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PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

June 16–July 13, 1940

The accompanying table summarizes the prevalence of eight important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the Public Health Reports under the section Prevalence of Disease. The table gives the number of cases of these diseases for the 4-week period ended July 13, 1940, the number reported for the corresponding period in 1939, and the median number for the years 1935–39.

With the exception of influenza, the incidence during the 4 weeks ended July 13 of all of the eight communicable diseases under consideration was again below the median expectancy for the period.

Influenza.—The number of cases (1,452) of influenza reported for the 4 weeks ended July 13 was about 90 percent of the number reported for the corresponding period in 1939, but it was slightly above the average incidence for this period. The increase seemed to be largely due to a somewhat higher incidence in the East North Central, South Atlantic, and Pacific regions than might normally be expected at this season of the year.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—For the 4 weeks ended July 13 there were 623 cases of diphtheria reported, as compared with 986, 1,145, and 1,249 cases for the corresponding period in 1939, 1938, and 1937, respectively. The current incidence was about 63 percent of the incidence last year and about 50 percent of the 1935–39 median figure for this period. The Mountain region reported a 40 percent excess over the expected seasonal incidence in that region, but in all other regions the number of cases was relatively low.

Measles.—The number of reported cases (23,946) of measles for the current period was almost 20 percent above the number recorded for the corresponding period in 1939, but it was about 5 percent below the average incidence for recent years. Very significant decreases from the 1935–39 median figures were reported from the Middle

Atlantic, East North Central, South Atlantic, and Pacific regions, but in all other regions the incidence was comparatively high.

Number of reported cases of 8 communicable diseases in the United States during the 4-week period June 16–July 13, 1940, the number for the corresponding period in 1939, and the median number of cases reported for the corresponding period 1935–39 [1]

Division	Current period	1939	5-year median	Current period	1939	5-year median	Current period	1939	5-year median	Current period	1939	5-year median
	Diphtheria			Influenza [2]			Measles [3]			Meningococcus meningitis		
United States [1]	623	986	1,232	1,452	1,599	1,384	23,946	20,185	24,029	89	124	296
New England	11	23	32	8	7	5	5,202	3,929	3,786	1	5	7
Middle Atlantic	103	137	241	30	18	22	6,666	4,126	10,052	15	34	72
East North Central	114	176	299	160	136	136	5,810	2,029	7,655	15	20	33
West North Central	45	63	85	19	108	118	1,168	950	950	6	12	16
South Atlantic	80	164	180	546	695	237	967	1,741	1,694	15	27	53
East South Central	45	63	82	73	117	109	720	273	436	14	12	38
West South Central	82	196	155	373	299	380	1,035	1,078	546	13	6	18
Mountain	66	66	47	99	130	71	1,137	753	740	2	2	4
Pacific	77	98	98	144	89	95	1,241	5,301	3,515	8	6	21
	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
United States [1]	301	390	390	5,703	4,732	8,017	158	381	534	857	1,369	1,706
New England	5	5	9	435	426	652	0	6	0	22	33	24
Middle Atlantic	4	18	18	1,858	1,247	2,381	0	0	0	89	73	115
East North Central	35	32	24	1,984	1,601	2,932	36	104	104	78	100	137
West North Central	30	12	12	366	381	751	71	127	220	58	56	78
South Atlantic	24	148	58	266	230	330	3	6	6	188	415	479
East South Central	16	19	41	181	153	135	11	11	5	98	238	334
West South Central	31	43	23	129	124	155	21	33	22	256	348	348
Mountain	9	20	4	128	181	225	10	34	81	26	54	56
Pacific	147	93	44	356	389	473	6	60	70	42	52	53

[1] 48 States. Nevada is excluded and the District of Columbia is counted as a State in these reports.
[2] 44 States and New York City.
[3] 47 States. Mississippi is not included.

Meningococcus meningitis.—The incidence of meningococcus meningitis reached a new low level. For the current period there were 89 cases reported, as compared with 124 for the corresponding period in 1939 and a median of 296 cases for the years 1935–39. Each section of the country shared in the favorable situation of this disease that now exists.

Poliomyelitis.—Of a total of 301 cases of poliomyelitis reported for the 4 weeks ended July 13, California reported 92, Washington 53, Texas 14, and Iowa, Kansas, Michigan, and Oklahoma 11 cases each; about 70 percent of the cases occurred in those 7 States. No more than 7 cases were reported from any other State and the figures represent about the normal increase in this disease that is expected at this season of the year. For the country as a whole the current incidence is approximately 75 percent of last year's figure for this period, which figure (390 cases) also represents the 1935–39 median incidence for this period.

Scarlet fever.—The scarlet fever incidence (5,703 cases) was about 20 percent above the recorded incidence for the corresponding period in 1939, but it was only about 70 percent of the average incidence for recent years. The East South Central region reported a slight increase over the 1935–39 median incidence, but other regions reported very definite declines from the seasonal expectancy.

Smallpox.—The smallpox incidence also reached a new low level, the current incidence (158 cases) being the lowest on record for this period. In the East South Central region the number of cases was slightly higher than might be expected and in the West South Central region the incidence stood approximately at the normal seasonal level, but other regions reported a significantly low incidence.

Typhoid fever.—The recent favorable record for typhoid fever was maintained during the current period. The number of reported cases (857) was only about 62 percent of the number reported in 1939 and approximately 50 percent of the 1935–39 average incidence for this period. The situation was favorable in all sections of the country.

MORTALITY, ALL CAUSES

The average mortality rate from all causes in large cities for the 4 weeks ended July 13, based on data received from the Bureau of the Census, was 10.2 per 1,000 inhabitants (annual basis). The rate for this period in 1939 was 10.1 and the average rate in the years 1935–39 was 10.6.

DISEASE OUTBREAKS RESULTING FROM FAULTY ENVIRONMENTAL SANITATION

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INTRODUCTION

Heretofore we have not been well informed as to the total number of outbreaks of disease which result from faulty sanitation. Several causes are responsible:

(*a*) The reporting of cases of communicable disease is frequently incomplete.

(*b*) The epidemiological studies of cases which *are* reported are frequently inadequate.

(*c*) The outbreaks which *are* studied are not always reported.

(*d*) The outbreaks which *are* reported have not hitherto been systematically corrected and published by any central national agency.

Not until 1923 did the United States Public Health Service inaugurate annual surveys of milk-borne outbreaks of disease. Prior to that time the approximate number of milk-borne outbreaks which

had found their way into the miscellaneous literature was 17 per year. As a result of the increased emphasis placed by the Public Health Service in 1923 upon more complete reporting of milk-borne outbreaks, the annual number of known outbreaks rose from 17 to about 42.

Last year the Public Health Service inaugurated the first Nation-wide survey of outbreaks of disease caused by faulty sanitation in general. Following is a discussion of the reports received for the year 1938, together with a discussion of the outbreak history prior to that year.

TOTAL DISEASE OUTBREAKS—ALL VEHICLES

TABLE 1.—*Total outbreaks, cases and deaths, 1938, by vehicles*

Vehicle	Number of outbreaks	Number of cases	Number of deaths
Water supplies	48	31,693	17
Milk and milk products	42	1,685	27
Other foods	70	2,247	25
Unidentified vehicles	8	882	3
Total	168	36,507	72

Of interest in table 1 is the finding that foods were a more prolific source of outbreaks in 1938 than were milk or water supplies. However, the number of persons affected by water-borne disease was far greater than the number affected by milk or food-borne disease. This was the result of a single water-borne outbreak of gastroenteritis, involving 29,250 cases, which occurred in one large city.

WATER-BORNE OUTBREAKS

TABLE 2.—*Water-borne outbreaks, 1938, by kind of supply*

Kind of water supply	Number of outbreaks	Number of cases	Number of deaths
Ground water supplies, treated	5	157	0
Ground water supplies, untreated	28	926	16
Surface water supplies, treated	4	29,374	0
Surface water supplies, untreated	4	40	1

Of interest is the fact that the greatest number of water-borne outbreaks and deaths occurred in connection with untreated ground water supplies. This means that one of the important problems still remaining in connection with the prevention of water-borne outbreaks is a more intensive sanitary control of ground water supplies. Many ground water supplies are faulty either in design or operation or both.

It is also evident, however, that our control of surface water supplies is not adequate either, for during 1938, as table 2 shows, there were

reported a total of 8 outbreaks in connection with surface water supplies, 4 of which were treated water supplies.

TABLE 3.—*Water-borne outbreaks, 1938, by diseases*

Disease	Number of outbreaks	Number of cases	Number of deaths
Dysentery	8	1,379	0
Gastroenteritis	22	30,108	0
Typhoid fever	18	206	17
Total	48	31,693	17

Table 3 shows that defective water supplies caused more outbreaks of gastroenteritis (22) than of either typhoid fever or dysentery. It is further to be noted that unsafe water supplies caused as many typhoid fever outbreaks as did unsafe milk supplies (see table 8).

TABLE 4.—*Water-borne outbreaks, 1938, by location*

State	Number of outbreaks	Number of cases	Number of deaths
Alabama	1	4	0
California	1	5	1
Connecticut	1	123	0
Indiana	5	451	6
Maine	1	2	0
Maryland	1	663	0
Massachusetts	2	68	0
New York	24	894	3
North Carolina	1	8	0
Ohio	1	3	0
South Carolina	1	23	3
Texas	4	31	2
Virginia	2	141	1
West Virginia	2	27	1
Wisconsin	1	29,250	0
Total (15 States)	48	31,693	17

It will be noted that 33 States failed to report any water-borne outbreaks whatever, whereas New York State reported 24, or exactly one-half of the total of 48 outbreaks.

TABLE 5.—*Water-borne outbreaks, 1938, by size of community*

Size of community	Outbreaks		Cases	
	Number	Percent	Number	Percent
1–99	11	23	178	0.6
100–199	4	8	205	.6
200–499	3	6	167	.5
500–999	9	19	498	1.6
1,000–2,499	6	13	711	2.2
2,500–4,999	8	17	193	.6
5,000–9,999	5	10	401	1.3
10,000–24,999	1	2	90	.3
25,000–49,999				
50,000–99,999				
100,000–499,999				
500,000 and over	1	2	29,250	92.3
Total	48	100	31,693	100.0

It will be noted that only 2 of the 48 water-borne outbreaks (4 percent) occurred in communities of more than 10,000 population. Since these constitute about 47.2 percent of the total population it is probably safe to say that water supplies in small communities are in general much less safe than water supplies in large communities. In other words many more water-borne outbreaks occur per unit of population in small communities than in large ones.

On the other hand, *so far as known numbers of persons affected* is concerned, the most extensive water-borne outbreak during 1938 occurred in one large city, in which 29,250 persons were involved. This should be compared with the fact that only 31,693 cases were reported for communities of all sizes.

PREVIOUS KNOWN INCIDENCE OF WATER-BORNE OUTBREAKS

Table 6 gives the frequency of water-borne outbreaks in the United States for the period 1920–36, inclusive, by years, as reported by Wolman and Gorman (*1*) for 1920 to 1929, inclusive, and by Wolman (*2*) for 1930 to 1936, inclusive.

TABLE 6.—*Water-borne outbreaks in the United States 1920–36, inclusive*

Year	Number of outbreaks	Number of cases	Number of deaths
1920	26	10,115	133
1921	29	3,449	30
1922	20	1,363	60
1923	24	1,488	119
1924	23	11,650	70
1925	24	6,073	16
1926	21	45,992	42
1927	30	1,694	51
1928	19	3,385	33
1929	26	8,503	76
1930	25	6,908	33
1931	20	1,184	15
1932	13	756	12
1933	20	2,371	131
1934	31	5,015	38
1935	29	1,908	43
1936	32	3,953	53
Total, 1920–36	412	115,807	955
Average per year	24.2	6,812	56
1938	48	31,693	17

It will be noted that the average number of water-borne outbreaks for the period 1920–36 was 24.2 per year, whereas the number of outbreaks reported for 1938 was 48; that the average annual number of cases of water-borne disease for the period was 6,812 as compared with 31,693 for 1938; and that the average annual number of deaths from water-borne disease for the period was 56 as compared with 17 for the year 1938. In only 1 year, 1926, was the reported number of cases of water-borne disease greater than the number reported for 1938. On the other hand, the deaths reported for 1938 were fewer in number than those reported for any of the 17 years except 3.

OUTBREAKS TRANSMITTED THROUGH MILK AND MILK PRODUCTS

TABLE 7.—*Outbreaks transmitted through milk and milk products, 1938, by kind of supply*

Kind of supply	Number of outbreaks	Number of cases	Number of deaths
Sweet milk, raw	37	1,462	27
Sweet milk, pasteurized	1	100	0
Buttermilk, raw	1	10	0
Buttermilk, pasteurized	0	0	0
Ice cream	2	96	0
Cheese	1	17	0
Total	42	1,685	27

It will be noted from table 7 that 38 of the 42 milk-borne outbreaks occurred in connection with sweet milk supplies, that only 1 was traced to buttermilk, only 2 to ice cream, and only 1 to cheese. In only 1 of the 38 outbreaks traced to sweet milk was any attempt made to pasteurize the milk. In this case the pasteurizer was reported to have "broken down."

TABLE 8.—*Outbreaks transmitted through milk and milk products, 1938, by diseases*

Disease	Number of outbreaks	Number of cases	Number of deaths
Diphtheria	1	31	3
Dysentery	2	166	0
Food poisoning	1	17	0
Gastroenteritis	8	610	0
Scarlet fever	5	82	0
Septic sore throat	7	592	7
Typhoid fever	18	187	17
Total	42	1,685	27

Evidently, typhoid fever was involved more often than any other disease, and caused more deaths. On the other hand, gastroenteritis and septic sore throat were the most prolific sources of cases, namely, 610 and 592, respectively, or 1,202 of the total of 1,685 cases of all diseases.

Table 9 shows that 31 States failed to report any milk-borne outbreaks whatever, whereas New York State reported more milk-borne outbreaks than did any other State, namely, 10 of the total of 42. California and Minnesota reported 5 each. Therefore, 3 of the 48 States reported nearly half of the outbreaks. Of course, this does not necessarily mean that these 3 States actually experienced so large a percentage of the total number of milk-borne outbreaks. It may mean, and probably does, that the outbreaks were more completely reported by these States.

TABLE 9.—*Outbreaks transmitted through milk and milk products, 1938, by location*

State	Number of outbreaks	Number of cases	Number of deaths
California	5	245	3
Colorado	2	83	3
Georgia	1	6	0
Idaho	2	38	1
Illinois	2	78	0
Indiana	2	15	0
Iowa	1	107	0
Kansas	1	5	1
Kentucky	1	10	0
Michigan	1	49	6
Minnesota	5	83	2
New York	10	859	7
North Dakota	2	11	2
Oklahoma	2	19	0
Washington	1	12	2
West Virginia	1	10	0
Wisconsin	3	55	0
Total (17 States)	42	1,685	27

TABLE 10.—*Outbreaks transmitted through milk and milk products, 1938, by size of community*

Size of community	Outbreaks		Cases	
	Number	Percent	Number	Percent
1–99	1	2	4	0.2
100–199	3	7	181	10.7
200–499	11	27	457	27.1
500–999	6	14	207	12.3
1,000–2,499	8	20	551	32.7
2,500–4,999	5	12	165	9.8
5,000–9,999	3	7	23	1.4
10,000–24,999	3	7	36	2.1
25,000–49,999	1	2	49	3.0
50,000–99,999				
100,000–499,999	1	2	12	.7
500,000 and over				
Total	42	100	1,685	100.0

Here again, as in the case of water-borne outbreaks, only 5 of the 42 outbreaks (12 percent) occurred in communities of more than 10,000 population. Since about 47.2 percent of the population lives in communities of more than 10,000 population it is hardly probable that by chance alone only 12 percent of the milk-borne outbreaks would have occurred therein. A far more logical explanation would be the probability that milk supplies in small communities in general are not as safe as those in large communities. For one thing, the percentage of milk pasteurized in communities of from 1,000 to 10,000 population is considerably smaller than for cities of over 10,000 population. For 1936 these figures were 39.3 percent for the group with 1,000 to 10,000 population as compared with 83.1 percent for the group with 10,000 and over population (*3*).

PREVIOUS KNOWN INCIDENCE OF OUTBREAKS TRACED TO MILK AND MILK PRODUCTS

In 1927 Armstrong and Parran (4) listed 791 outbreaks of milk-borne disease in the United States as having been reported in the literature from January 1, 1881, to January 1, 1927. This represents approximately 17 outbreaks per year for the 46-year period. However, the actual number of outbreaks of disease in this country traced to milk and milk products has been and is much greater than this, since the above figures do not include any outbreaks which failed to find their way into the literature.

Believing that a frequent periodic questionnaire survey, addressed to health authorities, might give a nearer approximation of the true number of outbreaks, in 1923 the Public Health Service instituted annual surveys as part of the work of its Office of Milk Investigations.

The total number of outbreaks reported by health authorities in the United States from 1923–1937, inclusive, was 639, or 42.6 per year instead of 17 per year as reported in the literature for the period 1881–1927. This, of course, does not mean that the incidence of milk-borne outbreaks was greater in the later period, but rather that an annual questionnaire survey of health authorities yields much more complete information than does an occasional literature survey.

FOOD-BORNE OUTBREAKS

TABLE 11.—*Food-borne outbreaks, 1938, by kind of food*

Kind of food	Number of outbreaks	Number of cases	Number of deaths
Pies and pastry	14	311	1
Pork and pork products	11	286	0
Fowl	5	94	1
Salads	5	179	3
Home-canned vegetables	5	11	6
Sausage	2	102	0
Veal	2	157	0
Gravy	2	70	7
Miscellaneous	24	1,037	7
Total	70	2,247	25

It will be noted that outbreaks traced to pies and pastry were more numerous than those traced to any other food product, and that the outbreaks traced to pork and pork products were second in frequency. Fowl, salads, and home-canned vegetables were responsible for 5 outbreaks each.

TABLE 12.—*Food-borne outbreaks, 1938, by diseases*

Disease	Number of outbreaks	Number of cases	Number of deaths
Botulism	5	11	6
Dysentery	3	118	0
Food poisoning	19	817	3
Gastroenteritis	23	1,015	0
Paratyphoid	1	21	0
Trichinosis	3	14	0
Typhoid fever	16	251	16
Total	70	2,247	25

Evidently, the food-borne disease most frequently involved for 1938 was gastroenteritis, with 23 outbreaks and 1,015 cases. The diseases next most frequently involved were "food poisoning" and typhoid fever, with 19 outbreaks, 817 cases, and 3 deaths, and 16 outbreaks, 251 cases, and 16 deaths, respectively.

TABLE 13.—*Food-borne outbreaks, 1938, by location*

State	Number of outbreaks	Number of cases	Number of deaths
Connecticut	1	6	0
Idaho	2	27	1
Iowa	1	45	3
Kansas	2	18	1
Kentucky	6	60	0
Maryland	7	367	1
Massachusetts	3	208	0
Michigan	3	27	1
Minnesota	3	13	0
Mississippi	1	200	0
New Jersey	10	290	0
New York	15	611	0
North Dakota	1	50	0
Ohio	1	53	1
Pennsylvania	4	83	7
Rhode Island	1	54	2
Tennessee	1	12	0
Texas	1	23	2
Utah	1	1	1
Virginia	1	17	0
Washington	3	8	5
Wisconsin	2	74	0
Total (22 States)	70	2,247	25

As in the case of water-borne outbreaks and milk-borne outbreaks New York State reported more food-borne outbreaks than did any other State, namely, 15. New Jersey was second with 10 outbreaks. Twenty-six States failed to report any food-borne outbreaks.

The significant fact brought out by table 15 is that, whereas only a small percentage of water and milk-borne outbreaks occurred in communities of over 10,000 population, this was not so in the case of food-borne outbreaks. Here 38 of the 70 outbreaks (54 percent) occurred in communities of 10,000 and over, which embraced 47.2 percent of the total population. It would appear, therefore, that while large communities are more advanced than small communities with respect to water and milk sanitation they do not excel with regard to food sanitation. This is not surprising since water sanitation and milk sanitation are much better understood in general than is food sanitation, pointing to the need of an intensive study of this subject.

TABLE 14.—*Food-borne outbreaks, 1938, by size of community*

Size of community	Outbreaks		Cases	
	Number	Percent	Number	Percent
1–99	10	14	114	5.1
100–199	5	7	190	8.4
200–499	6	9	343	15.3
500–999	2	3	8	.4
1,000–2,499	5	7	70	3.1
2,500–4,999	5	7	192	8.5
5,000–9,999	5	7	27	1.2
10,000–24,999	7	10	89	4.0
25,000–49,999	6	9	482	21.4
50,000–99,999	5	7	375	16.7
100,000–499,999	7	10	74	3.3
500,000 and over	6	9	260	11.6
Population unknown	1	1	23	1.0
Total	70	100	2,247	100.0

PREVIOUS KNOWN INCIDENCE OF FOOD-BORNE OUTBREAKS

The record of past food-borne outbreaks is unsatisfactory. However, following are several illustrative extracts from the literature.

In 1917 E. O. Jordan (*5*) reported that from press clipping bureaus and other sources he had collected for the period October 1913 to October 1915, 657 group and family outbreaks of "food poisoning" in the United States. In his opinion, "There is reason to believe that the majority of cases escape notice. Probably several thousand outbreaks of food poisoning in families and larger groups, affecting at least 15,000 to 20,000 persons, occur in the United States in the course of a year."

In 1924 Geiger (*6*) reported as follows: "It has been possible in some cases to study the records, and in other cases to participate in the investigation of over 800 outbreaks suspected of being food poisoning. These records cover a period of time from 1910 to the present date (1924), one-fourth of which (201) were reported in the period 1922 to 1924. It should be stated that the diagnosis of "ptomaine poisoning" is being loosely used by various members of the medical profession. Likewise it can be stated that in over 80 of these investigations, especially in those where it has been possible to reconstruct the history of the outbreak, or where subsequent autopsies were performed and investigations made, there were indications of other conditions than food poisoning, or that the food primarily blamed was not at fault. On the other hand, investigations have been made both from an epidemiological and laboratory standpoint, particularly at Rockford, Illinois, and Birmingham, Alabama, in which the causative food was determined and the contaminating organisms, paratyphoid A and B, respectively, were isolated."

In the publication referred to above (*6*) Geiger does not give the number of cases or deaths involved in the 800 outbreaks suspected of being "food poisoning," but in another publication (*7*) he reports that 749 of the outbreaks, which occurred between 1910 and 1922, inclusive, involved 5,210 persons and caused 399 deaths, a case

fatality rate of 7.5 percent. He further states that, based on the fact that the Bureau of the Census reported 7,316 deaths attributed to food poisoning during the period 1910–1920, and assuming that the same case fatality rate would apply, there were about 98,000 cases of food poisoning in the 10-year period. This would represent an average of about 9,800 cases per year as compared with the estimated 15,000 to 20,000 a year made earlier by Jordan. Geiger warns, however, that these assumptions may be misleading because of the unknown extent to which botulism, with its much higher case fatality rate, is involved in the food poisoning mortality reported by the Census.

COMPLETENESS OF REPORTING

It is improbable that the outbreaks reported herein are even approximately complete. Evidence as to this follows:

(1) Of the 48 water-borne outbreaks reported from all States New York State reported 24, or exactly half. It would be absurd to believe that New York State water supplies in general are so much less safe than those of the rest of the country that it actually experienced half of all water-borne outbreaks, despite the fact that it embraces only about one-tenth of our entire population. That would be approximately tantamount to saying that New York State water supplies are only one-fifth as safe as those of all other States combined.

(2) The same reasoning holds in the case of outbreaks conveyed through milk and milk products. New York State, California, and Minnesota combined reported nearly as many milk-borne outbreaks as all the rest of the country combined, although these three States represent only about one-sixth of our entire population.

(3) In the case of food-borne outbreaks New York State reported about one-sixth of all such outbreaks reported for the entire country, though New York represents only about one-tenth of our entire population.

(4) If we consider all outbreaks transmitted through all vehicles New York State reported 49 of the total of 169 for the entire country. This represents 30 percent of all outbreaks for 10 percent of the entire population.

(5) It is improbable that even New York State finds and reports all outbreaks which result from faulty sanitation.

(6) If the sanitary control of water supplies, milk supplies, and food supplies in New York State is as carefully done as in the average of the other States, which is a not unreasonable assumption, it follows that the actual number of outbreaks is probably at least three times as great as herein reported for 1938. If it is further assumed that even New York State is not perfect in its epidemiological work (not an unreasonable assumption) the above ratio of reported to actual outbreaks may be increased, perhaps considerably.

(7) All in all it seems safe to estimate that there are probably 5 to 10 or more times as many outbreaks, cases, and deaths resulting from faulty sanitation as are herein reported for 1938. Such an estimate would then represent 1,000 or more outbreaks, hundreds of thousands of cases, and 400 or more deaths per year resulting from faulty sanitation. That this is a conservative estimate is evidenced by the fact that during the past 5 years the total number of cases of typhoid fever alone occurring in the United States has been from 12,000 to 18,000 per year, and the fact that most typhoid fever cases are probably the result directly or indirectly of some breakdown in environmental sanitation.

(8) Finally, it should be noted that the above discussion takes no account of the fact that typhus fever, with 2,300 cases and 137 deaths in 1938, undulant fever, with at least 2,000 to 3,000 cases per year, and malaria with several hundred thousand cases and several thousand deaths per year are all the result of faulty environmental sanitation.

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REPORT ON MARKET-MILK SUPPLIES OF CERTAIN URBAN COMMUNITIES

Compliance of the Market-Milk Supplies of Certain Urban Communities With the Grade A Pasteurized and Grade A Raw Milk Requirements of the Public Health Service Milk Ordinance and Code, as Shown by Compliance (Not Safety) Ratings of 90 Percent or More Reported by the State Milk-Sanitation Authorities During the Period July 1, 1938, to June 30, 1940

The accompanying list gives the fourteenth semiannual revision of the list of certain urban communities in which the pasteurized market milk is both produced and pasteurized in accordance with the Grade A pasteurized milk requirements of the Public Health Service Milk Ordinance and Code and in which the raw market milk sold to the final

consumer is produced in accordance with the Grade A raw milk requirements of said ordinance and code, as shown by ratings of 90 percent or more reported by State milk-sanitation authorities.

These ratings are not a complete measure of safety but represent the degree of compliance with the Grade A requirements of the Public Health Service Milk Ordinance and Code. Safety estimates should also take into account the percentage of milk pasteurized, which is given in the following tables.

The primary reason for publishing such lists from time to time is to encourage the communities of the United States to attain and maintain a high level of excellence in the public health control of milk supplies.

It is emphasized that the Public Health Service does not intend to imply that only those communities on the list are provided with high-grade milk supplies. Some communities which have high-grade milk supplies are not included because arrangements have not been made for the determination of their ratings by the State milk-sanitation authority. In other cases the ratings which have been determined are now more than 2 years old and have therefore lapsed. In still other communities with high-grade milk supplies there seems, in the opinion of the community, to be no local necessity nor desire for rating or inclusion in the list, nor any reasonable local benefit to be derived therefrom.

The rules under which a community is included in this list are as follows:

(1) All ratings must have been determined by the State milk-sanitation authority in accordance with the Public Health Service rating method (Pub. Health Rep., **53:** 1386 (1938). Reprint No. 1970), based upon the Grade A pasteurized milk and the Grade A raw milk requirements of the Public Health Service Milk Ordinance and Code.

(2) No community will be included in the list unless both its pasteurized milk and its raw milk ratings are 90 percent or more. Communities in which only raw milk is sold will be included if the raw milk ratings are 90 percent or more. Communities which receive, without local inspection, milk from other sheds will be included in the list only if the locally inspected supply, as well as the shipped-in supply, shows a rating of 90 percent or more.

(3) The rating used will be the latest rating submitted to the Public Health Service, but no rating will be used which is more than 2 years old.

(4) The Public Health Service will make occasional check surveys of cities for which ratings of 90 percent or more have been reported by the State. If such check rating is less than 90 percent but not less than 85, the city will be removed from the 90-percent list

after 6 months unless a resurvey submitted by the State during this probationary interim shows a rating of 90 percent or more. If, however, such check rating is less than 85 percent, the city will be removed from the list immediately. If the check rating is 90 percent or more, the city will be retained on the list for a period of 2 years from the date of the check survey unless a subsequent rating submitted during this period warrants its removal.

Communities are urgently advised to bring their ordinances up to date at least every 5 years, since ratings will be made on the basis of later editions if those adopted locally are more than 5 years old.

Communities which are not now on the list and desire to be rated should request the State milk-sanitation authority to determine their ratings and, if necessary, should improve their status sufficiently to merit inclusion in the list.

Communities which are now on the list should not permit their ratings to lapse, as ratings more than 2 years old cannot be used.

Communities which have not adopted the Public Health Service Milk Ordinance may wish to give thoughtful consideration to the advisability of doing so. It is obviously easier to satisfy the requirements upon which the rating method is based if these are included in the local legislation.

Communities which are enforcing the Public Health Service Milk Ordinance, but which have not yet been admitted to the list, should determine whether this has been the result of failure to enforce the ordinance strictly or failure to bring the ordinance up to date.

State milk-sanitation authorities which are not now equipped to determine municipal ratings are urged, in fairness to their communities, to equip themselves as soon as possible. The personnel required is small, as in most States one milk specialist is sufficient for the work.

The inclusion of a community in this list means that the pasteurized milk sold in the community, if any, is of such a degree of excellence that the weighted average of the percentages of compliance with the various items of sanitation required for Grade A pasteurized milk is 90 percent or more and that, similarly, the raw milk sold in the community, if any, so nearly meets the requirements that the weighted average of the percentages of compliance with the various items of sanitation required for Grade A raw milk is 90 percent or more. However, high-grade pasteurized milk is safer than high-grade raw milk, because of the added protection of pasteurization. To secure this added protection, those who are dependent on raw milk can pasteurize the milk at home in the following simple manner: Heat the milk over a hot flame to 165° F., stirring constantly; then immediately place the vessel in cold water and continue stirring until cool.

TABLE 1.—*Communities in which all market milk is pasteurized. In these communities market milk complies with the Grade A pasteurized milk requirements of the Public Health Service Milk Ordinance and Code to the extent shown by pasteurized milk ratings of 90 percent or more* [1]

Community	Percentage of milk pasteurized	Date of rating
ILLINOIS		
Aurora	100	May 3, 1940.
Brooklyn	100	Mar. 22, 1940.
Canteen	100	Do.
Centerville	100	Do.
East St. Louis	100	Do.
Elgin	100	Dec. 14, 1938.
Fairmont City	100	Mar. 22,1940.
National City	100	Do.
Stites	100	Do.
MINNESOTA		
Albert Lea	100	Sept. 29, 1938.
Rochester	100	October 1938.
Winona	100	Aug. 12, 1938.
MISSOURI		
St. Louis	100	June 7, 1940.
NORTH CAROLINA		
Clinton	100	Aug. 18, 1939.
Fort Bragg	100	Do.
Greenville	100	June 15, 1940.
Sylva	100	May 10, 1940.
Tarboro	100	Nov. 1, 1938.

[1] Note particularly the percentage of milk pasteurized in the various communities listed in these tables. This percentage is an important factor to consider in estimating the safety of a city's milk supply.

TABLE 2.—*Communities in which some market milk is pasteurized. In these communities the pasteurized market milk complies with the Grade A pasteurized milk requirements and the raw market milk complies with the Grade A raw milk requirements of the Public Health Service Milk Ordinance and Code to the extent shown by pasteurized and raw milk ratings, respectively, of 90 percent or more* [1]

[NOTE.—All milk should be pasteurized or boiled, either commercially or at home, before it is consumed. See text for home method]

Community	Percentage of milk pasteurized	Date of rating
ALABAMA		
Dothan	39	May 30, 1940.
Montgomery	28	Feb. 24, 1940.
Tuscaloosa	86	May 24, 1940.
ARKANSAS		
Fayetteville	59	May 1939.
Fort Smith	38	June 1939.
Jonesboro	37	May 1939.
Little Rock	49	October 1939.
Osceola	42	January 1940.
Pine Bluff	28	June 1939.
Texarkana	35	Aug. 16, 1939.
FLORIDA		
Coral Gables	97	April 1940.
Dania	95	Mar. 28, 1940.
Fort Lauderdale	95	Do.
Hollywood	95	Do.
Miami	97	April 1940.
Pompano	95	Mar. 28, 1940.
GEORGIA		
Americus	13	June 21, 1939.
Statesboro	40	Mar. 14, 1940.

See footnotes at end of table.

TABLE 2.—*Communities in which some market milk is pasteurized. In these communities the pasteurized market milk complies with the Grade A pasteurized milk requirements and the raw market milk complies with the Grade A raw milk requirements of the Public Health Service Milk Ordinance and Code to the extent shown by pasteurized and raw milk ratings, respectively, of 90 percent or more*—Continued

Community	Percentage of milk pasteurized	Date of rating
ILLINOIS		
Chicago	99.9	May 20, 1939.
Decatur	87	Jan. 28, 1939.
Evanston	99.9	Apr. 17, 1940.
Glencoe	99.8	Apr. 11, 1940.
Highland Park	99.8	Do.
Kenilworth	99.8	Do.
Lake Bluff	99.8	Do.
Lake Forest	99.8	Apr. 11, 1940.
Peoria	97	May 23, 1940.
Waukegan	99.9	Apr. 3, 1940.
Winnetka	99.8	Apr. 11, 1940.
KANSAS		
Kansas City	51	December 1938.
Lawrence	69	May 1940.
Wellington	54	April 1940.
Wichita	75	December 1939.
KENTUCKY		
Berea	1	November 1939
Bowling Green	70	Dec. 22, 1939.
Glasgow	68	June 27, 1939.
Henderson	45	June 11, 1940.
Jefferson County	43	August 1939.
Louisville	97	October 1939.
Richmond	22	November 1939.
MINNESOTA		
Little Falls	70	June 26, 1939.
MISSISSIPPI		
Greenville	58	May 25, 1939.
McComb	21	Dec. 6, 1938.
Tupelo	21	Jan. 6, 1939.
MISSOURI		
Clayton	(2)	Dec. 14, 1939.
Ferguson	(2)	Do.
Glendale	(2)	Do.
Kirkwood	(2)	Do.
Maplewood	(2)	June 7, 1940.
University City	(2)	Dec. 14, 1939.
Webster Groves	(2)	Do.
NEW MEXICO		
Albuquerque	69	November 1939.
Las Vegas	65	July 25, 1939.
Roswell	77	Aug. 8, 1939.
Santa Fe	44	December 1939.
NORTH CAROLINA		
Fayetteville	50	Aug. 18, 1939.
Franklin	85	July 19, 1939.
Greensboro	79	August 1939.
Hendersonville	53	Sept. 13, 1938.
Lumberton	36	May 29, 1940.
Mount Airy	47	Oct. 18, 1938.
Reidsville	69	Aug. 18, 1938.
Rockingham	53	Apr. 9, 1940.
Rocky Mount	50	Nov. 29, 1938.
Tryon	49	July 24, 1939.
Waynesville	60	May 9, 1940.
Winston-Salem	78	November 1939.
NORTH DAKOTA		
Valley City	23	Nov. 10, 1939.
OHIO		
Athens	84	Oct. 6, 1938.

See footnotes at end of table.

TABLE 2.—*Communities in which some market milk is pasteurized. In these communities the pasteurized market milk complies with the Grade A pasteurized milk requirements and the raw market milk complies with the Grade A raw milk requirements of the Public Health Service Milk Ordinance and Code to the extent shown by pasteurized and raw milk ratings, respectively, of 90 percent or more*—Continued

Community	Percentage of milk pasteurized	Date of rating
OKLAHOMA		
Ada	55	June 27, 1940.
Bartlesville	45	Dec. 19, 1939.
Blackwell	35	Nov. 28, 1939.
Lawton	47	Feb. 22, 1939.
Muskogee	82	June 4, 1940.
Oklahoma City	73	Mar. 29, 1939.
Okmulgee	61	Nov. 8, 1939.
Seminole	63	Mar. 26, 1940.
Tulsa	74	Apr. 6, 1940.
OREGON		
Astoria	64	June 12, 1940.
Portland	82	Apr. 3, 1940.
Seaside	67	June 14, 1940.
SOUTH CAROLINA		
Walterboro	26	Dec. 6, 1939.
TENNESSEE		
Bristol	69	July 14, 1939.
TEXAS		
Abilene	67	Apr. 25, 1939.
Amarillo	73	Oct. 17, 1938.
Ballinger	49	Apr. 21, 1939.
Big Spring	34	Sept. 20, 1938.
Brownwood	21	Dec. 19, 1939.
Corpus Christi	87	May 26, 1939.
Dallas	77	Dec. 10, 1938.
Fort Worth	75	Feb. 25, 1939.
Gainesville	63	June 30, 1939.
Jacksonville	85	May 2, 1940.
Kerrville	74	Sept. 6, 1939.
Lamesa	38	June 10, 1940.
Lubbock	76	Oct. 28, 1939.
Palestine	23	Jan. 30, 1940.
San Angelo	65	May 13, 1940.
San Antonio	82	June 28, 1940.
Seguin	12	July 30, 1938.
Sherman	43	June 17, 1939.
Texarkana	26	Aug. 16, 1939.
Tyler	42	June 12, 1940.
Waco	48	Mar. 30, 1939.
VIRGINIA		
Bristol	69	July 14, 1939.
Lexington	41	Oct. 26, 1939.
Pulaski	77	Sept. 20, 1939.
South Boston	72	Sept. 22, 1939.
Waynesboro	95	Oct. 11, 1939.
Williamsburg	41	May 3, 1939.
WASHINGTON		
Camas	8	May 22, 1939.
Vancouver	31	May 25, 1939.
Walla Walla	53	Apr. 14, 1939.
Yakima	67	Apr. 20, 1939.
WEST VIRGINIA		
Huntington	66	June 5, 1939.
WYOMING		
Casper	71	Aug. 17, 1938.
Cheyenne	74	July 7, 1938.

[1] Note particularly the percentage of milk pasteurized in the various communities listed in these tables. This percentage is an important factor to consider in estimating the safety of a city's milk supply.

[2] The percentage of the total milk supply pasteurized cannot be accurately determined owing to the overlapping of milk routes.

TABLE 3.—*Communities in which no market milk is pasteurized, but in which the raw market milk complies with the Grade A raw milk requirements of the Public Health Service Milk Ordinance and Code to the extent shown by raw milk ratings of 90 percent or more* [1]

[NOTE.—All milk should be pasteurized or boiled, either commercially or at home, before it is consumed. See text for home method]

Community	Date of rating	Community	Date of rating
ALABAMA		NORTH CAROLINA—continued	
Bridgeport	June 29, 1940.	Farmville	May 15, 1940.
Lanett	Mar. 19, 1940.	Hope Mills	Aug. 18, 1939.
Scottsboro	June 29, 1940.	Kelford	Nov. 8, 1938.
Stevenson	Do.	Kenansville	May 23, 1940.
FLORIDA		Lewiston	Nov. 8, 1938.
Apalachicola	January 1940.	Mars Hill	Feb. 21, 1939.
KANSAS		Mount Olive	Aug. 22, 1939.
Horton	June 1940.	Murfreesboro	Oct. 20, 1938.
KENTUCKY		North Wilkesboro	July 1938.
Somerset	November 1939.	Pilot Mountain	Sept. 20, 1939.
MISSISSIPPI		Powellsville	Nov. 8, 1938.
Canton	Oct. 17, 1938.	Red Springs	May 29, 1940.
Greenwood	Nov. 22, 1938.	Rosehill	May 23, 1940.
Hollandale	Nov. 30, 1938.	Roxobel	Nov. 8, 1938.
Holly Springs	Jan. 4, 1939.	Wallace	May 23, 1940.
Leland	Nov. 30, 1938.	Warsaw	Do.
Magnolia	Dec. 6, 1938.	Wilkesboro	July 29, 1938.
Yazoo City	Oct. 12, 1938.	Windsor	Nov. 8, 1938.
MISSOURI		Woodville	Do.
Brentwood	June 7, 1940.	SOUTH CAROLINA	
NORTH CAROLINA		Hartsville	Nov. 9, 1939.
Ahoskie	Oct. 20, 1938.	TEXAS	
Aulander	Nov. 8, 1938.	Canyon	Oct. 14, 1938.
Belhaven	Oct. 26, 1938.	Colorado	Nov. 3, 1939.
Bethel	May 15, 1940.	Commerce	Mar. 16, 1939.
Bladenboro	Aug. 23, 1939.	Del Rio	Apr. 20, 1939.
Brevard	July 28, 1939.	Kermit	Sept. 12, 1938.
Calypso	May 23, 1940.	VIRGINIA	
Clarkton	Aug. 23, 1939.	Blackstone	Nov. 2, 1939.
Colerain	Nov. 8, 1938.	Boydton	Apr. 26, 1939.
Dunn	July 6, 1939.	WEST VIRGINIA	
Edenton	Nov. 7, 1938.	Grantsville	June 7, 1939.
Elkin	Sept. 18, 1939.		
Faison	May 23, 1940.		

[1] Note particularly the percentage of milk pasteurized in the various communities listed in these tables. This percentage is an important factor to consider in estimating the safety of a city's milk supply.

SUSCEPTIBILITY AND RESISTANCE OF CERTAIN SPECIES OF AMERICAN DEER MICE, GENUS *PEROMYSCUS*, AND OTHER RODENTS TO *LEPTOSPIRA ICTEROHAEMORRHAGIAE* [1]

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INTRODUCTION

The guinea pig has been the most widely used of laboratory animals in the diagnosis of infection with *Leptospira icterohaemorrhagiae*.

The American deer mouse, genus *Peromyscus*, (*1*, *9*) has not hitherto been studied as to its susceptibility and resistance to *Leptospira ictero-*

[1] Part of this work was performed at the Department of Bacteriology and Immunology, Washington University, St. Louis, Mo., during the academic year of 1933–34.

haemorrhagiae, nor has it been looked upon as a carrier of this organism, or considered as a suitable laboratory animal for the diagnosis of Weil's disease and for experimental studies of icterohemorrhagic spirochetosis. Inasmuch as over 43 species and 143 subspecies of the genus *Peromyscus* are widely distributed on the North American continent (*1*, *2*, *3*, *7*), such a study was considered desirable.

METHODS AND MATERIAL

Experimental animals.—The various species of American deer mice (*Peromyscus*) used in this study were largely cage-bred at the Maryland Caviaries, Baltimore, Md., and at the National Institute of Health, Washington, D. C. Other rodents used were captured in nature in the following States: Alabama, Arizona, California, Florida, Oregon, and Texas. The tail blood of newly captured animals was examined microscopically, a few days after their receipt at the laboratory, for the presence of spirochetes and trypanosomes. Those mice in which such examination showed no evidence of natural trypanosomiasis or spirochetosis were kept at least a month under laboratory conditions before they were used in these studies.

The strains of Leptospira icterohaemorrhagiae.—While a number of American and European strains [2] have been used during the progress of this study, only 6 were utilized for inoculation of large numbers of animals for comparative study. These 6 strains,[3] their sources, and designations in this report are as follows: 1. St. Louis mouse strain No. 33, isolated in 1933 from an albino mouse, *Mus musculus*, in St. Louis, Mo.; 2. Type I New York City rat strain No. 38, isolated during 1938 from a wild rat captured in a fish market in New York City where two cases of Weil's disease occurred during 1938; 3. Type I human European strain No. 41; 4. Type I human European strain No. 56. The first 2 strains were isolated by the writer, while the last 2 were isolated by Schüffner and his colleagues in Europe; 5. Strain No. 79 was isolated originally from a dog by Dr. Peter Olatson of the New York State Veterinary College and sent to Washington by Dr. W. S. Monlux; 6. Strain No. 80 was isolated from a fatal human case in the New York Post-Graduate Hospital by Dr. E. Farrell and forwarded to the writer by Professor Ward J. MacNeal. The last 2 strains have not yet been typed.

Inoculations.—In most of the work described, *Leptospira* were maintained in guinea pigs or deer mice for transfer. Infected animals

[2] The writer wishes to express his sincere appreciation and thanks to Dr. H. C. Brown, London, England; Dr. W. A. P. Schüffner, Amsterdam, Holland; Dr. J. Smith, Aberdeen, Scotland; Dr. B. Walch-Sorgdrager, Amsterdam, Holland; Dr. W. S. Monlux, Ithaca, N. Y.; and Dr. Ward J. MacNeal, New York City, for furnishing various pathogenic and avirulent strains of *Leptospira*. Thanks are due also to members of the Department of Health, City of Detroit, particularly to Dr. Henry F. Vaughan, Dr. Joseph Molner, and Dr. J. Kasper for making it possible during a field study at Detroit to collect live wild rats (*Rattus norvegicus*) from which strains of *Leptospira* were isolated for experimental studies.

[3] The classification of these strains into "types" is based on observations of the writer (*6*).

were bled at the height of infection. The blood was defibrinated and a suspension was prepared by dilution with an equal amount of physiological salt solution or Ringer's solution. A direct cover glass preparation of such suspensions examined with an oil immersion lens under dark-field illumination showed at least three *Leptospira* per microscopic field. When large series of animals were inoculated all were given about 0.25 cc. of this suspension intraperitoneally. When less than 3 animals were inoculated at a given time this procedure was varied in that injections were made with 2 drops of ear blood from an infected guinea pig or with blood from the tail of an infected *Peromyscus*. In each instance the blood was suspended in about 0.5 cc. salt solution.

In some instances the source of *Leptospira* was scrapings from the surface of the cortex of the kidneys of naturally infected wild rats (*Rattus norvegicus*) and occasionally from virulent or slightly virulent cultures grown *in vitro*. The latter cultures invariably contained over a million *Leptospira* per cc.

Subsequent examination of inoculated animals.—Following inoculation most animals were observed daily for evidence of infection. Droplets of blood were examined by dark-field illumination, usually with the oil immersion lens (objective 91×, ocular 10×). With sufficient experience it is possible to identify and estimate the number of spirochetes present in such a specimen within a relatively short time.

In addition to examination of the blood, all animals were carefully observed for the development of jaundice in the ears, feet, toes, and sclerae. In some animals the color of the urine and loss in weight were also recorded. At autopsy, jaundice and hemorrhage in the internal organs and in the thoracic and abdominal cavities were looked for. Sections taken from various organs were fixed in 10 percent formaldehyde and stained with Levaditi's or Warthin's stains.

EXPERIMENTAL FINDINGS

Isolation of Leptospira icterohaemorrhagiae, St. Louis mouse strain No. 33, and results of its inoculation in various species of Peromyscus and guinea pigs.—Leptospira icterohaemorrhagiae, St. Louis strain No. 33, was accidentally recovered from a naturally infected "laboratory white mouse," *Mus musculus*, in 1933. This mouse was also found to be infected with *Spirochaeta morsus muris* [4] (*4*, *5*, *6*). Suspensions of the blood and macerated organs of this naturally infected mouse were inoculated into *Peromyscus eremicus fraterculus*, *P. maniculatus rufinus*, *P. truei truei*, and *Mus musculus*. All the animals, with the exception of *Mus musculus*, developed leptospirochetosis and died. In this series the first animal to die of leptospirochetosis was one of

[4] *Spirochaeta morsus muris* is not fatal to the species of *Peromyscus* used (see table 1); however, it produces a light and prolonged infection in these animals, such as is seen in *Mus musculus*.

the *P. m. rufinus* which succumbed to the disease on the ninth day. However, leptospirochetes were demonstrable in the blood of most animals by the fifth day, and the blood was swarming with spirochetes by the ninth day.

Blood taken from one of the *P. e. fraterculus* at the height of illness was inoculated into other species of *Peromyscus* and in this manner the strain was passed serially. By passage from *Peromyscus* to *Peromyscus, Leptospira icterohaemorrhagiae* was apparently increased in virulence since it first killed these animals in 9 days, then in 7, and finally in about 3 days.

The strain was also cultured in semisolid serum agar and has been maintained in subcultures for 2 years.

Table 1 summarizes the number of animals and the different species inoculated with this strain, together with the results of the inoculations. It is noted that all animals of all species of *Peromyscus* used with this strain suffered external jaundice, invasion of the blood stream with spirochetes, internal hemorrhage, and death. There was some variation between species in the duration of life following inoculation and in the severity of jaundice observed.

TABLE 1.—*The virulence of Leptospira icterohaemorrhagiae, St. Louis strain No. 33, for species of American deer mice, Peromyscus, and other rodents*

Species	Number of animals inoculated with *Leptospira*	Duration of life after inoculation in days [1]			Remarks		
		Min.	Max.	Aver.	External jaundice	Microscopic demonstration of *Leptospira* in blood	Macroscopic internal hemorrhage
Peromyscus eremicus fraterculus	6	3	10	5.1	+	++	++
Peromyscus maniculatus artemisiae	10	3	7	4.7	+	++	++
P. m. bairdii	6	3	6	4.1	+	++	++
P. m. blandus	6	4	8	4.5	+	++	++
P. m. gambelii (colored)	10	3	7	3.9	+	++	++
P. m. gambelii (albino)	20	3	8	3.8	+++	++	++
P. m. gambelii (hairless)	20	3	7	3.7	+++	++	++
P. m. hollisteri	3	4	8	6	+	++	++
P. m. osgoodii	6	4	7	5.3	+	++	++
P. m. rubidus	20	3	10	5.2	+	++	++
P. m. rufinus	4	3	10	6.5	+	++	++
P. truei truei	2	7	9	8	+	++	++
Mus musculus	6	[2]	[2]	[2]	None	[3]	None
Rattus norvegicus	6	[3]	[3]	[3]	None	[3]	None

[1] All animals except *Mus musculus* and *Rattus norvegicus* died.
[2] All survived, chronic carrier. "Chronic carrier" indicates that *Leptospira* were seen and isolated from the surviving *Mus musculus* and *Rattus norvegicus* which were sacrificed 3 to 6 months after inoculation.
[3] Found in kidneys when sacrificed.

In all *Peromyscus* the microscopic pathology of the sections from each organ (stained by hematoxylin and eosin) showed necrotic areas in the liver and hemorrhagic emboli in practically every organ. Levaditi's and Warthin's stains revealed large numbers of leptospirochetes in each section.

It is further noted in table 1 that, although none of the inoculated *Mus musculus* and *Rattus norvegicus* died, all suffered abortive invasion of the blood stream with *Leptospira* and became chronic urinary carriers.

It is of interest that this strain of *Leptospira* was not lethal to guinea pigs shortly after its isolation. Following several transfers through *Peromyscus*, however, guinea pigs succumbed to inoculations.

Results of inoculation of animals with Leptospira icterohaemorrhagiae Type I New York City rat strain No. 38.[5]—A wild rat (*Rattus norvegicus*) caught in New York City was sacrificed. The serum from this rat agglutinated with Type I *Leptospira icterohaemorrhagiae* in a dilution up to 1: 10,000. At autopsy the kidneys of this animal were examined microscopically and a number of active *Leptospira* were found. Some of the suspension of the macerated kidneys was inoculated into a young albino guinea pig and 7 days later about one *Leptospira* per microscopic field was demonstrable in the guinea pig's blood. External jaundice was noticeable at the same time. Heart blood taken on the seventh day was inoculated into several species of rodents, the results of which are summarized in table 2.

TABLE 2.—*Susceptibility of certain species of rodents to Type I Leptospira icterohaemorrhagiae, New York City rat strain No. 38*

Species	Number of animals inoculated with *Leptospira*	Fatality in days			Remarks		
		Min.	Max.	Aver.	External jaundice	Microscopic demonstration of *Leptospira* in blood	Macroscopic internal hemorrhage
Peromyscus eremicus eremicus	6	4	5	4.9	++	++++	++
Peromyscus leucopus noveboracensis	10	5	[1] 100+	?	++	±	±
Peromyscus maniculatus (albino)	6	4	5	4.5	++++	++++	++
Peromyscus polionotus	10	4	6	4.1	++	+++	+
Neotoma fuscipes fuscipes	1	6	6	6	+	+	+
Mus musculus	3	([2])	([2])	([2])	None	([3])	−
Rattus norvegicus	3	([2])	([2])	([2])	None	([3])	−

[1] All animals except *Mus musculus* and *Rattus norvegicus* died.
[2] Survived, chronic carrier. "Chronic carrier" indicates that *Leptospira* were seen and isolated from the surviving *Mus musculus* and *Rattus norvegicus* which were sacrificed 3 to 6 months after inoculation.
[3] Found in kidneys.

It is seen in table 2 that in the 4 species of *Peromyscus* and in *Neotoma fuscipes fuscipes* frank infection was evident in that external jaundice, particularly of the ears, toes, and feet, was present and *Leptospira* were demonstrable in the blood. All of the animals succumbed. At autopsy they showed internal hemorrhages and jaundice. Of the 10 *P. leucopus noveboracensis* inoculated, only 3 died. Three

[5] Two additional strains of *Leptospira icterohaemorrhagiae* were isolated from wild rats (*Rattus norvegicus*), one of these strains from Detroit rats during 1938, the other from a rat captured in a house in Washington, D. C. (strain 78). The scrapings from the kidneys of these rats were inoculated into 16 albino deer mice (*P. maniculatus gambelii*), all of which died within 8 days with icterohemorrhagic spirochetosis.

inoculated *Mus musculus* and 3 *Rattus norvegicus* survived; these animals became carriers of *Leptospira* as demonstrated by the presence of organisms in their kidneys when sacrificed about 3 to 6 months following the inoculation.

Susceptibility and resistance of various species of rodents to Leptospira icterohaemorrhagiae, Type I human strains No. 41 and No. 56.—At various intervals 191 rodents of 22 different species and subspecies were inoculated with one or the other of 2 human strains of Type I *Leptospira icterohaemorrhagiae* (strain No. 41 or No. 56). The results of these inoculations are summarized in table 3. Since there were apparently no differences in virulence between strains No. 41 and No. 56, they are not differentiated in this table. Among the individuals of some species a few recoveries occurred. The blood serum of these recovered animals agglutinated freshly prepared formalinized antigen of Type I *Leptospira icterohaemorrhagiae.* The agglutination reaction was prompt and clear cut, the titer being about 1:10,000 (*10*).

The susceptibility and resistance of 14 species and subspecies of rodents to Leptospira icterohaemorrhagiae, Ithaca, N. Y., dog strain No. 79.—A guinea pig experimentally infected with the Ithaca dog strain of *Leptospira* was etherized at the height of infection; the heart blood of the guinea pig was removed, defibrinated, and 0.25 cc. amounts inoculated into each animal, representing 14 species and subspecies of rodents (see table 4).

All the inoculated animals of the following species died of icterohemorrhagic spirochetosis within 7 days: One kangaroo rat (*Dipodomys merriami merriami*); 2 white-throated wood rats (*Neotoma albigula albigula*); 2 Baird wood rats (*Neotoma micropus micropus*); 1 parasitic mouse (*Peromyscus californicus californicus*); 10 desert deer mice (*P. eremicus eremicus*); 10 albino deer mice (*P. maniculatus gambelii*); 10 old-field deer mice (*P. polionotus polionotus*); 1 true white-footed mouse (*P. truei truei*); and 1 harvest mouse (*Reithrodontomys* sp.?).

Leptospira were demonstrated more readily and in larger numbers in the peripheral blood of *P. e. eremicus, P. m. gambelii,* and *P. p. polionotus;* the number of *Leptospira* seen in the peripheral blood of these infected animals varied, depending on the stage of the disease, from one to over 100 per microscopic field (objective 91×, ocular 10×).

The external and internal jaundice was very pronounced in albino *Peromyscus maniculatus gambelii.*

Internal hemorrhage was noted in most animals which succumbed to the disease (see table 4).

TABLE 3.—*The susceptibility and resistance of 22 species and subspecies of rodents to Leptospira icterohaemorrhagiae Type I (human strains No. 41 and No. 56)*

Species	Popular name	Number of animals inoculated with *Leptospira*	Fatality in days			Remarks			
			Min.	Max.	Aver.	External jaundice	Microscopic demonstration of *Leptospira* in blood	Macroscopic internal hemorrhage	Type of infection
Ammospermophilus harrisii harrisii	Antelope ground squirrel	1	7	7	7	±	----------	----------	Fatal.
Neotoma albigula albigula	White-throated wood rat	2	4	7	5.5	++	+	----------	Do.
Neotoma fuscipes fuscipes	Dusky-footed wood rat	1	6	6	6	++	+	+	Acute, fatal.
Onychomys torridus torridus	Coues grasshopper	2	8	9	8.5	++	−	----------	Fatal.
Perognathus penicillatus pricei	Desert pocket mouse	3	7	8	7.6	++	−	----------	Do.
Peromyscus boylii rowleyi	Boyle deer brush mouse	3	9	10	9.3	++	+	++	Acute, fatal.
P. californicus californicus	Parasitic deer mouse	3	7	8	9	++	+	+	Do.
P. eremicus anthonyi	Apache desert mouse	10	3	11	7	++	++	++	Do.
P. eremicus eremicus	Desert deer mouse	46	3	10	6.2	++	++	++	Do.[1]
P. eremicus fraterculus	San Diego desert mouse	4	3	9	6	++	++	++	Acute, fatal.
P. floridanus floridanus	Florida white-footed mouse	5	42	4 survived		−	−	----------	Usually not fatal.[2]
P. gossypinus gossypinus	Cotton deer mouse	3	All survived			−	−	----------	Not fatal.
P. leucopus noveboracensis	Forest deer mouse	20	6+	17 survived		++	−	±	Usually not fatal.[3]
P. maniculatus gambelii (albino)	White deer mouse	20	4	8	6	++++	+++	++	Acute, fatal.[4]
P. m. nebrascensis	Nebraska sand hill deer mouse	2	9	1 survived		++	++	++	Usually fatal.[5]
P. m. sonorensis	Sonoran white-footed mouse	8	10	2 survived		++	+	+	Do.[6]
P. polionotus polionotus	Old-field mouse	12	6	9	7	++	+++	+	Acute, fatal.
Peromyscus truei truei	True deer mouse	3	8	9	10	++	++	+	Fatal.
Rattus norvegicus (albino)	Laboratory white rat	26	All survived			None	Kidney+	−	Not fatal, chronic carrier.[7]
Reithrodontomys	Harvest mouse	3	8	2 survived		++	----------	----------	Usually not fatal.[8]
Sigmodon hispidus hispidus	Northern cotton rat	4	10	3 survived		++	+	----------	Do.[9]
Mus musculus	Common laboratory mouse	10	All survived			None	Kidneys+	None	Not fatal, chronic carrier.[7]

[1] 44 out of 46 fatal.
[2] 1 out of 5 died.
[3] 3 out of 20 died.
[4] 19 out of 20 fatal.
[5] 4 out of 5 fatal.
[6] 6 out of 8 fatal.
[7] "Chronic carrier" indicates that *Leptospira* were seen and isolated from the kidneys of the surviving *Mus musculus* and *Rattus norvegicus* sacrificed 6 months to a year after inoculation.
[8] 1 out of 3 died.
[9] 1 out of 4 died.

TABLE 4.—*Susceptibility and resistance of 14 species of rodents to Leptospira icterohaemorrhagiae, Ithaca, N. Y., dog strain No. 79*

Species	Number of animals of each species	Microscopic examination of blood for *Leptospira*: Days following inoculation of the animals						Degree of external jaundice	Autopsy		Fatality in days
		2	5	6	7	8	10		Degree of internal jaundice	Degree of internal hemorrhage	
Dipodomys merriami merriami	1	0	dead					±	±	++	5
Neotoma albigula albigula	1	0	1	dead				±	±	+	6
Do	2	0	1/10	3	dead			+	+	++	7
Neotoma micropus micropus	1	0	0	0	dead			+	+	++	7
Do	2	0	1/5	dead				0	0	+++	6
Peromyscus californicus californicus	1	0	2	dead				+	+	++	6
Peromyscus eremicus eremicus	1	0	10, dead					+	++	+++	5
Do	2	0	2, dead					+	++	+++	5
Do	3	0	5	dead				+	++	++	6
Do	4	0	10	dead				+	+	++	6
Do	5	0	0	dead				+	+	++	6
Do	6	0	10	dead				+	+	++	6
Do	7	0	5	dead				+	+	++	6
Do	8	0	5	dead				+	+	++	6
Do	9	0	2	dead				+	+	++	6
Do	10	0	10	dead				+	+	++	6
Peromyscus gossypinus gossypinus	1	0	2	dead				++	+	+	6
Do	2	0	1/5	dead				++	+	+	6
Do	3	0	1/2	dead				++	+	+	6
Do	4	0	0	dead				++	+	+	6
Do	5	0	0	1/50, dead				++	+	+	6
Do	6	0	1/5				dead	++	+	+	10
Peromyscus leucopus noveboracensis	1	0	0	0	dead			+++	+++	++	7
Do	2	0	0	0	dead			+++	+++	++	7
Do	3	0	0	0	0	dead		+++	+++	++	8
Do	4	0	0	0	0	dead		+++	+++	++	8
Do	5	0	0	0	0	0	0	0			alive
Do	6	0	0	dead				+++	+++	++	6
Do	7	0	0	dead				+++	+++	++	6
Do	8	0	0	0	dead			+++	+++	++	7
Do	9	0	0	0	0	0	0	++	++	++	15
Do	10	0	0	0	0	0	0				alive
Peromyscus maniculatus gambelii (albino)	1	0	50, dead					++++	++++	+++	5
Do	2	0	50, dead					++++	++++	+++	5
Do	3	0	50	dead				++++	++++	+++	6
Do	4	0	50	dead				++++	++++	+++	6
Do	5	0	50	100, dead				++++	++++	+++	6
Do	6	0	dead					++++	++++	+++	5
Do	7	0	50, dead					++++	++++	+++	5
Do	8	0	50	dead				++++	++++	++	6
Do	9	0	0	dead				++++	++++	++	6
Do	10	0	0	dead				++++	++++	++	6
Peromyscus polionotus polionotus	1	0	10, dead					++	++	++	5
Do	2	0	10	dead				++	++	++	6
Do	3	0	10	dead				++	++	++	6
Do	4	0	10	dead				++	++	++	6
Do	5	0	10	dead				++	++	++	6
Do	6	0	dead					++	++	++	5
Do	7	0	dead					++	++	++	5
Do	8	0	dead					++	++	++	5
Do	9	0	10	dead				+	+	++	6
Do	10	0	10	dead				+	+	++	6
Peromyscus truei truei	1	0	3	dead				+	+	++	6
Reithrodontomys fulvescens fulvescens	1	0	1	dead				+	+	++	6

See footnotes at end of table.

TABLE 4.—*Susceptibility and resistance of 14 species of rodents to Leptospira icterohaemorrhagiae, Ithaca, N. Y., dog strain No. 79*—Continued

Species	Number of animals of each species	Microscopic examination of blood for *Leptospira*: Days following inoculation of the animals						Degree of external jaundice	Autopsy		Fatality in days
		2	5	6	7	8	10		Degree of internal jaundice	Degree of internal hemorrhage	
Guinea pig	1	0	0	0	1/50, dead	------	------	++++	++++	++++	7
Do	2	0	0	0	0	1/50, dead	------	++++	++++	++++	8
Mus musculus	1	0	0	0	0	0	0	--------	--------	--------	alive
Do	2	0	0	0	0	0	0	--------	--------	--------	alive
Do	3	0	0	0	0	0	0	--------	--------	--------	alive
Rattus norvegicus	1	0	0	0	0	0	0	--------	--------	--------	alive
Do	2	0	0	0	0	0	0	--------	--------	--------	alive

NOTE.—Animals marked "alive" in the last column survived inoculation and appeared healthy at the time of this writing, 43 days following the inoculation.
1/2, 1/5, 1/10 signifies that one spirochete was demonstrable per 2, 5, or 10 microscopic fields (objective 91×, ocular 10×).

Of 10 forest deer mice (*P. leucopus noveboracensis*), 8 died within 15 days and 2 survived over 2 months. The 8 mice which died were very yellow, particularly in the toes. No *Leptospira* were found in the peripheral blood of these 10 forest deer mice by microscopic search.

Three white mice (*Mus musculus*) and 2 rats (*Rattus norvegicus*) which were used as controls survived inoculation and no *Leptospira* were demonstrated in the peripheral blood, nor was external jaundice noted.

Two guinea pigs which were used as controls contracted the infection and died, one on the seventh day and the other on the eighth day of illness with characteristic jaundice and hemorrhages.

The susceptibility of four species of American deer mice to Leptospira icterohaemorrhagiae, New York City human strain No. 80.—A guinea pig which was experimentally infected with this strain of *Leptospira* at the height of infection was etherized, its heart blood removed, defibrinated, and 0.25 cc. amounts inoculated into 41 deer mice (1 *Peromyscus californicus californicus*, 10 *P. eremicus anthonyi*, 10 *P. eremicus eremicus*, 10 albino *P. maniculatus gambelii*, and 10 *P. polionotus polionotus*), 10 guinea pigs, 10 white mice (*Mus musculus*), and 10 rats (*Rattus norvegicus*) (see table 5).

All 41 of the inoculated deer mice contracted the infection and died in from 4 to 7 days (see table 5). *Leptospira* were demonstrated in the blood on the third day following inoculation. At the early stage of the disease only one *Leptospira* was seen in about 50 microscopic fields (objective 91×, ocular 10×), but the number soon increased and occasionally over 100 *Leptospira* were demonstrable per microscopic field (see table 5). The external jaundice, particularly in the ears, sclerae, toes, and tail, was more pronounced and of diagnostic

significance, especially in albino deer mice (*P. m. gambelii*). At autopsy internal jaundice and hemorrhages were noted in most animals; these features were more distinct in *P. m. gambelii*.

TABLE 5.—*Susceptibility of four species of American deer mice to Leptospira icterohaemorrhagiae, New York City human strain No. 80*

Species	Number of animals of each species	Microscopic examination of blood for *Leptospira*: Days following inoculation of the animals						Degree of external jaundice	Autopsy		Fatality in days
		3	4	5	6	7	8		Degree of internal jaundice	Degree of internal hemorrhage	
P. californicus californicus	1	0	0	1/10	{10 dead}	------	------	+	+	+	6
P. eremicus anthonyi	1	0	1/50	dead	------	------	------	+	+	++	5
Do	2	0	0	1/10	dead	------	------	+	+	++	6
Do	3	0	0	1/2	dead	------	------	±	+	++	6
Do	4	0	0	1/2	dead	------	------	±	+	++	6
Do	5	0	0	1/5	0	dead	------	+	+	++	7
Do	6	2	dead	------	------	------	------	+	+	++	4
Do	7	0	0	{10 dead}	------	------	------	+	+	++	5
Do	8	0	0	5	dead	------	------	±	±	++	6
Do	9	0	0	5	dead	------	------	±	+	++	6
Do	10	0	0	2	dead	------	------	±	+	++	6
P. eremicus eremicus	1	0	2	3	dead	------	------	+	+	++	6
Do	2	0	1/50	1/50	dead	------	------	+	+	++	6
Do	3	0	0	1/50	dead	------	------	+	+	++	6
Do	4	0	0	1/50	{1/2 dead}	------	------	+	+	++	6
Do	5	0	0	1/50	1/2	dead	------	+++	+++	++	7
Do	6	0	0	2	dead	------	------	+	+	++	6
Do	7	0	0	1/10	dead	------	------	+	+	++	6
Do	8	0	0	1/10	dead	------	------	+	+	++	6
Do	9	0	0	0	dead	------	------	+	+	++	6
Do	10	0	0	0	{10 dead}	------	------	+++	+++	+++	6
P. maniculatus gambelii (albino)	1	2	5	dead	------	------	------	++++	++++	+++	5
Do	2	0	2	dead	------	------	------	++++	++++	+++	5
Do	3	0	2	2 dead	------	------	------	+++	++++	+++	5
Do	4	0	2	2	dead	------	------	+++	++++	+++	6
Do	5	0	1/50	1/10	dead	------	------	+++	++++	+++	6
Do	6	0	2	2 dead	------	------	------	+++	+++	+++	5
Do	7	0	1/10	2 dead	------	------	------	+++	+++	+++	5
Do	8	0	1/10	2	dead	------	------	++++	++++	+++	6
Do	9	0	0	2	dead	------	------	++++	++++	++++	6
Do	10	0	2	100	dead	------	------	++++	++++	++++	6
P. polionotus polionotus	1	0	dead	------	------	------	------	++	++	+++	4
Do	2	0	1/10	dead	------	------	------	++	++	+++	5
Do	3	0	1/10	{50 dead}	------	------	------	++	++	+++	5
Do	4	0	1/10	{20 dead}	------	------	------	++	++	+++	5
Do	5	0	0	2	1/5	dead	------	++	++	++	7
Do	6	0	1/10	dead	------	------	------	0	±	++	5
Do	7	0	1/10	5 dead	------	------	------	++	++	++	5
Do	8	0	1/10	2 dead	------	------	------	+	+	++	5
Do	9	0	1/10	2 dead	------	------	------	+	++	++	5
Do	10	0	1/50	1/50	1 dead	------	------	+	++	++	6
Guinea pig	1	0	0	0	0	1 dead	------	++++	++++	++++	7
Do	2	0	0	0	0	1/10	dead	++++	++++	++++	8
Mus musculus	1	0	0	0	0	0	0	0	------	------	alive
Do	2	0	0	0	0	0	0	0	------	------	alive
Rattus norvegicus	1	0	0	0	0	0	0	0	------	------	alive
Do	2	0	0	0	0	0	0	0	------	------	alive

Remarks: 1/2, 1/5, 1/10, 1/50 signifies that only one *Leptospira* was seen per 2, 5, 10, or 50 microscopic field (objective 91×, ocular 10×).

The cipher ("0") signifies that no *Leptospira* were found microscopically in the blood during about one minute microscopic search.

Mus musculus and *Rattus norvegicus* are still alive (50 days) and show no external signs of illness.

Two guinea pigs which were inoculated as controls died of icterohemorrhagic spirochetosis, one on the seventh day, and the other on the eighth day of infection. The mice (*Mus musculus*) and the rats (*Rattus norvegicus*) which were also inoculated as controls survived. In the peripheral blood of these two species of rodents no *Leptospira* were seen, and the animals showed no signs of jaundice.

Two additional albino deer mice (*P. m. gambelii*) were inoculated with a culture of this strain of *Leptospira*. One of the mice died on the fifth day following the inoculation, with characteristic jaundice and hemorrhages, while the other mouse survived. Three weeks later this surviving deer mouse was inoculated with virulent material of *Leptospira* derived from *P. m. gambelii*. This deer mouse manifested pronounced resistance to the second inoculation; no *Leptospira* were found in the blood and the mouse survived and proved to be immune to further inoculations with *Leptospira icterohaemorrhagiae;* 5 control deer mice which were inoculated with the same inoculum contracted the infection and all died of leptospirochetosis within 6 days.

Six serial passages of the New York human strain of *Leptospira* from one albino deer mouse to another did not change the virulence of the strain for this species of rodents. All the subinoculated albino deer mice contracted the infection. *Leptospira* were demonstrated in the peripheral blood of these animals in larger numbers. They showed distinct external jaundice and all died within a week. At autopsy the internal jaundice and hemorrhages were, as a rule, constant features in these animals, justifying the name of icterohemorrhagic spirochetosis for the disease.

DISCUSSION

From the experimental data on hand it is evident that whenever a strain of *Leptospira icterohaemorrhagiae* (mouse, rat, dog, and human strains) was infective to guinea pigs, it also produced a fatal spirochetal infection in several species and subspecies of American rodents. (See tables 1, 2, 3, 4, and 5.)

While the number of animals of some species used in this work has been small, it appears that the susceptibility of a given species to *Leptospira icterohaemorrhagiae* is relatively constant, although individual variations within a given species were also noted. However, when large numbers of animals of a given species, such as albino *Peromyscus maniculatus gambelii*, were inoculated with a virulent strain of *Leptospira*, such variation did not seriously interfere with the experiments and general conclusions appear justified from the results.

It must be borne in mind that when the strains of *Leptospira icterohaemorrhagiae* are kept *in vitro* for a certain period, or kept in unfavorable conditions, they may partly or completely lose their pathogenicity not only for guinea pigs but also for susceptible American rodents.

The demonstration of *Leptospira* in the peripheral blood was relatively easier in the following species of animals, based on over 200 animal inoculations of each species (all cage-bred animals): *Peromyscus maniculatus gambelii* (albino), *Peromyscus eremicus eremicus*, *Peromyscus polionotus polionotus*. *Leptospira* were also seen in the blood of animals representing 24 species and subspecies of rodents; the number of animals used was small, from 1 to about 30 of each species being inoculated. All died within about a week, proving their susceptibility to the infection. In addition, 4 species of rodents died within 10 days, but no *Leptospira* were seen in the blood during the short fatal course of illness. The jaundice and internal hemorrhages suggested that these last 4 species likewise died of leptospirosis.

Four species of rodents, i. e., *P. floridanus floridanus*, *P. gossypinus gossypinus*, *P. leucopus noveboracensis*, and *Reithrodontomys*, appeared to have resistance to most strains of *Leptospira* and some recoveries occurred in all 4 species. It is striking that most individuals of these species, particularly *P. leucopus noveboracensis*, when dead from this disease showed very pronounced jaundice in the toes, yet few or no *Leptospira* were found in their blood by microscopic search. These 4 species of rodents appeared to be less suitable as susceptible experimental animals, because of the lack of uniformity in results.

The degree of jaundice, both internal and external, was found to vary not only among different species, but also among the individuals of the same species, even though they were given the same inoculum representing a given strain of *Leptospira icterohaemorrhagiae*. Likewise, it was noted that in any species of rodents a single strain of organisms produced more intense jaundice at one time than at another. The jaundice as a whole is more readily detectable in albino deer mice (*Peromyscus maniculatus gambelii*) in which this condition is of diagnostic significance.

The species of rodents which are highly susceptible to *Leptospira* and die within 10 days are unlikely to represent important reservoirs for *Leptospira icterohaemorrhagiae* because of the short period of illness and fatal outcome. Such animals are suitable for experimental studies of icterohemorrhagic spirochetosis and for diagnosis of Weil's disease. On the other hand, species such as *Mus musculus* and *Rattus norvegicus*, which survive infection and become chronic carriers of the leptospirochetes, continue to represent important reservoirs of infection (*4*, *8*).

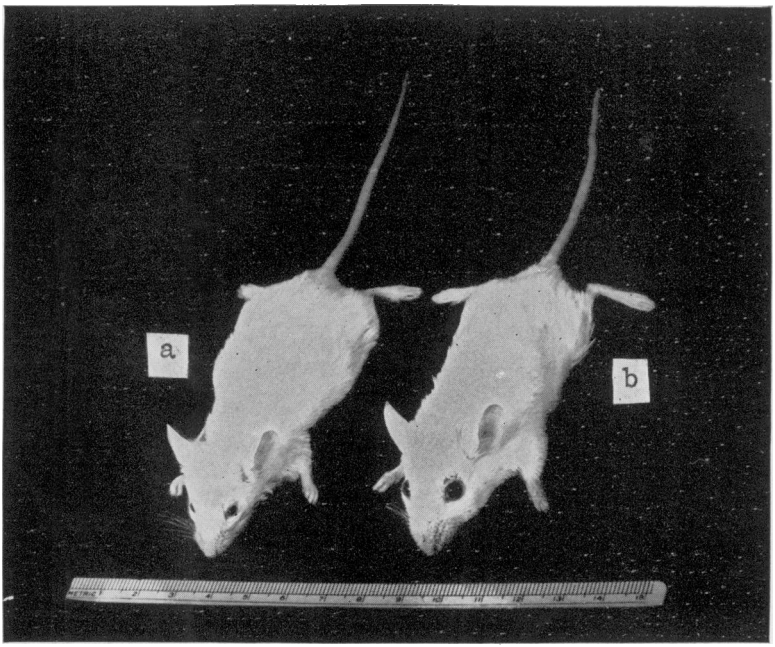

FIGURE 1.—(a) Regular laboratory white mouse, *Mus musculus*, highly resistant to *Leptospira icterohaemorrhagiae*. (b) Albino deer mouse, *Peromyscus maniculatus gambelii*, highly susceptible to *Leptospira icterohaemorrhagiae*. (Note large eyes of deer mice.)

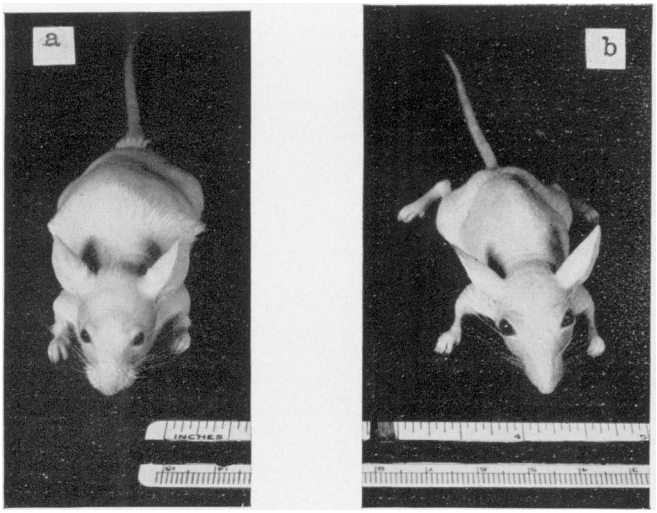

FIGURE 2.—(a) Hairless house mouse, *Mus musculus*, highly resistant to *Leptospira icterohaemorrhagiae* (carrier of disease). (b) Hairless deer mouse, *Peromyscus maniculatus*, highly susceptible to *Leptospira icterohaemorrhagiae*.

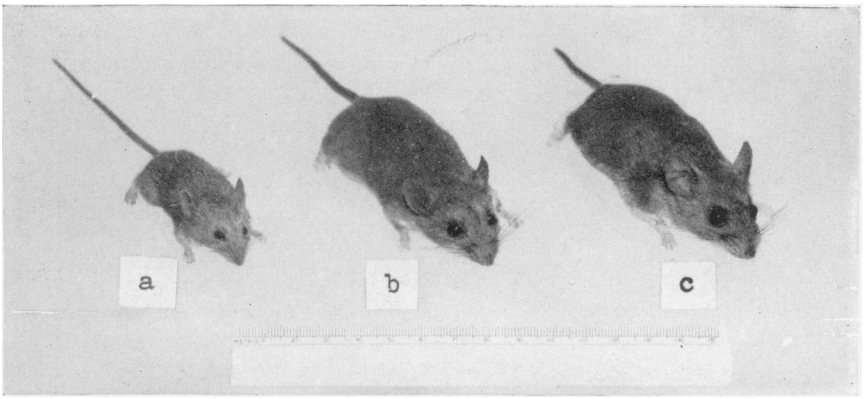

FIGURE 3.—Adult mice. (a) Harvest mouse, *Reithrodontomys fulvescens fulvescens*. (b) Forest deer mouse, *Peromyscus leucopus noveboracensis*. (c) Cotton mouse, *Peromyscus gossypinus gossypinus*. All have resistance to *Leptospira icterohaemorrhagiae*.

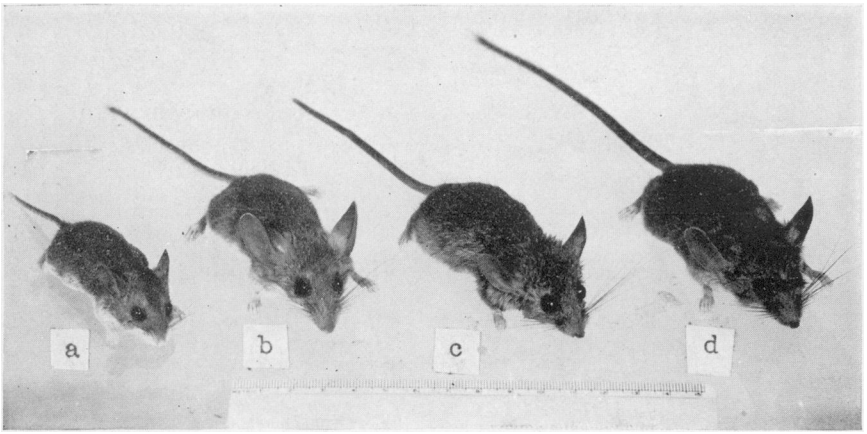

FIGURE 4.—(a) Old-field mouse, adult, *Peromyscus polionotus polionotus*. (b) True white-footed deer mouse, *Peromyscus truei truei*, about 4 mouths old. (c) Desert deer mouse, adult, *Peromyscus eremicus eremicus*. (d) Parasitic deer mouse, *Peromyscus californicus californicus*, about 3 months old. All are susceptible to *Leptospira icterohaemorrhagiae*.

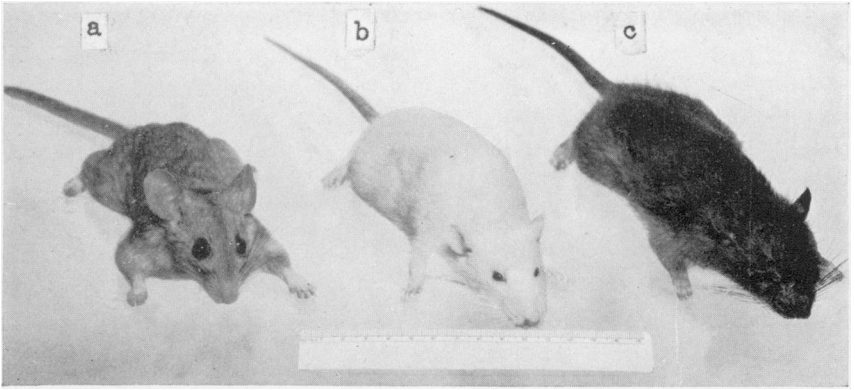

FIGURE 5.—Adult rats. (a) Baird wood rat, *Neotoma albigula albigula*, susceptible to *Leptospira icterohaemorrhagiae*. (b) Laboratory white rat, *Rattus norvegicus*, highly resistant to *Leptospira icterohaemorrhagiae*. Common house wild rat, *Rattus norvegicus*, has high resistance and is a carrier of *Leptospira icterohaemorrhagiae*.

When an animal is infected with *Leptospira icterohaemorrhagiae*, it will eliminate in the urine *Leptospira* which may be virulent (see table 4). The writer also found laboratory white mice (*Mus musculus*) infected naturally with both *Leptospira icterohaemorrhagiae* and *Spirochaeta morsus muris* during 1933 at St. Louis, Mo., and during 1937 at Washington, D. C. (*6*). The animal farm engaged in rearing white mice (*Mus musculus*) or white rats (*Rattus norvegicus*) should take every precaution that "wild" *Mus musculus* or *Rattus norvegicus* do not come in contact, directly or indirectly, with the stock animals; otherwise, some or all of the mice and rats may contract the infection and thus become carriers of the disease.

The most suitable animal for diagnosis of Weil's disease and for experimental studies of icterohemorrhagic spirochetosis is the albino *Peromyscus maniculatus*. Other rodents which are of value include *P. polionotus*, when a very small animal is desired; *P. eremicus* or *P. truei*, when a medium-sized experimental animal is needed; and *P. californicus*, *Neotoma micropus micropus*, or *Neotoma albigula albigula*, when a larger animal is needed. The breeding stock of *Neotoma* is not established as yet in captivity, while the other species in captivity are prolific.

SUMMARY

1. Thirty-two species and subspecies of rodents were inoculated with virulent strains of *Leptospira icterohaemorrhagiae*. Of this number, 26 species and subspecies were found to be susceptible, while the remaining 6 species were resistant to the experimental infection.

2. *Leptospira icterohaemorrhagiae* were demonstrable in the circulating blood of the susceptible animals 1 to 5 days following intraperitoneal inoculation; their number increased, and at the height of infection from 5 to over 100 *Leptospira* were demonstrable per microscopic field. The infection in these rodents ran an acute course and usually terminated fatally in from 3 to 15 days. Two or 3 days before death of the animals external jaundice, particularly of the ears, toes, and feet was, as a rule, a constant feature. At autopsy marked internal hemorrhages and jaundice were noted in these rodents.

3. Among the individuals of some species susceptible to the disease a few recoveries occurred. The blood serum of these recovered animals agglutinated freshly prepared formalinized antigen of *Leptospira icterohaemorrhagiae*. The agglutination reaction was prompt and clear cut.

4. It is suggested that *Peromyscus californicus californicus*, *P. eremicus eremicus*, *P. maniculatus gambelii* (albino), *P. polionotus*

polionotus, and *P. truei truei* are suitable as susceptible small laboratory animals for experimental studies of icterohemorrhagic spirochetosis and for the diagnosis of Weil's disease.

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DISABLING MORBIDITY AMONG MALE AND FEMALE INDUSTRIAL WORKERS DURING 1938 AND 1939, AND AMONG MALES DURING THE FIRST QUARTER OF 1940, WITH AN INQUIRY INTO THE OCCURRENCE OF MULTIPLE ATTACKS OF DISABLING SICKNESS AND INJURIES, 1939 [1]

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

The quarterly reports for the year 1939 on the frequency of sickness and nonindustrial injuries causing disability for 8 consecutive calendar days or longer among a group of over 170,000 male members of 26 industrial sick benefit organizations have already appeared (*1–4*). The present report records the experience among both males and females for the years 1938 and 1939,[2] and among males for the first quarter of 1940; there is a concluding note on the frequency of occurrence of multiple attacks of disabling sickness and injuries experienced during 1939.

[1] From the Division of Industrial Hygiene, National Institute of Health. For the fourth quarter of 1939 see reference (*4*); the reader is referred also to (*5*).

[2] The last report of this series referring to the experience among females appeared in 1938 (*6*)

The years 1938 and 1939.—An inspection of table 1 with respect to the experience of the males shows that while the frequency of sickness and nonindustrial injuries for 1939 does not compare unfavorably with the corresponding frequency for either 1934–38 or 1938, the group of respiratory diseases yields a frequency almost 30 percent greater in 1939 than in 1938. This increase reflects primarily the rate for influenza and grippe which is seen to be 16.6 per 1,000 males in 1939 and 9.9 per 1,000 in 1938, the rate for 1939 being, however, less than one-half of the rate for the year 1937.

TABLE 1.—*Frequency of cases of sickness and nonindustrial injuries lasting 8 consecutive calendar days or longer among male and female employees in various industries, by cause, experience of 1938 and 1939, and of the 5 years, 1934–38*

Cause. (Numbers in parentheses are disease title numbers from the International List of Causes of Death, 1929)	Annual number of cases per 1,000 persons					
	Males			Females		
	1939	1934–38[1]	1938	1939	1934–38[1]	1938
Sickness and nonindustrial injuries[2]	89.0	87.1	82.3	150.0	143.0	130.4
Percent of female rate	*59*	*61*	*63*			
Percent of male rate				*169*	*164*	*158*
Nonindustrial injuries (163–198, 201–214)	10.3	11.6	11.1	13.0	12.9	14.5
Sickness[2]	78.7	75.5	71.2	137.0	130.1	115.9
Respiratory diseases	33.9	30.9	26.4	63.9	55.5	45.3
Influenza and grippe (11)	16.6	13.9	9.9	29.9	21.6	16.1
Bronchitis, acute and chronic (106)	4.1	4.1	4.2	7.3	7.2	6.7
Diseases of the pharynx and tonsils (115a)	4.4	4.8	4.5	11.6	12.5	10.5
Pneumonia, all forms (107–109)	3.0	2.4	2.2	2.0	1.5	2.1
Tuberculosis of the respiratory system (23)	.7	.9	.9	.9	.8	.7
Other respiratory diseases (104, 105, 110–114)	5.1	4.8	4.7	12.2	8.9	9.2
Nonrespiratory diseases	42.8	42.4	42.8	68.4	70.2	66.6
Digestive diseases	13.4	13.3	13.4	21.5	23.3	22.4
Diseases of the stomach, except cancer (117, 118)	3.5	3.7	4.1	2.2	2.8	2.7
Diarrhea and enteritis (120)	1.2	1.2	.9	1.6	2.6	2.3
Appendicitis (121)	4.3	4.1	3.9	11.9	11.4	10.4
Hernia (122a)	1.5	1.6	1.7	.5	.4	.5
Other digestive diseases (115b, 116, 122b–129)	2.9	2.7	2.8	5.3	6.1	6.5
Nondigestive diseases	29.4	29.1	29.4	46.9	46.9	44.2
Diseases of the heart (90–95)	2.9	2.4	2.6	1.8	1.5	1.4
Other circulatory diseases (96–103)	3.5	2.9	3.3	3.2	3.0	3.7
Nephritis, acute and chronic (130–132)	.4	.5	.5	.5	.3	.3
Other genitourinary diseases (133–139)	2.3	2.4	2.4	9.5	10.0	8.9
Neuralgia, neuritis, sciatica (87a)	2.2	2.1	2.1	2.1	2.3	1.2
Neurasthenia and the like (part of 87b)	.9	1.0	1.0	5.7	5.9	5.5
Other diseases of the nervous system (78–85, part of 87b)	1.1	1.2	1.2	1.2	1.0	.6
Rheumatism, acute and chronic (56, 57)	3.5	4.0	3.7	2.4	3.3	3.6
Diseases of the organs of locomotion, except diseases of the joints (156b)	2.6	2.9	2.8	1.4	1.8	1.5
Diseases of the skin (151–153)	2.7	2.9	3.0	3.3	3.2	2.3
Infectious and parasitic diseases[3] (1–10, 12–22, 24–33, 36–44)	2.1	2.5	2.1	2.3	3.7	3.6
Cancer, all sites (45–53)	.6	.5	.6	.5	.4	.6
All other diseases (54, 55, 58–77, 88, 89, 140–150, 154–156a, 157, 162)	4.6	3.8	4.1	13.0	10.5	11.0
Ill-defined and unknown causes (200)	2.0	2.2	2.0	4.7	4.4	4.0
Number of person-years, all reporting organizations	188,595	882,654	178,405	15,343	77,998	15,203
Number of organizations	29		29	24		24

[1] Average of the 5 annual rates.
[2] Industrial injuries, venereal diseases, and a few numerically unimportant causes of disability are not reported.
[3] Except influenza, respiratory tuberculosis, and the venereal diseases.

The experience of the females, on the other hand, shows an increase of about 15 percent in the frequency of sickness and nonindustrial injuries when 1939 is compared with 1938, while a comparison of 1939 with the average for 1934–38 shows only a slight increase. As in the instance of the males the former increase is largely accounted for by influenza and grippe, the rate for 1939 being 29.9 and for 1938, 16.1.

It will be observed that while the total frequency, for either year or the 5-year period, is approximately 60 percent greater among the females than among the males there are certain causes and cause groups that show for each of the three time periods lower rates among the females; these are pneumonia (all forms), diseases of the stomach except cancer, hernia, diseases of the heart, and rheumatism.[3]

First quarter of the year 1940.—The morbidity experience among the male members of 26 industrial sick benefit organizations for the first quarter of 1940 as compared with the corresponding quarters of 1939 and 1938 is shown in table 2. An examination of this table reveals the corresponding first quarter rates for the subgroups of the nonrespiratory diseases to be remarkably similar. The situation is different, however, with respect to the respiratory group in that the experience for 1940 is more similar to the experience of 1939 than to that of 1938. A review of the first quarter rates for the 10 years, 1931–40, reveals that the 1940 rate (69.8) for the respiratory group of diseases is exceeded only by those for 1937 (87.5) and 1931 (75.2).

Of interest is the relatively high rate (12.4) for nonindustrial injuries. The available data on the frequency of nonindustrial injuries by quarter years extend back to 1928 and yield for the 13 years, 1928–40, an average first quarter rate of 10.9, the maximum first quarter rate occurring in 1940 and the minimum (9.6) in the year immediately preceding. Previous to 1940 the highest rate attained was that of 11.9 in 1929.

Distribution of the occurrence of multiple attacks of disabling sickness and injuries, 1939.—The following question frequently arises: Given a population of industrial workers and a period of time, how many of the workers suffered no attacks, 1 attack, 2 attacks, etc.? The requisite data on sickness and injuries that were reported as having caused incapacitation for work for 1 calendar day or longer during 1939 among the 2,738 male workers of a public utility are available for an examination of the subject proposed. The number of disabilities totaled 2,816, of which 2,629 are accounted for by sickness, 139 by nonindustrial injuries, and 48 by industrial injuries.

[3] Summation of neuralgia, neuritis, and sciatica; rheumatism, acute and chronic; and diseases of the organs of locomotion except diseases of the joints.

TABLE 2.—*Frequency of cases of sickness and nonindustrial injuries lasting 8 consecutive calendar days or longer among MALE employees in various industries, by cause, the first quarter of 1940 compared with the first quarters of 1939 and 1938* [1]

Cause. (Numbers in parentheses are disease title numbers from the International List of Causes of Death, 1939)	Annual number of cases per 1,000 men for the first quarter		
	1940	1939	1938
Sickness and nonindustrial injuries [2]	132.3	125.3	99.1
Nonindustrial injuries (163–198)	12.4	9.6	10.8
Sickness [3]	119.9	115.7	88.3
Respiratory diseases	69.8	65.9	39.1
Influenza and grippe (33)	39.6	39.9	16.8
Bronchitis, acute and chronic (106)	8.7	6.6	6.2
Diseases of the pharynx and tonsils (part of 115)	6.1	5.7	5.5
Pneumonia, all forms (107–109)	6.1	4.7	3.1
Tuberculosis of the respiratory system (13)	.5	.8	.9
Other respiratory diseases (104, 105, 110–114)	8.8	8.2	6.6
Nonrespiratory diseases	47.9	47.4	46.9
Digestive diseases	14.5	14.2	13.5
Diseases of the stomach, except cancer (117, 118)	3.7	3.6	3.9
Diarrhea and enteritis (120)	1.4	1.1	.7
Appendicitis (121)	5.2	4.5	4.3
Hernia (part of 122)	1.3	1.4	1.9
Other digestive diseases (part of 115, 116, part of 122, 123–129)	2.9	3.6	2.7
Nondigestive diseases	33.4	33.2	33.4
Diseases of the heart and arteries, and nephritis (90–99, 102, 130–132)	4.8	5.3	4.8
Other genitourinary diseases (133–138)	2.9	2.3	2.7
Neuralgia, neuritis, sciatica (part of 87)	2.8	2.3	2.7
Neurasthenia and the like (part of 87)	1.1	1.0	.9
Other diseases of the nervous system (80–86, part of 87)	1.1	1.1	1.5
Rheumatism, acute and chronic (58, 59)	4.3	4.5	4.4
Diseases of the organs of locomotion, except diseases of the joints (part of 156)	3.4	3.1	2.8
Diseases of the skin (151–153)	3.1	2.7	3.0
Infectious and parasitic diseases [3] (1–12, 14–24, 26–29, 31, 32, 34–44)	2.2	3.0	2.8
All other diseases (45–57, 60–79, 88, 89, 100, 101, 103, 154, 155, part of 156, 157, 162)	7.7	7.9	7.8
Ill-defined and unknown causes (200)	2.2	2.4	2.3
Average number of males covered in the record	194,034	170,649	172,257
Number of organizations	26	26	26

[1] The same 26 organizations are included in 1940, 1939, and 1938.
[2] Industrial injuries, venereal diseases, and a few numerically unimportant causes of disability are not reported.
[3] Except influenza, respiratory tuberculosis, and the venereal diseases.

NOTE.—Title numbers from the International List of the Causes of Death, 1939, are given in this table. For some diseases and disease groups the numbers are not the same as shown in previous tables where the edition of 1929 was used, but the disease classification is unchanged.

The results of the analysis are shown in table 3 according to the 4 groups of causes: Sickness and injuries, sickness, nonindustrial injuries, and industrial injuries. It will be observed that of the total group of workers 42 percent had during the year neither disabling sicknesses nor disabling injuries, 45 percent had no disabling sicknesses, 95 percent had no disabling nonindustrial injuries, and 98 percent had no industrial injuries.

Of particular interest are the percentage distributions with respect to sicknesses and injuries, and sicknesses. According to the table the population exposed is in each instance sufficiently large to show for the number of attacks varying from 1 through 6 that the percentage rate of decrease of the different percentages is approximately constant.

TABLE 3.—*Distribution of the occurrence of multiple attacks of disabling sickness and injuries, experience of 2,738 male workers of a public utility, 1939*

Number of attacks during 1939 disabling for one calendar day or longer	Workers suffering the indicated number of attacks							
	Percent				Number			
	2,816 sicknesses and injuries	2,629 sicknesses	139 nonindustrial injuries	48 industrial injuries	2,816 sicknesses and injuries	2,629 sicknesses	139 nonindustrial injuries	48 industrial injuries
None, or one or more	100.0	100.0	100.0	100.0	2,738	2,738	2,738	2,738
None	42.4	44.8	95.4	98.3	1,160	1,227	2,613	2,692
One or more	57.6	55.2	4.6	1.7	1,578	1,511	125	46
1	31.6	31.5	4.1	1.6	866	863	113	44
2	14.3	13.0	.4	.1	392	355	10	2
3	7.2	6.7	.1	0	197	183	2	0
4	2.9	2.5	0	0	78	70	0	0
5	.9	.9	0	0	25	24	0	0
6	.5	.4	0	0	13	11	0	0
7	.1	.1	0	0	3	2	0	0
8	.1	.1	0	0	2	2	0	0
9	(1)	0	0	0	1	0	0	0
10	0	0	0	0	0	0	0	0
11	0	(1)	0	0	0	1	0	0
12	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0
14	(1)	0	0	0	1	0	0	0

[1] Less than 0.05 percent.

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STUDIES IN CHRONIC SELENOSIS

A REVIEW

This Bulletin [1] presents the results of a series of investigations on the effects of continued ingestion of naturally occurring food selenium in amounts and quantities such as man and farm animals are exposed to in selenium-endemic areas in several of the Great Plains States. The material in the Bulletin is treated under four headings:

Part I. The chronic toxicity of naturally occurring food selenium.

Part II. Gastric acidity in chronic selenium poisoning.

Part III. Liver function and bile pigments in experimental chronic selenium poisoning.

Part IV. Selenium in the hair as an index of the extent of its deposition in the tissues in chronic poisoning.

[1] Studies in chronic selenosis. By M. I. Smith, R. D. Lillie, E. F. Stohlman, and B. B. Westfall. National Institute of Health Bulletin No. 174. U. S. Government Printing Office, Washington, D. C. Price 15 cents.

The data in Part I are summarized as follows: "Data are presented showing the systematic effects and morphologic changes in the tissues of animals fed graded doses of naturally occurring food selenium over periods extending up to about 1 year. The results indicate that food selenium is somewhat less toxic than the inorganic sodium selenite or selenate. Doses in excess of 1 mg. per kg. per day are dangerously toxic. Doses up to 0.5 mg. per kg. per day may be tolerated under favorable nutritional conditions without causing serious symptoms or pronounced tissue damage, though doses as small as 0.2 mg. per kg. per day may cause symptoms of systemic poisoning characterized by liver injury and damage to the gastric mucosa."

In Part II the results of experiments on gastric acidity, free HCl, and total acidity in chronically poisoned experimental animals are given. The data indicate that marked or constant diminution in free or total gastric acidity is not an essential feature in chronic selenium poisoning. Gastric analysis would appear to be of little help in the diagnosis of chronic selenium poisoning in man.

In Part III the methods employed and results obtained on urinary urobilinogen, plasma bilirubin, and four different types of tests employed in measuring liver function in chronically poisoned animals are given. It is shown that no marked abnormalities in the bile pigment metabolism may be expected in the mild forms of poisoning, but that impairment of liver function is demonstrable when no other symptoms are apparent. Of the four tests employed, viz, (1) the conjugation of hippuric acid from intravenously injected sodium benzoate, (2) the removal of intravenously injected bromsulphalein, (3) the removal of intravenously injected bilirubin, and (4) the removal of intravenously injected rose bengal (di-sodium-tetrachlor-tetraiodo-fluorescein), the last is the most sensitive and most specific test for this type of interstitial hepatitis.

In Part IV the method in use for the determination of small amounts of selenium in biological material is described in detail. Data are also presented on the concentration of selenium in the hair in relation to that in various tissues and body fluids, and it is pointed out that analysis of the hair for selenium may serve as an index of the amount of selenium stored in the body and of the length of time an individual has been exposed to it just as an analysis of the urine for selenium serves to indicate the probable daily absorption of this element.

COURT DECISION ON PUBLIC HEALTH

Statute regarding employment of county health personnel construed.—(New Mexico Supreme Court; *Board of Com'rs of Colfax County et al.* v. *Department of Public Health et al.*, 100 P.2d 222; decided March 15,

1940.) A section of the statutes of New Mexico provided that whenever, in the opinion of the State director of public health, conditions required the employment of persons in addition to the county health officer to execute properly the health laws, rules, and regulations in any county, "the board of county commissioners of such county, with the approval of the director of public health may employ such additional persons as the director of public health shall designate, and their compensation and expenses shall be paid from the 'county health fund' upon vouchers drawn by the county health officer." In a suit for a declaratory judgment the question presented was whether the board of county commissioners or the State director of public health had the power to discharge an employee who had been regularly employed under the said law.

With respect to the word "employ" as used in the statute, the supreme court said that it was unquestionably synonymous with "hire" or "appoint" and did not mean "to make use of." As to where the employing power or the power to appoint resided, it was held by the court to be in the board of county commissioners and that the power to remove, being an incident to the power to appoint, rested in the board alone.

The court stated that the act vested in the State director of public health two separate and distinct powers in the matter of employees hired by the board. One was the power to approve or disapprove the person employed by the board, and the other was the power to designate the place to be filled by the board, as, for example, nurse, stenographer, etc. "However," said the court, "once an employee has been appointed to fill a place which has been designated by the director as necessary to be filled, such appointee having been approved by the director, the right to discharge such employee is with the board and not the director."

DEATHS DURING WEEK ENDED JULY 20, 1940

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

	Week ended July 20, 1940	Corresponding week, 1939
Data from 87 large cities of the United States:		
Total deaths	7,461	[1] 7,212
Average for 3 prior years	7,280	
Total deaths, first 29 weeks of year	252,868	250,494
Deaths under 1 year of age	473	[1] 456
Average for 3 prior years	522	
Deaths under 1 year of age, first 29 weeks of year	14,524	14,883
Data from industrial insurance companies:		
Policies in force	65,106,173	66,974,598
Number of death claims	10,834	10,937
Death claims per 1,000 policies in force, annual rate	8.7	8.5
Death claims per 1,000 policies, first 29 weeks of year, annual rate	10.1	10.8

[1] Data for 88 cities.

PREVALENCE OF DISEASE

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

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JULY 27, 1940

Summary

The week ended July 27, 1940, shows slight increased incidence for diphtheria, influenza, poliomyelitis, typhoid fever, and whooping cough and decreases for measles, meningococcus meningitis, scarlet fever, and smallpox as compared with the preceding week. Of these diseases, only influenza and measles were higher than the 5-year (1935–39) median expectancy, and the cumulative figures for the current year to date are higher than the 5-year median only for influenza.

Only 21 cases of smallpox were reported for the current week, with only 8 States reporting any cases. No cases were reported in the New England, Middle Atlantic, South Atlantic, East North Central, and West Central groups of States. Of 136 cases of poliomyelitis, 18 cases each were reported in California and Washington State, 13 cases in Indiana, and 10 cases in Texas. The remaining cases were scattered with no one State reporting more than 8 cases. Of 385 cases of typhoid fever, 38 cases occurred in Georgia, 30 in Missouri, and 137 in the 4 West South Central States, 43 of which were reported in Texas. Of 28 cases of Rocky Mountain spotted fever, 24 occurred in the eastern States and only 4 cases in the Rocky Mountain area. Seventy-one cases of endemic typhus fever were reported, of which 21 were in Georgia and 19 in Texas.

The following table shows the deaths in large cities during July 1940 and comparison with the corresponding week of 1939 and the 3-year (1937–39) average. The excess deaths due to high temperatures are probably indicated by the figures for the current week and the 3-year average for the week of July 13.

	Week ended—			
	July 6	July 13	July 20	July 27
1940	7,116	7,872	7,461	8,855
1939	7,206	7,582	7,198	7,218
3-year (1937–39) average	7,394	8,126	7,280	7,193

Telegraphic morbidity reports from State health officers for the week ended July 27, 1940, and comparison with corresponding week of 1939 and 5-year median

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

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	July 27, 1940	July 29, 1939		July 27, 1940	July 29, 1939		July 27, 1940	July 29, 1939		July 27, 1940	July 29, 1939	
NEW ENG.												
Maine	0	0	0	------	------	------	44	23	23	0	0	0
New Hampshire	0	0	0	------	------	------	0	6	2	0	0	0
Vermont	2	0	0	------	------	------	9	38	12	0	0	0
Massachusetts	1	1	6	------	------	------	391	106	105	1	0	2
Rhode Island	0	0	0	------	------	------	31	27	6	0	0	0
Connecticut	1	2	3	2	------	------	16	46	32	0	0	0
MID. ATL.												
New York	10	8	16	[1] 4	[1] 3	[1] 2	561	278	354	2	1	5
New Jersey [2]	6	6	7	------	1	1	290	18	125	0	0	2
Pennsylvania	8	15	13	------	------	------	170	45	234	2	7	6
E. NO. CEN.												
Ohio [2]	4	4	22	2	5	5	21	20	106	0	0	1
Indiana	11	0	9	3	2	3	12	1	8	1	0	2
Illinois	17	16	21	6	6	6	104	10	36	1	0	4
Michigan [3]	0	7	8	------	1	------	366	73	128	1	1	1
Wisconsin	1	0	0	6	9	19	356	73	73	0	0	0
W. NO. CEN.												
Minnesota	0	0	0	1	1	1	13	19	19	0	0	0
Iowa [2]	2	0	4	------	------	------	28	20	15	1	0	0
Missouri	2	1	5	------	------	13	8	1	8	2	1	0
North Dakota	18	4	0	------	------	------	3	0	4	1	0	0
South Dakota	0	4	1	------	------	------	4	1	1	0	0	0
Nebraska	0	1	1	------	------	------	8	3	5	0	0	0
Kansas	1	1	3	4	3	2	33	13	13	1	1	1
SO. ATL.												
Delaware	0	0	0	------	------	------	2	3	2	0	1	0
Maryland [2 3 4]	1	2	8	------	3	1	2	11	11	0	0	0
Dist. of Col. [2]	2	5	4	------	------	------	2	9	6	1	1	1
Virginia [2]	3	20	5	25	27	------	35	57	57	1	1	2
West Virginia [3]	1	4	4	5	3	9	7	4	19	3	2	2
North Carolina [2 4]	8	21	14	------	------	1	21	27	27	0	0	0
South Carolina [4]	4	3	3	87	69	46	2	------	2	1	1	0
Georgia [2 4]	8	15	10	21	7	------	4	7	------	0	0	0
Florida [4]	1	4	4	1	2	------	1	11	1	0	0	0
E. SO. CEN.												
Kentucky	1	8	5	------	2	2	40	4	27	0	1	3
Tennessee	1	3	5	13	7	7	17	16	8	0	1	1
Alabama [4]	4	12	12	3	3	3	51	18	12	6	4	2
Mississippi [3]	2	16	11	------	------	------	------	------	------	0	0	0
W. SO. CEN.												
Arkansas	1	3	3	23	4	5	1	19	2	0	0	0
Louisiana [4]	4	6	9	2	6	6	3	3	4	0	0	0
Oklahoma	2	3	3	8	7	7	8	13	5	0	0	0
Texas [4]	19	11	22	183	9	23	90	37	34	1	5	2
MOUNTAIN												
Montana	0	0	0	------	------	------	11	16	15	0	0	0
Idaho	0	1	1	------	------	2	4	1	4	0	0	0
Wyoming [3]	0	2	0	------	1	------	5	18	5	0	0	0
Colorado [2 5]	10	16	6	2	5	------	10	14	14	0	1	1
New Mexico [2]	0	3	3	------	------	------	16	1	2	0	0	0
Arizona	0	0	1	23	8	10	36	1	5	0	0	0
Utah [3]	0	3	0	------	------	------	31	12	12	0	0	0
PACIFIC												
Washington	3	1	1	------	------	------	11	168	52	0	0	0
Oregon	1	0	0	1	8	8	33	74	15	1	0	0
California [4]	19	16	19	11	7	10	88	177	177	4	0	5
Total	179	248	286	436	209	251	2,999	1,542	2,170	31	29	67
30 weeks	8,371	11,127	13,410	167,969	150,757	141,130	223,674	345,945	345,945	1,056	1,288	3,946

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended July 27, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	July 27, 1940	July 29, 1939		July 27, 1940	July 29, 1939		July 27, 1940	July 29, 1939		July 27, 1940	July 29, 1939	
NEW ENG.												
Maine	0	0	0	2	4	5	0	0	0	6	1	1
New Hampshire	0	0	0	1	0	1	0	0	0	0	1	1
Vermont	0	0	0	0	2	4	0	0	0	0	0	0
Massachusetts	0	2	3	30	22	32	0	0	0	1	3	3
Rhode Island	0	0	0	0	0	2	0	0	0	0	1	1
Connecticut	0	1	1	6	9	10	0	0	0	1	4	3
MID. ATL.												
New York	3	11	11	92	72	93	0	0	0	4	10	12
New Jersey [2]	3	3	3	50	23	16	0	0	0	5	10	2
Pennsylvania	0	4	4	76	72	72	0	0	0	8	9	15
E. NO. CEN.												
Ohio [2]	7	3	5	38	55	65	0	5	1	6	14	14
Indiana	13	0	2	17	21	21	0	7	6	6	4	8
Illinois	4	7	7	87	64	80	0	1	4	7	23	19
Michigan [3]	7	29	8	50	69	76	0	19	1	7	2	5
Wisconsin	1	0	0	36	31	56	0	1	1	0	0	1
W. NO. CEN.												
Minnesota	0	4	0	12	50	29	6	4	4	2	2	0
Iowa [2]	2	0	1	5	13	19	3	7	7	1	10	4
Missouri	0	3	1	18	6	13	0	4	4	30	14	15
North Dakota	0	1	0	1	2	6	1	1	1	0	0	1
South Dakota	1	0	0	1	8	6	1	1	1	0	0	0
Nebraska	0	2	0	1	3	10	0	5	0	0	0	0
Kansas	8	3	2	15	23	23	0	0	0	5	6	6
SO. ATL.												
Delaware	0	0	0	2	5	1	0	0	0	0	0	0
Maryland [2 3 4]	0	0	0	5	10	12	0	0	0	1	5	6
Dist. of Col. [2]	0	0	0	4	3	5	0	0	0	0	2	2
Virginia [2]	3	3	4	13	11	11	0	0	0	7	23	36
West Virginia [3]	6	0	0	7	10	13	0	0	0	11	20	12
North Carolina [2 4]	1	8	6	5	15	15	0	0	0	6	21	21
South Carolina [4]	0	12	2	6	8	2	0	0	0	11	24	16
Georgia [2 4]	1	5	2	7	3	6	0	0	0	38	39	35
Florida [4]	1	2	1	0	5	1	0	0	0	1	3	2
E. SO. CEN.												
Kentucky	0	4	4	5	11	11	0	1	0	21	37	37
Tennessee	0	2	6	12	10	10	2	0	0	9	17	38
Alabama [4]	2	2	4	11	17	10	1	0	0	9	25	20
Mississippi [3]	1	0	2	6	4	4	0	0	0	11	6	16
W. SO. CEN.												
Arkansas	0	1	1	1	8	4	0	2	2	36	30	30
Louisiana [4]	8	0	1	4	2	5	0	0	0	38	39	32
Oklahoma	6	3	0	13	6	7	0	2	0	20	26	33
Texas [4]	10	10	2	15	7	16	0	1	1	43	67	67
MOUNTAIN												
Montana	1	0	0	4	10	10	0	0	3	0	2	2
Idaho	3	0	0	2	1	2	0	0	2	1	1	1
Wyoming [2]	1	0	0	3	4	4	0	0	0	1	0	0
Colorado [2 5]	0	1	0	12	11	11	3	1	0	2	3	4
New Mexico [2]	1	0	0	2	8	4	0	0	0	7	6	6
Arizona	0	3	0	2	0	1	0	1	0	4	3	0
Utah [3]	2	1	0	4	4	5	0	0	0	1	2	1
PACIFIC												
Washington	18	0	0	15	9	13	0	2	4	4	1	3
Oregon	4	1	0	3	10	10	4	0	3	6	4	4
California [4]	18	46	21	45	52	62	0	11	9	8	14	13
Total	136	177	177	746	793	998	21	76	76	385	534	582
30 weeks	1,200	1,334	1,334	116,998	114,282	162,236	1,893	8,576	7,795	3,829	5,599	6,126

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended July 27, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Whooping cough	
	Week ended—	
	July 27, 1940	July 29, 1939
NEW ENG.		
Maine	25	43
New Hampshire	0	2
Vermont	16	35
Massachusetts	126	81
Rhode Island	5	26
Connecticut	63	62
MID. ATL.		
New York	321	420
New Jersey [2]	114	254
Pennsylvania	322	364
E. NO. CEN.		
Ohio [2]	306	313
Indiana	16	115
Illinois	135	389
Michigan [2]	310	160
Wisconsin	106	212
W. NO. CEN.		
Minnesota	46	60
Iowa [2]	31	20
Missouri	51	32
North Dakota	7	27
South Dakota	5	1
Nebraska	16	24
Kansas	71	16
SO. ATL.		
Delaware	7	8
Maryland [2 3 4]	143	55
Dist. of Col. [3]	17	44
Virginia [2]	55	95
West Virginia [3]	63	13
North Carolina [2 4]	103	172
SO. ATL.—con.		
South Carolina [4]	19	58
Georgia [2 4]	11	10
Florida [4]	0	7
E. SO. CEN.		
Kentucky	78	53
Tennessee	65	95
Alabama [4]	23	40
Mississippi [3]		
W. SO. CEN.		
Arkansas	23	28
Louisiana [4]	14	1
Oklahoma	17	3
Texas [4]	244	120
MOUNTAIN		
Montana	0	11
Idaho	11	0
Wyoming [3]	10	2
Colorado [2 5]	17	48
New Mexico [3]	26	31
Arizona	7	3
Utah [3]	78	52
PACIFIC		
Washington	36	15
Oregon	15	6
California [4]	297	133
Total	3,471	3,759
30 weeks	96,898	117,164

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended July 27, 1940, 28 cases as follows: New Jersey, 1; Ohio, 1; Iowa, 2; Maryland, 6; District of Columbia, 1; Virginia, 2; North Carolina, 8; Georgia, 3; Wyoming, 2; Colorado, 1; New Mexico, 1.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended July 27, 1940, 71 cases as follows: Maryland, 1; North Carolina, 3; South Carolina, 3; Georgia, 21; Florida, 8; Alabama, 9; Louisiana, 6; Texas, 19; California, 1.
[5] Colorado tick fever, week ended July 27, 1940, Colorado, 1 case.

BUBONIC PLAGUE IN EMMETT, IDAHO

Under date of July 22, 1940, Dr. E. L. Berry, State director of public health of Idaho, reported bubonic plague diagnosed by Surg. L. B. Byington, of the Public Health Service Plague Suppressive Measures Laboratory in San Francisco, in a 13-year-old boy at Emmett, Gem County, Idaho. Onset of illness was on June 10, but the case was not immediately recognized as plague.

PLAGUE INFECTION IN FLEAS FROM GROUND SQUIRRELS IN SAN BERNARDINO COUNTY, CALIF.

Under date of July 15, 1940, Dr. Bertram P. Brown, State director of public health of California, reported plague infection proved in a pool of 38 fleas from 21 golden-mantled ground squirrels submitted to the laboratory on June 26 from a location 1 mile north of Fawnskin Resort, San Bernardino County, Calif.

WEEKLY REPORTS FROM CITIES

City reports for week ended July 13, 1940

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

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	100	27	13	1,345	307	454	8	362	57	1,338	----
Current week [1]	47	28	10	1,906	216	413	0	342	35	1,161	----
Maine:											
Portland	0	----	0	6	1	0	0	1	0	4	24
New Hampshire:											
Concord	0	----	0	0	0	0	0	0	0	0	6
Nashua	0	----	0	0	0	0	0	0	0	0	6
Vermont:											
Barre	----	----	----	----	----	----	----	----	----	----	----
Burlington	0	----	0	0	0	0	0	0	0	0	12
Rutland	0	----	0	0	0	0	0	0	0	0	2
Massachusetts:											
Boston	1	----	0	111	11	0	0	12	0	46	189
Fall River	0	----	0	59	1	0	0	0	0	10	26
Springfield	0	----	0	6	0	0	0	0	0	3	36
Worcester	0	----	0	181	6	0	0	1	0	6	59
Rhode Island:											
Pawtucket	0	----	0	0	0	0	0	0	1	0	19
Providence	0	----	0	51	2	1	0	2	1	2	57
Connecticut:											
Bridgeport	0	----	0	3	2	1	0	1	0	2	25
Hartford	0	----	0	0	2	2	0	0	0	0	42
New Haven	0	----	1	0	2	1	0	4	0	1	57
New York:											
Buffalo	0	----	0	3	8	4	0	3	0	3	153
New York	14	2	0	350	30	94	0	88	1	125	1,385
Rochester	0	1	0	5	2	1	0	0	0	8	67
Syracuse	0	----	0	2	0	1	0	0	0	3	51
New Jersey:											
Camden	0	----	1	5	2	4	0	2	0	1	27
Newark	0	----	0	177	4	12	0	11	0	30	98
Trenton	0	----	0	2	3	2	0	2	1	5	42
Pennsylvania:											
Philadelphia	1	----	2	177	15	34	0	30	4	42	456
Pittsburgh	1	4	1	1	9	10	0	5	1	31	146
Reading	0	----	0	5	0	2	0	0	1	32	25
Scranton	0	----	----	0	----	0	0	----	0	0	----
Ohio:											
Cincinnati	0	----	0	0	2	5	0	9	0	7	121
Cleveland	0	5	0	1	8	14	0	7	0	69	174
Columbus	2	----	0	1	0	3	0	4	0	12	74
Toledo	0	----	0	2	2	9	0	3	0	12	78
Indiana:											
Anderson	0	----	0	0	0	0	0	1	0	0	10
Fort Wayne	0	----	0	1	0	1	0	0	0	4	32
Inianapolis	0	----	0	2	7	1	0	5	0	2	88
Muncie	0	----	0	0	3	0	0	0	0	2	14
South Bend	0	----	0	0	1	0	0	0	0	0	20
Terre Haute	0	----	0	0	1	0	0	0	0	0	19
Illinois:											
Alton	0	----	0	0	0	0	0	0	1	5	9
Chicago	8	3	2	137	12	97	0	22	3	11	659
Elgin	0	----	0	0	0	0	0	0	0	3	5
Moline	0	----	0	0	0	0	0	0	0	0	12
Springfied	0	----	0	0	2	0	0	1	0	3	21
Michigan:											
Detroit	2	----	0	178	3	30	0	16	1	159	226
Flint	0	----	0	4	0	0	0	0	0	7	13
Grand Rapids	0	----	0	22	0	6	0	0	1	49	32
Wisconsin:											
Kenosha	0	----	0	16	0	0	0	0	0	0	5
Madison	0	----	0	6	0	0	0	0	0	14	18
Milwaukee	0	----	0	252	1	13	0	4	0	8	108
Racine	0	----	0	3	0	3	0	0	0	0	9
Superior	0	----	0	7	0	1	0	1	0	0	6

[1] Figures for Barre and Boise estimated; reports not received.

City reports for week ended July 13, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0	----	0	3	0	0	0	0	0	1	21
Minneapolis	0	----	0	0	2	3	0	2	2	13	101
St. Paul	0	----	0	0	4	3	0	5	0	13	46
Iowa:											
Cedar Rapids	0	----	----	2	----	0	0	----	0	1	----
Davenport	0	----	----	0	----	1	0	----	0	0	----
Des Moines	0	----	0	3	0	0	0	0	0	0	26
Sioux City	0	----	0	0	0	0	0	1	0	4	----
Waterloo	0	----	----	2	----	0	0	----	0	3	----
Missouri:											
Kansas City	0	----	0	1	2	1	0	2	0	4	107
St. Joseph	0	----	0	0	3	0	0	0	0	0	29
St. Louis	1	----	0	4	5	5	0	13	2	22	147
North Dakota:											
Fargo	0	----	0	0	0	0	0	0	0	0	8
Grand Forks	0	----	----	0	----	0	0	----	0	2	----
Minot	0	----	0	0	0	0	0	0	0	0	8
South Dakota											
Aberdeen	0	----	----	0	----	0	0	----	0	0	----
Sioux Falls	0	----	0	0	0	0	0	0	0	0	8
Nebraska:											
Lincoln	0	----	----	1	----	1	0	----	0	0	----
Omaha	0	----	0	2	2	2	0	2	0	4	55
Kansas:											
Lawrence	0	----	1	0	0	0	0	0	0	0	7
Topeka	0	----	0	3	0	0	0	0	0	0	9
Wichita	0	----	0	3	0	0	0	0	0	5	27
Delaware:											
Wilmington	0	----	0	0	1	1	0	1	0	8	34
Maryland:											
Baltimore	0	1	1	1	4	4	0	10	0	118	188
Cumberland	0	----	0	0	0	0	0	0	1	0	10
Frederick	0	----	0	0	0	0	0	0	0	0	1
Dist. of Col.:											
Washington	5	----	0	1	3	8	0	9	0	13	160
Virginia:											
Lynchburg	0	----	0	0	3	0	0	0	0	3	13
Norfolk	1	----	0	1	1	1	0	2	3	7	26
Richmond	0	----	1	1	0	2	0	0	0	0	42
Roanoke	0	----	0	5	0	0	0	0	0	6	10
West Virginia:											
Charleston	0	----	0	0	1	1	0	0	0	1	5
Huntington	0	----	----	0	----	0	0	----	0	0	----
Wheeling	0	----	0	0	0	0	0	0	1	1	22
North Carolina:											
Gastonia	0	----	----	0	----	0	0	----	0	0	----
Raleigh	0	----	0	0	1	0	0	0	0	0	9
Wilmington	0	----	0	0	0	0	0	0	0	0	11
Winston-Salem	0	----	0	0	0	1	0	0	0	1	20
South Carolina:											
Charleston	0	2	0	0	2	0	0	1	0	0	15
Florence	0	----	0	0	1	0	0	0	0	0	12
Greenville	0	----	0	0	0	0	0	0	0	2	12
Georgia:											
Atlanta	0	1	0	0	2	3	0	5	1	5	81
Brunswick	0	----	0	0	0	0	0	0	0	0	3
Savannah	0	5	0	0	0	0	0	1	0	1	24
Florida:											
Miami	0	----	0	2	1	0	0	1	2	0	37
Tampa	2	----	0	2	1	0	0	0	0	0	22
Kentucky:											
Ashland	0	----	0	0	2	0	0	0	0	0	5
Covington	0	----	0	1	0	0	0	1	0	0	----
Lexington	0	----	0	27	0	0	0	0	0	15	12
Tennessee:											
Knoxville	0	----	0	0	0	0	0	1	0	2	22
Memphis	0	----	0	8	3	0	0	0	0	13	68
Nashville	0	----	0	0	1	0	0	1	0	10	38
Alabama:											
Birmingham	0	1	0	5	1	2	0	2	0	3	56
Mobile	0	----	1	0	2	0	0	2	0	0	16
Montgomery	0	----	----	0	----	1	0	----	0	0	----
Arkansas:											
Fort Smith	0	----	----	0	----	0	0	----	0	0	----
Little Rock	0	----	0	0	0	2	0	1	0	1	----

City reports for week ended July 13, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Louisiana:											
Lake Charles	0		0	0	1	0	0	0	1	0	6
New Orleans	1		0	1	7	6	0	8	7	56	120
Shreveport	0		0	1	0	0	0	2	1	0	34
Oklahoma:											
Oklahoma City	1		0	0	2	0	0	1	0	0	42
Tulsa	0		0	4	0	2	0	0	0	29	17
Texas:											
Dallas	0		0	17	1	0	0	2	4	13	73
Fort Worth	1		0	3	3	2	0	2	1	2	40
Galveston	0		0	0	1	0	0	0	0	0	17
Houston	1		0	3	5	1	0	2	0	6	69
San Antonio	0	1	0	0	0	4	0	0	0	8	57
Montana:											
Billings	0		0	0	1	0	0	0	0	0	7
Great Falls	0		0	14	1	0	0	1	1	0	12
Helena	0		0	0	0	0	0	0	0	0	1
Missoula	0		0	0	1	0	0	0	0	0	10
Idaho:											
Boise											
Colorado:											
Colorado Springs	0		0	0	0	1	0	1	0	0	6
Denver	5		0	3	2	3	0	4	1	1	60
Pueblo	0		0	3	1	1	0	0	0	0	7
New Mexico:											
Albuquerque	0		0	0	2	0	0	2	0	3	14
Utah:											
Salt Lake City	0		0	30	2	1	0	0	0	63	33
Washington:											
Seattle	0		0	15	4	2	0	7	0	12	91
Spokane	0		0	0	0	3	0	0	0	0	26
Tacoma	0		0	0	1	0	0	2	0	1	30
Oregon:											
Portland	0		0	2	1	1	0	1	0	15	72
Salem	1			0		0	0		0	1	
California:											
Los Angeles	2	2	0	7	2	10	0	20	0	40	329
Sacramento	0		0	1	2	0	0	0	0	12	25
San Francisco	1		0	2	5	1	0	6	0	18	156

State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Boston	1	0	1
New York:			
New York	0	0	1
Ohio:			
Columbus	0	0	1
Michigan:			
Detroit	1	0	0
Wisconsin:			
Milwaukee	1	0	0
Iowa:			
Sioux City	0	0	3
Missouri:			
St. Joseph	0	1	0
St. Louis	0	0	1
Kansas:			
Wichita	0	0	2
Delaware:			
Wilmington	0	0	1

State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths	
Virginia:			
Richmond	0	0	1
West Virginia:			
Huntington	0	0	3
Kentucky:			
Covington	0	0	1
Arkansas:			
Fort Smith	1	0	1
Louisiana:			
New Orleans	0	0	1
Oklahoma:			
Oklahoma City	0	0	1
Washington:			
Seattle	0	0	6
Tacoma	0	0	1
California:			
Los Angeles	0	0	4

Encephalitis, epidemic or lethargic.—Cases: New York, 1.
Pellagra.—Cases: Savannah, 5; Sacramento, 1; San Francisco, 1.
Typhus fever.—Cases: New York, 3; Wilmington, N. C., 1; Savannah, 3; Montgomery, 1; New Orleans, 2.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended June 22, 1940.—During the week ended June 22, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1	3	1				5
Chickenpox		28	10	193	402	30	20	7	117	807
Diphtheria		1		30	2	7	1			41
Dysentery				2						2
Influenza		3			2				6	11
Measles		3	2	83	220	58	145	13	205	729
Mumps				31	185	4	11		11	242
Pneumonia		3			4		1		1	9
Poliomyelitis							1			1
Scarlet fever		2	1	81	63	4	1	8	2	162
Tuberculosis		10	13		61	3	84	2		173
Typhoid and paratyphoid fever		1		15	6		1	8	1	32
Whooping cough		35		150	70	24	39	4	17	339

NOTE.—None of the above diseases were reported from Prince Edward Island for this period.

SCOTLAND

Vital statistics—Quarter ended March 31, 1940.—Following are vital statistics for Scotland for the quarter ended March 31, 1940:

	Number	Rate per 1,000 population		Number	Rate per 1,000 population
Marriages	12,003	9.6	Deaths from—Continued.		
Births	22,113	17.7	Lethargic encephalitis	32	
Deaths	25,937	20.7	Malaria	1	
Deaths under 1 year of age	2,474	[1] 112.0	Measles	28	
Deaths from—			Nephritis (acute and chronic)	411	
Appendicitis	91		Pneumonia (all forms)	2,389	1.91
Cancer	2,067	1.65	Poliomyelitis	1	
Cerebrospinal fever	195	.16	Puerperal sepsis	22	
Cerebral hemorrhage	1,469		Scarlet fever	8	.01
Cirrhosis of the liver	49		Senility	1,001	
Diabetes mellitus	297		Suicide	104	
Diarrhea and enteritis (under 2 years of age)	147		Syphilis	12	
Diphtheria	155	.12	Tuberculosis (all forms)	1,180	.94
Dysentery	14		Typhoid and paratyphoid fever	10	
Heart disease	5,764		Whooping cough	45	.04
Influenza	1,601	1.28			

[1] Per 1,000 live births.

PUERTO RICO

Influenza.—An outbreak of influenza in Puerto Rico which began about the middle of June has reached epidemic proportions. All parts of the island are affected. A low fatality rate is indicated.

The Department of Sanitation has reported cases as follows: For the week ended June 22, 175; June 29, 1,187; July 6, 8,812; July 13, 16,851.

According to information dated August 2, there has been 69,925 cases, with 200 deaths, up to August 1, 1940.

VIRGIN ISLANDS

Notifiable diseases—April-June 1940.—During the months of April, May, and June 1940, cases of certain notifiable diseases were reported in the Virgin Islands as follows:

Disease	April	May	June	Disease	April	May	June
Cerebrospinal meningitis		1		Leprosy	1		
Chickenpox	3			Malaria	1		
Dengue	1			Ophthalmia neonatorum		1	
Filariasis	5	15	11	Schistosomiasis		1	1
Gonorrhea	18	12	7	Syphilis	14	19	11
Hookworm disease	2	5	4	Tuberculosis	1	1	2
Influenza	1		1				

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

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of July 26, 1940, pages 1367-1370. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

India.—During the week ended July 6, 1940, cholera was reported in India as follows: Sind State, 11 cases; Vizagapatam, 6 cases.

Plague

China.—According to a report dated July 13, 1940, an outbreak of bubonic plague occurred along the Yunnan-Burma border in the districts of Loiwing, Chefang, Juili, and Muchieh, China, where numerous deaths have occurred.

Egypt—Port Said.—During the week ended July 20, 1940, one case of bubonic plague was reported in Port Said, Egypt.

Hawaii Territory—Island of Hawaii—Hamakua District—Paauilo (vicinity of).—Two rats found on June 28, 1940, in the vicinity of Paauilo, Hamakua District, Island of Hawaii, T. H., have been proved positive for plague.

United States.—A report of plague-infected fleas in San Bernardino County, California, and of a case of human plague in Emmett, Idaho, appears on page 1412 of this issue of PUBLIC HEALTH REPORTS.

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