar. 9, 1946	Mar. 10, 1945		Mar. 9, 1946	Mar. 10, 1945		Mar. 9, 1946	Mar. 10, 1944	
NEW ENGLAND												
Maine	0	0	0	51	53	20	0	0	0	0	0	0
New Hampshire	0	0	0	3	9	9	0	0	0	0	0	0
Vermont	1	0	0	13	23	5	0	0	0	0	0	0
Massachusetts	2	1	0	219	376	381	0	0	0	3	2	1
Rhode Island	0	0	0	9	42	18	0	0	0	0	0	0
Connecticut	1	0	0	43	91	81	0	0	0	0	0	1
MIDDLE ATLANTIC												
New York	0	14	1	594	581	536	0	0	0	4	2	4
New Jersey	0	0	0	121	171	208	0	0	0	2	0	0
Pennsylvania	1	0	0	468	710	637	0	0	0	8	8	5
EAST NORTH CENTRAL												
Ohio	1	2	2	490	442	404	1	0	0	0	0	2
Indiana	2	0	0	129	152	152	1	0	1	0	3	2
Illinois	1	1	1	265	429	429	0	0	0	1	1	1
Michigan [3]	0	0	0	197	361	276	0	1	0	1	0	1
Wisconsin	0	0	0	173	319	319	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	0	0	0	58	115	110	0	0	0	2	0	0
Iowa	0	0	0	57	101	67	0	0	0	0	0	1
Missouri	0	0	0	75	100	123	0	1	1	1	1	1
North Dakota	0	0	0	11	38	26	0	0	0	0	0	0
South Dakota	0	0	0	17	16	22	0	0	0	0	1	0
Nebraska	0	0	0	39	81	40	0	0	0	1	0	1
Kansas	1	1	1	90	127	101	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	11	12	12	0	0	0	0	0	0
Maryland [3]	0	0	0	129	252	88	0	0	0	0	0	0
District of Columbia	0	0	0	36	65	26	0	0	0	1	0	0
Virginia	0	1	0	77	142	53	0	0	0	2	1	1
West Virginia	1	0	0	33	66	48	0	0	0	0	0	0
North Carolina	0	1	0	50	97	43	0	0	0	0	0	0
South Carolina	0	0	0	9	17	10	0	0	0	6	1	1
Georgia	0	2	0	16	34	23	0	0	0	3	2	2
Florida	[b] 3	0	0	7	7	7	0	0	0	2	1	2
EAST SOUTH CENTRAL												
Kentucky	0	1	1	59	40	76	0	0	0	0	0	1
Tennessee	1	3	0	28	97	97	0	0	0	1	2	2
Alabama	0	0	1	16	16	16	0	0	0	0	1	1
Mississippi [3]	1	1	0	8	47	15	0	2	0	3	2	2
WEST SOUTH CENTRAL												
Arkansas	[b] 0	0	0	2	27	13	1	2	2	1	1	1
Louisiana	2	1	0	10	13	7	0	0	0	3	3	3
Oklahoma	1	0	0	24	25	22	0	0	1	0	1	1
Texas	7	4	1	99	114	64	3	0	1	2	1	2
MOUNTAIN												
Montana	2	0	0	9	14	19	0	0	0	0	1	0
Idaho	0	0	0	8	58	8	0	0	0	0	0	0
Wyoming	0	0	0	33	94	23	0	0	0	1	0	0
Colorado	0	0	0	49	82	49	0	1	1	1	3	1
New Mexico	0	0	0	3	27	9	0	0	0	0	2	0
Arizona	0	0	0	18	31	17	0	0	0	0	3	1
Utah [3]	0	0	0	27	69	64	0	0	0	0	0	0
Nevada	0	0	0	0	17	4	0	1	0	0	0	0
PACIFIC												
Washington	1	0	1	38	95	39	0	0	0	0	0	1
Oregon	0	0	1	37	30	12	0	0	0	1	0	2
California	8	0	1	213	488	197	3	0	0	6	0	1
Total	37	33	19	4,171	6,413	5,036	9	8	16	56	43	53
10 weeks	[b] 443	373	276	32,501	54,810	39,658	72	94	207	423	568	734

[2] Period ended earlier than Saturday.

[3] Including paratyphoid fever reported separately, as follows: Massachusetts 2; New York 1; New Jersey 1; Georgia 1; Florida 1; Arkansas 1; Louisiana 1; Oregon 1.

[b] Correction: Poliomyelitis, week ended Mar. 2, Florida 18 cases (instead of 17); week ended Mar. 9, Arkansas 0 (instead of 1).

Telegraphic morbidity reports from State health officers for the week ended Mar. 9, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended Mar. 9, 1946							
	Week ended—		Median 1941–45	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	Mar. 9, 1946	Mar. 10, 1945		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine	12	24	30	1							1
New Hampshire		5	3								
Vermont	14	65	34								
Massachusetts	146	134	197		8						
Rhode Island	46	39	38								
Connecticut	69	67	67	1							2
MIDDLE ATLANTIC											
New York	220	261	361	5	7		2				3
New Jersey	154	123	123	3		3					
Pennsylvania	123	119	211				4				1
EAST NORTH CENTRAL											
Ohio	104	125	150	1							
Indiana	19	10	17				1				
Illinois	104	60	98	2			3				6
Michigan [2]	123	147	164							[4] 1	
Wisconsin	75	66	145						1		2
WEST NORTH CENTRAL											
Minnesota	9	20	59	1							5
Iowa	10	2	23								
Missouri	6	14	14								1
North Dakota			5								
South Dakota		1	6								3
Nebraska		14	14								
Kansas	73	49	49								7
SOUTH ATLANTIC											
Delaware	3	2	2								
Maryland [2]	23	41	45			1					
District of Columbia	4	2	6								
Virginia	35	44	74	1		12	1		2	1	
West Virginia	31	33	33								
North Carolina	55	95	122	5	3		2				
South Carolina	69	107	80	4	4				1	1	
Georgia	7	16	17		4				4	4	5
Florida	15	18	18	2			1			7	
EAST SOUTH CENTRAL											
Kentucky	25	30	42								
Tennessee	36	37	37			1	2		1		2
Alabama	11	19	22							7	2
Mississippi [2]									6	3	4
WEST SOUTH CENTRAL											
Arkansas	6	29	20	1	10				1		
Louisiana	10	5	3		2				1	3	2
Oklahoma	5	20	20		1						
Texas	219	313	256	6	246	47			7	12	10
MOUNTAIN											
Montana		5	6	1							
Idaho	12	4	4								
Wyoming	4	6	3					1			
Colorado	26	32	32		5						2
New Mexico	18	8	17			2					
Arizona	21	21	20			15					1
Utah [2]	26	27	37								
Nevada		1	6								
PACIFIC											
Washington	37	26	35								
Oregon	9	30	30								
California	97	298	298	3	7		3			1	7
Total	2,111	2,614	3,911	37	297	81	19	1	24	40	66
Same week, 1945	2,614			24	287	98	9	0	10	36	94
Average, 1943–44	2,814			48	244	78	11	[5] 0	13	[5] 32	
10 weeks; 1946	18,272			400	2,920	1,099	85	4	213	500	639
1945	23,430			270	5,354	1,379	66	4	208	547	854
Average, 1943–45	26,851		[5] 38,789	260	3,168	803	90	[5] 4	161	[5] 443	

[2] Period ended earlier than Saturday.
[4] Imported.
[5] 5-year median, 1941–45.

WEEKLY REPORTS FROM CITIES

City reports for week ended Mar. 2, 1946

This table lists the reports from 86 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		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis 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	3	0	0	7
New Hampshire:												
Concord	0	0	------	0	-------	0	5	0	1	0	0	------
Vermont:												
Barre	0	0	------	0	-------	0	0	0	0	0	0	------
Massachusetts:												
Boston	1	0	------	1	82	2	6	0	40	0	0	28
Fall River	0	0	------	0	1	0	2	0	2	0	0	5
Springfield	1	0	------	0	2	0	2	0	9	0	0	1
Worcester	0	0	------	0	25	0	9	0	8	0	0	4
Rhode Island:												
Providence	0	0	2	1	4	0	1	0	10	0	0	46
Connecticut:												
Bridgeport	0	0	------	0	-------	0	0	0	0	0	0	3
New Haven	0	0	2	0	16	0	4	0	3	0	0	1
MIDDLE ATLANTIC												
New York:												
Buffalo	1	0	------	0	114	0	5	0	7	0	0	19
New York	14	1	8	0	984	9	77	0	307	0	3	50
Rochester	0	1	------	0	309	0	:	0	11	0	0	5
Syracuse	0	0	------	0	428	0	3	0	4	0	0	1
New Jersey:												
Camden	0	0	------	0	59	0	0	0	0	0	0	1
Newark	0	0	------	0	649	0	3	0	8	0	0	26
Trenton	0	0	------	0	1	0	4	0	3	0	0	2
Pennsylvania:												
Philadelphia	0	0	5	2	971	6	28	0	66	0	1	14
Pittsburgh	2	0	2	0	3	2	6	0	16	0	0	5
Reading	0	0	------	2	352	0	1	0	1	0	0	30
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0	------	0	104	1	13	0	18	0	0	4
Cleveland	2	0	2	1	15	2	9	0	38	0	0	12
Columbus	1	0	1	1	4	1	2	0	13	0	0	5
Indiana:												
Fort Wayne	0	0	------	0	1	0	1	0	1	0	0	4
Indianapolis	7	0	------	0	308	0	4	0	22	0	0	16
South Bend	0	0	------	0	-------	0	0	0	3	0	0	1
Terre Haute	0	0	------	0	-------	0	3	0	4	0	0	------
Illinois:												
Chicago	0	0	3	1	1,196	10	34	0	74	0	0	53
Michigan:												
Detroit	6	1	4	0	1,572	6	15	0	48	0	0	35
Flint	0	0	------	0	10	0	2	0	5	0	0	3
Grand Rapids	0	0	------	0	85	1	0	0	7	0	0	3
Wisconsin:												
Kenosha	0	0	------	0	------	1	0	0	6	0	0	------
Milwaukee	0	0	1	1	434	1	6	0	34	0	0	23
Racine	0	0	------	0	1	0	1	0	4	0	0	1
Superior	0	0	------	0	-------	0	0	0	2	0	0	5
WEST NORTH CENTRAL												
Minnesota:												
Duluth	1	0	------	0	4	0	0	0	3	0	0	1
Minneapolis	2	0	------	0	16	2	4	0	15	0	0	------
St. Paul	2	0	------	0	2	0	4	0	11	0	0	------
Missouri:												
Kansas City	0	0	4	0	216	0	11	0	4	0	0	1
St. Joseph	0	0	------	0	15	0	0	0	0	0	0	------
St. Louis	2	0	3	0	53	0	8	0	23	0	0	1

City reports for week ended Mar. 2, 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												
Nebraska:												
Omaha	0	0	------	0	17	0	11	0	5	0	0	------
Kansas:												
Topeka	0	0	------	0	230	1	3	0	9	0	0	3
Wichita	0	1	------	0	51	0	4	0	6	0	0	5
SOUTH ATLANTIC												
Delaware:												
Wilmington	2	0	------	0	16	0	4	0	2	0	0	------
Maryland:												
Baltimore	7	0	2	2	202	6	8	0	43	0	0	8
Cumberland	0	0	------	0	------	0	0	0	4	0	0	------
Frederick	0	0	------	0	------	0	0	0	0	0	0	------
District of Columbia:												
Washington	0	0	1	0	124	0	5	1	25	0	0	6
Virginia:												
Lynchburg	0	0	------	0	4	0	1	0	1	0	0	8
Richmond	0	0	------	2	8	0	0	0	14	0	1	5
Roanoke	0	0	------	0	3	0	0	0	1	0	1	------
West Virginia:												
Wheeling	1	0	------	1	6	0	1	0	1	0	0	5
North Carolina:												
Raleigh	0	0	------	0	19	0	1	0	1	0	0	------
Wilmington	0	0	------	0	17	0	0	0	1	0	0	1
Winston-Salem	0	0	------	0	2	1	3	0	2	0	0	3
South Carolina:												
Charleston	0	0	10	0	14	0	0	0	0	0	0	2
Georgia:												
Atlanta	*0	0	1	1	1	0	1	0	5	0	1	4
Brunswick	0	0	------	0	1	0	1	0	0	0	0	------
Savannah	0	0	------	0	4	1	1	0	2	0	0	------
Florida:												
Tampa	0	0	------	0	33	2	6	0	0	0	0	2
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	4	1	35	0	14	0	9	0	0	1
Nashville	1	0	------	0	26	1	0	0	2	0	0	------
Alabama:												
Mobile	1	0	7	1	2	2	0	0	0	0	0	------
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	14	0	1	0	1	0	2	0	0	1
Louisiana:												
New Orleans	0	0	2	0	7	3	12	0	6	0	1	1
Shreveport	0	0	------	0	------	0	3	0	2	0	0	------
Texas:												
Dallas	0	0	1	1	------	0	6	0	1	0	0	------
Galveston	0	0	------	0	3	0	1	0	1	0	0	------
Houston	4	0	------	1	2	1	14	0	7	0	0	1
San Antonio	1	0	10	2	18	0	6	0	1	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0	------	0	------	0	0	0	1	0	0	------
Great Falls	0	0	------	0	1	0	1	0	0	0	0	------
Helena	0	0	------	0	------	0	0	0	0	0	0	------
Missoula	2	0	------	0	------	0	2	0	0	0	0	------
Idaho:												
Boise	0	0	------	0	2	0	0	0	0	0	0	------
Colorado:												
Denver	1	0	9	0	121	1	5	0	14	0	0	9
Pueblo	0	0	------	0	2	0	1	0	2	0	0	------
Utah:												
Salt Lake City	0	0	------	1	69	0	1	0	9	0	0	3

*Delayed report, Atlanta, 5 cases in prior weeks.

City reports for week ended March 2, 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	5	0	------	1	295	0	3	0	9	1	0	7
Spokane	0	0	4	1	110	0	4	0	5	0	0	4
Tacoma	0	0	------	0	29	0	1	0	2	0	0	8
California:												
Los Angeles	2	0	29	4	218	3	7	1	60	0	0	19
Sacramento	0	0	1	1	51	0	0	0	0	0	0	------
San Francisco	1	0	6	2	386	2	10	1	23	1	1	1
Total	71	4	138	32	10,166	68	420	3	1,112	2	9	524
Corresponding week, 1945	54	------	85	24	656	------	468	------	1,859	3	11	627
Average, 1941–45	68	------	308	[1] 44	[2] 5,155	------	[1] 502	------	1,685	1	13	797

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

Dysentery, amebic.—Cases: Boston, 2; New York, 3; Detroit, 1; Minneapolis, 1; Baltimore, 1.
Dysentery, bacillary.—Cases: New York, 1; Detroit, 2; Tampa, 1; Los Angeles, 1.
Dysentery, unspecified.—Cases: Cincinnati, 1; San Antonio, 2.
Tularemia.—Cases: New York, 1; Memphis, 1.
Typhus fever, endemic.—Cases: Savannah, 1; New Orleans, 2; Dallas, 1; Houston, 1; Los Angeles, 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1943, 33,941,400)

	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	5.2	0.0	10.5	5.2	340	5.2	78.4	0.0	199	0.0	0.0	248
Middle Atlantic	7.9	0.9	6.9	1.9	1,791	7.9	60.6	0.0	196	0.0	1.9	71
East North Central	10.4	0.6	6.7	2.5	2,287	14.1	55.2	0.0	171	0.0	0.0	101
West North Central	14.1	2.0	14.1	0.0	1,215	6.0	90.5	0.0	153	0.0	0.0	22
South Atlantic	16.7	0.0	23.4	10.0	760	16.7	53.6	1.7	171	0.0	5.0	74
East South Central	17.1	0.0	94.3	17.1	540	25.7	120.0	0.0	94	0.0	0.0	9
West South Central	14.3	0.0	77.5	11.5	89	11.5	123.4	0.0	57	0.0	2.9	11
Mountain	23.8	0.0	71.5	7.9	1,549	7.9	79.4	0.0	207	0.0	0.0	95
Pacific	12.7	0.0	63.3	14.2	1,722	7.9	39.5	3.2	157	3.2	1.6	62
Total	10.9	0.6	21.3	4.9	1,566	10.5	64.7	0.5	171	0.3	1.4	81

PLAGUE INFECTION IN SAN BENITO COUNTY, CALIF.

Under date of February 28, 1946, plague infection was reported demonstrated on February 23 in squirrels, species not stated, taken in San Benito County, Calif., as follows: In tissue from a lot of 11 squirrels and from another lot of 5 squirrels shot 5 miles and 7 miles, respectively, east of Tres Pinos.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended February 9, 1946.—During the week ended February 9, 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 Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		10		101	271	28	36	43	77	566
Diphtheria		9	6	16	9	1	1		1	43
Dysentery:										
Amebic					40					40
Bacillary				4					2	6
German measles		1		22	22			7	5	57
Influenza		228			139	1			39	407
Measles		43	14	293	1,286		4	9	39	1,688
Meningitis, meningococcus		1	1	3	3				3	11
Mumps				62	113	26	25	42	92	360
Poliomyelitis				1	1					2
Scarlet fever	2	6	5	112	80	14	4	6	25	254
Tuberculosis (all forms)		3	6	72	45	10	20	2	26	184
Typhoid and paratyphoid fever				5	1					6
Undulant fever				3						3
Venereal diseases:										
Gonorrhea		15	81	90	154	55	37	55	90	577
Syphilis		17	12	168	141	24	9	10	35	416
Whooping cough				127	39	1				167

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

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

CHOLERA

[C indicates cases; P, present]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January–December 1945	January 1946	February 1946—week ended—			
				2	9	16	23
ASIA							
Burma	C	[1] 2,871					
Rangoon	C	[2] 65	1				
Ceylon: Trincomalee District	C	19					
China: [3]							
Hupeh Province	C	129					
Kwangsi Province	C	1,266					
Kwantung Province	C	178					
Kweichow Province	C	906					
Shensi Province	C	49					

[1] For the months of July and August 1945.
[2] For the period May 1 to Dec. 31, 1945.
[3] Cholera was also reported present during August in the following Provinces of China: Chekiang, Honan, Hunan, and Kansu.

CHOLERA—Continued

[C indicates cases; P, present]

Place		January-December 1945	January 1946	February 1946—week ended— 2	9	16	23
ASIA—continued							
China—Continued							
Sikong Province	C	113					
Szechwan Province	C	14,748					
Chungking	C	8,000					
Yunnan Province	C	137					
India	C	268,884					
Bombay	C	101					
Calcutta	C	5,298	69	38		65	
Cawnpore	C	202					
Chittagong	C	19	1				
Delhi	C	318					
Madras	C	53	2				
Vizagapatam	C	31					
Indochina: Cochinchina	C	P					
Thailand (Siam): **Bangkok**	C						

PLAGUE

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

AFRICA							
Algeria	C	[1] 14					
Basutoland	C	4					
Bechuanaland	C	19	P				
Belgian Congo	C	[2] 28	2				
British East Africa:							
Kenya	C	93	6				
Uganda	C	6	7				
Egypt	C	225	5			1	3
Alexandria	C		1				3
Ismailiya	C	83					
Port Said	C	84				1	
Suez	C	26	4				
French West Africa	C	5					
Dakar	C	1					
Madagascar	C	181	27				
Morocco (French)	C	811					
Senegal	C	54					
Tunisia	C	3					
Union of South Africa	C	[3] 18					
ASIA							
Burma: **Rangoon**	C	[4] 21	2				
China:							
Chekiang Province	C	50					
Foochow	C	30					
Kiangsi Province	C	2					
Kirin Province	C	75					
Kwangtung Province	C	17					
Yunnan Province [5]	C	38					
India	C	26,846					
Iraq	C	34					
Palestine	C	46	9	1	1		
Plague-infected rats		42					
EUROPE							
France: Corsica—Ajaccio	C	8					
Great Britain: Malta	C	[6] 75		1			
Italy	C	28					
Portugal: Azores	C	55	4	[7] 5			
Spain: Canary Islands	C	1					
NORTH AMERICA							
Canada: Alberta Province: [8]							
Plague-infected squirrels		2					
SOUTH AMERICA							
Argentina:							
Buenos Aires Province—Plague-infected rats		2					
Santiago del Estero Province	C	2					
Tucuman Province	C	1					

See footnotes at end of table.

PLAGUE—Continued

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

Place		January–December 1945	January 1946	February 1946—week ended—			
				2	9	16	23
SOUTH AMERICA—continued							
Bolivia:							
Santa Cruz Department	C	[9] 79			12		
Tarija Department: Plague-infected rats							P
Brazil:							
Alagoas State	C	1					
Ceara State	C	7					
Pernambuco State	C	90					
Ecuador:							
Canar Province	C	10					
Chimborazo Province	C	6					
Loja Province	C	27					
Peru:							
Ancash Department	C	7	[4]				
Ica Department	C	[3] 5					
Lambayeque Department	C	13					
Libertad Department	C	11					
Lima Department	C	16					
Otuzco Department	C	3					
Piura Department	C	6					
Tumbes Province	C	32					
OCEANIA							
Hawaii Territory	D	[10] 1					
Plague-infected rats [11]		17	2				
New Caledonia: Loyalty Islands—Mare Island	C	[12] 60					

[1] Includes 4 cases of pneumonic plague.
[2] Includes 7 suspected cases.
[3] Includes 1 suspected case.
[4] For the period May 1–Dec. 31, 1945.
[5] Information dated July 5, 1945, stated that from April 1944 to May 1945, 85 deaths from plague had occurred in the mountainous region south of Kunming, China.
[6] Includes 4 suspected cases.
[7] Includes 3 suspected cases.
[8] During the month of June 1945, plague infection in fleas was reported in Alberta Province. For the week ended July 28, 1945, plague infection was also reported in 6 pools of fleas in Alberta Province. For the week ended Aug. 11, 1945, 2 pools of plague-infected fleas were reported in Alberta Province, Canada.
[9] Includes 6 suspected cases.
[10] Previously reported as a case, death occurring on June 2, 1945.
[11] Plague infection was also proved positive in a pool of 5 mice on Jan. 4, in a pool of fleas on Feb. 14, in a pool of 40 fleas on Mar. 14, and in a pool of 47 rats on Dec. 15, 1945.
[12] Pneumonic plague.

SMALLPOX

[C indicates cases; P, present]

AFRICA							
Algeria	C	209					
Angola	C	253					
Basutoland	C	362					
Belgian Congo	C	[1] 6,938	[1] 185	[1] 52	[1] 16	[1] 69	
British East Africa:							
Kenya	C	815	55	12	124	12	
Nyasaland	C	170	16	19	9		
Tanganyika	C	5,724					
Uganda	C	1,279	17	5			
Cameroon (French)	C	837	11		[2] 5		
Dahomey	C	330	65				[2] 213
Egypt	C	1,092	41	9	13		
French Equatorial Africa	C	1,715	69				
French Guinea	C	1,724	39				[2] 34
French West Africa: Dakar District	C	401	3				[2] 4
Gambia	C	82		1			
Gold Coast	C	914	208	112	98		
Ivory Coast	C	563	45				[2] 72
Libya	C	25	23	4	2		1
Mauritania	C	85					
Morocco (French)	C	2,673	418				[2] 319
Mozambique	C	1					

See footnotes at end of table.

SMALLPOX—Continued

[C indicates cases; P, present]

Place		January–December 1945	January 1946	February 1946—week ended— 2	9	16	23
AFRICA—continued							
Nigeria	C	4,764					
Niger Territory	C	638	57				[3] 77
Rhodesia:							
Northern	C	5,846	69	10			
Southern	C	16					
Senegal	C	504	6				[2] 5
Sierra Leone	C	106	23	36			
Somaliland, British	C	1					
Sudan (Anglo-Egyptian)	C	[4] 5	1	1			
Sudan (French)	C	3,004	786				[3] 213
Togo (British)	C	54					
Toto (French)	C	528	2				[3] 25
Tunisia	C	207	9				
Union of South Africa [5]	C	2,246	P	P	P	P	
ASIA							
Arabia	C	29					
Burma: Rangoon	C	[6] 81	74				
Ceylon	C	[7] 848	188	20		16	
China	C	1,530	50	33			
India	C	231,176					
Indochina (French)	C					25	
Iran	C	400					
Iraq	C	41	2				
Syria and Lebanon	C	14					
Thailand (Siam): Bangkok	C		P				
Trans-Jordan	C	2					
Turkey (see Turkey in Europe).							
EUROPE							
Belgium	C	1					
Czechoslovakia	C		24				
France	C	27	2				
Germany	C	3					
Great Britain:							
England	C	[8] 5			[9] 3	[9] 2	
Scotland	C	[10] 2					
Italy	C	2,724	130				[11] 34
Sicily	C	9					
Portugal	C	29		1			
Spain	C	31					
Canary Islands	C	1					
Turkey	C	297		1		2	3
NORTH AMERICA							
Canada	C	6		2			
Guatemala	C	4					
Honduras	C	8					
Mexico	C	1,426					
Nicaragua	C	[1] 141					
SOUTH AMERICA							
Argentina	C	6	2				
Bolivia	C	1,793					
Brazil	C	[1] 941	9		1		
Colombia	C	1,234	6	2			
Ecuador	C	40	4				
Paraguay	C	1					
Peru	C	230					
Uruguay	C	106					
Venezuela	C	[1] 970	[1] 159				

[1] Includes cases of alastrim.
[2] For the period Feb. 1–10, 1946.
[3] For the period Feb. 1–20, 1946.
[4] Includes 3 imported cases.
[5] For the week ended June 30, 1945, cases of virulent smallpox were reported in the Union of South Africa.
[6] For the period May 1 to Dec. 31, 1945.
[7] Includes some cases of chickenpox.
[8] Includes 2 imported cases.
[9] Imported cases.
[10] Includes 1 imported case.
[11] For the month of February

TYPHUS FEVER*

[C indicates cases; P, present]

Place		January–December 1945	January 1946	February 1946—week ended—			
				2	9	16	23
AFRICA							
Algeria	C	1,024					
Basutoland	C	120					
Belgian Congo [1]	C	1,091					
British East Africa: Kenya	C	40					
Egypt	C	15,767	247	71	82		
Eritrea	C	81	26	24	19	6	
French West Africa: Dakar [1]	C	20					
Gold Coast	C	1					
Libya: Tripolitania	C	43	6		1	1	2
Madagascar	C	1					
Morocco (French)	C	8,143	343				[2] 351
Morocco (Spanish)	C	8	1				
Nigeria	C	93					
Rhodesia, Northern	C	31					
Sierra Leone [1]	C	11	2				
Tunisia	C	403	6				
Union of South Africa	C	866	P		P	P	
ASIA							
China	C	2,182	6				
India	C	23					
Iran	C	826					
Iraq [1]	C	273	6	5	1		5
Palestine [1]	C	191					
Syria and Lebanon	C	15	27	1	1	1	
Trans-Jordan	C	47	1				
Turkey (see Turkey in Europe).							
EUROPE							
Albania	C	262					
Austria	C	56	9				
Belgium	C	158					
Bulgaria	C	979	52	29	40	52	
Czechoslovakia	C	621	234				
Denmark	C	162					
France	C	512		1			
Germany	C	8,025	184	89			
Gibraltar [1]	C	9					
Great Britain	C	[2] 26					
Malta and Gozo [1]	C	15					
Greece	C	697	30		20		6
Hungary.[4]							
Italy	C	198					
Netherlands	C	67					
Norway	C	8					
Poland	C	14,959	837		94		
Portugal	C	53	1				
Rumania	C	9,636					
Spain	C	27					
Sweden	C	226					
Switzerland	C	6					
Turkey	C	2,795	174	27	50	69	83
Yugoslavia	C	14,157					
NORTH AMERICA							
Canada [1]	C	1					
Costa Rica [1]	C	18	3	11	5		
Cuba [1]	C	13	3				
Guatemala	C	2,834					
Jamaica [1]	C	49	5	1	1		
Martinique [1]	C	1					
Mexico	C	1,687					
Panama (Republic)	C	6	1				
Puerto Rico [1]	C	180					
Virgin Islands [1]	C	13					
SOUTH AMERICA							
Argentina	C	9					
Bolivia	C	770					
Brazil	C	8					
Chile [1]	C	655					
Colombia	C	533					
Curacao	C	4					
Ecuador	C	594	106				

See footnotes at end of table.

TYPHUS FEVER—Continued

[C indicates cases; P present]

Place		January–December 1945	January 1946	February 1946—week ended—			
				2	9	16	23
SOUTH AMERICA—continued							
Paraguay	C	16	1				
Peru	C	771					
Venezuela [1]	C	144	13				
OCEANIA							
Australia [1]	C	116	15				
Hawaii Territory [1]	C	104	9				

*Reports from some areas are probably murine type, while others probably include both murine and louse-borne types.
[1] Reports cases as murine type.
[2] For the period Feb. 1–20, 1946.
[3] Includes imported cases.
[4] For the period Jan. 1 to Sept. 1, 1945, between 8,000 and 10,000 cases of typhus fever were reported in Hungary.

YELLOW FEVER

[C indicates cases; D, deaths]

AFRICA							
Gold Coast	C	[1] 13					
Nsawam	C	[2] 3					
Takoradi	C	1					
Tamale	C	[3] 1					
Winneba	C	[4] 4					
Ivory Coast:							
Gaoua	C	1					
Guiglo	C	1					
Sierra Leone: Moyamba	C	2					
Sudan (French): Bamako	C	[3] 1					
SOUTH AMERICA							
Bolivia:							
Beni Department	C	1					
La Paz Department	C	2					
Santa Cruz Department	D		[3] 39				
Brazil:							
Goiaz State	D	76					
Minas Geraes State	D	25					
Para State	D	1					
British Guiana: Kwakwani	C	1					
Colombia:							
Magdalena Department	D	3					
Putumayo Commissary	D	1					
Santander de Norte Department	D	19					
Peru:							
Cuzco Department	C	3					
Junin Department	C	[5] 6					
Loreto Department	C	1					
Venezuela:							
Bolivar State	C	1					
Merida State	C	3					
Tachira State	D	20		[6] 1	[6] 1		
Trujillo State	C		2		1		
Zulia State	C	8	1	3			

[1] Includes 4 suspected cases.
[2] Includes 2 suspected cases.
[3] Suspected.
[4] Includes 1 suspected case.
[5] Includes 3 suspected cases.
[6] Reported as a case.

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