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CURRENT PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES[1]

March 1–28, 1931

The prevalence of certain important communicable diseases, as indicated by weekly telegraphic reports from State health departments to the Public Health Service, is summarized in this report. The underlying statistical data are published weekly in the Public Health Reports under the section entitled "Prevalence of Disease."

Influenza.—For the aggregated States included, the reported cases for the 4-week period totaled 25,635, which was very nearly three times last year's figure for the corresponding season. During the preceding period this ratio stood at 3.9, the reported cases having totaled 41,548.

TABLE 1.—*Number of influenza cases reported in different geographic sections by 2-week periods in the winter and spring of 1930–31 and during the corresponding periods in 1929–30*

Region	2-week period ended—										
	Nov. 15, 1930	Nov. 29, 1930	Dec. 13, 1930	Dec. 27, 1930	Jan. 10, 1931	Jan. 24, 1931	Feb. 7, 1931	Feb. 21, 1931	Mar. 7, 1931	Mar. 21, 1931	Apr. 4, 1931
New England and Middle Atlantic:											
1930–31	70	69	67	113	642	3,546	3,396	1,776	748	401	196
1929–30	71	66	127	174	191	158	179	201	199	180	255
South Atlantic:											
1930–31	1,307	1,351	1,529	1,294	2,052	5,090	12,768	13,963	9,948	5,791	4,975
1929–30	1,558	1,451	2,271	1,879	2,832	2,508	2,698	2,510	2,619	2,211	2,143
East North Central:											
1930–31	82	112	128	111	148	472	1,237	1,834	2,243	1,609	683
1929–30	82	125	151	182	253	341	202	235	221	251	392
West North Central:											
1930–31	12	27	17	22	58	146	220	525	613	229	176
1929–30	20	45	36	36	87	141	124	94	60	42	44
East and West South Central:											
1930–31	349	422	453	502	991	1,510	2,271	2,879	2,609	2,967	2,771
1929–30	480	697	970	885	1,481	1,447	2,104	1,593	1,157	1,024	993
Mountain and Pacific:											
1930–31	94	114	197	227	242	302	555	1,032	1,454	1,532	888
1929–30	157	174	234	174	301	384	358	329	305	206	157
Total (all regions): *											
1930–31	1,914	2,095	2,391	2,269	4,133	11,066	20,447	22,009	17,615	12,529	9,689
1929–30	2,368	2,558	3,789	3,330	5,145	4,979	5,665	4,962	4,561	3,913	3,984

[1] 38 States, New York City, and the District of Columbia included.

* From the Office of Statistical Investigations, U. S. Public Health Service. The number of States included for the various diseases are as follows: Typhoid fever 47, poliomyelitis 48, meningococcus meningitis 48, smallpox 48, measles 45, diphtheria 47, scarlet fever 47, influenza 39 States and New York City. The District of Columbia is counted as a State in these reports.

Table 1 shows the number of cases by 2-week periods during recent months in comparison with the experience of last year. From this table it is evident that recovery had advanced farthest in the North Atlantic and North Central regions and that the two southern groups were still high at the end of the period, although there, also, the decline seems to have begun.

Poliomyelitis.—During the period of this report 87 cases of poliomyelitis were reported, which is about 20 per cent higher than the figure for the corresponding period of last year. Most sections of the country seem to be declining from the high rates of last autumn.

Meningococcus meningitis.—For the current period there were reported 682 cases of meningococcus meningitis, about 56 per cent of the figure for the corresponding period of last year. This favorable comparison was characteristic of all regions.

Typhoid fever.—For typhoid fever, also, the recent reports have been favorable. The reported cases totaled 475, or about 65 per cent of last year's figure for the comparable season.

Scarlet fever.—The reported current incidence of scarlet fever, 24,192 cases for the period under report, was about 11 per cent in excess of that for last year. The excess over last year has, during recent months, been apparent in all regions except the Mountain and Pacific and East and West South Central.

Measles.—During the current four weeks 69,621 cases of measles were reported, a figure 31 per cent in excess of last year's level for the period involved. This unfavorable comparison applies mainly to the Atlantic coast and the East North Central groups of States.

Diphtheria.—The low level of diphtheria in relation to past years continues. During the current period 4,036 cases were reported, which is approximately 75 per cent of last year's figure. The only region showing an excess over last year is the West North Central, and even there the excess is only about 5 per cent.

Smallpox.—For smallpox, also, the comparison with last year is favorable. The number of reported cases (3,750) is only 58 per cent of that for the corresponding period last year. All regions show a favorable picture in this regard.

Mortality, all causes.—The mortality from all causes in large cities reporting to the Census Bureau was 13.7 per thousand population, annual basis. Last year the rate was 13.5. During the four preceding years the rates for the corresponding period were 14.8, 14.6, 13.9, and 17.7, respectively. The current mortality, therefore, is relatively low in relation to recent years.

During the preceding four weeks of this year the rate was 14.2.

STUDIES ON MENINGOCOCCI ISOLATED IN THE UNITED STATES, 1928–1930

SEROLOGICAL CLASSIFICATION AND GEOGRAPHIC DISTRIBUTION

By SARA E. BRANHAM, *Bacteriologist*, CLARA E. TAFT, *Assistant Bacteriologist*, and SADIE A. CARLIN, *Laboratory Assistant*, *United States Public Health Service*

INTRODUCTION

Epidemic cerebrospinal meningitis was more prevalent in the United States during 1928, 1929, and 1930, than it has been at any other time since the World War. The most serious outbreaks have occurred in a scattered fashion and have usually shown no obvious relation to each other epidemiologically, though the general trend of the epidemic has been from the west coast eastward. Although Chicago, Detroit, and Indianapolis are in geographic proximity, the principal outbreaks in these cities were many months apart. The fatality rate throughout these three years has been high—as much as 50 per cent in some places—and serum therapy was not as efficacious in many localities as earlier experience with it had promised. A study of meningococci isolated from meningitis patients during this time has seemed an important step in approaching an understanding of this disappointing situation. We began our studies by trying to determine whether or not there are differences between the meningococci involved in these current cases and those which were prevalent during the epidemics of 10 years ago.

These studies have been made upon 235 strains of meningococci which have been received from a number of sources and through the cooperation of many people. All the strains have been isolated since June, 1928. Two hundred and fifteen are from spinal fluid, 5 from blood, and 15 from the nasopharynx. Table 1 lists these strains with their laboratory numbers, shows the dates on which they were received, the localities from which they were obtained, their source (i. e., whether from spinal fluid, blood, etc.), and their serological type as determined at the National Institute of Health.

TABLE 1.—*A list of the meningococci included in this study, with dates received, sources, and types as determined at the National Institute of Health*

No.	National Institute of Health No.	Time of reception	Locality	Sender	Source	Typing by agglutination	Typing by absorption necessary
1	100	May 21, 1928	New York City	Postgraduate Hospital.	Spinal fluid	I	Yes.
2	101	do	do	do	do	III	Yes.
3	102	do	do	do	do	III	Yes.
4	103	March, 1928	Washington, D. C.	Dr. J. W. Lindsay, Children's Hospital.	do	I	Yes.
5	104	Apr. 11, 1928	do	do	do	I	No.

TABLE 1.—*A list of the meningococci included in this study, with dates received, sources, and types as determined at the National Institute of Health*—Continued

No.	National Institute of Health No.	Time of reception	Locality	Sender	Source	Typing by agglutination	Typing by absorption necessary
6	105	Feb. 23, 1928	Newport, R. I	United States Naval Hospital.	Spinal fluid	I	No.
7	106	May 4, 1928	New York City	Postgraduate Hospital.	do	I	No.
8	107	do	do	do	do	I	No.
9	108	do	Cincinnati, Ohio	Dr. H. Amoss, Johns Hopkins.	do	I	No.
10	109	do	Baltimore, Md	Harriet Lane Home.	do	III	Yes.
11	110	May 18, 1928	Washington, D. C.	Dr. J. W. Lindsay, Children's Hospital.	do	I	Yes.
12	111	May 16, 1928	New York City	Postgraduate Hospital.	do	I	No.
13	112	June 14, 1928	San Francisco, Calif.	Dr. K. F. Meyer, Hooper Foundation.	do	I	Yes.
14	113	do	do	do	do	I	No.
15	114	do	do	do	do	I	Yes.
16	115	do	do	do	do	I	Yes.
17	116	do	do	do	do	I	Yes.
18	117	June 26, 1928	Detroit, Mich	Parke, Davis & Co.	do	III	Yes.
19	118	do	do	do	do	III	Yes.
20	119	do	do	do	do	III	Yes.
21	120	do	do	do	do	III	Yes.
22	121	do	do	do	do	III	Yes.
23	122	Summer of 1928.	Memphis, Tenn	Dr. A. D. Dulaney	Blood	II	No.
24	124	July 2, 1928	Washington, D. C.	Dr. J. W. Lindsay, Childrens' Hospital.	Spinal fluid	I	Yes.
25	125	Aug. 15, 1928	Chicago, Ill	Doctor Tonney, Chicago Department of Health.	Naso-pharynx	IV	No.
26	126	June 11, 1928	do	do	Spinal fluid	IV	No.
27	127	June 15, 1928	do	do	do	IV	No.
28	128	June 11, 1928	do	do	do	n. sp.[1]	No.
29	129	Aug. 15, 1928	do	do	do	n. sp.[1]	No.
30	130	June 11, 1928	do	do	do	I	No.
31	131	do	do	do	do	I	No.
32	132	do	do	do	do	I	No.
33	133	do	do	do	do	I	Yes.
34	134	do	do	do	do	II	Yes.
35	135	do	do	do	do	I	Yes.
36	137	do	do	do	do	I	Yes.
37	138	Aug. 15, 1928	do	do	do	IV	No.
38	139	do	do	do	do	III	Yes.
39	140	do	do	do	do	I	Yes.
40	141	do	do	do	do	III	Yes.
41	142	Nov. 17, 1928	Boston, Mass	Dr. E. Robinson, Massachusetts State Department of Health.	do	I	Yes.
42	143	Oct. 23, 1928	Lawrence, Kans	Dr. Noble Sherwood, University of Kansas.	do	I	Yes.
43	144	Oct. 2, 1928	San Francisco, Calif.	Dr. K. F. Meyer, Hooper Foundation.	do	I	No.
44	145	Nov. 20, 1928	Detroit, Mich	Parke, Davis & Co.	do	I	No.
45	146	do	do	do	do	III	Yes.
46	147	do	do	do	do	III	Yes.
47	148	do	do	do	do	I	Yes.
48	149	June 27, 1927	New York State	Board of health	do	II	No.
49	150	do	New Haven, Conn.	New York State Board of Health.	do	I	No.
50	151	do	New York State	Board of health	do	I	Yes.
51	152	do	do	do	do	I	No.
52	153	Dec. 29, 1928	Washington, D. C.	Dr. J. W. Lindsay, Children's Hospital.	do	III	No.
53	154	Dec. 16, 1928	San Pedro, Calif., U. S. S. Pennsylvania.	Naval Medical School.	do	III	Yes.

[1] This is a pigmented form which has been described as a new species, *Neisseria flavescens*, in a separate report. (Public Health Reports, Vol. 45, No. 16, Apr. 18, 1930, pp. 845-849.)

TABLE 1.—*A list of the meningococci included in this study, with dates received, sources, and types as determined at the National Institute of Health*—Continued

No.	National Institute of Health No.	Time of reception	Locality	Sender	Source	Typing by agglutination	Typing by absorption necessary
54	155	June 11, 1928	Chicago, Ill.	Doctor Tonney, Chicago Department of Health.	Spinal fluid	n. sp.[1]	No.
55	156	do	do	do	do	n. sp.[1]	No.
56	157	Aug. 15, 1928	do	do	do	n. sp.[1]	No.
57	158	do	do	do	do	IV	No.
58	159	do	do	do	do	n. sp.[1]	No.
59	160	do	do	do	do	n. sp.[1]	No.
60	161	Dec. 26, 1928	Twin Falls County, Idaho.	Mr. Saxon, Southern Idaho Laboratory.	do	I	No.
61	162	do	do	do	do	I	Yes.
62	163	Jan. 28, 1929	do	do	do	I	No.
63	164	do	do	do	do	I	No.
64	165	Feb. 16, 1929	Salt Lake City, Utah.	Utah State Board of Health.	do	I	Yes.
65	166	Feb. 18, 1929	do	do	do	I	Yes.
66	167	Feb. 16, 1929	do	do	do	I	Yes.
67	168	Feb. 18, 1929	do	do	do	I	Yes.
68	169	Oct. 19, 1928	New Orleans, La.	Doctor Duvall, Tulane University.	do	III	Yes.
69	170	Dec. 27, 1928	Massachusetts	State department of health.	do	I	Yes.
70	171	do	do	do	do	III	No.
71	172	do	do	do	do	I	No.
72	173	Jan. 12, 1929	Detroit, Mich.	Dr. J. F. Norton, Detroit Health Department.	do	II	No.
73	174	do	do	do	do	III	Yes.
74	175	Jan. 25, 1929	do	do	do	I	No.
75	176	do	do	do	do	I	No.
76	177	do	do	do	do	I	No.
77	178	do	do	do	do	I	No.
78	179	Jan. 12, 1929	do	do	do	I	No.
79	180	do	do	do	do	I	No.
80	181	Feb. 16, 1929	do	do	do	I	No.
81	182	do	do	do	do	I	No.
82	183	do	do	do	do	I	No.
83	184	do	do	do	Carrier	I	No.
84	185	Feb. 26, 1929	Salt Lake City, Utah.	Doctor Beatty, State Department of Health, Utah.	[2]	I	Yes.
85	186	do	do	do	[2]	I	Yes.
86	187	do	do	do	[2]	I	Yes.
87	188	February or March, 1929	Washington, D. C.	Dr. J. W. Lindsay, Children's Hospital.	Spinal fluid	I	No.
88	189	Feb. 16, 1929	Detroit, Mich.	Dr. J. F. Norton, Detroit Health Department.	do	I	Yes.
89	190	Mar. 9, 1929	do	do	do	I	Yes.
90	191	do	do	do	do	III	Yes.
91	192	do	do	do	do	I	Yes.
92	193	do	do	do	do	I	Yes.
93	194	do	do	do	do	I	No.
94	195	Mar. 11, 1929	do	do	do	I	Yes.
95	196	do	do	do	do	I	No.
96	197	do	do	do	do	I	No.
97	198	do	do	do	do	I	No.
98	199	do	do	do	do	I	Yes.
99	200	do	do	do	do	III	No.
100	201	do	do	do	do	I	Yes.
101	203	Mar. 18, 1929	Chicago, Ill.	Doctor Tonney, Chicago Health Department.	do	III	Yes.
102	204	Mar. 28, 1929	do	do	do	IV	No.
103	205	do	do	do	do	IV	No.
104	206	do	do	do	do	IV	No.
105	207	Mar. 22, 1929	do	do	do	III	Yes.
106	208	do	do	do	do	n. sp.[1]	No.
107	209	do	do	do	do	n. sp.[1]	No.
108	210	Mar. 28, 1929	do	do	do	IV	No.

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[2] No definite information obtained, but presumably from spinal fluid.

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No.	National Institute of Health No.	Time of reception	Locality	Sender	Source	Typing by agglutination	Typing by absorption necessary
109	211	Mar. 22, 1929	Chicago, Ill.	Doctor Tonney, Chicago Health Department.	Spinal fluid	IV	No.
110	212	Mar. 28, 1929	do	do	do	IV	No.
111	213	Mar. 22, 1929	do	do	do	IV	No.
112	214	Mar. 28, 1929	do	do	do	I	No.
113	215	do	do	do	do	IV	No.
114	216	do	do	do	do	IV	No.
115	217	Mar. 22, 1929	do	do	do	n. sp.[1]	No.
116	218	do	do	do	do	n. sp.[1]	No.
117	219	do	do	do	do	n. sp.[1]	No.
118	220	Mar. 28, 1929	do	do	do	IV	No.
119	221	Mar. 22 1929	do	do	do	n. sp.[1]	No.
120	222	Mar. 28, 1929	do	do	do	IV	No.
121	223	Mar. 22, 1929	do	do	do	n. sp.[1]	No.
122	224	Mar. 28, 1929	do	do	do	I	No.
123	225	Mar. 22, 1929	do	do	do	IV	No.
124	226	Mar. 28, 1929	do	do	do	I	Yes.
125	227	do	Detroit, Mich.	Parke, Davis & Co.	do	I	No.
126	228	do	do	do	do	III	Yes.
127	229	do	do	do	do	I	No.
128	230	do	do	do	Naso-pharynx of contact.	II	Yes.
129	231	do	do	do	Spinal fluid	III	No.
130	232	do	do	do	do	I	No.
131	233	do	do	do	do	I	No.
132	234	do	do	do	do	I	Yes.
133	244	Apr. 27, 1929	Kansas City, Mo.	Dr. J. F. Anderson, Squibb & Sons.	do	IV	No.
134	245	Apr. 18, 1929	Baltimore, Md.	Dr. Ann G. Kuttner, Harriet Lane Home, Johns Hopkins Hospital.	Blood	II	No.
135	246	Apr. 26, 1929	Massachusetts.	Dr. E. S. Robinson, Massachusetts, Department of Health.	Spinal fluid	I	Yes.
136	248	do	do	do	do	I	No.
137	249	May 29, 1929	Rocky Mount, N.C.	Isolated at National Institute of Health.	Naso-pharynx	II	Yes.
138	250	do	do	do	do	II	Yes.
139	252	Apr. 29, 1929	Washington, D. C.	Doctor Rice, Garfield Hospital.	Spinal fluid	III	Yes.
140	253	May 13, 1929	San Francisco, Calif.	Senior Surgeon J. C. Perry, San Francisco.	Brain at post-mortem.	III	No.
141	254	do	do	do	Naso-pharynx of carrier.	III	No.
142	255	do	do	do	do	III	No.
143	256	June 12, 1929	do	do	do	III	Yes.
144	257	June 14, 1929	do	do	do	III	Yes.
145	258	do	do	do	do	III	Yes.
146	259	July 15, 1929	Massachusetts.	Dr. E. S. Robinson, Massachusetts Health Department.	Spinal fluid	I	No.
147	260	July 30, 1929	do	do	Blood	I	No.
148	261	Sept. 13, 1929	Washington, D. C.	Dr. J. W. Lindsay, Garfield Hospital.	Spinal fluid	II	No.
149	268	Sept. 18, 1929	do	do	do	I	No.
150	270	Nov. 14, 1929	Baltimore, Md.	Johns Hopkins Hospital.	do	I	No.
151	271	Nov. 23, 1929	Cleveland, Ohio.	Dr. E. E. Ecker, Western Reserve University.	do	III	No.
152	277	Jan. 26, 1930	do	do	do	III	No.
153	279	Feb. 19, 1930	New Haven, Conn.	Mr. E. F. Voigt, Lederle Antitoxin Laboratory.	do	III	No.

[1] This is a pigmented form which has been described as a new species, *Neisseria flavescens*, in a separate report. (Public Health Reports, Vol. 45, No. 16, Apr. 18, 1930, pp. 845-849.)

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No.	National Institute of Health No.	Time of reception	Locality	Sender	Source	Typing by agglutination	Typing by absorption necessary
154	280	Feb. 19, 1930	New Haven, Conn.	Mr. E. F. Voigt, Lederle Antitoxin Laboratory.	Spinal fluid	III	No.
155	283	Feb. 24, 1930	Indianapolis, Ind.	Mr. Jamieson, Eli Lilly & Co.	do	III	Yes.
156	284	do	do	do	do	III	No.
157	285	do	do	do	do	III	No.
158	288	do	do	do	do	III	No.
159	290	do	do	do	do	III	No.
160	291	do	do	do	do	III	No.
161	292	do	do	do	do	III	No.
162	293	do	do	do	do	III	No.
163	302	March, 1930	do	do	do	III	No.
164	304	do	do	do	do	I	Yes.
165	305	do	do	do	do	III	Yes.
166	306	do	do	do	do	I	No.
167	307	do	do	do	do	I	Yes.
168	308	do	do	do	do	III	No.
169	309	do	do	do	do	III	No.
170	313	Apr. 10, 1930	do	do	do	III	No.
171	316	May 1, 1930	Memphis, Tenn.	Dr. A. D. Dulaney, University of Tennessee.	do	I	Yes.
172	318	do	do	do	do	III	No.
173	321	do	do	do	do	I	Yes.
174	323	do	do	do	do	III	No.
175	324	do	do	do	do	I	No.
176	325	do	do	do	do	I	No.
177	326	do	do	do	do	III	No.
178	327	do	do	do	do	I	No.
179	328	do	do	do	do	I	No.
180	330	do	do	do	do	I	No.
181	331	do	do	do	do	I	No.
182	332	do	do	do	do	I	No.
183	334	do	do	do	do	I	No.
184	335	do	do	do	do	I	No.
185	336	do	do	do	do	III	No.
186	337	do	do	do	do	III	No.
187	338	do	do	do	do	III	No.
188	339	do	do	do	do	III	No.
189	340	do	do	do	do	I	No.
190	341	do	do	do	do	III	No.
191	342	do	do	do	do	I	No.
192	343	do	do	do	do	I	Yes.
193	345	do	do	do	do	III	No.
194	347	do	do	do	do	I	No.
195	348	do	do	do	do	I	No.
196	350	do	do	do	do	I	No.
197	351	do	do	do	do	I	No.
198	352	do	do	do	do	I	No.
199	353	do	do	do	do	I	No.
200	354	do	do	do	do	III	No.
201	355	do	do	do	do	III	No.
202	356	do	do	do	do	III	No.
203	357	do	do	do	do	III	No.
204	358	do	do	do	do	III	No.
205	359	do	do	do	do	I	No.
206	361	do	do	do	do	I	No.
207	362	do	do	do	do	I	No.
208	364	do	do	do	do	I	No.
209	365	do	do	do	do	III	No.
210	366	do	do	do	do	III	No.
211	369	do	do	do	do	I	No.
212	370	do	do	do	do	III	No.
213	371	do	do	do	do	I	No.
214	372	do	do	do	do	I	No.
215	373	do	do	do	do	I	No.
216	374	do	do	do	do	I	No.
217	375	do	do	do	do	I	No.
218	376	do	do	do	do	III	No.
219	378	do	do	do	do	III	No.
220	379	do	do	do	do	I	Yes.
221	382	June 9, 1930	New Orleans, La.	Miss D. M. Douglas, Tulane University.	Blood	III	No.
222	383	do	do	do	(1)	II	No.

[1] No definite information obtained, but presumably from spinal fluid.

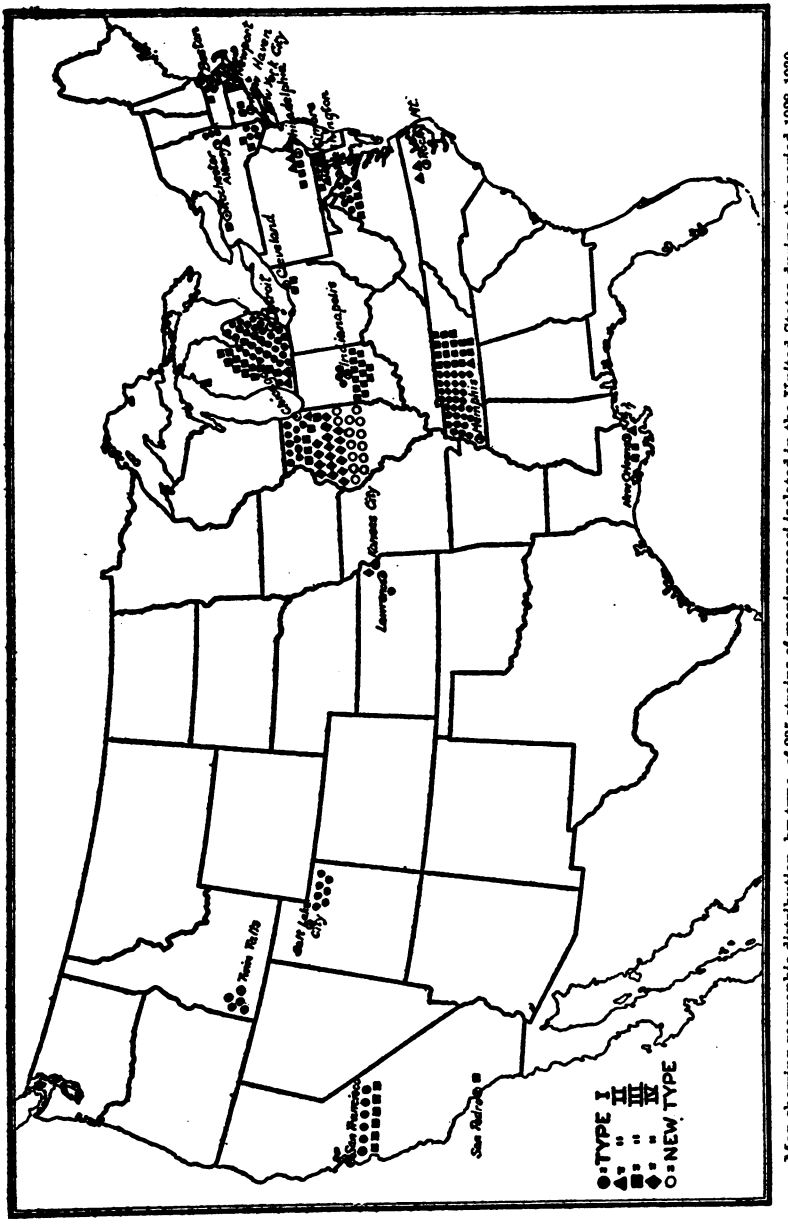
TABLE 1.—*A list of the meningococci included in this study, with dates received, sources, and types as determined at the National Institute of Health*—Continued

No.	National Institute of Health No.	Time of reception	Locality	Sender	Source	Typing by agglutination	Typing by absorption necessary
223	384	June 27, 1930	Detroit, Mich.	Parke, Davis & Co.	Spinal fluid	I	No.
224	385	do	do	do	do	I	No.
225	386	do	do	do	do	I	No.
226	387	do	do	do	Blood	III	No.
227	388	do	do	do	Spinal fluid	III	No.
228	389	do	do	do	Naso-pharynx	I	Yes.
229	391	Sept. 17, 1930	Philadelphia, Pa.	Dr. J. Zozaya, Mulford Biological Laboratory, Glenolden, Pa.	do	III	Yes.
230	392	do	do	do	do	II	Yes.
231	393	do	do	do	do	II	Yes.
232	394	do	do	do	do	II	Yes.
233	396	Nov. 1, 1930	Washington, D. C.	Isolated at National Institute of Health.	Spinal fluid	III	No.
234	402	Dec. 15, 1930	do	do	do	I	No.
235	403	Jan. 2, 1931	Rochester, N. Y.	Dr. J. A. Kennedy, Strong Memorial Hospital.	do	III	No.

These meningococci have been studied from many angles, but in this paper only their serological relationships, based on the agglutination and the absorption of agglutinin tests, will be discussed, because it is upon this basis that serum therapy in cerebrospinal meningitis depends in the United States at the present time.

Although meningococci are a homogeneous group morphologically and culturally, they show much variation serologically. Several classifications have been reported. Murray (1) presents a table in which he has worked out the interrelations of six classifications, based on the agglutination test. To these we must add a German classification (2) into seven types whose relation to these other groupings is entirely unknown. These do not take into account the classification into five tropin groups made by Evans (3) in 1920. To-day the Gordon-Murray classification (4) is finding wide use in England and America, while the A, B, C, D (5) classification of Nicolle, Debains, and Jouan is recognized in France. The English I and III correspond with the French A, and II and IV with the French B; but the French C and D do not correspond with any English type.

Gordon has reported his four groups to be as distinct from each other as the paratyphoid species A and B (6). At the other extreme it appears that Walker (7) believes there is no justification for splitting the meningococcus into subgroups. He claims that immunization by any type of meningococcus results in a polyvalent serum, and considers that such a subdivision into groups could be made with different strains of any bacteria. Between these two extremes are many opinions.



Map showing geographic distribution, by type, of 235 strains of meningococci isolated in the United States during the period 1928–1930

CLASSIFICATION OF NEW STRAINS

Both on account of the interest felt in the type distribution and as a basis for further studies of the types, our 235 new strains of meningococci have been typed, using the Gordon-Murray classification. Monovalent type sera were made by immunizing young rabbits with representative strains which have been used at the National Institute of Health as standard type strains for several years.

(A) DESCRIPTION OF TECHNIQUE

Sera were prepared by immunizing rabbits weighing about 1,500 grams with intravenous injections of freshly made suspensions of living meningococci in a manner similar to that used by Butterfield and Neill (8). The cultures were grown on 1 per cent glucose agar slants for 18 hours, suspended in buffered 0.85 per cent salt solution of pH = 7.6, diluted to approximately 1,000,000,000 meningococci per cubic centimeter (a turbidity of 500 when compared with silica standards) (9) and injected immediately. Usually one-half billion organisms per kilogram of rabbit were injected on each of three successive days; after three or four days' rest, three similar injections were made; after another three or four days' rest period, a third series of doses was given, the last two consisting of 1,000,000,000 meningococci. These nine injections were followed by a week of rest, after which time a sample of blood was taken from the ear and tested for agglutinins. Usually these nine injections resulted in very good agglutinating sera, though often a second series of nine injections was given in order to produce sera of higher titer. If the test bleeding indicated a sufficiently high agglutinin content, the rabbits were bled from the heart and the serum obtained preserved by adding 50 per cent of glycerine.

Antigens for agglutination and absorption of agglutinins were made according to the method described by Butterfield and Neill, except that we used 1 per cent glucose agar instead of the plain agar medium and suspended our organisms in salt solution that had been buffered with phosphates to the desired pH (10). Although we used antigens with a turbidity of 1,000 (2,000,000,000 meningococci per cubic centimeter) for absorption of serums, a turbidity of 500 was found to be much more satisfactory for simple agglutination tests, and all of the agglutination experiments described in this paper were done with antigens of that density.

In these simple agglutination tests, both with polyvalent and with type sera, six serum dilutions were regularly included, the final dilutions after the addition of the antigen being 1:50, 1:100, 1:200, 1:400, 1:800, and 1:1600. In addition, normal horse serum in dilutions of 1:50 and 1:100 was used. The dilutions were made with 0.85 per cent NaCl buffered with phosphates to obtain the desired pH. As a

rule, pH 6.6 was found to be most satisfactory for this work, though frequently it was found desirable to raise the pH for individual strains that showed a tendency to agglutinate spontaneously, or to lower it for strains that were agglutinable with difficulty. One-half cubic centimeter of the serum dilution and 0.5 cubic centimeter of the antigen made a total volume of 1 cubic centimeter in each tube. These were set up in copper racks and incubated in a water bath at 56° C. for 18 to 24 hours. In recording the results, complete agglutination was designated by the figure 4, lesser agglutination by 3, 2, and 1, and no agglutination by 0. In reading these tests, dependence was not placed entirely upon the clearness of the supernatant fluid in the tubes, since some strains tend to settle out; but the nature of the flocculum was examined as well. Since the serums were preserved in 50 per cent glycerine, the final titer of any given serum was twice that indicated in the test.

For absorption of agglutinins, the technique described by Butterfield and Neill was found quite satisfactory. Suspensions of meningococci with a turbidity of 1,000 were added to a 1:10 dilution of the serum to be absorbed in the proportion to make a serum dilution of 1:50 and incubated for 20 to 24 hours at 37° C. This mixture was then centrifuged at high speed until the organisms were thrown down, and the clear supernatant fluid was used to set up agglutination tests with the required antigens. Serum dilutions in such cases, after the addition of the antigen, were 1:100, 1:200, 1:400, 1:800, and 1:1600.

(B) GENERAL PROCEDURE

As the strains of meningococci were received, they were plated out on blood agar, the purity of the cultures was checked, and antigens were made as described above. All strains were then tested for agglutinability with polyvalent antimeningococcus serum from eight different manufacturers and with normal horse serum.

Then simple agglutination tests were made, running all strains with each of the four type sera. Absorption of agglutinin tests were done wherever they seemed to be indicated. Although no rigid criterion was adopted, these absorption tests were usually made with all strains which were agglutinated by a type serum in a dilution representing more than one-quarter of its titer.

(C) RESULTS WITH POLYVALENT SERA

About 50 per cent of these 235 strains were well agglutinated from the first by polyvalent therapeutic sera from all eight manufacturers. Some were agglutinated by several of these sera and not by others. Some were very poorly agglutinated at first, but became more agglutinable after a period of laboratory maintenance. None was agglutinated by normal horse serum. The only strains that have

never been agglutinated by any of these polyvalent sera are the 5.9 per cent which we have not been able to place in any of the four usual types. Apparently they are not represented in the Gordon-Murray classification, nor in the polyvalent therapeutic sera, if the agglutination test be taken as a criterion, although they form a homogeneous group among themselves. These strains, as a new species, *Neisseria flavescens*, have been described in more detail in another paper (11).

(D) RESULTS WITH TYPING SERA

The Type IV strains were easily separated from the others by these simple agglutination tests with representative sera. There was relatively little cross agglutination with other types and but slight evidence of the close relation to II referred to by many others. In this respect some of the IV strains that we have found in this country differ from a IV that has come from Doctor Gordon, through the kindness of Doctor Krumwiede, and, to a less extent, from one which we have received recently from Doctor Murray, which are typical of those which these investigators found in England during the 1915–1918 period.

TABLE 2.—*The relative serological independence of Type IV strains of meningococci*[1]

Number	Strain	Type I serum						Type II serum						Type III serum						Type IV serum						Saline control
		100	200	400	800	1600	3200	100	200	400	800	1600	3200	100	200	400	800	1600	3200	100	200	400	800	1600	3200	
1	125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	3	3	0	0
2	126	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	4	3	0	0
3	127	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	3	2	0	0
4	138	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	4	3	0	0
5	158	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	3	3	1	0
6	204	3	3	3	2	1	0	1	1	2	1	1	0	3	3	2	1	0	0	4	4	4	4	3	2	0
7	205	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	4	4	4	3	2	0	0
8	206	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	1	0	0
9	210	0	0	0	0	0	0	2	2	2	0	0	0	0	0	0	0	0	0	4	4	4	4	3	1	0
10	211	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3	1	0
11	212	1	1	1	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	4	4	4	3	2	1	0
12	213	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	3	3	2	2	2	1	0
13	215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	4	3	2	0
14	216	1	1	1	1	1	1	2	2	1	1	1	0	1	1	0	0	0	0	4	4	4	3	2	1	0
15	220	2	2	1	1	0	0	3	3	2	2	1	0	1	1	1	1	0	0	4	4	4	4	3	2	0
16	222	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1	0	4	4	4	4	3	2	0
17	225	0	0	0	0	0	0	2	2	2	0	0	0	0	0	0	0	0	0	3	3	3	3	2	0	0
18	244	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	2	1	0	0
19	Control I	4	4	4	4	4	3	1	1	1	1	1	0	4	4	3	2	1	0	0	0	0	0	0	0	0
20	Control II	0	0	0	0	0	0	3	3	3	3	3	2	1	1	1	1	0	0	0	0	0	0	0	0	0
21	Control III	2	2	1	1	0	0	2	3	3	1	1	0	4	4	4	4	3	2	0	0	0	0	0	0	0
22	Control IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	4	3	0	0
23	IV(Gordon)	2	2	2	1	1	0	3	3	3	2	2	3	2	2	1	1	0	0	4	4	4	3	3	2	0
24	IV(Murray)	1	1	0	0	0	0	2	2	2	0	0	0	0	0	0	0	0	0	4	4	4	3	2	1	0

[1] 4=complete agglutination; 0=no agglutination; 1, 2, and 3=varying degrees of agglutination.

Table 2 shows how easily the IV strains were separated from the other meningococci. Nine of these 19 IV strains showed no trace of cross agglutination with any other type; 4 showed a trace of relation to II; 5 showed traces of agglutination with I or III sera, as well as

II, but only 2 (strains 204 and 220) showed cross agglutination with all types to any significant degree. These two strains showed as much cross agglutination as the strain received from Doctor Gordon and more than the one received from Doctor Murray. The simple agglutination tests shown in this table were repeated several times with different lots of antigens and sera, each time with similar results. No absorption of agglutinin tests were needed in order to separate these Type IV strains from other meningococci.

Next to IV, the II strains were most easily recognized. Table 3 indicates that, while there is considerable cross agglutination between some II strains and those of other groups, this is not usually great enough to obscure the true type identity. Nevertheless, absorption was necessary with 4 of the 13 new II strains included in this report, because of the great amount of cross agglutination with the I serum. Cross agglutination with III was less common, and with IV it was least of all. This last observation is contrary to general opinion, since Types II and IV have usually been considered to be as closely related to each other as I and III.

TABLE 3.—*The relation of II strains to other groups of meningococci*

No.	Strain	Type I serum						Type II serum						Type III serum						Type IV serum						Saline control
		100	200	400	800	1600	3200	100	200	400	800	1600	3200	100	200	400	800	1600	3200	100	200	400	800	1600	3200	
1	122	2	2	0	0	0	0	4	4	4	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	134 [1]	4	4	4	4	3	0	4	4	4	4	3	0	4	4	4	0	0	0	0	0	0	0	0	0	0
3	149	0	0	0	0	0	0	3	3	2	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0
4	173	1	0	0	0	0	0	4	4	4	4	3	2	1	1	1	0	0	0	1	1	0	0	0	0	0
5	230	2	2	2	0	0	0	4	4	3	3	2	0	2	2	2	0	0	0	1	1	1	0	0	0	0
6	245	0	0	0	0	0	0	3	3	2	2	2	0	1	1	0	0	0	0	1	1	0	0	0	0	0
7	249 [1]	4	4	3	2	2	0	4	4	4	3	2	0	2	2	2	2	0	0	1	2	2	0	0	0	
8	250 [1]	3	3	3	2	0	0	4	4	4	3	2	0	1	1	1	0	0	0	1	1	0	0	0	0	0
9	261	2	2	2	1	0	0	4	4	4	3	2	0	3	3	2	2	0	0	3	3	2	0	0	0	0
10	383	0	0	0	0	0	0	4	4	4	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	392	2	2	1	1	0	0	3	3	3	2	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0
12	393 [1]	3	3	2	2	0	0	4	4	4	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0
13	394	2	2	2	1	1	0	3	3	3	2	1	0	1	1	1	1	0	0	1	1	1	0	0	0	0
14	Control II	0	0	0	0	0	0	3	3	3	2	2	0	3	2	1	0	0	0	0	0	0	0	0	0	0
15	II (Murray)	2	2	1	0	0	0	3	4	4	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	Control I	4	4	4	3	2	0	0	0	0	0	0	0	2	2	2	2	1	0	2	1	1	0	0	0	0
17	Control III	2	2	2	0	0	0	1	1	0	0	0	0	3	3	3	3	2	0	0	0	0	0	0	0	0
18	Control IV	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	3	3	3	3	1	0	0

[1] Absorption necessary.

The separation of the I and III strains from each other was often very difficult, and absorption of agglutinins was frequently necessary. Although many Type I strains were recognized as such in the simple agglutination tests, few Type III strains could be so easily identified. Since the great majority of strains included in this study are I's and III's, it is impossible to show the agglutination reactions of all, but Table 4 will suffice to illustrate some of the most common problems encountered in placing these I and III meningococci in these respective groups.

TABLE 4.—*Examples chosen to illustrate the most common types of behavior found in I and III meningococci*

No.	Strain	Type I serum						Type II serum						Type III serum						Type IV serum						Saline control	Type
		100	200	400	800	1600	3200	100	200	400	800	1600	3200	100	200	400	800	1600	3200	100	200	400	800	1600	3200		
1	102	4	3	2	1	0	0	3	2	2	1	0	0	4	3	2	1	0	0	0	0	0	0	0	0	0	(1)
2	103	4	3	2	1	0	0	0	0	0	0	0	0	4	2	2	0	0	0	0	0	0	0	0	0	0	(1)
3	104	3	4	3	3	2	0	3	2	0	0	0	0	3	2	0	0	0	0	1	1	0	0	0	0	0	I
4	108	4	4	4	3	1	0	1	1	1	0	0	0	3	2	0	0	0	0	1	0	0	0	0	0	0	I
5	109	4	4	4	3	3	1	3	3	1	0	0	0	4	4	4	3	1	0	0	0	0	0	0	0	0	(1)
6	111	4	4	4	4	4	3	1	1	1	0	0	0	4	2	1	0	0	0	0	0	0	0	0	0	0	I
7	116	4	4	4	2	0	0	2	0	0	0	0	0	4	3	3	1	0	0	0	0	0	0	0	0	0	(1)
8	117	4	4	4	3	1	0	4	3	3	2	1	0	4	4	3	3	2	1	1	0	0	0	0	0	0	(1)
9	121	4	4	3	3	2	0	4	4	3	2	1	0	4	4	4	4	1	0	2	1	0	0	0	0	0	(1)
10	130	4	4	4	4	3	2	2	1	0	0	0	0	4	4	2	0	0	0	0	0	0	0	0	0	0	I
11	140	4	4	4	4	2	1	3	3	2	1	0	0	4	4	4	2	2	0	1	0	0	0	0	0	0	(1)
12	141	3	3	1	0	0	0	3	2	1	0	0	0	4	4	4	3	3	2	1	0	0	0	0	0	0	III
13	146	3	3	2	0	0	0	3	3	2	0	0	0	4	4	4	4	3	2	2	1	0	0	0	0	0	III
14	154	2	0	0	0	0	0	2	2	1	0	0	0	3	3	3	3	2	0	1	1	0	0	0	0	0	III
15	169	4	4	4	3	1	0	4	4	3	1	0	0	4	4	4	4	2	0	0	0	0	0	0	0	0	(1)
16	170	3	2	1	1	1	1	1	1	0	0	0	0	3	2	1	1	0	0	1	1	1	0	0	0	0	(1)
17	171	2	1	1	1	0	0	1	1	0	0	0	0	4	3	3	2	1	1	1	0	0	0	0	0	0	III
18	176	4	4	4	3	0	0	1	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	I
19	200	1	0	0	0	0	0	1	1	0	0	0	0	3	3	3	2	1	0	0	0	0	0	0	0	0	III
20	252	3	3	3	2	1	1	2	1	1	0	0	0	3	3	3	2	1	1	0	0	0	0	0	0	0	(1)
21	259	3	3	3	2	1	0	0	0	0	0	0	0	2	2	0	0	0	0	1	1	0	0	0	0	0	I
22	277	0	0	0	0	0	0	0	0	0	0	0	0	4	4	2	0	0	0	0	0	0	0	0	0	0	III
23	283	4	4	4	2	1	0	0	0	0	0	0	0	4	4	4	2	0	0	0	0	0	0	0	0	0	(1)
24	284	0	0	0	0	0	0	2	1	0	0	0	0	4	4	4	4	3	1	0	0	0	0	0	0	0	III
25	Control I	4	4	4	4	3	1	2	2	1	0	0	0	4	3	3	0	0	0	0	0	0	0	0	0	0	------
26	Control II	1	1	1	1	0	0	4	4	4	4	3	3	2	2	2	1	1	0	0	0	0	0	0	0	0	------
27	Control III	3	3	3	1	0	0	1	1	1	0	0	0	3	4	4	4	4	3	0	0	0	0	0	0	0	------
28	Control IV	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	3	2	0	0	------

[1] Absorption necessary.

Occasionally we found a group of strains, isolated from cases associated in the same epidemic, which showed very nearly identical serological behavior, as, for example, those from Salt Lake City in 1929; but more often there was great variation in the cultures found in any given outbreak, for example, those from Chicago, 1928. Every imaginable degree of interrelationship between the types seems likely to occur. In general, we have found it possible to consider our Type I and III strains in three general groups, and examples of these are shown in Table 4. First, we find strains which can be easily typed by simple agglutination with our standard sera. (Strains 104, 108, 111, 130, 176, and 259 are plainly of Type I; strains 141, 146, 154, 171, 200, 277, and 284 are plainly of Type III.) Second, we found strains which agglutinated equally well with both Type I and III sera, but which could be easily identified by absorption of agglutinins from our type sera with these strains. Such strains are 103, 116, 140, 170, and 252. Third, we found strains which could not be identified by such absorption of our standard type sera, these strains removing all agglutinins from both the I and III sera. Examples of these are 102, 109, 117, 121, 169, and 283. The behavior of these second and third groups in absorption tests is shown in Table 5.

TABLE 5.—*Typing I and III meningococci by absorption of agglutinins from standard type sera with individual strains*

Antigen	Type I serum					Type II serum					Type III serum					Saline control	Reported
	100	200	400	800	1,600	100	200	400	800	1,600	100	200	400	800	1,600		
ABSORBED WITH 102																	
102	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	I or III (?).[1]
123 I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
55 II	0	0	0	0	0	4	3	3	3	2	0	0	0	0	0	0	
57 III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
ABSORBED WITH 103																	
103	0	0	0	0	0						0	0	0	0	0	0	I.
123 I	0	0	0	0	0						3	2	0	0	0	0	
57 III	0	0	0	0	0						4	4	4	2	1	0	
ABSORBED WITH 109																	
109	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	I or III (?).[1]
123 I	2	1	0	0	0	2	1	0	0	0	2	1	0	0	0	0	
55 II	0	0	0	0	0	4	4	3	2	1	0	0	0	0	0	0	
57 III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
ABSORBED WITH 116																	
116	0	0	0	0	0						0	0	0	0	0	0	I.
123 I	0	0	0	0	0						2	2	0	0	0	0	
57 III	0	0	0	0	0						4	4	4	2	1	0	
ABSORBED WITH 117																	
117	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	I or III (?).[1]
123 I	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	
55 II	0	0	0	0	0	4	4	3	2	1	0	0	0	0	0	0	
57 III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
ABSORBED WITH 121																	
121	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	I or III (?).[1]
123 I	0	0	0	0	0	2	2	0	0	0	2	1	0	0	0	0	
55 II	0	0	0	0	0	4	4	3	2	2	0	0	0	0	0	0	
57 III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
ABSORBED WITH 140																	
140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	I.
123 I	0	0	0	0	0	2	1	0	0	0	3	3	2	0	0	0	
55 II	0	0	0	0	0	4	4	3	2	1	0	0	0	0	0	0	
57 III	0	0	0	0	0	0	0	0	0	0	4	4	3	2	0	0	
ABSORBED WITH 169																	
169	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	I or III(?).[1]
123 I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
55 II	0	0	0	0	0	4	4	3	2	1	0	0	0	0	0	0	
57 III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

[1] Could not be identified by absorbing our standard type sera.

TABLE 5.—*Typing I and III meningococci by absorption of agglutinins from standard type sera with individual strains*—Continued

Antigen	Type I serum					Type II serum					Type III serum					Saline control	Reported
	100	200	400	800	1,600	100	200	400	800	1,600	100	200	400	800	1,600		
ABSORBED WITH 170																	
170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	I.
123 I	0	0	0	0	0	0	0	0	0	0	3	3	3	0	0	0	
55 II	0	0	0	0	0	3	3	3	3	2	0	0	0	0	0	0	
57 III	0	0	0	0	0	0	0	0	0	0	4	4	3	2	2	0	
ABSORBED WITH 252																	
252	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	III.
123 I	4	4	3	2	2	0	0	0	0	0	0	0	0	0	0	0	
55 II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
57 III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
ABSORBED WITH 283																	
283	0	0	0	0	0						0	0	0	0	0	0	I or III(?).[1]
123 I	0	0	0	0	0						0	0	0	0	0	0	
57 III	0	0	0	0	0						0	0	0	0	0	0	
UNABSORBED																	
102	4	3	2	0	0	1	0	0	0	0	4	3	2	0	0	0	
103	3	3	3	1	0						4	4	4	4	3	0	
109	4	3	3	1	0	3	3	3	0	0	4	3	3	1	0	0	
116	4	4	3	2	0						4	4	3	2	0	0	
117	4	3	3	1	0	3	3	3	0	0	4	3	3	2	0	0	
121	3	3	3	2	0	3	3	3	2	0	3	3	3	2	0	0	
140	4	3	3	2	1	4	3	3	2	0	4	4	3	1	0	0	
169	4	4	3	0	0	4	4	3	2	1	4	3	3	2	1	0	
170	4	3	3	2	0	4	3	3	3	0	4	4	3	3	2	0	
252	4	4	3	2	1	2	1	0	0	0	3	3	3	2	1	0	
283	4	4	4	4	2						4	4	4	2	1	0	
123 I	3	4	4	3	3	2	1	1	0	0	4	3	2	0	0	0	
55 II	2	2	1	0	0	4	3	3	2	1	2	2	0	0	0	0	
57 III	3	3	2	1	1	1	1	0	0	0	3	3	3	2	1	0	

[1] Could not be identified by absorbing our standard type sera.

The standard type sera that we used were made from strains which, while specific, are broadly agglutinogenic for their types—that is, a serum produced with each will agglutinate the majority of strains belonging to that type. "Broad" strains are more likely to show cross agglutination than "narrow" ones. "Narrow" strains, on the other hand, are frequently so highly specific that they are not agglutinated by sera prepared with some other strains belonging to the same type, nor, conversely, do sera prepared with these narrow strains agglutinate all other strains that have been shown to belong to that type.

Apparently the relation between some I and III strains (i. e., those of our third class mentioned above, of which 102, 109, 117, 121, 169, and 283 are examples) is so close that they can not be distinguished by means of absorption tests with sera prepared from broad strains. It was necessary to seek for strains of narrower specificity in order to

separate them. On the basis of experiments illustrated in Table 4, 176 was chosen as an example of a narrow I and 146 as a narrow III. When these puzzling strains were tested with sera made from strains 176 and 146, all six proved to be of Type III. This is shown in the first part of Table 6. In the latter part of this table the homologous strains and other known I and III strains are included to illustrate the action of these narrow sera. For example, serum made with strain 176 agglutinates 108 and 111 well, but does not agglutinate 103 and 104, although all four of these strains have been definitely shown to be of Type I in Tables 4 and 5.

TABLE 6.—*Action of sera prepared from "narrow" strains upon I and III meningococci which could not be separated in Table 5*

No.	Strain	Serum from strain 176 Type I						Serum from strain 146 Type III						Type
		100	200	400	800	1600	3200	100	200	400	800	1600	3200	
1	102	2	0	0	0	0	0	4	3	3	2	1	1	III
2	109	1	0	0	0	0	0	3	3	3	2	1	1	III
3	117	0	0	0	0	0	0	4	4	3	3	2	1	III
4	121	0	0	0	0	0	0	3	3	3	3	2	1	III
5	169	2	1	0	0	0	0	4	4	3	3	2	1	III
6	283	4	4	2	1	0	0	4	4	4	4	2	1	III
7	176	4	3	3	3	3	2	2	1	0	0	0	0	I
8	146	3	2	1	1	0	0	4	4	4	3	2	2	III
9	Control I	4	4	4	3	1	1	4	4	3	2	0	0	I
10	Control III	1	1	1	0	0	0	2	2	2	1	0	0	III
11	104[1]	1	1	1	0	0	0	1	1	0	0	0	0	I
12	111	4	4	4	4	4	3	2	2	1	0	0	0	I
13	108	3	4	4	4	4	2	3	2	0	0	0	0	I
14	103[1]	1	1	0	0	0	0	1	0	0	0	0	0	I

[1] Experiments done at the same time with our standard type sera proved that these suspensions were easily agglutinable when broader sera were used.

The behavior of these "broad" and "narrow" strains and of the sera prepared from them suggests that the usually recognized four main groups of meningococci, especially I and III, might be further divided into a possibly indefinite number of subgroups by using sera prepared with very narrow strains. Since the four main groups are not clear-cut and overlap to such an extent that some strains can be typed only with great expenditure of time and labor, further division into subgroups would make the typing of meningococci far more complicated than it is already.

The behavior of these "broad" and "narrow" strains further suggests that when the separation of I and III strains depends on the choice of narrow strains within each group as standards, a change to yet other narrow strains might alter their classification. That this can actually occur is shown in Table 7 in which strains 304, 321, 328, 335, 350, 357, and 366, are typed as I when sera prepared with 178 (I) and 146 (III) are used, and as III when sera prepared with 270 (I) and 153 (III) are employed. Conversely, strains 337 and 348 seem to be III with sera from 178 and 146, and I when sera from 270

and 153 are used. Strains 178, 146, 270, and 153, from which the sera were prepared, retained their original typing consistently.

TABLE 7.—*The apparent change in type of some strains of meningococci when a change is made in typing sera*

No.	Strain	Serum Ia (178)						Serum IIIa (146)						Indicated type	Serum Ib (270)						Serum IIIb (153)						Indicated type
		100	200	400	800	1600	3200	100	200	400	800	1600	3200		100	200	400	800	1600	3200	100	200	400	800	1600	3200	
1	304	4	4	4	3	1	0	4	4	1	0	0	0	I	0	0	0	0	0	0	4	4	3	2	0	0	III
2	321	4	4	4	3	3	1	4	4	4	2	1	0	I	3	3	2	1	0	0	4	4	4	3	2	0	III
3	328	4	4	4	4	3	2	4	4	4	2	0	0	I	3	3	2	0	0	0	4	4	4	3	2	0	III
4	335	4	4	4	4	3	0	4	4	3	1	0	0	I	1	1	1	0	0	0	4	4	4	4	2	0	III
5	337	2	2	1	1	0	0	4	4	4	4	3	0	III	3	3	3	3	3	0	3	3	3	2	0	0	I
6	348	4	4	4	4	2	0	4	4	4	4	4	3	III	4	4	4	4	4	3	4	4	4	2	2	0	I
7	350	4	4	4	3	1	0	4	4	4	1	0	0	I	0	0	0	0	0	0	4	4	4	3	1	0	III
8	357	4	4	4	3	2	1	3	3	2	1	1	0	I	2	2	2	1	0	0	4	4	4	3	2	1	III
9	366	4	4	4	4	3	1	4	4	3	1	0	0	I	4	4	4	0	0	0	4	4	4	4	3	0	III
10	178 (control)	4	4	3	3	3	2	2	2	1	0	0	0	I	4	4	3	3	2	1	3	1	0	0	0	0	I
11	146 (control)	3	3	2	1	0	0	4	4	4	4	3	2	III	3	3	3	2	2	0	4	4	4	4	3	2	III
12	270 (control)	4	4	3	2	1	0	2	2	1	0	0	0	I	3	3	3	2	1	0	1	1	1	0	0	0	I
13	153 (control)	2	2	0	0	0	0	3	3	3	3	0	0	III	2	2	2	1	0	0	3	3	3	2	2	0	III

Thus, differences in typing of the same strains in different laboratories can easily occur unless the type sera are prepared from strains sufficiently broad to be actually representative of that group. For example, meningococci 123, 267, and 178 are all Type I strains, but they are by no means just alike; 123 is so broad that serum made from it does not allow the separation of some I and III strains, even by absorption of agglutinins; 267 is a more highly specific I; 178 is such a narrowly specific I that sera prepared with it do not agglutinate some strains shown to be I by sera prepared with 267 or 123.

Our experience in typing these strains of meningococci makes us question the desirability of separating I and III into two groups. It seems here that III may be a subgroup of I, and it is considered as such by several classifications. Evans (12) found Types I and III to belong to the same tropin group. The time and labor involved in separating organisms as closely related as the I and III meningococci which have been prevalent in our recent epidemics, while of much interest from a theoretical point of view, seems of questionable practical value. On the other hand, the strains of Types II and IV which have been found during these same epidemics have been quite distinct.

The situation just described may not exist in other epidemics. It is possible that, while our outbreaks have been due to unusually broad strains, outbreaks at other times may be due to narrower strains which are as easily separable as we have found our II and IV strains to be.

(E) SUPPLEMENTARY TYPING

Since, when sera prepared with narrow strains are used for typing, a change in serum may give a change in results, it has seemed desirable to check our typing by more than one method. This was done in two ways: (1) By determining the agglutinability of these doubtful strains

with a number of different Type I and Type III sera prepared from both narrow and broad strains; and (2) by indirect typing, i. e., by immunizing rabbits with these doubtful strains and studying the agglutinative action of the resulting sera upon a number of strains of known type. This latter method of checking the typing was followed by us with nearly all our difficult strains.

(F) COMPARISON WITH ORIGINAL GORDON-MURRAY STRAINS

The fact that the type of some meningococci may seem to vary according to the strains chosen for preparing the type sera, made it seem important to compare our own standard type meningococci anew with strains representing the original classification of Gordon and Murray. Doctor Gordon had dried his original type strains *in vacuo;* and, when he learned of our studies, he generously placed these at our disposal. Doctor Murray kindly supplemented these antigens with cultures of the original strains which he has maintained in his laboratories. By immunizing rabbits with the dried antigens and with the cultures, sera have been obtained which represent the types as originally described by Gordon and Murray. With these sera we have checked, not only our standard cultures, but our entire collection of new strains, with the exception of a few which had been lost through laboratory accidents. The results have been interesting and illuminating. The fundamental differences that have been apparent in this general survey of our strains are as follows: (1) The original Type I was "narrower," or more specific, than the standard I's in general use in the United States, and, consequently, sera prepared from the dried powder given us by Doctor Gordon had fewer agglutinins for Type III strains, though there was, even then a considerable amount of overlapping. A very large number of the new strains isolated during our recent epidemics are typical Gordon-Murray I's. (2) The strains of IV obtained from both Gordon and Murray are "broader" than most of the IV strains found in the United States, and overlap a little more with other types than our own IV's. Most of the IV's that we have found in the United States form a narrow homogeneous group; and it has been suggested that our American group IV is different from the original IV described by Gordon and Murray. That a close relation exists between these American and English strains can be seen in Table 2, and it seems to us to be desirable to place all in group IV for the present. On the basis of the intensive work which we had already done, it has been a relatively simple procedure to check our entire collection with sera made from these English strains.

Thus, not only have most of our difficult strains been typed by at least three methods, but practically all have been finally confirmed by the sera prepared with materials representing the original type strains of Gordon and Murray.

(G) INAGGLUTINABLE STRAINS

Many strains seemed at first to be inagglutinable. These had to be considered individually. Some became readily agglutinable after several months of cultivation; with others an adjustment of the pH of the suspensions and serum dilutions nearer to the isolectric point for each individual strain solved the agglutination problem; sometimes it was necessary to plate out strains and to pick a number of colonies in order to obtain an agglutinable culture. Sometimes all these methods failed and it was necessary to resort to indirect typing by immunizing rabbits with these cultures and studying the agglutination activities of the sera thus obtained. In these ways we have succeeded in typing all of our meningococci.

(H) PRESENT TYPE DISTRIBUTION COMPARED WITH THAT OF FORMER YEARS

Table 8 shows the distribution of our 235 strains according to type, expressed in percentage. The first column shows the type distribution in the epidemic years 1918–19, as determined by Butterfield and Neill. Columns 2 and 3 show the distribution of types in two non-epidemic years as determined by Evans. Column 4 shows the distribution among the types during the epidemic years 1928–1930 as determined by ourselves. These typings are interesting to compare because they were done with practically the same technique, and the same four standard type strains of meningococci were used to prepare the type sera.

TABLE 8.—*Grouping of meningococci in the United States according to Gordon's types*

Type	1918–19 (128 strains)	1921 (16 strains)	1922 (15 strains)	1928–1930 (235 strains)
	Per cent	*Per cent*	*Per cent*	*Per cent*
I	37.5	18.7	6.7	50.2
II	25.8	18.7	----------	5.5
III	21.1	12.6	----------	31.4
IV	2.3	6.3	13.3	7.6
Not in above types	13.3	43.7	80.0	5.9

One hundred and ninety, or 81.6 per cent, of our strains fall into Groups I and III, which correspond to the French Type A. This is definitely a higher percentage than in the epidemics of 10 years ago. It is of interest to note that there is a low incidence at present of Type II, which has usually been next to I in frequency of occurrence. The increase in Type IV and the decrease in the number of strains which can not be placed in any type, as compared with previous epidemic years, are worthy of note. The majority of sporadic strains found during the interepidemic years of 1921 and 1922 were atypical and did not fall into any of the recognized types.

(I) THE GEOGRAPHIC DISTRIBUTION OF STRAINS ACCORDING TO TYPES

The geographic distribution of our 235 strains, with type indicated, is shown on the accompanying map. This map is obviously incom-

plete, for there have been many outbreaks from which we have obtained no cultures; but it represents the distribution of those strains which we were fortunate enough to receive. The localization of Type IV in the Middle West is striking, only one strain of this type being received from outside Chicago, and that one from Kansas City. In Chicago it seems to have been the dominant type.

It is also interesting to note that in small, definitely localized outbreaks all strains are alike in type; as, for example, Type I in Salt Lake City, Utah, and in Twin Falls County, Idaho, and Type II in Rocky Mount, N. C. The likeness of strains occurring in these small explosive outbreaks is far greater than is indicated by the fact that they have been "typed" alike. Our seven Salt Lake City strains are practically identical, crossing with Type II to a great extent. This close interrelation between Types I and II has not been commonly met in these studies, for a I and III relation has been the rule. Consequently it is interesting to note that we found very few such strains in the entire number studied—not more than 2 or 3 among those received from Illinois, Michigan, or Tennessee, and none among those from Indiana.

The first group of cultures received from Detroit (i. e., strains 117–121) have behaved in an identical manner throughout our studies, whereas those received later, and which were isolated during the same epidemic, have varied widely within the I and III groups. The San Francisco strains represent two different outbreaks, separated by one year; the first group received consisted of practically identical I's, and the second of equally similar III's. The Indiana strains were chiefly III's which might easily have been placed in several subgroups. Every possible intergradation between I and III seemed to occur among those from Tennessee. The Chicago strains were the most heterogeneous group of all, offering a number of variations of all four types, and *Neisseria flavescens* as well. Most of the Eastern strains represent more or less isolated cases, and great differences occur among them. Such observations upon strain variation become of considerable epidemiological interest when considered in connection with the slow and irregular progress of this 1928–1930 wave of meningococcus meningitis eastward from coast to coast.

SUMMARY

A serological study, based on agglutination and absorption of agglutinins, has been made of 235 strains of meningococci isolated during 1928–1930. At least 50 per cent of these were well agglutinated by the polyvalent sera prepared for therapeutic use by eight different manufacturers, and 40 per cent were agglutinable in less degree by most of these sera. The only strains which were not represented in any of these sera were the 14 (5.9 per cent) which have been described elsewhere.

These 235 strains of meningococci have been typed according to the Gordon-Murray classification, and their typing has been checked by comparison with original type strains received from Doctor Gordon and Doctor Murray. Of these, 118, or 50.2 per cent, were of Type I; 13, or 5.5 per cent, were II; 72, or 31.4 per cent, were III; 18, or 7.6 per cent, were IV; and 14, or 5.9 per cent, were not represented by any type in this classification.

The II and IV strains were easily separated from the others, but the I and III strains were often very difficult to identify, and even absorption of agglutinins sometimes failed to classify them. During the present epidemics these two groups have been so closely related that a change in strains used for preparing type sera can result in an apparent change of type in some strains within these groups. Thus, supplementary typing is often desirable, and this has been most satisfactorily done by means of monovalent sera prepared in rabbits with each individual strain.

The I and III strains have been predominant during our recent epidemics, more than 80 per cent of our cultures falling into these groups. A comparison of the grouping of our 1928–1930 strains with that of those studied during 1918–19 by Butterfield and Neill shows a marked increase in these groups, a strikingly low incidence of Type II, and a definite increase in Type IV, as well as a decline in the number of strains which did not fall into any of the recognized types. These groupings are in interesting contrast to those of the sporadic strains studied by Evans during interepidemic years, the majority of which could not be classified.

A map showing the geographic distribution of the 235 strains included in this study indicates that although small isolated outbreaks are often due to one type of meningococcus, more extensive epidemics may involve all varieties.

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OBSERVATIONS ON THE ASSAY OF THE ANTINEURITIC VITAMIN

Some of the Factors Involved in the Use of the Rat Method

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In a paper published in 1926, Goldberger, Wheeler, Lillie, and Rogers (1) presented a chart showing the development of polyneuritis in rats on a diet containing 27 per cent of autoclaved yeast. Only two of the four rats in that group showed signs of polyneuritis; the other two rats died without showing such signs. In another chart presenting the development of polyneuritis in rats on a diet containing 20 per cent of dried fresh beef, three of the four rats developed signs of polyneuritis. Because some of the rats died without showing such signs, the authors mentioned the rats as dying "with or without signs of polyneuritis."

In looking over some of Goldberger's unpublished data, we were impressed with the results of the following experiment:

Three groups, of four rats each, were placed on a basal diet [1] to which was added varying amounts of an antineuritic concentrate.[2] The diet of one group contained 0.35 per cent of the concentrate; that fed to the second group contained 0.25 per cent; while the diet of the third group contained only 0.125 per cent of the concentrate. The results obtained are shown herewith in Chart 1.

These results show that 0.25 per cent of the antineuritic concentrate in the diet was about sufficient for normal growth under these conditions, since on increasing the concentrate to 0.35 per cent there was only slight noticeable improvement. When the antineuritic concentrate was reduced to 0.125 per cent, all the rats ultimately developed polyneuritis. Inasmuch as the results of this experiment indicate that rats will develop signs of polyneuritis with a small amount of the antineuritic vitamin in the diet, it appears that the symptoms of polyneuritis in rats may be indicative of an insufficiency of the antineuritic

[1] This diet (300-C) had the composition shown in Table 1, but the casein was baked by means of a current of air heated by gas instead of in an electric oven, the temperature in this case being 120°-130° C., and the time of baking about 23 hours.

[2] In the preparation of this concentrate the preliminary treatment was essentially the same as that described by Goldberger (PUBLIC HEALTH REPORTS, vol. 41, p. 309, 1926), namely, an extract was prepared by intermittent percolation of whole white corn meal at room temperature with alcohol of 85 per cent by volume, until about 6.5 liters were obtained from 5 kilograms of the corn meal. But instead of concentrating in a distilling flask, the alcoholic extract, in this case, was treated with fullers' earth, which Seidell (5) has shown to have the property of adsorbing the antineuritic vitamin of brewers' yeast, and the adsorbed material was then extracted with N/10 NaOH, (about 800 c. c. per 100 gms.) by shaking in a shaking machine for about 15 minutes. The latter extract, after centrifuging, was adjusted to a pH of about 5.5, by means of hydrochloric acid, and again centrifuged. The solution was evaporated to dryness, under reduced pressure, at a temperature not exceeding about 70° C., the conditions being so adjusted that the time of heating of any portion of this solution did not exceed about two hours. The concentrate thus prepared is not entirely soluble in water, the insoluble residue corresponding to about 6 per cent In the tests here reported, however, only the soluble portion was used, although the dosages are expressed in terms of the weights of the total concentrate.

vitamin rather than its complete absence. It seems possible, therefore, to explain some of the failures to observe symptoms of polyneuritis in rats reported in the literature, as well as the partial failures such as those of Goldberger referred to above, as being probably due to the entire absence or the presence of a quantity of the antineuritic too small for this purpose. Of course, this explanation is to be considered only in instances where an adequate amount of the P–P factor is known to have been present in the diet.

Sandels (2) has recently reported similar results. Rats which were kept on his basal diet alone grew somewhat during the first 7 to 14 days, then rapidly declined, and died within 25 to 40 days. The majority of these rats became weak and unsteady on their feet but rarely showed characteristic symptoms of polyneuritis. On the

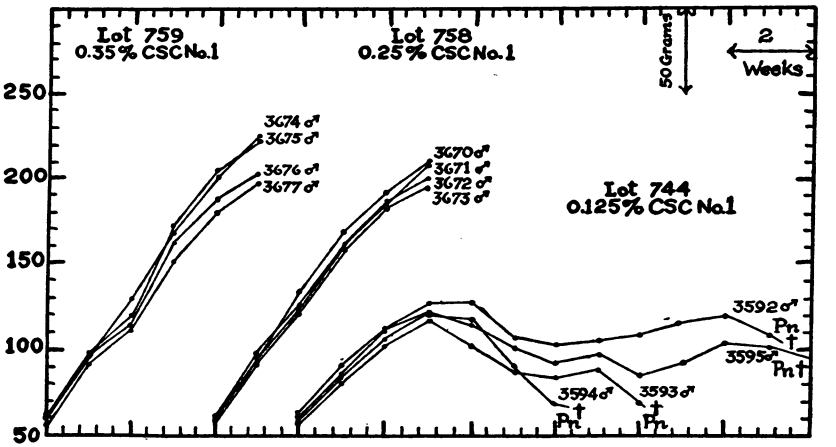

CHART 1.—Weight curves of three lots of young albino rats. The basal diet (300-C) was the same for all, but the proportion of added antineuritic concentrate varied, as indicated on the chart. All of the rats in the lot whose diet contained only 0.125 per cent of the antineuritic concentrate ultimately developed polyneuritis, indicated by "*Pn*." A plus sign (+) indicates death

other hand, rats which received the antineuritic vitamin in amounts which were measurable, but which were insufficient for protection, developed, almost without exception, typical symptoms of polyneuritis. Sandels points out that his work confirms the results of Hofmeister (3), who also found that certain of the polyneuritic symptoms are associated with shortage rather than complete absence of the antineuritic vitamin.

In testing antineuritic preparations on rats, Goldberger used both the preventive and curative [3] tests. Hofmeister (3) apparently used the curative test the most. It is evident, however, that in order to be able to utilize advantageously the curative method, it is of importance to know the conditions which favor the production of the

[3] PUBLIC HEALTH REPORTS, vol. 41, p. 310, 1926: "Evidently our alcoholic extract of maize contains an essential that cures polyneuritis in the rat."

polyneuritic symptoms. We were particularly impressed with the importance of the composition of the basal diet in this connection when we were not successful in regularly producing polyneuritic symptoms in rats which were fed a basal diet that was as free as practically possible from the antineuritic vitamin and which was known to be adequate in the P–P factor. This basal diet contained casein which, after being thoroughly leached with water (after the method of McCollum), was baked at 140° to 142° C. for 24 hours and purified further by means of alcohol and ether extractions, which

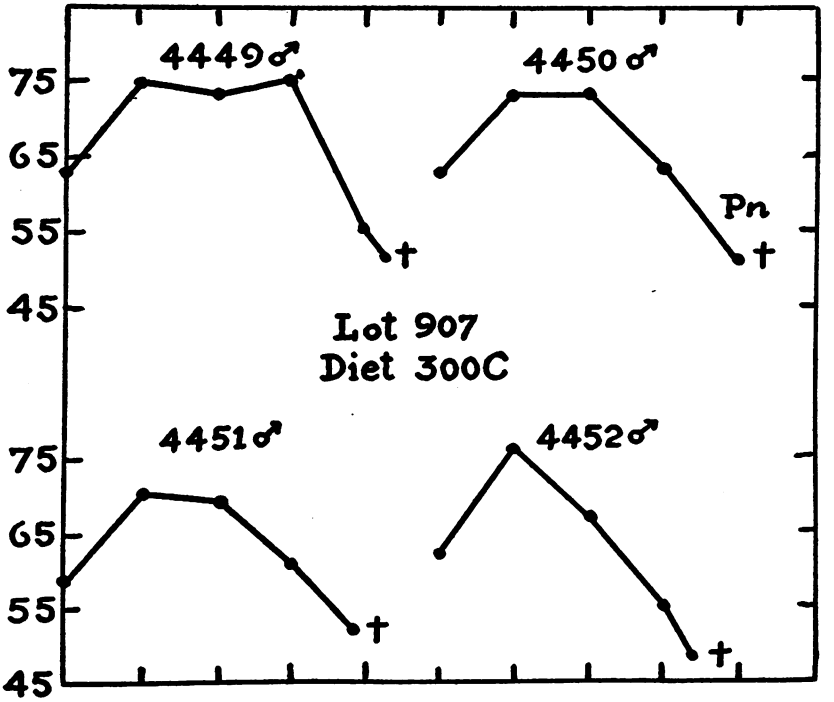

CHART 2.—Weight curves of four young albino rats on diet No. 300–C, the casein of which, after thorough leaching with acidulated water, was baked at 140°–142° C. for 24 hours and purified further by means of alcohol and ether extractions. Only one of these rats showed symptoms of polyneuritis, indicated by "*Pn.*" All of the other rats in this lot died without showing symptoms of polyneuritis. A plus sign (+) indicates death

would be expected to remove or destroy the residual antineuritic if any of it still remained after the leaching. We have referred to this material as "BEA" casein. The results obtained in feeding this diet (300–C) to a group of four rats are shown in Chart 2.

It will be seen that on this diet in the case of this particular group, only one of the four rats showed signs of polyneuritis, while the remaining three died without showing the polyneuritic symptoms.

That the failure to obtain a greater proportion of polyneuritic rats in this case was not due to an insufficient amount of the P–P factor

in the autoclaved yeast was indicated by results obtained when the latter was increased from 15 to 20 per cent of the diet. Out of 5 rats thus treated, 2 developed polyneuritic symptoms while the other 3 died without showing polyneuritis.

Experiments were therefore carried out using diets of various composition, with the object of ascertaining which were the most favorable for the production of the polyneuritic symptoms in rats. The composition of the diets used and the number of rats in each group which showed polyneuritic symptoms are given in Table 1.

TABLE 1.—*Composition of diets and proportion of rats showing polyneuritis*

Diet No.	Composition [1] of diets	Number of rats	Number showing polyneuritis	Number dying without showing polyneuritis
300–C	*Per cent* "BEA" casein 20.0 Autoclaved yeast 15.0 Cottonseed oil 3.0 Cod-liver oil 2.0 Salt mixture 4.0 Starch (cooked) 56.0	54	36	18
300–B	Same as 300–C, but having leached casein substituted for the "BEA" casein.	18	15	3
300–A	Same as 300–C, but having raw starch substituted for the cooked starch.	37	24	13
348	*Per cent* Leached casein 20.0 Autoclaved yeast 15.0 Cottonseed oil 10.0 Cod-liver oil 2.0 Salt mixture 4.0 Starch (cooked) 49.0	3	3	0
348–A	Same as 300–C, but having 10 per cent cottonseed oil instead of 3 per cent (reducing the starch correspondingly).	3	3	0
348–B	Same as 348, but having 10 per cent Crisco instead of the 10 per cent cottonseed oil.	4	4	0
348–C	Same as 348, but having raw starch substituted for the cooked starch.	4	3	1

[1] The leached casein is prepared by leaching with daily changes of acidulated water after McCollum (McCollum, Simmonds, Shipley, and Park: Bull. Johns Hopkins Hospital, vol. 33, p. 398).

The "BEA" casein is prepared by baking leached casein in an electric oven at 140°–142° C. for 24 hours. About 10 pounds are then packed in a metal percolator, wet with ether, and allowed to stand overnight. The following morning the ether is allowed to drip; fresh ether is added in the afternoon; and the process repeated for three days, or until the percolate is clear. The casein is then removed, air dried, repacked in the percolator with 95 per cent alcohol, and allowed to drip after standing overnight. This is repeated three times. At the end of the third day fresh alcohol is added and allowed to drip overnight. The casein is then removed and air dried.

The autoclaved yeast is prepared by autoclaving pure, dried bakers' or brewers' yeast for 2½ hours at 15 pounds pressure.

The raw starch is commercial cornstarch. The cooked starch is prepared by mixing 6 pounds of this starch with four liters of warm water until a uniform paste results. Fourteen liters of tap water are brought to a boil and the starch paste slowly added, with constant stirring. The stirring is continued until the mixture just boils. This is then dried in shallow pans in a current of warm air, and ground.

The salt mixture is prepared according to the method of Osborne and Mendel, J. Biol. Chem. 1919, vol. 37, p. 572.

With the diets other than 300–C ("BEA" casein), 300–B (leached casein), and 300–A ("BEA" casein), the number of rats observed is too small to be used as a basis for definite conclusions. It is believed, however, that in the case of diet 300–C, in which 54 rats were observed and 18 (or 33 per cent) died without showing polyneuritis, and in the

case of diet 300–A, in which 37 rats were used and 13 (or 35 per cent) died without showing polyneuritis, and in the case of diet 300–B, in which 18 rats were used and only 3 (or 17 per cent) died without showing polyneuritis, we are justified in concluding that the leached casein in the diet appears distinctly more favorable for the production of polyneuritis in rats than the "BEA" casein.

In applying the curative rat test for evaluating the potency of antineuritic concentrates, Smith (4) has recently described a method which is based on the intravenous injection of a solution of the concentrate. As has been pointed out by Smith, however, not all concentrates are suitable for intravenous injection and only such as are free from extraneous toxic substances may be administered intravenously. Inasmuch as some antineuritic concentrates are not toxic when given by mouth but may kill the rat when administered intravenously, this method of administration is often unsatisfactory. In order to make the curative rat test also applicable to material of this nature, we carried out experiments in which the solution of the antineuritic concentrate to be tested was injected subcutaneously or intraperitoneally. Hofmeister (3) appears to have used subcutaneous injections occasionally, but he warns against its general use since, according to him, it is liable to produce shock [4] and quickly kill the rat and, therefore, he prefers to incorporate the antineuritic substance into the diet. It seemed desirable, however, to find out to what extent subcutaneous or intraperitoneal injections could be used if care were taken to treat the rat with the antineuritic concentrate as soon as definite spasticity occurred. Accordingly, six antineuritic concentrates [5] were tested by this procedure. The general technique was as follows:

The rats used were all from the laboratory colony, which has been carried on two stock diets for several generations. Young rats, both male and female, were selected, usually weighing from 55 to 65 grams. The experimental animals were kept in individual metal cages having a ¾-inch wire mesh bottom. Food and water were kept constantly present, and the animals were weighed once a week until they began to decline in weight. They were then weighed and examined daily for symptoms of polyneuritis. The examination for symptoms of polyneuritis was made by quickly turning the animal on its back.

[4] Biochem. Zeit., 128, p. 548 (1922): "Bemerkenswert ist, dass der Tod der Tiere schon im ataktischen oder spastischen Stadium durch äussere Reize–z. B. eine subcutane Injektion–hervorgerufen werden kann. Es erinnert dies an die Tatsache, dass auch bei Menschen mit 'latenter Beriberi' durch Überanstrengung oder Traumen die schwersten Erscheinungen mit tödlichem Ausgang ausgelöst werden können. Ich habe durch einen derartigen 'Schock' so manches Tier bei Einbringung von antineuritischer Substanz verloren."

[5] The concentrates which are designated in Tables 2 and 3 as CSC No. 1 and CSC No. 2, respectively, were prepared as described in footnote 2 on p. 917 and represent different lots prepared at different times. Concentrates CA No. 1, CA No. 2, CA No. 3, and CA No. 4, referred to in Tables 4, 5, 6, and 7, respectively, were prepared from corn meal in a similar manner, by alcoholic extraction, and represent different fractions of the alcoholic extract. In these, however, the adsorption by fullers' earth was omitted.

This would frequently be sufficient to bring on a convulsive seizure with extension of the extremities, and in the more advanced cases rolling convulsive seizures. Unless a definite convulsive seizure could be elicited by this procedure the animal was considered as not having polyneuritis.

If a convulsive seizure could be elicited, the animal was given a suitable solution of the concentrate being tested, either subcutaneously or intraperitoneally. The animal was then observed in a similar manner for two days unless the polyneuritic symptoms disappeared earlier. If at the end of two days the convulsive seizures had not entirely disappeared the animal was considered as not recovered. The results obtained by the above procedure are given in the following tables:

TABLE 2.—*Results with antineuritic concentrate CSC No. 1*

Lot No.	Rat No. and sex	Weight of rat when treated	Mode of administration	Dose	Number of previous polyneuritic attacks	Gain in weight 1 day after treatment	Maximum gain in weight	Interval between treatment and maximum weight	Results	Duration of recovery
		Gm.		*Mgm.*		*Gm.*	*Gm.*	*Days*		*Days*
878	4275M	105	Subcutaneously	50	0	9	13	2	Recovered	12
		85	do	50	1	0	0	0	Died [1]	
	4277M	104	do	50	1	6	6	1	Recovered	13
		82	do	50	2	0	0	0	Died [1]	
879	4278M	59	do	50	5	10	20	5	Recovered	11
		71	do	50	8	8	11	2	do	11
		69	do	50	9	8	15	3	do	13
		59	do	50	11	11	15	2	do	6
895	4380M	54	do	50	0	4	15	5	do	15
		53	do	50	2	7	15	4	do	11
	4381M	52	do	50	0	6	10	3	do	15
896	4387M	50	do	50	0	7	17	3	do	13
	4385M	54	do	50	0	8	19	4	do	15
903	4431F	53	do	50	0	5	13	3	do	14
878	4277M	99	do	25	0	3	5	2	Not recovered	
	4278M	64	do	25	6	10	10	1	Recovered	2
		68	do	25	7	10	10	1	do	2
		63	do	25	10	7	13	3	do	6
895	4380M	56	do	25	1	6	10	4	do	10
		48	do	25	3	3	9	4	do	7
	4381M	48	do	25	1	2	7	3	do	9
	4382M	54	do	25	0	5	7	4	do	9
921	4514M		do	25	0				do	12
904	4435M	50	do	20	0	−2			Not recovered	
	4436M	48	do	20	0	−1			Died [1]	
	4437M	54	do	20	0	3	7	3	Recovered	11
895	4380M	46	do	15	4	−2			Not recovered	

[1] Moribund when treated.

TABLE 3.—*Results with antineuritic concentrate CSC No. 2*

Lot No.	Rat No. and sex	Weight of rat when treated	Mode of administration	Dose	Number of previous polyneuritic attacks	Gain in weight 1 day after treatment	Maximum gain in weight	Interval between treatment and maximum weight	Results	Duration of recovery
		Gm.		*Mgm.*		*Gm.*	*Gm.*	*Days*		*Days*
908	4454F	59	Intraperitoneally	40	2	4	13	16	Recovered	26
924	4537M	79	do	40	2	4	13	3	do	25
		72	do	40	3	6	18	4	do	20
		63	do	40	4	−1			Not recovered	
932	4567M	84	do	40	3	10	25	4	Recovered	13
		90	do	40	5	10	34	22	do	26
		98	do	40	4	−8			Not recovered	
945	4656M	71	do	40	1	6	21	6	Recovered	27
	4654M	85	do	40	2				do	24
	4653M	58	do	40	1	−2			Not recovered	
899	4399M	79	do	30	6	8	13	2	Recovered	9
906	4443F	50	do	30	3	−1			Not recovered	
916	4496M	50	Subcutaneously	30	0	5	10	3	Recovered	17
922	4518M	66	Intraperitoneally	30	1	7	14	3	do	12
924	4538M	52	do	30	0	0			Died [1]	
908	4455F	62	do	25	0	6	18	4	Recovered	22
918	4503M	48	do	25	1	5	11	3	do	15
		75	do	25	4	1	25	29	do	46
925	4540F	46	do	25	6	5	10	2	do	12
932	4567M	98	do	25	2	7	13	3	do	15
945	4653	62	do	25	0	4	12	5	do	14
	4654M	66	do	25	0	2	17	15	do	27
919	4508F	52	do	20	0	3	12	5	do	18
924	4535M	67	do	20	0	5	9	3	do	8
925	4540F	49	do	20	0	−1	3	3	do	7
		46	do	20	1	5	8	7	do	10
931	4566F	47	do	20	0	−2			Not recovered	

[1] Moribund when treated.

TABLE 4.—*Results with antineuritic concentrate CA No. 1*

Lot No.	Rat No. and sex	Weight of rat when treated	Mode of administration	Dose	Number of previous polyneuritic attacks	Gain in weight 1 day after treatment	Maximum gain in weight	Interval between treatment and maximum weight	Results	Duration of recovery
		Gm.		*Mgm.*		*Gm.*	*Gm.*	*Days*		*Days*
899	4399M	60	Subcutaneously	65	0	4	15	5	Recovered	8
918	4502M	61	Intraperitoneally	65	3	6	17	9	do	23
	4504M	49	do	65	4	0			Not recovered	
		68	do	65	0	8	23	14	Recovered	26
922	4518M	71	do	65	0	3	11	5	do	16
899	4399M	67	Subcutaneously	52	1	9	14	2	do	8
		65	do	52	2	10	15	2	do	8
908	4453F	46	do	52	0	−2			Not recovered	
918	4503M	64	Intraperitoneally	52	3	3	18	17	Recovered	25
924	4537M	62	do	52	1	1	36	32	do	51
906	4443F	52	do	45	2	−2			Not recovered	
	4448F	55	do	45	3	7	13	27	Recovered	36
910	4463F	56	do	45	2	6	17	26	do	44
918	4504M	56	do	45	3	0	6	5	do	8
921	4514M	63	do	45	4	−3			Not recovered	
925	4540F	48	do	45	3	3	6	2	Recovered	5
		48	do	45	4	4	7	2	do	6
894	4299M	65	Subcutaneously	39	0	6	10	2	do	6
	4300M	76	do	39	0	0			Not recovered	
899	4399M	66	do	39	1	4	4	1	do	
		78	Intraperitoneally	39	8	−2	2	2	do	
908	4454F	57	do	39	1	3	3	1	do	
912	4479M	70	do	39	0	−6			do	

TABLE 5.—*Results with antineuritic concentrate CA No. 2*

Lot. No.	Rat No. and sex	Weight of rat when treated	Mode of administration	Dose	Number of previous polyneuritic attacks	Gain in weight 1 day after treatment	Maximum gain in weight	Interval between treatment and maximum weight	Results	Duration of recovery
		Gm.		*Mgm.*		*Gm.*	*Gm.*	*Days*		*Days*
899	4399M	63	Subcutaneously	57	3	10	20	8	Recovered	9
906	4448F	46	do	57	1	3	14	12	do	31
910	4463F	46	do	57	0	3	14	11	do	26
912	4480M	42	do	57	0				Not recovered	
899	4399M	81	do	45	4	4	7	2	Recovered	8
908	4454F	48	do	45	0	5	22	43	do	53
916	4497M	41	do	45	0	0			Died [1]	
918	4502M	48	do	45	0	4	11	5	Recovered	12
	4503M	47	do	45	0	3	11	4	do	10
	4504M	51	do	45	0	3	16	11	do	22
921	4514M	65	Intraperitoneally	45	3	2	16	7	do	11
899	4399M	80	Subcutaneously	40	5	7	10	2	do	8
922	4516M	50	Intraperitoneally	40	3	−1			Not recovered	
932	4567M	93	do	40	0	1	9	4	Recovered	9
922	4517M	58	do	34	2	−4			Not recovered	

[1] Moribund when treated.

TABLE 6.—*Results with antineuritic concentrate CA. No. 3*

Lot. No.	Rat No. and sex	Weight of rat when treated	Mode of administration	Dose	Number of previous polyneuritic attacks	Gain in weight 1 day after treatment	Maximum gain in weight	Interval between treatment and maximum weight	Results	Duration of recovery
		Gm.		*Mgm.*		*Gm.*	*Gm.*	*Days*		*Days*
918	4502M	51	Intraperitoneally	50	1	5	13	3	Recovered	15
931	4564F	43	do	50	0	−1			Died [1]	
	4565F	47	do	50	0	3	7	2	Recovered	8
925	4540F	52	do	42	2	−6	3	3	do	10
906	4443F	54	do	33	0	4	8	3	do	8
921	4513M	59	do	33	1	−1			Not recovered	
	4514M	59	do	33	2	6	9	2	Recovered	3
924	4535M	66	do	33	2	4	8	2	do	6
	4536M	62	do	33	1	−2			Not recovered	
919	4508F	51	do	25	1	−4			do	
925	4540F	50	do	25	2	4	4	1	do	

[1] Moribund when treated.

TABLE 7.—*Results with antineuritic concentrate CA. No. 4*

Lot. No.	Rat No. and sex	Weight of rat when treated	Mode of administration	Dose	Number of previous polyneuritic attacks	Gain in weight 1 day after treatment	Maximum gain in weight	Interval between treatment and maximum weight	Results	Duration of recovery
		Gm.		*Mgm.*		*Gm.*	*Gm.*	*Days*		*Days*
899	4399M	72	Intraperitoneally	54	7	9	18	2	Recovered	10
921	4513M	63	do	54	0	9	17	4	do	10
	4514M	60	do	54	1	6	21	6	do	11
922	4516M	52	do	41	2	6	11	2	do	12
	4517M	55	do	41	1	5	10	3	do	13
933	4570F	56	do	41	0	0			Not recovered	
906	4443F	54	do	34	1	6	12	3	Recovered	16
	4448F	52	do	34	2	4	9	4	do	16
918	4503M	52	do	34	2	4	23	15	do	26
924	4536M	61	do	31	0	4	12	4	do	9
906	4444F	48	do	27	0	3	13	19	do	53
924	4535M	60	do	27	1	3	7	3	do	4
918	4502M	56	do	20	2	2	10	12	do	26
921	4515M	75	do	20	0	−3			Not recovered	
924	4537M	64	do	20	0	0	12	10	Recovered	22

Tables 2 to 7 show that as the dosage approaches the minimum curative amount some of the animals will be cured and others will not. There is also an occasional failure with doses which should have produced cures. This is the result ordinarily obtained when dealing with such biological methods, and means that we have to decide, more or less arbitrarily, on the minimum number of rats to use for a test and the minimum percentage recoveries which we may regard as giving a positive result. If we may tentatively choose three rats as the minimum number to use for a given dose and regard it as curative when there are at least two recoveries out of the three, or a minimum of 60 per cent recoveries if more than three rats are used, we would obtain the following figures, expressed in milligrams, as the minimum curative doses of the concentrates:

	Mgm.
CSC No. 1	25
CSC No. 2	20
CA No. 1	45
CA No. 2	40
CA No. 3	33
CA No. 4	20

Hofmeister [5] states that he did not succeed in curing rats that had more than two recurrences of the attack. Smith (4), however, reports rats which were cured after the sixth attack. As is indicated in the above tables, in our experiments some of the rats were cured after five or six previous attacks. One rat (No. 4278, Table 2) was cured after the eleventh attack. It probably would not be quite safe, however, to test a preparation on a group of rats all of which have had more than two or three previous attacks.

SUMMARY

Results are reported, which are in agreement with the experience of others, to the effect that the symptoms of polyneuritis in rats appear to be associated with shortage rather than complete absence of the antineuritic vitamin.

The curative method for testing antineuritic concentrates on rats may be applied by injecting a suitable solution of the concentrate, subcutaneously or intraperitoneally.

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(3) Hofmeister: Biochem. Zeit., vol. 128, 1922, pp. 540–556, and vol. 129, pp. 477–486.
(4) Smith, M. I.: Pub. Health Rep., vol. 45, 1930, pp. 116–129. (Reprint No. 1348.)
(5) Seidell, A.: Pub. Health Rep., vol. 37, 1922, p. 801. (Reprint No. 738.)

[5] Biochem. Zeit. vol. 129, p. 481 (1922): "Es ist mir nicht gelungen, mehr als 2 Rezidive erfolgreich zu bekämpfen."

DEATHS DURING WEEK ENDED MARCH 28, 1931

Summary of information received by telegraph from industrial insurance companies for the week ended March 28, 1931, and corresponding week of 1930. (From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce)

	Week ended Mar. 28, 1931	Corresponding week, 1930
Policies in force	75, 075, 351	75, 656, 614
Number of death claims	16, 129	15, 087
Death claims per 1,000 policies in force, annual rate	11. 2	10. 4

Deaths[1] from all causes in certain large cities of the United States during the week ended March 28, 1931, infant mortality, annual death rate, and comparison with corresponding week of 1930. (From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce)

[The rates published in this summary are based upon mid-year population estimates derived from the 1930 census]

City	Week ended Mar. 28, 1931				Corresponding week, 1930		Death rate [2] for first 13 weeks	
	Total deaths	Death rate [2]	Deaths under 1 year	Infant mortality rate [3]	Death rate [2]	Deaths under 1 year	1931	1930
Total (81 cities)	9,202	13. 5	813	[4] 64	13. 2	880	14. 0	13. 3
Akron	40	8. 1	5	49	7. 5	5	8. 6	8. 8
Albany [5]	41	16. 6	2	40	14. 7	5	15. 2	16. 6
Atlanta	70	13. 1	5	51	15. 9	8	16. 8	17. 4
White	36		4	63		4		
Colored	34	(6)	1	29	(6)	4	(6)	(6)
Baltimore [5]	248	15. 9	23	78	15. 1	13	17. 5	15. 7
White	185		16	69		10		
Colored	63	(6)	7	109	(6)	3	(6)	(6)
Birmingham	88	17. 0	9	91	16. 7	5	15. 5	14. 5
White	42		7	120		0		
Colored	46	(6)	2	49	(6)	5	(6)	(6)
Boston	218	14. 5	16	46	16. 5	30	16. 8	16. 1
Bridgeport	27	9. 6	1	17	17. 4	6	13. 3	14. 4
Buffalo	196	17. 6	27	110	14. 3	12	15. 5	14. 4
Cambridge	30	13. 7	1	20	16. 0	1	14. 2	14. 4
Camden	41	18. 0	6	105	19. 3	9	18. 7	15. 2
Canton	17	8. 3	1	23	10. 4	5	11. 1	11. 7
Chicago [5]	741	11. 2	62	55	10. 2	73	12. 0	11. 7
Cincinnati	150	17. 1	12	72	18. 1	9	18. 0	17. 6
Cleveland	240	13. 7	21	61	13. 2	23	12. 6	12. 4
Columbus	115	20. 3	6	59	15. 0	7	15. 1	15. 2
Dallas	72	13. 8	7		13. 1	9	12. 6	12. 7
White	46		5			7		
Colored	26	(6)	2		(6)	2	(6)	(6)
Dayton	52	13. 1	1	14	11. 6	5	14. 0	10. 6
Denver	92	16. 4	8	77	13. 9	11	16. 0	15. 6
Des Moines	34	12. 3	0	0	11. 3	1	12. 7	12. 9
Detroit	320	10. 4	39	62	9. 6	42	9. 7	10. 4
Duluth	19	9. 7	2	49	7. 2	2	12. 0	11. 4
El Paso	35	17. 4	7		15. 7	7	18. 7	18. 5
Erie	40	17. 7	1	19	9. 0	3	11. 6	11. 3
Fall River [5 7]	29	13. 1	7	159	16. 3	7	13. 9	14. 1
Flint	28	8. 9	3	38	11. 2	10	8. 2	10. 4
Fort Worth	40	12. 5	3		10. 5	0	12. 0	12. 4
White	31		3			0		
Colored	9	(6)	0		(6)	0	(6)	(6)
Grand Rapids	25	7. 6	3	44	14. 5	4	9. 8	11. 4
Houston	77	13. 0	4		11. 3	4	12. 0	13. 1
White	51		3			3		
Colored	26	(6)	1		(6)	1	(6)	(6)
Indianapolis	128	18. 0	5	41	17. 0	4	15. 8	16. 3
White	110		4	38		2		
Colored	18	(6)	1	67	(6)	2	(6)	(6)
Jersey City	80	13. 1	15	133	13. 6	7	13. 8	12. 7
Kansas City, Kans	24	10. 2	2	41	13. 2	4	15. 9	12. 7
White	21		1	25		3		
Colored	3	(6)	1	127	(6)	1	(6)	(6)
Kansas City, Mo	105	13. 4	9	68	14. 0	14	15. 6	14. 4
Knoxville	30	14. 3	6	128	26. 0	7	14. 5	16. 5
White	26		6	143		7		
Colored	4	(6)	0	0	(6)	0	(6)	(6)
Long Beach	34	11. 6	2	48	11. 6	1	10. 9	10. 7
Los Angeles	271	10. 7	27	78	13. 5	15	11. 9	12. 4

Footnotes at end of table.

Deaths[1] from all causes in certain large cities of the United States during the week ended March 28, 1931, etc.—Continued

City	Week ended Mar. 28, 1931				Corresponding week, 1930		Death rate [2] for first 13 weeks	
	Total deaths	Death rate [2]	Deaths under 1 year	Infant mortality rate [3]	Death rate [2]	Deaths under 1 year	1931	1930
Louisville	59	10.0	4	34	15.8	7	17.5	14.7
White	42		2	20		6		
Colored	17	(6)	2	133	(6)	1	(6)	(6)
Lowell [7]	31	16.0	3	76	11.9	2	15.1	15.5
Lynn	22	11.2	2	52	9.7	5	12.8	12.5
Memphis	110	22.2	9	95	18.1	11	18.3	18.1
White	53		2	33		5		
Colored	57	(6)	7	203	(6)	6	(6)	(6)
Miami	39	18.1	5	127	14.1	0	15.0	13.7
White	28		2	71		0		
Colored	11	(6)	3	265	(6)	0	(6)	(6)
Milwaukee	140	12.4	21	91	10.3	17	10.8	10.8
Minneapolis	120	13.2	8	52	10.1	4	12.5	11.5
Nashville	55	18.4	7	104	22.7	8	18.4	17.4
White	33		7	140		7		
Colored	22	(6)	0	0	(6)	1	(6)	(6)
New Bedford [7]	28	13.0	2	53	10.7	4	13.4	12.1
New Haven	43	13.8	0	0	14.7	4	13.7	15.1
New Orleans	168	18.7	14	77	17.3	10	19.8	19.6
White	105		10	83		6		
Colored	63	(6)	4	65	(6)	4	(6)	(6)
New York	1,685	12.4	140	58	12.8	194	13.6	12.2
Bronx Borough	238	9.3	22	50	9.3	28	9.8	8.7
Brooklyn Borough	572	11.4	51	54	11.9	71	12.7	11.3
Manhattan Borough	680	19.5	54	92	19.1	78	20.7	18.0
Queens Borough	155	7.0	11	30	8.1	14	8.8	7.9
Richmond Borough	40	12.8	2	36	12.8	3	14.4	15.1
Newark, N. J	99	11.6	14	73	12.1	16	13.9	14.2
Oakland	63	11.2	4	51	12.0	4	12.3	12.5
Oklahoma City	40	10.6	7	97	11.1	6	11.7	10.6
Omaha	73	17.6	4	45	13.9	5	15.3	14.4
Paterson	49	18.4	4	69	13.2	1	16.2	13.6
Philadelphia	582	15.4	62	90	14.5	57	16.2	14.0
Pittsburgh	226	17.4	19	66	16.5	25	18.1	15.8
Portland, Oreg	72	12.2	3	36	13.1	0	13.1	14.2
Providence	58	11.9	6	55	15.0	9	15.4	15.5
Richmond	62	17.5	5	73	14.2	4	17.9	16.5
White	36		3	66		2		
Colored	26	(6)	2	87	(6)	2	(6)	(6)
Rochester	90	14.1	5	46	14.1	8	14.1	13.0
St. Louis	283	17 8	24	81	13 8	8	18.4	15.2
St. Paul	71	13.4	4	41	11.5	4	11.9	11.4
Salt Lake City [5]	42	15.3	5	74	15.6	5	13.4	14.1
San Antonio	72	15.6	7		18.3	11	15.3	18.8
San Diego	44	14.7	2	41	16.4	3	15.7	16.1
San Francisco	164	13.2	4	27	11.9	5	14.9	14.1
Schenectady	28	15.2	2	59	11.4	4	11.9	11.6
Seattle	96	13.5	3	28	10.5	3	13.3	12.0
Somerville	10	5.0	0	0	16.0	5	11.2	12.8
South Bend	22	10.6	1	25	7.9	2	9.4	9.8
Spokane	26	11.7	2	52	16.7	2	13.4	13.4
Springfield, Mass	27	9.2	1	15	12.8	6	14.0	14.7
Syracuse	46	11.3	7	83	9.9	8	13.0	12.9
Tacoma	26	12.6	4	103	13.2	1	15.5	13.5
Toledo	88	15.5	10	92	13.8	8	13.8	14.2
Trenton	52	21.9	6	104	17.3	4	19.8	18.5
Utica	31	15.8	2	52	23.5	5	16.5	16.2
Washington, D. C	187	19.8	17	94	16.3	13	18.7	16.1
White	121		9	74		7		
Colored	66	(6)	8	138	(6)	6	(6)	(6)
Waterbury	23	11.9	3	90	9.9	1	11.4	11.3
Wilmington, Del. [7]	34	16.6	5	108	14.2	4	16.6	15.8
Worcester	49	13.0	2	27	15.2	3	15.1	15.5
Yonkers	29	10.9	3	79	8.9	1	10.8	9.1
Youngstown	32	9.7	3	42	9.8	5	11.8	10.9

[1] Deaths of nonresidents are included. Stillbirths are excluded.
[2] These rates represent annual rates per 1,000 population, as estimated for 1931 and 1930 by the arithmetical method.
[3] Deaths under 1 year of age per 1,000 live births. Cities left blank are not in the registration area for birth.
[4] Data for 76 cities.
[5] Deaths for week ended Friday.
[6] For the cities for which deaths are shown by color, the percentage of colored population in 1920 was as follows: Atlanta, 31; Baltimore, 15; Birmingham, 39; Dallas, 15; Fort Worth, 14; Houston, 25; Indianapolis, 11; Kansas City, Kans., 14; Knoxville, 15; Louisville, 17; Memphis, 38; Miami, 31; Nashville, 30; New Orleans, 26; Richmond, 32; and Washington, D. C., 25.
[7] Population Apr. 1, 1930; decreased 1920 to 1930; no estimate made.

PREVALENCE OF DISEASE

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

UNITED STATES

CURRENT WEEKLY STATE REPORTS

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

Reports for Weeks Ended April 4, 1931, and April 5, 1930

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended April 4, 1931, and April 5, 1930

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Apr. 4, 1931	Week ended Apr. 5, 1930	Week ended Apr. 4, 1931	Week ended Apr. 5, 1930	Week ended Apr. 4, 1931	Week ended Apr. 5, 1930	Week ended Apr. 4, 1931	Week ended Apr. 5, 1930
New England States:								
Maine	4	1	13	11	64	30	0	1
New Hampshire	----	2	----	3	54	16	0	0
Vermont	1	2	----	----	1	51	0	0
Massachusetts	33	82	9	13	461	1,099	1	10
Rhode Island	3	2	4	----	31	2	0	0
Connecticut	5	11	9	7	542	31	0	0
Middle Atlantic States:								
New York	107	122	[1] 52	[1] 58	2,244	1,401	14	22
New Jersey	43	113	8	19	771	1,275	2	8
Pennsylvania	77	136	----	----	3,764	1,412	14	17
East North Central States:								
Ohio	47	56	61	15	800	738	4	8
Indiana	29	32	57	----	1,341	80	13	18
Illinois	122	151	71	23	1,647	691	22	16
Michigan	28	38	21	2	119	1,571	6	39
Wisconsin	11	13	102	36	571	656	4	4
West North Central States:								
Minnesota	12	10	2	1	61	309	1	1
Iowa	2	9	----	----	30	512	1	9
Missouri	21	23	58	12	400	113	14	18
North Dakota	9	8	----	----	37	17	1	1
South Dakota	5	12	1	1	62	69	0	0
Nebraska	9	11	8	----	9	501	0	3
Kansas	7	11	7	2	30	629	4	4
South Atlantic States:								
Delaware	----	2	2	----	170	9	0	0
Maryland [2]	15	23	33	33	1,226	42	5	1
District of Columbia	7	9	4	1	327	8	4	0
Virginia	----	----	----	----	----	----	----	3
West Virginia	18	17	87	42	114	88	1	1
North Carolina	29	21	92	14	939	33	2	10
South Carolina	17	10	1,364	926	121	----	4	2
Georgia	5	7	706	85	136	215	2	2
Florida	8	10	10	----	171	396	0	1
East South Central States:								
Kentucky	----	----	----	----	188	61	4	1
Tennessee	4	6	186	66	202	63	1	----
Alabama	15	13	451	147	441	242	10	6
Mississippi	9	10	----	----	----	----	0	12

[1] New York City only.

[2] Week ended Friday.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended April 4, 1931, and April 5, 1930—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Apr. 4, 1931	Week ended Apr. 5, 1930	Week ended Apr. 4, 1931	Week ended Apr. 5, 1930	Week ended Apr. 4, 1931	Week ended Apr. 5, 1930	Week ended Apr. 4, 1931	Week ended Apr. 5, 1930
West South Central States:								
Arkansas	5	3	307	44	50	25	1	6
Louisiana	22	28	48	13	4	86	2	1
Oklahoma [3]	6	13	106	78	45	597	0	4
Texas	26	62	72	200	98	178	0	3
Mountain States:								
Montana	4				2	4	3	2
Idaho	1	4	18		5	14	0	2
Wyoming	1				3	67	0	1
Colorado	10	8			273	728	0	0
New Mexico	4	8	17		69	94	1	3
Arizona	3	10	145	1	71	34	1	3
Utah [3]	1	1	4	4	3	228	0	20
Pacific States:								
Washington	5	8	5		56	446	1	7
Oregon	5	9	130	26	65	93	1	1
California	57	54	134	28	1,273	2,216	10	12

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Apr. 4, 1931	Week ended Apr. 5, 1930	Week ended Apr. 4, 1931	Week ended Apr. 5, 1930	Week ended Apr. 4, 1931	Week ended Apr. 5, 1930	Week ended Apr. 4, 1931	Week ended Apr. 5, 1930
New England States:								
Maine	[4] 2	1	20	52	0	0	0	3
New Hampshire	1	0	1	22	0	0	0	2
Vermont	0	0	2	22	0	1	0	0
Massachusetts	2	2	392	294	0	0	4	6
Rhode Island	0	0	58	17	0	0	0	0
Connecticut	0	0	59	117	0	0	0	1
Middle Atlantic States:								
New York	2	0	970	605	3	4	9	19
New Jersey	0	1	270	244	0	0	2	2
Pennsylvania	0	1	569	546	0	2	8	13
East North Central States:								
Ohio	0	1	509	337	90	215	8	14
Indiana	1	0	353	176	111	174	7	1
Illinois	1	1	560	519	60	174	4	2
Michigan	1	0	202	310	9	72	3	2
Wisconsin	0	1	144	167	3	22	1	3
West North Central States:								
Minnesota	2	0	94	127	1	2	4	1
Iowa	0	0	78	76	63	111	1	0
Missouri	0	0	388	119	31	48	0	2
North Dakota	0	0	22	44	7	18	0	1
South Dakota	0	0	31	15	17	33	0	0
Nebraska	1	0	52	86	46	51	0	0
Kansas	1	0	42	113	124	131	0	4
South Atlantic States:								
Delaware	0	0	41	12	0	0	0	1
Maryland [3]	0	1	85	127	0	0	4	3
District of Columbia	0	0	23	17	0	0	0	0
Virginia								
West Virginia	0	0	39	40	22		5	6
North Carolina	1	1	42	28	2	22	4	2
South Carolina	1	3	8	11	6	0	5	6
Georgia	0	0	71	23	0	0	3	1
Florida	0	0	7	3	2	0	0	0
East South Central States:								
Kentucky	0	0	108	59	3	21	3	7
Tennessee	0	1	39	37	4	6	2	7
Alabama	0	0	35	15	11	7	9	3
Mississippi	0	0	22	5	92	9	4	4
West South Central States:								
Arkansas	0	0	21	10	14	12	2	3
Louisiana	0	0	18	18	28	3	3	7
Oklahoma [3]	1	0	26	37	113	116	3	4
Texas	0	1	45	54	39	162	0	6

[3] Week ended Friday. [3] Figures for 1931 are exclusive of Oklahoma City and Tulsa. [4] Delayed reports.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended April 4, 1931, and April 5, 1930—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Apr. 4, 1931	Week ended Apr. 5, 1930	Week ended Apr. 4, 1931	Week ended Apr. 5, 1930	Week ended Apr. 4, 1931	Week ended Apr. 5, 1930	Week ended Apr. 4, 1931	Week ended Apr. 5, 1930
Mountain States:								
Montana	0	0	25	44	3	9	1	6
Idaho	0	0	7	4	1	13	0	3
Wyoming	0	0	23	8	1	3	4	0
Colorado	0	0	41	41	0	12	0	0
New Mexico	0	0	2	11	4	10	1	2
Arizona	0	0	4	14	1	28	2	0
Utah[2]	0	1	5	5	0	0	0	2
Pacific States:								
Washington	0	1	55	51	46	103	2	0
Oregon	0	0	13	28	25	28	1	2
California	2	4	110	164	26	73	6	5

[2] Week ended Friday.

SUMMARY OF MONTHLY REPORTS FROM STATES

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

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
January, 1931										
Florida	3	44	97	2	228	1	1	40	6	5
Rhode Island	3	28	38		2		0	225	0	1
February, 1931										
Florida	9	30	842	9	637	1	0	31	0	13
Iowa	16	34	1		39		1	554	249	1
Kansas	12	59	544		71		5	279	373	2
Mississippi	15	67	8,479	1,115	190	528	1	131	90	20
New Hampshire		1	379					46		
March, 1931										
Arizona	14	12	82		622		0	21	9	2
Florida	5	35	448	8	702	2	0	26	6	10
Nebraska	2	42	16		30		1	226	224	2

January, 1931

	Cases
Chicken pox:	
Florida	154
Rhode Island	97
German measles:	
Rhode Island	8
Mumps:	
Florida	2
Rhode Island	33
Rabies in animals:	
Rhode Island	2
Septic sore throat:	
Rhode Island	1
Typhus fever:	
Florida	2
Undulant fever:	
Florida	1
Whooping cough:	
Florida	29
Rhode Island	44

February, 1931

	Cases
Chicken pox:	
Florida	240
Iowa	325
Kansas	727
Mississippi	1,092
Conjunctivitis:	
Kansas	1
Dengue:	
Mississippi	8
Dysentery:	
Mississippi (amebic)	27
Mississippi (bacillary)	170
German measles:	
Iowa	4
Kansas	3
Hookworm disease:	
Mississippi	233
Impetigo contagiosa:	
Iowa	4
Kansas	1

Lethargic encephalitis:	Cases
Kansas	2
Mumps:	
Florida	26
Iowa	58
Kansas	339
Mississippi	348
Ophthalmia neonatorum:	
Mississippi	14
Puerperal septicemia:	
Mississippi	39
Rabies in animals:	
Mississippi	10
Scabies:	
Kansas	2
Septic sore throat:	
Iowa	1
Kansas	4
Tetanus:	
Kansas	1
Trachoma:	
Mississippi	7
Typhus fever:	
Florida	1
Undulant fever:	
Iowa	3
Kansas	1
Vincent's angina:	
Iowa	7
Kansas	6
Whooping cough:	
Florida	29
Iowa	33
Kansas	122
Mississippi	442

March, 1931

Chicken pox:	
Arizona	54
Florida	290
Nebraska	390
Lethargic encephalitis:	
Arizona	1
Mumps:	
Arizona	26
Florida	35
Nebraska	602
Paratyphoid fever:	
Florida	1
Septic sore throat:	
Arizona	8
Nebraska	2
Trachoma:	
Arizona	16
Tularæmia:	
Florida	2
Typhus fever:	
Florida	1
Undulant fever:	
Nebraska	1
Whooping cough:	
Arizona	20
Florida	60
Nebraska	79

GENERAL CURRENT SUMMARY AND WEEKLY REPORTS FROM CITIES

The 95 cities reporting cases used in the following table are situated in all parts of the country and have an estimated aggregate population of more than 33,340,000. The estimated population of the 88 cities reporting deaths is more than 31,795,000. The estimated expectancy is based on the experience of the last nine years, excluding epidemics.

Weeks ended March 28, 1931, and March 29, 1930

	1931	1930	Estimated expectancy
Cases reported			
Diphtheria:			
46 States	1,012	1,237	----------
95 cities	497	516	859
Measles:			
45 States	19,603	15,453	----------
95 cities	7,646	5,538	----------
Meningococcus meningitis:			
46 States	163	277	----------
95 cities	79	139	----------
Poliomyelitis:			
46 States	13	14	----------
Scarlet fever:			
46 States	5,934	4,963	----------
95 cities	2,573	1,942	1,582
Smallpox:			
46 States	919	1,630	----------
95 cities	107	137	97
Typhoid fever:			
46 States	134	170	----------
95 cities	24	51	70
Deaths reported			
Influenza and pneumonia:			
88 cities	1,278	1,063	----------
Smallpox:			
88 cities	0	0	----------

City reports for week ended March 28, 1931

The "estimated expectancy" given for diphtheria, poliomyelitis, scarlet fever, smallpox, and typhoid fever is the result of an attempt to ascertain from previous occurrence the number of cases of the disease under consideration that may be expected to occur during a certain week in the absence of epidemics. It is based on reports to the Public Health Service during the past nine years. It is in most instances the median number of cases reported in the corresponding weeks of the preceding years. When the reports include several epidemics, or when for other reasons the median is unsatisfactory, the epidemic periods are excluded, and the estimated expectancy is the mean number of cases reported for the week during nonepidemic years.

If the reports have not been received for the full nine years, data are used for as many years as possible, but no year earlier than 1922 is included. In obtaining the estimated expectancy, the figures are smoothed when necessary to avoid abrupt deviation from the usual trend. For some of the diseases given in the table the available data were not sufficient to make it practicable to compute the estimated expectancy.

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
NEW ENGLAND								
Maine:								
Portland	9	1	1		0	0	23	8
New Hampshire:								
Concord	0	0	0		0	6	0	1
Manchester	0	0	0		0	0	0	1
Nashua	0	0	0		0	25	1	0
Vermont:								
Barre		0						
Burlington	0	0	0		0	0	0	0
Massachusetts:								
Boston	76	32	16	1	1	90	23	16
Fall River	3	3	4		0	1	11	5
Springfield	4	3	3		0	5	21	4
Worcester	7	4	1	1	0	4	3	4
Rhode Island:								
Pawtucket		1						
Providence	6	8	2		0	30	5	8
Connecticut:								
Bridgeport	3	5	1	3	3	1	3	4
Hartford	2	5	0		1	53	1	8
New Haven	25	2	0		1	425	13	7
MIDDLE ATLANTIC								
New York:								
Buffalo	26	11	11		2	381	50	31
New York	410	247	107	24	18	1,323	82	258
Rochester	7	8	0	5	1	5	5	10
Syracuse	8	5	0		1	14	2	3
New Jersey:								
Camden	5	5	8	1	1	30	15	8
Newark	126	16	3	3	0	19	6	12
Trenton	3	3	0	4	1	1	8	10
Pennsylvania:								
Philadelphia	163	63	5	34	9	1,007	49	88
Pittsburgh	120	17	6	6	11	91	65	69
Reading	12	2	1		0	83	22	2
EAST NORTH CENTRAL								
Ohio:								
Cincinnati	6	8	2		3	109	21	16
Cleveland	196	27	10	29	7	33	293	31
Columbus	18	3	1	5	7	57	2	10
Toledo	32	4	12	3	1	1	30	12
Indiana:								
Fort Wayne	1	2	13		1	48	0	6
Indianapolis	62	4	3		2	390	21	16
South Bend	2	2	1		0	1	0	4
Terre Haute	0	0	0		2	2	0	2
Illinois:								
Chicago	131	94	72	256	8	228	92	57
Springfield	6	1	4	3	0	211	0	6
Michigan:								
Detroit	120	42	24	14	6	16	55	42
Flint	20	3	0	23	1	3	7	5
Grand Rapids	6	1	0	1	0	3	0	2

City reports for week ended March 28, 1931—Continued

Division, State, and city	Chicken pox; cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
EAST NORTH CENTRAL—continued								
Wisconsin:								
Kenosha	19	0	0	----	0	0	117	0
Madison	31	1	1	----	----	2	54	----
Milwaukee	214	13	5	4	4	76	669	8
Racine	6	1	0	----	0	13	8	1
Superior	19	0	0	----	0	0	0	0
WEST NORTH CENTRAL								
Minnesota:								
Duluth	3	0	0	----	0	0	0	0
Minneapolis	73	13	7	1	4	103	138	12
St. Paul	46	7	0	1	1	19	9	10
Iowa:								
Davenport	1	0	0	----	----	2	0	----
Des Moines	6	1	0	----	----	1	1	----
Sioux City	8	1	0	----	----	9	24	----
Waterloo	4	0	0	----	----	0	0	----
Missouri:								
Kansas City	38	4	7	----	1	120	3	11
St. Joseph	0	0	52	----	1	0	0	10
St. Louis	24	38	12	9	1	87	10	----
North Dakota:								
Fargo	13	0	0	----	1	----	7	3
Grand Forks	1	0	1	----	----	0	2	----
South Dakota:								
Aberdeen	4	0	0	----	----	0	0	----
Sioux Falls	0	0	0	----	----	0	0	----
Nebraska:								
Omaha	22	3	6	----	0	0	23	8
Kansas:								
Topeka	32	1	1	3	2	2	48	0
Wichita	20	2	0	----	1	0	4	4
SOUTH ATLANTIC								
Delaware:								
Wilmington	1	2	2	----	0	82	3	8
Maryland:								
Baltimore	120	22	6	16	1	1,116	59	45
Cumberland	0	0	0	1	0	0	0	4
Frederick	1	0	1	----	0	6	0	0
District of Columbia:								
Washington	41	11	11	1	1	280	0	30
Virginia:								
Lynchburg	26	1	2	----	0	4	0	2
Norfolk	16	----	2	----	0	117	2	8
Richmond	1	2	3	----	5	216	0	6
Roanoke	3	1	2	----	2	2	1	1
West Virginia:								
Charleston	2	1	0	5	0	0	6	2
Wheeling	38	0	0	----	1	0	0	2
North Carolina:								
Raleigh	7	0	0	----	0	60	0	1
Wilmington	2	0	1	----	0	0	0	1
Winston-Salem	3	0	0	----	0	34	14	4
South Carolina:								
Charleston	1	0	0	26	1	9	0	9
Columbia	2	0	0	----	0	0	1	9
Greenville	1	0	0	----	0	0	0	0
Georgia:								
Atlanta	4	3	1	141	3	55	2	6
Brunswick	0	0	0	----	0	0	8	0
Savannah	2	1	2	6	1	2	12	2
Florida:								
Miami	15	3	0	2	2	6	0	4
St. Petersburg	----	0	----	----	2	----	----	5
Tampa	9	0	0	1	1	98	0	1

City reports for week ended March 28, 1931—Continued

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
EAST SOUTH CENTRAL								
Kentucky:								
Covington	0	0	0	----	1	23	0	2
Tennessee:								
Memphis	47	4	3	----	8	136	13	13
Nashville	2	1	0	----	1	59	0	4
Alabama:								
Birmingham	5	2	4	43	9	62	1	9
Mobile	0	0	2	1	1	1	0	2
Montgomery	1	0	4	1	----	----	0	----
WEST SOUTH CENTRAL								
Arkansas:								
Fort Smith	2	0	0	----	----	0	0	----
Little Rock	1	0	0	4	0	0	0	4
Louisiana:								
New Orleans	12	12	6	4	3	1	0	22
Shreveport	2	1	0	----	0	1	5	2
Oklahoma:								
Muskogee	2	0	0	2	----	0	2	----
Tulsa	8	1	2	----	----	14	0	----
Texas:								
Dallas	41	5	5	10	8	0	20	18
Fort Worth	6	3	3	----	1	0	0	6
Galveston	1	0	2	----	0	5	0	1
Houston	4	5	3	----	0	4	2	5
San Antonio	4	4	3	----	5	3	0	9
MOUNTAIN								
Montana:								
Billings	0	0	0	----	0	0	0	1
Great Falls	12	0	0	----	1	1	0	0
Helena	0	0	0	----	0	0	0	0
Missoula	0	0	0	27	0	0	0	1
Idaho:								
Boise	5	0	0	----	1	1	0	0
Colorado:								
Denver	65	7	10	----	3	20	31	8
Pueblo	----	2	----	----	----	----	----	----
New Mexico:								
Albuquerque	6	0	0	----	0	1	0	4
Arizona:								
Phoenix	0	1	1	----	0	0	0	3
Utah:								
Salt Lake City	4	2	0	----	2	1	8	2
Nevada:								
Reno	0	0	0	----	0	0	0	2
PACIFIC								
Washington:								
Seattle	63	3	2	----	----	7	17	----
Spokane	15	2	1	----	----	12	0	----
Tacoma	11	1	0	----	4	0	0	8
Oregon:								
Portland	32	8	1	18	4	37	11	11
Salem	3	1	0	----	----	5	16	----
California:								
Los Angeles	77	40	32	87	7	228	17	18
Sacramento	9	0	0	8	2	0	9	6
San Francisco	39	15	0	23	4	18	8	9

City reports for week ended March 28, 1931—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
NEW ENGLAND											
Maine:											
Portland	4	11	0	0	0	0	0	0	0	8	33
New Hampshire:											
Concord	2	0	0	0	0	0	0	0	0	0	8
Manchester	2	0	0	0	0	1	0	0	0	0	22
Nashua	0	0	0	0	0	0	0	0	0	0	----
Vermont:											
Barre	0	----	0	----	----	----	0	----	----	----	----
Burlington	2	0	0	0	0	0	0	0	0	5	7
Massachusetts:											
Boston	85	151	0	0	0	15	0	1	0	34	218
Fall River	7	18	0	0	0	2	0	0	0	5	29
Springfield	9	9	0	0	0	1	0	0	0	8	21
Worcester	10	21	0	0	0	3	0	0	0	18	49
Rhode Island:											
Pawtucket	2	----	0	----	----	----	0	----	----	----	----
Providence	14	41	0	0	0	2	0	0	0	2	58
Connecticut:											
Bridgeport	11	19	0	0	0	0	0	0	0	3	27
Hartford	6	5	0	0	0	0	0	0	0	1	38
New Haven	10	4	0	0	0	0	0	0	0	8	43
MIDDLE ATLANTIC											
New York:											
Buffalo	30	25	0	0	0	8	0	0	0	36	194
New York	365	539	0	0	0	97	0	5	0	179	1,685
Rochester	11	109	0	0	0	4	0	0	0	16	84
Syracuse	13	40	0	0	0	2	0	0	0	15	46
New Jersey:											
Camden	6	7	0	0	0	3	0	0	0	5	41
Newark	43	44	0	0	0	11	0	0	0	39	103
Trenton	5	22	0	0	0	3	0	0	0	0	52
Pennsylvania:											
Philadelphia	104	176	0	0	0	37	0	0	0	42	582
Pittsburgh	31	52	0	0	0	12	0	0	0	38	226
Reading	5	1	0	0	0	0	0	0	0	0	18
EAST NORTH CENTRAL											
Ohio:											
Cincinnati	21	34	2	1	0	13	2	1	0	19	159
Cleveland	41	61	0	0	0	19	0	1	0	16	240
Columbus	12	16	1	0	0	12	1	0	0	0	115
Toledo	14	5	0	1	0	6	0	0	0	3	88
Indiana:											
Fort Wayne	5	3	0	0	0	0	0	0	0	0	29
Indianapolis	11	72	8	10	0	5	8	1	1	25	----
South Bend	3	2	0	1	0	0	0	0	0	9	18
Terre Haute	3	0	0	0	0	0	0	0	0	0	17
Illinois:											
Chicago	136	258	2	0	0	36	2	0	0	51	741
Springfield	2	3	0	0	0	0	0	0	0	0	24
Michigan:											
Detroit	120	128	2	0	0	30	2	1	0	98	329
Flint	13	10	2	0	0	1	2	0	0	9	28
Grand Rapids	9	8	0	0	0	1	0	0	0	18	25
Wisconsin:											
Kenosha	2	3	0	0	0	0	0	0	0	0	4
Madison	7	9	0	0	----	----	0	0	----	2	----
Milwaukee	29	20	0	0	0	7	0	0	0	20	140
Racine	4	1	0	0	0	0	0	0	0	6	15
Superior	3	4	0	0	0	1	0	0	0	0	11
WEST NORTH CENTRAL											
Minnesota:											
Duluth	9	2	0	0	0	3	0	0	0	0	19
Minneapolis	43	20	5	2	0	3	5	1	1	33	120
St. Paul	32	10	0	0	0	2	0	0	0	22	71
Iowa:											
Davenport	2	3	1	10	----	----	0	0	----	0	----
Des Moines	10	7	1	7	----	----	0	0	----	0	34
Sioux City	2	13	0	1	----	----	0	0	----	0	----
Waterloo	3	4	0	1	----	----	0	0	----	1	----

City reports for week ended March 28, 1931—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
WEST NORTH CENTRAL—con.											
Missouri:											
Kansas City	27	10	2	5	0	8	2	0	0	2	105
St. Joseph	2	6	0	0	0	3	0	0	0	0	49
St. Louis	35	219	2	5	0	25	2	0	1	8	283
North Dakota:											
Fargo	1	4	0	0	0	0	0	0	0	0	13
Grand Forks	1	1	1	0	----	----	0	0	----	0	----
South Dakota:											
Aberdeen	1	0	0	0	----	----	0	0	----	0	----
Sioux Falls	2	1	1	1	----	----	0	1	----	0	7
Nebraska:											
Omaha	4	13	3	18	0	5	3	0	0	2	73
Kansas:											
Topeka	2	1	1	0	0	0	1	0	0	0	14
Wichita	7	1	1	20	0	0	1	0	0	1	23
SOUTH ATLANTIC											
Dclaware:											
Wilmington	5	13	0	0	0	0	0	0	0	1	34
Maryland:											
Baltimore	38	52	0	0	0	20	0	4	0	19	248
Cumberland	0	4	0	0	0	1	0	0	0	0	10
Frederick	0	0	0	0	0	0	0	0	0	0	----
District of Col.:											
Washington	27	30	1	0	0	10	1	0	0	12	187
Virginia:											
Lynchburg	1	0	0	0	0	2	0	0	0	0	20
Norfolk	1	10	0	0	0	0	0	0	0	10	----
Richmond	3	8	0	0	0	3	0	0	0	0	57
Roanoke	1	1	0	0	0	0	0	0	0	0	18
West Virginia:											
Charleston	0	0	1	0	0	0	1	0	0	2	13
Wheeling	2	0	0	0	0	1	0	1	0	2	24
North Carolina:											
Raleigh	0	2	0	0	0	1	0	0	0	16	14
Wilmington	1	0	0	0	0	1	0	0	0	20	12
Winston-Salem	0	0	1	0	0	2	1	0	0	9	20
South Carolina:											
Charleston	0	0	0	0	0	0	0	1	0	0	34
Columbia	0	0	1	0	0	4	1	0	0	2	57
Greenville	0	0	1	0	0	0	0	0	0	1	----
Georgia:											
Atlanta	5	47	2	2	0	9	2	0	0	2	70
Brunswick	0	0	0	0	0	1	0	0	0	0	1
Savannah	1	0	1	0	0	3	1	0	0	1	32
Florida:											
Miami	1	0	0	0	0	0	0	0	0	2	39
St. Petersburg	0	----	0	----	0	1	0	----	0	----	41
Tampa	1	0	0	0	0	2	0	0	0	0	27
EAST SOUTH CENTRAL											
Kentucky:											
Covington	2	8	0	0	0	0	0	0	0	0	22
Tennessee:											
Memphis	10	66	2	2	0	8	2	0	0	4	110
Nashville	3	9	0	0	0	2	0	0	0	0	55
Alabama:											
Birmingham	3	8	1	0	0	6	1	0	0	3	88
Mobile	0	2	0	0	0	1	0	0	0	0	22
Montgomery	0	3	0	0	----	----	0	0	----	0	----
WEST SOUTH CENTRAL											
Arkansas:											
Fort Smith	0	0	0	0	----	----	0	0	----	1	----
Little Rock	1	1	0	2	0	2	0	0	0	0	----
Louisiana:											
New Orleans	8	14	0	16	0	15	0	2	1	2	168
Shreveport	1	1	1	3	0	3	1	0	0	0	25

City reports for week ended March 28, 1931—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
WEST SOUTH CENTRAL—Con.											
Oklahoma:											
Muskogee	1	0	2	0	-------	-------	0	0	-------	0	-------
Tulsa	2	3	2	10	-------	-------	0	0	-------	0	-------
Texas:											
Dallas	5	2	4	1	0	0	4	0	0	16	72
Fort Worth	3	2	4	9	0	1	0	0	0	0	40
Galveston	1	0	0	0	0	0	0	0	0	0	19
Houston	2	4	2	1	0	5	2	0	0	0	77
San Antonio	0	1	0	0	0	7	0	0	0	0	72
MOUNTAIN											
Montana:											
Billings	1	0	0	3	0	2	0	0	0	2	11
Great Falls	2	2	0	0	0	1	0	0	0	12	17
Helena	0	1	0	0	0	0	0	0	0	0	6
Missoula	1	0	0	1	0	0	0	0	0	1	4
Idaho:											
Boise	0	0	0	1	0	0	0	0	0	0	10
Colorado:											
Denver	13	17	0	0	0	4	0	0	0	23	93
Pueblo	2	-------	1	-------	-------	-------	1	-------	-------	-------	-------
New Mexico:											
Albuquerque	1	0	0	0	0	4	0	0	0	4	11
Arizona:											
Phoenix	1	0	1	0	0	10	0	0	0	0	-------
Utah:											
Salt Lake City	3	4	1	0	0	1	1	0	0	27	42
Nevada:											
Reno	0	0	1	0	0	0	1	0	0	0	8
PACIFIC											
Washington:											
Seattle	10	3	2	1	-------	-------	2	1	-------	32	-------
Spokane	7	1	8	5	-------	-------	8	0	-------	1	-------
Tacoma	3	2	4	1	0	0	4	0	0	4	26
Oregon:											
Portland	5	2	13	3	0	5	0	0	0	2	72
Salem	0	0	0	0	0	0	0	0	0	0	-------
California:											
Los Angeles	40	42	3	4	0	22	3	2	0	35	271
Sacramento	3	0	1	0	0	4	1	0	0	31	35
San Francisco	25	5	1	0	0	16	1	2	1	37	186

Division, State, and city	Meningococcus meningitis		Lethargic encephalitis		Pellagra		Poliomyelitis (infantile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, estimated expectancy	Cases	Deaths
NEW ENGLAND									
Massachusetts:[1]									
Boston	0	0	1	1	0	0	0	0	0
MIDDLE ATLANTIC									
New York:									
Buffalo	0	1	0	0	0	0	0	0	0
New York	9	6	1	3	0	0	1	0	0
Rochester	0	0	1	0	0	0	0	0	0
New Jersey:									
Newark	2	0	1	1	0	0	1	0	0
Pennsylvania:									
Philadelphia	6	5	1	1	0	0	0	0	0
Pittsburgh	2	0	0	0	0	0	0	0	0

[1] Rabies (in man); 1 case and 1 death at Worcester, Mass.

City reports for week ended March 28, 1931—Continued

Division, State, and city	Meningococcus meningitis		Lethargic encephalitis		Pellagra		Poliomyelitis (infantile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, estimated expectancy	Cases	Deaths
EAST NORTH CENTRAL									
Ohio:									
Cleveland	1	1	0	0	0	0	0	0	0
Indiana:									
Indianapolis	2	2	0	0	0	0	0	0	0
South Bend	1	0	0	0	0	0	0	0	0
Illinois:									
Chicago	13	11	1	0	0	0	0	0	0
Springfield	0	1	0	0	0	0	0	0	0
Michigan:									
Detroit	4	2	0	0	0	0	0	1	1
WEST NORTH CENTRAL									
Missouri:									
Kansas City	3	1	0	0	0	0	0	0	0
St. Joseph	0	1	0	0	0	0	0	0	0
St. Louis	4	1	1	2	0	0	0	0	0
Nebraska:									
Omaha	2	0	0	0	0	0	0	0	0
SOUTH ATLANTIC									
Maryland:									
Baltimore	1	0	1	0	0	0	0	0	0
District of Columbia:									
Washington	2	1	0	0	0	0	0	0	0
North Carolina:									
Winston-Salem	0	0	0	0	1	1	0	0	0
South Carolina:									
Columbia	1	3	0	0	0	0	0	0	0
Georgia:									
Atlanta	1	1	0	0	0	0	0	0	0
Savannah [2]	0	0	0	0	2	1	0	0	0
EAST SOUTH CENTRAL									
Tennessee:									
Memphis	6	2	0	0	0	0	0	0	0
Nashville	3	0	0	0	0	0	0	0	0
Alabama:									
Birmingham	7	1	0	0	5	2	0	0	0
Mobile	1	0	0	0	1	0	0	0	0
Montgomery	0	0	0	0	1	0	0	0	0
WEST SOUTH CENTRAL									
Louisiana:									
New Orleans	3	1	0	0	0	0	0	0	0
Texas:									
Dallas	0	0	0	0	3	2	0	0	0
Fort Worth	0	0	0	0	0	2	0	0	0
Houston	0	0	0	0	0	1	0	0	0
San Antonio	2	1	0	0	0	0	0	0	0
MOUNTAIN									
Utah:									
Salt Lake City	1	0	0	0	0	0	0	1	1
PACIFIC									
Oregon:									
Portland	0	0	0	1	0	0	0	0	0
California:									
Los Angeles	2	0	0	0	0	0	0	0	0

[2] Typhus fever; 1 case at Savannah, Ga.

The following tables give the rates per 100,000 population for 98 cities for the 5-week period ended March 28, 1931, compared with those for a like period ended March 29, 1930. The population figures used in computing the rates are estimated mid-year populations for 1930 and 1931, respectively, derived from the 1930 census. The 98 cities reporting cases have an estimated aggregate population of more than 33,000,000. The 91 cities reporting deaths have more than 31,500,000 estimated population.

Summary of weekly reports from cities February 22 to March 28, 1931—Annual rates per 100,000 population, compared with rates for the corresponding period of 1930 [1]

DIPHTHERIA CASE RATES

	Week ended—									
	Feb. 28, 1931	Mar. 1, 1930	Mar. 7, 1931	Mar. 8, 1930	Mar. 14, 1931	Mar. 15, 1930	Mar. 21, 1931	Mar. 22, 1930	Mar. 28, 1931	Mar. 29, 1930
98 cities	70	104	73	88	[2] 66	101	[3] 65	97	[4] 78	82
New England	89	121	106	92	79	92	67	65	[5] 70	56
Middle Atlantic	56	103	61	85	67	94	64	97	63	80
East North Central	78	122	75	94	[6] 78	134	[7] 73	132	82	114
West North Central	55	120	71	118	63	110	73	74	163	64
South Atlantic	77	96	93	78	53	104	73	90	61	70
East South Central	58	54	29	36	35	24	[8] 8	36	76	48
West South Central	132	101	118	143	[9] 66	111	71	136	64	125
Mountain	87	35	61	88	[10] 29	26	[10] 19	88	[10] 95	44
Pacific	57	63	63	38	55	63	51	45	69	34

MEASLES CASE RATES

98 cities	703	538	769	620	[2] 913	646	[3] 1,027	776	[4] 1,196	879
New England	655	506	909	593	1,346	743	1,527	1,030	[5] 1,543	1,117
Middle Atlantic	645	346	874	417	1,026	396	1,158	539	1,321	611
East North Central	300	345	369	442	[6] 449	471	[7] 566	538	723	654
West North Central	874	939	643	938	595	781	492	994	650	908
South Atlantic	2,800	148	2,238	535	2,753	481	3,442	617	3,879	697
East South Central	1,042	753	1,036	717	1,146	634	[8] 1,073	1,291	1,635	968
West South Central	24	704	68	505	[9] 33	617	51	547	47	784
Mountain	1,209	1,507	1,332	2,106	[10] 333	2,449	[10] 219	2,880	[10] 219	2,987
Pacific	223	1,636	347	1,581	356	1,881	394	1,800	519	2,184

SCARLET FEVER CASE RATES

98 cities	373	357	345	321	[2] 376	337	[3] 385	316	[4] 402	308
New England	606	402	527	431	589	426	676	372	[5] 700	363
Middle Atlantic	381	308	359	283	389	327	392	294	454	299
East North Central	364	510	346	448	[6] 395	461	[7] 400	418	378	383
West North Central	509	341	492	345	518	308	589	335	580	306
South Atlantic	363	258	354	206	310	210	342	286	310	272
East South Central	553	173	401	173	477	96	[8] 231	179	559	233
West South Central	125	108	71	139	[9] 99	167	101	108	78	111
Mountain	305	388	305	300	[10] 428	379	[10] 323	352	[10] 228	458
Pacific	145	352	121	241	96	229	110	202	104	204

[1] The figures given in this table are rates per 100,000 population, annual basis, and not the number of cases reported. Populations used are estimates as of July 1, 1931 and 1930, respectively.
[2] Cleveland, Ohio, Springfield, Ill., Dallas, Tex., and Pueblo, Colo., not included.
[3] South Bend, Ind., Memphis, Tenn., Pueblo, Colo., not included.
[4] Barre, Vt., Pawtucket, R. I., and Pueblo, Colo., not included.
[5] Barre, Vt., and Pawtucket, R. I., not included.
[6] Cleveland, Ohio, and Springfield, Ill., not included.
[7] South Bend, Ind., not included.
[8] Memphis, Tenn., not included.
[9] Dallas, Tex., not included.
[10] Pueblo, Colo., not included.

Summary of weekly reports from cities February 22 to March 28, 1931—Annual rates per 100,000 population, compared with rates for the corresponding period of 1930—Continued

SMALLPOX CASE RATES

	Week ended—									
	Feb. 28, 1931	Mar. 1, 1930	Mar. 7, 1931	Mar. 8, 1930	Mar. 14, 1931	Mar. 15, 1930	Mar. 21, 1931	Mar. 22, 1930	Mar. 28, 1931	Mar. 29, 1930
98 cities	20	30	13	25	[2] 20	25	[3] 21	24	[4] 17	22
New England	0	0	0	2	0	0	0	0	[5] 0	2
Middle Atlantic	0	0	0	0	0	0	0	0	0	0
East North Central	11	40	15	24	[6] 10	30	[7] 8	20	7	17
West North Central	128	91	57	79	132	70	130	97	99	99
South Atlantic	0	2	0	2	0	4	0	2	4	8
East South Central	23	6	23	18	0	24	[8] 8	6	12	18
West South Central	64	111	47	63	[9] 74	24	95	49	78	45
Mountain	9	26	17	9	[10] 19	9	[10] 10	35	[10] 48	26
Pacific	39	87	12	105	41	115	43	103	22	71

TYPHOID FEVER CASE RATES

98 cities	7	8	4	8	[2] 3	6	[3] 4	8	[4] 4	8
New England	5	0	5	2	0	5	2	0	[5] 3	2
Middle Atlantic	6	4	3	4	2	5	2	6	2	15
East North Central	3	1	1	2	[6] 1	1	[7] 2	1	2	3
West North Central	11	6	11	8	0	4	8	10	2	4
South Atlantic	22	60	12	40	6	12	16	14	12	6
East South Central	6	30	17	12	17	24	[8] 0	84	0	30
West South Central	14	0	0	31	[9] 16	7	10	10	7	7
Mountain	0	0	0	0	[10] 0	53	[10] 0	18	[10] 0	0
Pacific	4	6	2	6	4	10	8	10	10	2

INFLUENZA DEATH RATES

91 cities	50	19	44	16	[2] 34	13	[3] 31	15	[4] 29	14
New England	24	12	19	19	36	2	19	2	[5] 15	10
Middle Atlantic	40	16	32	13	23	11	23	14	20	10
East North Central	61	16	48	12	[6] 27	9	[7] 28	9	25	11
West North Central	74	15	59	3	50	6	47	12	35	6
South Atlantic	79	28	73	36	57	18	49	28	32	16
East South Central	76	52	139	58	101	84	[8] 130	78	126	97
West South Central	45	64	52	32	[9] 55	43	35	25	55	32
Mountain	17	18	44	35	[10] 29	18	[10] 38	62	[10] 67	53
Pacific	11	10	34	2	36	2	34	7	41	2

PNEUMONIA DEATH RATES

91 cities	212	193	194	166	[2] 189	155	[3] 184	161	[4] 180	163
New England	236	232	185	220	147	169	183	218	[5] 163	220
Middle Atlantic	217	219	229	181	214	178	216	159	220	187
East North Central	193	179	160	141	[6] 130	127	[7] 132	148	125	117
West North Central	218	138	218	129	159	144	215	123	171	135
South Atlantic	312	236	265	222	332	196	269	222	263	212
East South Central	271	175	227	214	240	233	[8] 222	188	189	227
West South Central	221	185	148	160	[9] 211	142	180	199	211	164
Mountain	191	247	131	150	[10] 209	123	[10] 124	194	[10] 133	176
Pacific	91	62	101	75	125	65	101	77	98	92

[2] Cleveland, Ohio, Springfield, Ill., Dallas, Tex., and Pueblo, Colo., not included.
[3] South Bend, Ind., Memphis, Tenn., Pueblo, Colo., not included.
[4] Barre, Vt., Pawtucket, R. I., and Pueblo, Colo., not included.
[5] Barre, Vt., and Pawtucket, R. I., not included.
[6] Cleveland, Ohio, and Springfield, Ill., not included.
[7] South Bend, Ind., not included.
[8] Memphis, Tenn., not included.
[9] Dallas, Tex., not included.
[10] Pueblo, Colo., not included.

FOREIGN AND INSULAR

CANADA

Quebec Province—Communicable diseases—Week ended March 28, 1931.—The Bureau of Health of the Province of Quebec, Canada, reports cases of certain communicable diseases for the week ended March 28, 1931, as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	1	Mumps	27
Chicken pox	68	Poliomyelitis	1
Diphtheria	30	Puerperal septicemia	1
Erysipelas	7	Scarlet fever	78
German measles	10	Tuberculosis	64
Influenza	1	Typhoid fever	19
Measles	234	Whooping cough	28

Quebec Province—Vital statistics—November, December, 1930, January, 1931.—Births, deaths, and marriages for the months of November and December, 1930, and January, 1931, in the Province of Quebec, Canada, with deaths from certain specified causes, are shown in the following table:

	November, 1930	December, 1930	January, 1931
Estimated population	2,735,000	2,735,000	2,782,500
Births	5,791	6,474	6,351
Birth rate per 1,000 population	25.8	27.9	26.9
Deaths	2,601	2,834	3,195
Death rate per 1,000 population	11.6	12.2	13.5
Marriages	988	1,034	944
Deaths under 1 year	680	730	811
Deaths under 1 year per 1,000 births	117.4	112.7	127.7
Deaths from—			
Cancer	172	180	194
Cerebrospinal meningitis		1	1
Diabetes	30	30	44
Diarrhea	144	88	100
Diphtheria	33	35	42
Heart disease	316	351	353
Influenza	41	51	102
Measles	11	13	9
Nephritis			157
Pneumonia	226	262	354
Poliomyelitis		1	
Scarlet fever	23	15	20
Syphilis	8	19	12
Tuberculosis, pulmonary	165	200	198
Tuberculosis, other forms	46	37	43
Typhoid fever	30	26	13
Violence	83	91	51
Whooping cough	36	46	53

MEXICO

Vera Cruz—Deaths—March 2-29, 1931.—During the period from March 2 to 29, 1931, deaths from certain causes were reported in Vera Cruz, Mexico, as follows:

Cause of death	Deaths	Cause of death	Deaths
Bronchitis	2	Septicemia	1
Cancer	4	Syphilis	7
Gastro-intestinal disorders	33	Tuberculosis	22
Hookworm disease	1	Typhoid fever	1
Influenza	6	All other causes	56
Leprosy	1		
Malaria	4	Total	148
Pneumonia	10		

PANAMA CANAL ZONE

Communicable diseases—February, 1931.—During the month of February, 1931, certain communicable diseases, including imported cases, were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chicken pox	13		Pneumonia		20
Diphtheria	46		Scarlet fever	3	
Dysentery (amebic)	4		Tuberculosis		37
Malaria	100	4	Typhoid fever	4	
Measles	64		Whooping cough	2	

PORTO RICO

San Juan—Communicable diseases—Five weeks ended March 7, 1931.—During the five weeks ended March 7, 1931, cases of certain communicable diseases were reported in San Juan, Porto Rico, as follows:

Disease	Cases	Disease	Cases
Diphtheria	8	Tetanus	1
Malaria	27	Tetanus, infantile	2
Ophthalmia neonatorum	1	Whooping cough	2

TRINIDAD

Port of Spain—Vital statistics—February, 1930, 1931.—The following statistics for the months of February, 1930 and 1931, are taken from a report issued by the Public Health Department of Port of Spain, Trinidad:

	February			February	
	1930	1931		1930	1931
Number of births	137	140	Death rate per 1,000 population	22.6	19.7
Birth rate per 1,000 population	26.4	27.1	Deaths under 1 year	23	23
Number of deaths	117	102	Deaths under 1 year per 1,000 births	167.9	164.3

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

From medical officers of the Public Health Service, American consuls, International Office of Public Hygiene, 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; D, deaths; P, present]

Place		Sept. 21–Oct. 18, 1930	Oct. 19–Nov. 15, 1930	Nov. 16–Dec. 13, 1930	Dec. 14, 1930–Jan. 10, 1931	Week ended— January, 1931			February, 1931				March, 1931				Apr. 4, 1931
						17	24	31	7	14	21	28	7	14	21	28	
Ceylon: Colombo	C													1			
China:																	
Canton	C	1	1														
Shanghai	C	38	2														
	D	4															
India	C	30,529	18,944	11,112	10,687	3,504	4,022	4,275	3,533								
	D	17,635	9,782	5,933	5,689	1,770	2,165	2,231	1,957								
Bombay	C	16	19	13		20	1										
	D	11	17	7		6	3										
Calcutta	C	24	33	22	28	36	29	24	32	27	33	45	65	80	102		
	D	15	16	16	20	25	19	19	23	22	25	26	39	49	68		
Karikal	C				1					4		1	4		1		
	D									4			4		1		
Madras	C	2	1		201	47	36	16		18	20	19	6				
	D	2			67	21	11	7	8	5	4	14	6	5			
Negapatam	D							1	2	1		2					
Rangoon	C	1			1												
	D	1			1	1											
Tuticorin	C	1	1	5	1	1					1						
	D	1	1														
India (French):																	
Chandernagor	C	3	1	1	2			1			1	2	2		2		
	D	1			3			1			1	3	1		3		
Pondicherry	C	1	1	4	31	9	4	3	3	10	20	31	39	29	25	26	
	D	1		4	21	3	3	3	2	10	9	6	9	6	5	4	
India (Portuguese)	C		14		1												
	D		9														
Indo-China (see also table below):																	
Pnompenh	C	2	1	2			1	2	1		3	3	3				
	D			2				2			1	2	2		1		
Saigon and Cholon	C	2	1	3	9	4	1		1			3	1	1		1	
	D			1	4	2	1					3	1	2	1	1	

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

CHOLERA—Continued

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

Place		Sept. 21–Oct. 18, 1930	Oct. 19–Nov. 15, 1930	Nov. 16–Dec. 13, 1930	Dec. 14, 1930–Jan. 10, 1931	Week ended— January, 1931			February, 1931				March, 1931				Apr. 4, 1931
						17	24	31	7	14	21	28	7	14	21	28	
Philippine Islands: [1]																	
Ports—																	
Iloilo	C	1		1	1			2									
	D	4		3	1			2									
Manila	C	5															
	D	1															
Provinces—																	
Antique	C	40															
	D	18															
Bulacan	C	2															
	D	1															
Capis	C							3	56	69	54	28	35	29	11	4	4
	D							2	45	55	39	23	29	24	10	4	3
Iloilo	C	50	30	45	28	11	41	36	57	27	42	10	16	2	5		
	D	40	23	27	22	9	27	25	49	21	22	11	11	2	2		
Masbate	C													21			
	D													9			
Negros, Occidental	C	28	56	163	120	19	32	33	6	1	1	2					
	D	20	41	123	97	15	17	19	5	1	1	2					
Negros, Oriental	C								1								
	D								1								
Samar	C	7	16	8	17												
	D	7	12	8	9												
Sorsogon	C		5														
	D		4														
Surigao	C	(2)															
Siam	C	4	4	6	2	2		1			1					4	
	D	1	4	6	2	1										1	
Bangkok	C	3	3	4	2	2		1		1			1		1	1	
	D	2	2	4	2	1							1		1	1	

Place		August, 1930	September, 1930	October, 1930	November, 1930			December, 1930			January, 1931			February, 1931	
					1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20	21-31	1-10	11-20
Indo-China (French) (see also table above):															
Annam [3]	C	3													
Cambodia [3]	C	59	38	22	8	1	17	28				19	36		35
Cochin-China [3]	C	27	33	28	5	5	3	8				4	13		5

PLAGUE

Place		Sept. 21–Oct. 18,1930	Oct. 19–Nov. 15,1930	Nov. 16–Dec. 13,1930	Dec. 14, 1930–Jan. 10,1931	Week ended— January, 1931			February, 1931				March, 1931				Apr. 4, 1931
						17	24	31	7	14	21	28	7	14	21	28	
Algeria:																	
Algiers	C	6	11	2	1	1		1		1							
	D		3														
Bone	C							1									
Constantine, vicinity of	C		1		50			1		1							
	D							1									
Oran	C	10	2														
	D	3	1														
Plague-infected rats		6	1														
Philippeville	C	3	2		1												
	D	1			1												
Argentina:																	
Cordoba Province	C						1				2						
Entre Rios Province—Diamante	C											2					
Jujuy Province—Palpala	C							1			1						
Santa Fe	C										2						
Belgian Congo	C		1	1											2		
	D		1	1											2		
British East Africa (see also table below):																	
Tanganyika	C			3	2							15	7				
	D			3	2							4					
Uganda	C	165	171	111	67	7	8	2	8	6							
	D	164	168	112	67	6	8	2	8	6							

[1] Figures for cholera in the Philippine Islands are subject to correction.
[3] During the period from Aug. 24 to Sept. 26, 1930, 26 cases of cholera with 17 deaths were reported in Manitum, Surigao Province, P. I.
[3] Reports incomplete.

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

PLAGUE—Continued

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

Place		Sept. 21–Oct. 18, 1930	Oct. 19–Nov. 15, 1930	Nov. 16–Dec. 13, 1930	Dec. 14, 1930–Jan. 10, 1931	Week ended— January, 1931			February, 1931				March, 1931				Apr. 4, 1931
						17	24	31	7	14	21	28	7	14	21	28	
Ceylon: Colombo	C	3	1	9	9	1	1	1	5	6	2	1	2	1	3	3	———
	D	3	1	8	9	———	1	1	4	7	2	1	3	1	3	2	———
Plague-infected rats		———	1	2	———	———	———	1	1	1	1	1	———	———	3	———	———
China:																	
Manchuria—Tungliau and Nungan	C	1	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———
Shensi	C	———	1	———	———	———	———	———	———	———	———	———	———	———	———	———	———
Dutch East Indies:																	
Batavia and West Java	C	107	143	208	239	56	57	37	30	29	———	———	———	———	———	———	———
	D	103	146	206	238	54	53	37	24	29	———	———	———	———	———	———	———
East Java and Madura	C	———	———	———	———	———	———	———	4	———	———	———	———	———	———	———	———
	D	———	———	———	———	———	———	———	4	———	———	———	———	———	———	———	———
Java and Madura	D	335	501	557	615	142	102	98	85	89	100	———	———	———	———	———	———
Egypt:																	
Alexandria	C	9	7	4	8	———	———	———	1	———	———	———	1	———	———	———	———
	D	6	7	1	———	———	———	———	———	———	———	———	———	———	———	———	———
Plague-infected rats		———	———	3	1	———	1	———	———	———	1	———	———	———	———	———	———
Assiout	C	———	3	9	7	2	19	2	3	9	———	17	15	6	10	1	1
	D	———	1	1	1	2	2	2	———	4	———	3	4	———	4	1	1
Aswan	C	———	———	3	———	———	———	———	———	———	———	———	———	———	———	———	———
Beni-Suef	C	———	———	———	———	1	———	———	———	———	———	———	———	———	———	———	———
	D	———	———	———	———	1	———	———	———	———	———	———	———	———	———	———	———
Cairo	C	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	1
Deirout	C	———	———	———	———	———	19	2	———	6	10	———	———	———	———	———	———
	D	———	———	———	———	———	2	2	———	———	4	———	———	———	———	———	———
Gharbieh	C	———	———	———	———	———	———	1	———	———	———	———	———	———	———	———	———
	D	———	———	———	———	———	———	1	———	———	———	———	———	———	———	———	———
Girga	C	———	———	———	7	———	———	———	1	———	———	———	———	———	14	37	35
	D	———	———	———	2	———	———	———	1	———	———	———	———	———	2	5	17
Kena	C	———	———	———	———	———	———	———	———	———	———	———	———	———	———	5	———
	D	———	———	———	———	———	———	———	———	———	———	———	———	———	———	2	———
Manfalut	C	———	———	———	23	5	21	4	———	11	———	2	2	3	5	9	———
	D	———	———	———	5	2	3	1	———	4	———	1	———	———	2	1	———
Minieh	C	———	———	1	———	———	1	1	———	———	———	———	———	———	2	1	———
	D	———	———	———	———	———	———	1	———	———	———	———	———	———	1	1	———
Port Said	C	———	2	———	———	———	———	———	———	———	———	———	———	———	———	———	———

France: Marseille	C	4	4															
Greece (see also table below): Pyrgos	C	2																
India	C	2,371	2,721	3,259	3,740	1,169	1,279	1,438	1,449									
	D	1,068	1,497	1,856	2,226	837	737	957	891									
Bassein	C		1		2	1		1	2					1				
	D				1	1			2	1								
Bombay	C	2	1				1			1					1			
	D	2	1				1			1								
Plague-infected rats		64	30	32	38	10	6	9	9	14		8	10	17	14			
Madras Presidency	C	196	185	148	220	73	99	75	65									
	D	110	124	78	154	47	53	39	43									
Rangoon	C	2	2		2		2										1	
	D	2	1		1		1										1	
Plague-infected rats		1	1	4	2	2	1	1				8						
India (Portuguese)	C		3															
	D		3															
Indo-China (see also table below):																		
Pnompenh	C	2		6	1	1	3	2	1				1					
	D	3	1	6	1	1	3	2	1		1	2	1	2	1	1		
Saigon and Cholon	C	1																
Iraq: Baghdad	C	1	P	4			2	3				1	2	1	3	3		
	D	1		2			2	2					2		3	1		
Madagascar (see also table below): Tamatave	C	1	5	4	2		5	4										
	D	1	3															
Morocco	C		5		19	13												
	D				8	4												
Nigeria: Lagos	C	5	38	9	5				1									
	D	5	5	9	5				1									
Plague-infected rats		11	13	5	5													
Peru (see table below).																		
Senegal (see table below).																		
Siam	C	1	6						4	5			1	2				
	D		5						2	4				1				
Bangkok	C		1	1	3		4	4		1	2	3		29				
	D		1	1	3		4	3	1		1	4		6				
Nagara Rajsima	C	1	1	11	17	3	2	1	3	7								
	D	1	1	9	10	2	3	1	4	6								
Syria: Beirut	C		6		1				1		1							
Tripolitania	C		1	13		2	2	1	3		1			1				
	D			1		2			1									
Tunisia: Tunis	C		1	P	13	1					9	2	3		5			
	D										7							
Union of Socialist Soviet Republics:																		
Gouranduz	D							28										
Transcaucasia—Karabakh	C						6											
Union of South Africa:																		
Cape Province	C		1	P														
Orange Free State	C				2				P	P	1							
	D				2						1							
On vessel: S. S. Marionga de Thermiotis at Avonmouth	C				1													

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

PLAGUE—Continued

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

Place		Aug., 1930	Sept., 1930	Oct., 1930	Nov., 1930	Dec., 1930	Jan., 1931
British East Africa (see also table above):							
Kenya	C	87	53	58	62	50	69
Greece (see also table above)	C	-------	-------	2	-------	-------	-------
Indo-China (see also table above)	C	2	5	2	5	1	-------
Madagascar (see also table above):							
Ambositra Province	C	-------	-------	4	44	95	-------
	D	-------	-------	4	44	87	-------
Antisirabe Province	C	11	21	3	18	27	-------
	D	11	21	3	18	26	-------
Miarinarivo Province	C	2	7	18	12	18	-------
	D	2	7	18	12	18	-------
Moramanga Province	C	27	18	20	19	13	-------
	D	27	17	20	19	11	-------
Tananarive Province	C	39	79	125	170	178	-------
	D	38	79	116	164	172	-------
Peru	C	21	10	42	34	8	-------
	D	8	2	20	14	-------	-------
Senegal:							
Baol [1]	C	79	48	53	-------	-------	-------
	D	20	23	35	4	-------	-------
Dakar [1]	C	108	3	-------	-------	-------	-------
	D	90	8	-------	-------	-------	-------
Louga [1]	C	75	61	37	10	-------	-------
	D	33	30	25	3	-------	-------
Thies [1]	C	34	12	24	27	2	-------
	D	20	4	15	23	1	-------
Tivaouane [1]	C	110	20	53	31	2	-------
	D	54	14	31	25	1	-------

SMALLPOX

Place		Sept. 21–Oct. 18, 1930	Oct. 19–Nov. 15, 1930	Nov. 16–Dec. 13, 1930	Week ended— December, 1930		January, 1931					February, 1931				March, 1931			
					20	27	3	10	17	24	31	7	14	21	28	7	14	21	28
Algeria:																			
Algiers	C	-------	-------	-------	1	-------	-------	-------	-------	-------	-------	1	-------	1	-------	-------	-------	-------	-------
Bone	C	-------	-------	-------	-------	-------	-------	-------	-------	-------	1	-------	-------	-------	-------	-------	-------	-------	-------
Constantine	C	-------	1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	1	-------
Oran	C	-------	-------	3	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Arabia: Aden	C	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	1	1	-------	-------	-------	-------	-------	-------
Belgian Congo	C	-------	-------	-------	-------	-------	37	42	27	23	-------	-------	-------	-------	-------	-------	-------	-------	-------
Belgium	C	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	1	-------	-------	-------	-------	-------	-------

Brazil:																			
Porto Alegre (alastrim)	C	26	28	36						3									
Rio de Janeiro	C		2																
British East Africa (see also table below):																			
Tanganyika	C	95	17	385	23	1	57	3	21	25	18	6	35	42					
	D	6	1	36	1		3		1	1	2	1		12					
British South Africa: Southern Rhodesia	C	153	95	18				18	2	1									
	D			3															
Canada:																			
Alberta	C	22		1			19			7			1						
British Columbia—Vancouver	C	2	3	1			1	2			2	1	2	5					
Manitoba	C										1			1					
Winnipeg	C							1						1					
Nova Scotia	C										1								
Ontario	C	19	59	23	1		8	8	10	3	32	4	10	4	7	8	2	3	
Kingston	C					2	4		1					1					
North Bay	C					1		1					1						
Ottawa	C		37	12			2		1	1	1			1					
Sault Ste. Marie	C							1	11	8	5	6			2				
Toronto	C			4													1		1
Quebec	C			2						2									
Saskatchewan	C	3	2	18					7	6	5	20	17	18	18	10	40	10	
Regina	C													1					2
China:																			
Canton	C												2			1	1	2	
Chungking	C	P	P	P	2														
Foochow	C	P	P	P				P		P		P		P		P			
Hong Kong	C					1				1			2	5		2			1
	D												1	1	1				2
Manchuria—																			
Harbin	C		1								1								
Kwantung—Dairen	C			4	1														2
	D			1															
Nanking	C	P	P	P	P	P	P	P	P		P	P	P	P	P	P			
Shanghai—																			
Foreigners only	C	1	2	8	4	2	6	2	1	1	6	4	4	7	2	3	3	1	1
Including natives	D		1	4	5	1	1	4	2	4	4	3	5	2	4	3	5	2	2
Swatow	D	4	3	3		2	1	2	1	1	3	2		3	3	7	3		6
Tientsin	C	1	1	2					1										
Chosen (see table below).																			
Colombia: Cali	D	2		1															
Dutch East Indies:																			
Java—Batavia and West Java	C	14	26	6	2		2			28		1					1		
	D	4	4	2		1	1			1		1	1						
Sanggi Islands	C		29																
	D		3																
France (see table below).																			

[1] Reports incomplete.

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

SMALLPOX—Continued

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

Place		Sept. 21–Oct. 18, 1930	Oct. 19–Nov. 15, 1930	Nov. 16–Dec. 13, 1930	Week ended— December, 1930		January, 1931					February, 1931				March, 1931			
					20	27	3	10	17	24	31	7	14	21	28	7	14	21	28
Great Britain:																			
England and Wales	C	325	372	508	138	135	164	228	187	272	286	213	221	250	247	227	171	----	----
Bradford	C	1	1	1	----	----	1	----	----	1	----	3	----	1	----	----	----	----	----
Cardiff	C	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Leeds	C	1	2	----	----	----	2	----	----	----	----	----	----	----	----	----	----	----	----
London	C	29	172	184	27	38	48	48	45	47	33	24	23	16	23	36	26	----	----
London and Great Towns	C	52	296	433	105	131	162	162	154	198	194	147	150	186	189	158	117	----	----
	D	----	1	1	----	----	----	----	----	----	----	----	----	1	----	----	----	----	----
Sheffield	C	----	----	----	----	----	----	----	----	1	1	1	----	16	6	10	2	----	----
Stoke-on-Trent	C	----	1	----	----	----	----	----	----	1	----	----	----	----	----	1	----	----	----
Greece (see table below).																			
Honduras:																			
Amapala	C	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----	----	----
Ocotopeque and Gracias districts	C	----	----	----	----	----	----	----	----	----	----	----	----	----	----	P	----	----	----
Puerto Castilla	C	----	----	----	----	----	----	4	7	1	----	3	3	----	----	----	----	----	----
India	C	2,322	2,412	3,627	942	1,169	1,278	2,234	2,068	2,396	2,477	2,682	----	----	----	----	----	----	----
	D	572	606	874	262	281	327	510	497	486	523	739	----	----	----	----	----	----	----
Bombay	C	1	----	1	----	----	1	1	2	2	2	1	----	1	3	2	4	1	----
	D	----	----	1	----	----	1	1	----	----	1	----	----	1	1	1	----	1	----
Calcutta	C	12	9	18	10	19	15	15	28	28	40	47	35	51	83	82	53	69	----
	D	11	7	11	7	13	10	10	16	22	29	33	26	41	66	55	36	54	----
Cochin	C	12	25	22	6	7	----	2	5	6	8	10	19	----	16	24	15	17	----
	D	1	3	4	----	----	----	1	----	----	----	----	1	----	1	1	----	----	----
Karachi	C	----	----	3	----	----	----	----	----	----	2	1	----	----	4	----	----	3	----
	D	----	----	1	----	----	----	----	----	----	1	1	----	----	----	----	----	----	----
Madras	C	19	9	20	----	1	----	3	4	7	3	2	4	1	3	1	6	3	----
	D	8	2	3	----	----	----	----	----	----	----	----	----	1	----	----	----	2	----
Moulmein	C	----	----	----	----	----	----	----	----	2	----	----	----	----	----	----	----	----	----
Negapatam	C	14	9	6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Rangoon	C	2	1	1	----	----	----	----	----	----	----	----	2	----	1	1	1	1	----
	D	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----	----
Tuticorin	C	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Vizagapatam	C	1	----	----	----	----	----	----	----	----	----	1	----	----	8	----	1	----	----
	D	----	----	----	----	----	----	----	----	----	----	----	----	----	2	----	----	----	----

India (French):																			
Chandernagor	C	3	3			5			3	2	1	3	2		6	6		3	
	D	1	1			2	1		1						1				
Karikal	C	1					1	2	1	2		2	2		16	1			
	D	1						2		2		2	2		16				
Pondicherry Province	C	38	11	19	8	8	7	11	16	8	13	8	1	1	10	7			
	D	36	11	17	7	8	7	10	16	8	13	8	1	1	10	7			
India (Portuguese)	C				3			1	1	4			2	3					
Indo-China (see also table below):																			
Pnompenh	C	2		1		2						1					1		
	D			1								1							
Saigon and Cholon	C		2	2					3	1		2		2	2		1		1
	D		2	2					2			2			1		3	1	2
Iraq:																			
Baghdad	C	2													3	6			
Mosul Liwa	C	69	6	16				1		2		1		5					
	D	27		2										1					
Ivory Coast (see table below).																			
Japan:																			
Kobe	C														1	1			
Taiwan	C											1							
Mexico (see also table below):																			
Jalisco (State)—Guadalajara	D	3	3	3						1									1
Juarez	D	1	1																
Mexico City and surrounding territory	C	13	9	6	1	5	4						7	5		11	13		
	D	3	2	6	2	1	3					1	1	3	2	2	5		
Vera Cruz	C		1										1		1	1		1	
Morocco (see table below).																			
Nicaragua: Porto Cabezas	C				2														
Nigeria: Lagos	C																		2
Panama Canal Zone	C										2								
Poland	C		8	3			23	2					1						
Portugal: Lisbon	C	16	20	37	21	17		34	27	31	15	30		12	19	9	16	15	
Siam	C	1						1	1		1	1	1	1					
Somaliland, British: Boales	C	1	1	1															
	D	1						1											
Spain	C		51	67	19	31	18				10	8	10	4	10	46	45		
Straits Settlements	C	5	10	17	3		2	1	3	1	2	1			2				2
	D	1	2	7	2		1				1				1				1
Sudan (Anglo-Egyptian)	C	82	5	50		47		17	1	7		3	1	1	44	51	3	1	4
	D	7	1	5		5		1		7					6	4		1	1
Sudan (French) (see table below).																			
Switzerland: Berne Canton	C	1																	
Syria (see table below).																			
Tunisia: Tunis	C	2					13	4	6	1	1								
Turkey (see table below).																			
Union of South Africa:																			
Cape Province	C	P	P	P	P	P	P	P				P							
Orange Free State	C		2	P								P							
Transvaal	C	P	P	P	P	P	P		P	P	P	P	P	P					
Upper Volta	C			6				4						8	10				
	D							2											

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

SMALLPOX—Continued

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

Place	Sept. 21–Oct. 18, 1930	Oct. 19–Nov. 15, 1930	Nov. 16–Dec. 13, 1930	Week ended— December, 1930		January, 1931					February, 1931				March, 1931			
				20	27	3	10	17	24	31	7	14	21	28	7	14	21	28
On vessel:																		
S. S. Clan Mactoggart at Suez C												2						
S. S. Muncaster Castle at Manila from Hong Kong C					1													
S. S. Matheran at Suez from Calcutta C									1									
S. S. Clan Buchanan at Suez C														2				

Place	August, 1930	September, 1930	October, 1930	November, 1930			December, 1930			January, 1931			February, 1931	
				1–10	11–20	21–30	1–10	11–20	21–31	1–10	11–20	21–31	1–10	11–20
Indo-China (see also table above) C	93	192	258		86		38	9	14		48	46		46
Ivory Coast C			4		2		9							
Sudan (French) C	39	P	17				43		96					
D	3		2				16		4					
Syria: Beirut C	1										1			

Place	July, 1930	Aug., 1930	Sept., 1930	Oct., 1930	Nov., 1930	Dec., 1930
British East Africa (see also table above):						
Kenya C	186		424		653	
Chosen C	65	35	3	22		
D	21	15	5	6		
France C	1					
Greece C	1	6				4
Mexico (see also table above) D	659	718	822	893		1
Morocco C	3	8	4	4	20	
Turkey C	51	21	19	74		
D	13	4	2	1		

TYPHUS FEVER

Place		Sept. 21–Oct. 18, 1930	Oct. 19–Nov. 15, 1930	Nov. 16–Dec. 13, 1930	Week ended— December, 1930		January, 1931					February, 1931				March, 1931			
					20	27	3	10	17	24	31	7	14	21	28	7	14	21	28
Algeria:																			
Algiers	C		1	2									1	1					
Constantine Department	C	2	1	2			3	3		6	6	19			4			1	
Oran	C	3		5						1	2					1			
Bulgaria	C	6	3	11	3				9	2	1	1		2		3			
	D				1														
Chile: Valparaiso	D																	1	
China:																			
Canton	C									2									
Manchuria—Harbin (see also table below)	C	1		1						3									
Shanghai	C									2									
Tientsin	C			1															
Chosen (see table below).																			
Czechoslovakia (see table below).																			
Egypt:																			
Alexandria	C	1	2	2															
	D		2																
Beheira Province	C				1														
	D				1														
Cairo	C			1	1							1							
Port Said	C	1	2							1									
Eritrea: Asmara	C																1		
Great Britain: Scotland	C											1							
Glasgow	C										2								
	D										1								
Guatemala.[1]																			
Iraq: Baghdad	C												2	1	1	1	1		
	D												1						
Latvia (see table below).																			
Lithuania (see table below).																			
Mexico (see also table below):																			
Durango	D	2									1								
Mexico City, including municipalities in Federal District	C	8	11	14	5	2	4	1	13	12	6	8	13	13	9		46		
	D	2	4	7	4	1	3	2	8	9	9	8	4	7	5		20		
San Luis Potosi	D			2									2	2		1	1	1	2

[1] On Feb. 27, 1931, the Director General of Public Health of Guatemala reports an unusual outbreak of typhus fever in a small village in Guatemala.

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

TYPHUS FEVER—Continued

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

Place		Sept. 21–Oct. 18, 1930	Oct. 19–Nov. 15, 1930	Nov. 16–Dec. 13, 1930	Week ended— December, 1930		January, 1931					February, 1931				March, 1931			
					20	27	3	10	17	24	31	7	14	21	28	7	14	21	28
Morocco	C		3	1	8					5	6	2	7	8	5	8	2	2	
	D	1								2				1					
Palestine	C	3	3	7	1	1		2	1	1			3				2	1	1
Paraguay: Asuncion	D									2	2								
Poland	C	22	37	42	18	6	28	11	19	21	16	50	49	41	43	56	62	58	
	D	2		7	3				2	1	4	1	3	3	4	9	4		
Portugal: Oporto	C	2	4	6						1									
Rumania	C	14	41	34	20	34		59	54	43	51	45	49	53	12				
	D		2	3	1	2		2	1	7	6	2	5	11	3				
Spain	C	2	4	1															
	D	2		1															
Tunisia	C	12		28						7	4	5			6	12	5	2	
Turkey (see table below).																			
Union of South Africa:																			
Cape Province	C	P	P	P	P	P	P	P	P	P	P	P	P	P					
Municipality of East London	C	1	1	1	P		2	1		1	1	1							
Natal	C	2	P					P	P	P	P	P	P	P					
Orange Free State	C		P		P	P		P	P	P	P	P	P						
Transvaal	C	P	P	P	P	P	P	P	P	P	P	P	P	P					
Yugoslavia (see table below).																			

Place		Aug., 1930	Sept., 1930	Oct., 1930	Nov., 1930	Dec., 1930	Jan., 1931
China: Harbin (see also table above)	C	5		3			
Chosen: Seoul	C	2	1	7	1	1	1
Czechoslovakia	C	1			16	16	60
Greece: Athens	C	6	4	4	4	10	10
Latvia	C	1	2				
Lithuania	C	7	24	1	5	6	26
	D	1	2		1	3	3
Mexico (see also table above)	D	26	47	47			
Turkey	C	11		28	3	2	
Yugoslavia	C	2		2	2		20
	D	1		1			2

	Cases	Deaths
Brazil:		
Bahia State—Mar. 14, 1931	1	
Ceara State—Mar. 14, 1931	2	
Barbalha, Feb. 7, 1931	1	1
Minas Geraes State, Mar. 20, 1931	2	
Rio de Janeiro State—		
Mar. 7, 1931	1	1
Mar. 21, 1931	1	1
Cambucy—		
Jan. 1-25, 1931	3	3
Feb. 1-7, 1931	1	1
Brazil—Continued.		
Rio de Janeiro State—Continued.		
Friburgo (imported), Jan. 25-30, 1931	1	
Padua—		
Jan. 18-24, 1931	1	1
Feb. 1-7, 1931	1	1
Gold Coast:		
July 10, 1930	1	
Albosso, Aug. 4, 1930		1

×