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RECENT DEVELOPMENTS RELATING TO PUBLIC HEALTH INTEREST IN HOUSING [1]

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During recent months increasing emphasis has been placed on housing as a matter of concern to health authorities. This emphasis has arisen partly from the growing recognition of the importance to the defense program of adequate healthful housing in areas undergoing population expansion. There is, however, strong evidence that attention is also being given to longer-range considerations. The purpose of this article is briefly to summarize for the past year significant developments in the field of housing as related to public health interest.[2]

At the annual conference of the State and Territorial Health Officers with the United States Public Health Service, in April 1940, the Surgeon General said:

> It is becoming increasingly apparent that health officers must turn their attention to stronger assistance in the solution of another age-old and basic health problem—the problem of inadequate housing. Programs now being carried on under recent housing legislation have made a real beginning in the amelioration of conditions of substandard housing. The health departments have a tremendous stake in these programs both from the standpoint of physical as well as mental health benefits that may be expected to derive from improvement in housing conditions.

A special conference of State and Territorial Health Officers with the United States Public Health Service convened in September to consider public health problems arising out of national defense (*1*). The conference gave considerable time to discussion of the problem of inadequate housing in areas of industrial and military concentration and the strain on sanitary facilities resulting from a rapid increase in

[1] From the Division of Public Health Methods, National Institute of Health.

[2] This review covers only information that has been readily available to the United States Public Health Service. The Public Health Service will be glad to be informed of any similar developments which have occurred during the year in State and local areas. Communications should be addressed to the Division of Public Health Methods, National Institute of Health, United States Public Health Service, Bethesda, Md.

population in these areas. Among the recommendations made by the Committee on Public Health in Areas of Mobilization, to which the subject was referred, were the following:

That minimum requirements for environmental sanitation and communicable disease control be formulated by the United States Public Health Service for the guidance of State and local health authorities in the mobilization areas.

That coordination of activities pertaining to housing, industrial hygiene, and sanitation be immediately effected by the United States Public Health Service with existing governmental and nonofficial agencies, in order that State and local health authorities may be aided in establishing proper measures for the protection of the health of the civil population in areas affected by national defense measures.

In conformance with the first of these recommendations, the Sanitation Section of the Domestic Quarantine Division has prepared a tentative sanitation code, part of which deals with the sanitation of habitable buildings. A preliminary draft of the code has been released to secure comments and suggestions for revision, as well as to determine how it fits in with existing regulations. The objective of the code is to suggest procedures by which health departments may correct many of our environmental problems, especially those created in national defense areas. In connection with the second recommendation, the Public Health Service has carried out special reconnaissance surveys in extra-military and defense industrial areas to determine health and medical care needs in these areas. One part of these surveys relates to housing conditions and needs.

The United States Public Health Service has always given considerable attention to health and sanitation problems associated with unsatisfactory housing conditions. As part of their regular functions, two units of the Public Health Service—the Sanitation Section of the Domestic Quarantine Division and the Division of Public Health Methods of the National Institute of Health—are continuously working with problems in this field.

The Sanitation Section, whose sanitation code has been mentioned, normally concerns itself with the sanitation aspects of housing as part of its work in the whole field of community and environmental sanitation.

The Division of Public Health Methods of the National Institute of Health, in its work with housing, is interested primarily in studying the current administrative practices of local health departments in the control of health hazards associated with housing. Illness and accident data from the National Health Survey have also been analyzed in relation to housing characteristics (*2*). At the request of the United States Housing Authority, a member of the staff of the Division has been serving in liaison capacity with the Authority to assist in resolving matters in its program which have a health impli-

cation. These cover a broad field, including standards for healthful housing, problems of home and environmental sanitation, physiological and sociological effects of adequate housing, community facilities with particular reference to health centers, and procedures relating to cooperative practices between housing and health authorities.

In April 1940, the Milbank Memorial Fund held its 18th Annual Conference, at which the fundamental human needs—food and shelter—were discussed, together with the population trends which will affect these needs in coming decades. At one of the round-table meetings, held in conjunction with the Committee on the Hygiene of Housing of the American Public Health Association, the closing discussions on the opportunities and responsibilities of public health administrators in the field of housing indicated very clearly the growing tendency to regard it as of basic importance in a broad program of expanding public health objectives.

The American Public Health Association at its annual meeting in Detroit on October 8–11, 1940, set up a committee on housing in the Health Officers' Section. A panel discussion, "How Far Should Housing Concern the Health Officer," preceded the establishment of this committee and inquired into the responsibilities the health officer should assume in assuring healthful housing to his community. The committee, under the chairmanship of Dr. Huntington Williams, Commissioner of Health, Baltimore, Md., will function as a clearing house for reports and advice on health department activities relative to housing conditions in local areas. The Committee will also attempt to show how remedial action related to slums and demolition of substandard dwellings can become part of the normal function of the health officer.

Recently the National Organization for Public Health Nursing has created a housing committee to serve in a consultant capacity to the organization and keep it informed about housing developments throughout the country with particular reference to the health implications of housing projects. This action was taken by the Board of Directors of the National Organization for Public Health Nursing in January 1940, and interest in the subject was evident at the Biennial Convention in Philadelphia, May 12–17, 1940, at which Dr. C.-E. A. Winslow presented a paper on housing and health, emphasizing nursing activities (*3*). All sections of the country are represented on the committee.

Increasing interest at the State level in the public health aspects of housing is evidenced by recent actions taken in Texas and Connecticut. The Texas Public Health Association passed the following resolution at its annual meeting (Fort Worth, Oct. 1–3, 1940):

Whereas the Texas Public Health Association recognizes the improvement in living conditions and consequently in the health levels of numerous groups of the

population being brought about through programs of the several agencies concerned directly with the improvement in housing conditions; and

Whereas these programs would be greatly implemented through a positive public health program designed to supplement the efforts of the housing authorities; now

Therefore be it Resolved, That the Texas Public Health Association recommend that a Unit be set up in the State Health Department to survey the public health aspects of housing throughout the State with a view of providing consultant services to local health departments.

(a) Establishing a definite State public health policy in regard to housing improvement;

(b) Development of a long-range program for dealing comprehensively with the public health aspects of housing;

(c) Organization of cooperative programs with housing agencies in the various localities of the State.

Another significant development is the appointment in the Connecticut State Health Department of a housing engineer whose function will be to study housing conditions in the communities of the State, to review critically the structure and administration of existing local and State regulations, to investigate the adequacy of inspectional services affecting housing, and to work with local officials on a general housing education program. The position has been established with the aid of funds available to the State under Title VI of the Social Security Act. The Committee on the Hygiene of Housing will serve in a consulting capacity in connection with this work.

Connecticut thus has taken a leading step toward meeting the increasing demands being made on both State and local health agencies to participate actively in a concerted movement to bring the national housing structure up to an adequate level. Such action, together with the other evidences of interest cited, indicates something of the extent to which improvement of conditions of substandard housing is coming more definitely to be regarded as a public health responsibility.

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(*2*) Britten, Rollo H., Brown, J. E., and Altman, Isidore: Certain characteristics of urban housing and their relation to illness and accidents: Summary of the findings of the National Health Survey. The Milbank Memorial Fund Quarterly, **18**: 91 (1940).

(*3*) Winslow, C.-E. A.: Housing and health. Public Health Nursing, **32**: 434 (1940).

PREVALENCE OF POLIOMYELITIS IN THE UNITED STATES IN 1940

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In 1940 the number of cases of poliomyelitis reported in the United States increased by about 30 percent over the number in 1939. The total of 9,770 cases [1] in 1940 has been exceeded only four times since 1915. In 1916 there were 27,363 cases reported from 27 States, in 1927 there were 10,533 from 48 States, in 1931 15,790 from 43 States, and in 1935 10,839 cases from the entire country. However, it must be borne in mind that there have been changes in the criteria for diagnosis of poliomyelitis and that reporting of the disease was probably more accurate in 1940 than in 1916 or 1927. In each of the four years mentioned the disease occurred mainly in the thickly populated eastern seaboard States, while in 1940 it was found principally in the north central part of the country.

The distribution of poliomyelitis in 1939 was characterized by a series of small localized outbreaks in different sections of the country in addition to a fairly widespread occurrence in the southern Rocky Mountain region. In 1940, as shown in the accompanying map (fig. 1), the disease occurred in epidemic form in several large areas in the north central section and northwestern or northern Rocky Mountain section of the country. In several instances the larger epidemic areas in 1940 were in the same regions in which the smaller localized outbreaks had occurred in 1939.

Michigan reported the largest number of cases (1,241) in 1940, which was also the largest number ever reported in that State. Iowa had a greater number of cases per 100,000 population, 937 cases being reported, or a case rate of 36.9. Indiana reported 682 cases (case rate 19.9), and West Virginia 662 cases (case rate 34.8). Other States reporting a large number of cases were: Ohio (656), Illinois (600), Kansas (542), Wisconsin (494), California (466), Washington (428), and Missouri (316). Table 1 shows that three States had case rates of 30 or more per 100,000 population, two had rates between 20 and 30, and eight had case rates between 10 and 20. Throughout the entire country there were 28 counties in which the case rate per 100,000 population was in excess of 100. In 1939 only 13 counties had rates of 100 or more. These data indicate a fairly high rate of incidence in certain sections of the country.

As in previous reports (*1*) the numbers of cases by counties used in preparing the map for 1940 were the total of those reported monthly by individual States to the Public Health Service. Case rates were calculated according to the populations of the 1940 Census.

[1] Numbers of cases and case rates for 1940 throughout this report are provisional.

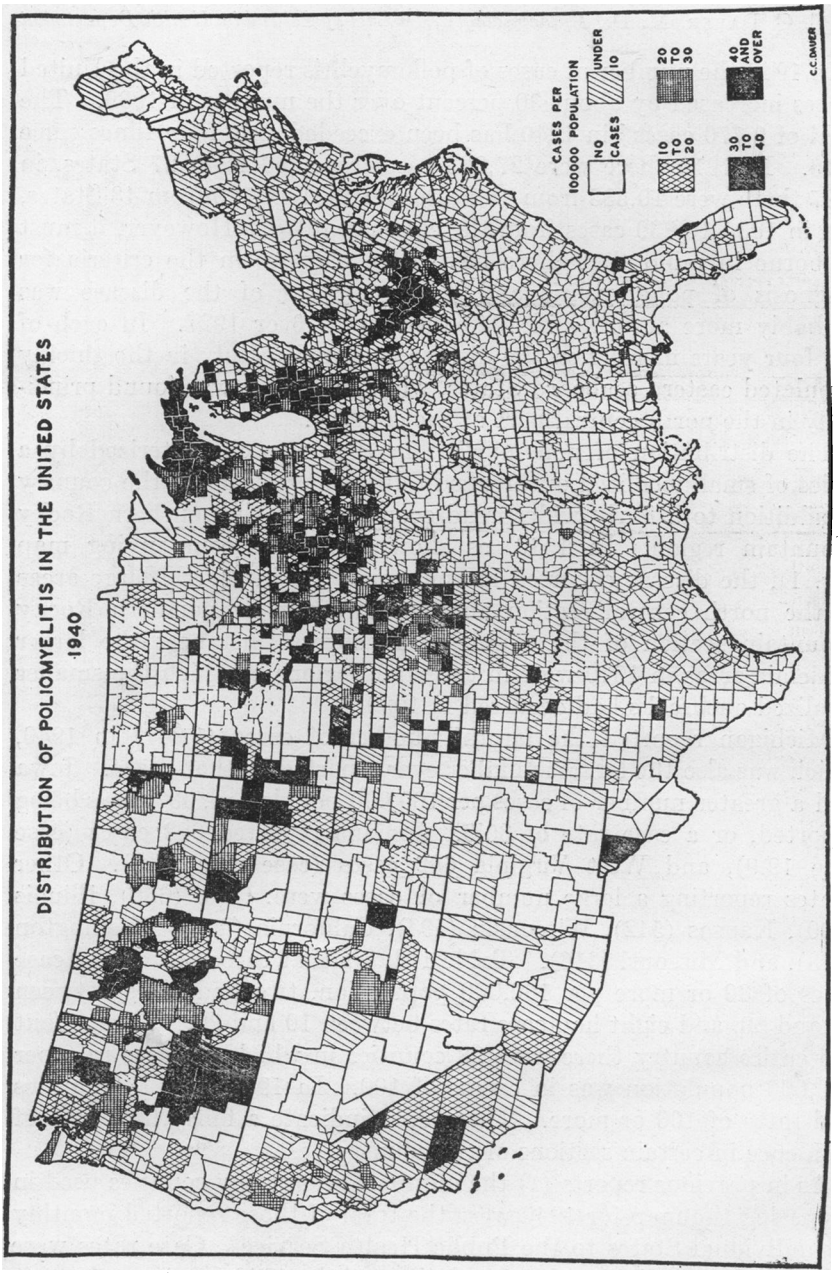
DISTRIBUTION OF POLIOMYELITIS IN THE UNITED STATES
1940
CASES PER 100000 POPULATION
NO CASES
UNDER 10
10 TO 20
20 TO 30
30 TO 40
40 AND OVER
C.C. DWIER

FIGURE 1.

TABLE 1.—*Poliomyelitis case rates per 100,000 population by States, 1935–1940*

	1935	1936	1937	1938	1939	1940
United States	8.6	3.5	7.3	1.3	5.6	7.4
New England:						
Maine	19.0	5.0	16.1	1.7	.5	1.3
New Hampshire	9.5	.8	4.9	.2	.8	.4
Vermont	17.7	2.1	7.6	2.3	8.4	1.7
Massachusetts	32.0	1.3	7.9	.4	1.7	1.0
Rhode Island	51.5	.7	3.2	.9	.4	1.2
Connecticut	23.4	.9	6.2	1.2	1.6	1.1
Middle Atlantic:						
New York	22.2	1.5	4.9	1.1	8.0	1.6
New Jersey	11.8	.6	3.6	.9	5.3	1.5
Pennsylvania	2.2	1.3	3.3	.8	4.2	1.7
East North Central:						
Ohio	1.3	5.1	7.9	.8	2.3	9.5
Indiana	1.4	1.5	4.2	.4	1.6	19.9
Illinois	3.0	8.8	9.9	1.4	2.4	7.6
Michigan	13.0	3.2	9.0	1.2	19.1	23.0
Wisconsin	2.2	1.5	11.4	1.7	3.8	15.7
West North Central:						
Minnesota	3.6	1.2	12.6	1.6	20.5	8.4
Iowa	2.5	3.0	9.4	1.5	7.7	36.9
Missouri	1.3	2.7	9.9	.6	.7	8.3
North Dakota	1.7	2.7	.9	1.1	1.9	3.9
South Dakota	2.1	1.9	5.7	4.0	3.6	12.7
Nebraska	.9	1.7	16.0	.7	3.6	14.0
Kansas	1.5	5.0	12.9	.6	2.3	30.1
South Atlantic:						
Delaware	2.0	.4	3.1	.8	3.1	.8
Maryland	6.4	2.2	4.8	1.0	1.6	.9
District of Columbia	14.3	1.1	4.8	4.3	3.0	1.2
Virginia	25.7	2.2	2.4	2.0	1.8	9.3
West Virginia	2.2	3.4	3.7	.8	3.5	34.8
North Carolina	19.8	1.5	3.1	1.4	3.3	2.1
South Carolina	2.1	1.2	1.2	1.4	23.8	1.0
Georgia	.8	4.8	2.7	1.9	3.1	.9
Florida	1.0	2.5	1.8	1.8	4.0	1.7
East South Central:						
Kentucky	11.5	3.1	4.4	1.3	5.9	7.8
Tennessee	3.2	13.2	4.4	1.1	1.1	1.9
Alabama	2.1	14.6	2.9	3.4	1.5	1.9
Mississippi	.8	9.5	21.0	3.4	1.3	2.0
West South Central:						
Arkansas	.8	2.7	16.2	1.6	2.4	1.5
Louisiana	4.8	1.6	6.2	2.0	.9	5.5
Oklahoma	.5	5.0	18.1	1.1	2.2	4.9
Texas	1.3	1.1	10.7	1.0	3.8	2.7
Mountain:						
Montana	1.1	2.6	5.8	2.6	1.1	19.1
Idaho	.9	4.3	3.9	2.4	7.2	13.0
Wyoming	.9	3.0	16.7	.4	3.5	16.3
Colorado	2.1	6.3	19.4	1.3	13.0	3.5
New Mexico	2.4	7.4	6.1	2.6	26.1	4.3
Arizona	6.1	3.4	6.8	2.2	22.4	1.4
Utah	2.1	1.3	6.4	.8	19.0	11.3
Nevada	2.0	2.0	5.0	.0	2.0	1.0
Pacific:						
Washington	2.4	4.7	5.3	1.1	1.7	24.6
Oregon	4.6	3.6	6.0	1.5	5.2	5.8
California	13.7	6.4	11.5	2.2	16.6	6.7

There were five distinct areas in the north central part of the United States where epidemics of poliomyelitis occurred. The center of one such area was located in western West Virginia, which area also included a number of counties in southern Ohio, eastern Kentucky, and southwestern Virginia. Another area was composed of a large group of counties in northern Indiana and the western part of the lower peninsula of Michigan. The upper or northern peninsula of Michigan and northern Wisconsin formed another epidemic area. Nearly all of the State of Iowa, a few counties in southern Minnesota, west central Illinois, and eastern South Dakota were the location for

another epidemic. The fifth area included the eastern half of Kansas, western Missouri, and some of Nebraska. The incidence of the disease was also high in Wyoming, Montana, Idaho, Washington, Oregon, and Utah but in these States the counties with high rates (40 or more per 100,000 population) were more scattered, except in eastern Oregon and adjoining counties in Idaho, in eastern Wyoming, and in Montana. In the northwest section of the country a comparatively large proportion of the counties reported only a few cases each but because of small populations the case rates were high.

The incidence of poliomyelitis in the area comprising the upper peninsula of Michigan and northern Wisconsin was higher than in any other section of the country. The 15 counties of the upper peninsula of Michigan, which constitute 4.5 percent of the total population of the State, reported 358 of the 1,241 cases, or 29 percent of the total for Michigan in 1940. The case rate for the group of 15 counties was 111.5 per 100,000 population. Luce County (population 7,406) reported the largest number, according to the monthly reports, 85 cases or a rate of 1,148, which means more than one in every 100 inhabitants were attacked.[2] An adjoining county, Alger, reported 35 cases, or a rate of 346. Two counties in Wisconsin bordering on Michigan also had excessively high rates of incidence. Vilas County reported 19 cases and Florence County 16, case rates of 245 and 381, respectively. From 1929 to 1939, inclusive, the group of 15 counties in upper Michigan reported comparatively few cases except in 1931 when 51 were recorded. However, 25 of the 51 cases occurred in Houghton County. The average number reported from this group of counties for the years from 1932 to 1939, inclusive, was about 6 cases per year. Thus the interval between epidemics was about 8 years in some of the counties.

Although the case rate for the State of Iowa was higher than for the whole State of Michigan, the epidemic in the former was not as severe as that in the upper peninsula of Michigan. Six counties in Iowa had rates ranging from 100 to 175 per 100,000 population and a considerable number ranged between 40 and 100. In the remainder of the epidemic areas in the north central region the average case rate was somewhat lower than in the Iowa area. Only two counties in Indiana and four in lower Michigan had rates of 100 or more, while there were three counties in Kansas, one in Ohio, and two in West Virginia with

[2] According to a statement in a personal communication to the author from the District Health Officer, Dr. A. C. Orr, there were 96 cases of poliomyelitis in Luce County in 1940, 63 paralytic and 33 nonparalytic, with 7 deaths registered. In the village of Newberry (population 2,732) there were 51 cases, or a case rate of 1,866 per 100,000 population (almost 2 percent of the population). Several of the townships had almost as high rates; in one the cases were concentrated along the main highway. The age distribution of the cases in the county was not unusual. No cases were discovered among vacationers, campers, or transients. Twenty-two families had multiple cases. It was stated that the disease appeared to spread in the same manner as typhoid fever, and that in Newberry food stands seemed to play some part in the spread of the disease.

rates in excess of 100. The greatest number of cases in any one county in the northwest or northern Rocky Mountain region occurred in Pierce County, Washington. From this county 205 cases were reported (case rate 116.5), 108 in the city of Tacoma (case rate 100.4), and 97 cases from the remainder of the county (case rate 142.4).

In addition to collecting data on poliomyelitis by counties a tabulation of cases reported weekly by States has been kept by the author. Study of these two groups of data reveals a point of unusual interest. It was pointed out in the report for 1939 that the peak of incidence in several States was reached much later in the fall than usual. This happened in Iowa, Kentucky, West Virginia, and Wisconsin. In each of these States there were small groups of counties in which a comparatively large number of cases occurred late in the season, i. e., in November and December 1939 and even in January 1940. In the late winter and spring months of 1940 poliomyelitis was not reported in larger numbers than one would expect, but in the following summer the disease again appeared in epidemic form in certain of these counties and in the area surrounding them. Several counties in eastern Kentucky and western West Virginia, which had a high incidence in the fall of 1939, appear to have been the focus from which the infection spread to the surrounding area in the summer of 1940. Likewise the small group of counties in Iowa which reported poliomyelitis in larger numbers than usual in the fall and winter of 1939–40, appear to have been the center from which the epidemic in that area may have spread the following summer. Several counties in northern Wisconsin reported a number of cases late in the fall of 1939 and a considerable number in January and February of 1940. In the summer of 1940 the disease began to appear first in the area comprising these counties and immediately afterward in the counties of the upper peninsula of Michigan.

Such occurrences as described above are not unusual, since several similar instances are to be found in the past decade. Even earlier the winter outbreak occurring in Elkins, West Virginia, may be cited (*2*). Late in November 1916 an epidemic of poliomyelitis began in Elkins which reached its peak in December and subsided in January 1917. Two other towns nearby also had outbreaks of the disease in January and February of that year. During the summer of 1917 a more widespread outbreak occurred in the nearby counties and in several counties of Virginia, Maryland, Pennsylvania, and Ohio. Caverly (*3*) described an outbreak of the disease in Vermont in the summer of 1917. He believed that the 6 cases occurring in March 1917 in the town of Waterbury were connected with a severe epidemic in surrounding towns of Washington County later in the summer.

Late in the fall of 1933 and in January 1934 cases of poliomyelitis were reported in larger numbers than usual in the State of Washington

(see table 2 showing cases reported by weeks). A severe outbreak followed in the summer of 1934. In the summer of 1936 few cases of poliomyelitis were reported from the States of Arkansas and Oklahoma but late in the fall and early winter a fairly large number of cases occurred, principally in a group of adjoining counties in western Arkansas and eastern Oklahoma.[3] This was followed by a more widespread outbreak in the summer of 1937 involving a large number of counties in these two States and in neighboring areas. In November 1938 several cases of poliomyelitis were reported in Charleston, S. C., and sporadic cases continued to occur during the next two months.

TABLE 2.—*Number of cases reported by weeks in Washington, Arkansas, Oklahoma, and South Carolina*

Week	Washington			Arkansas			Oklahoma			South Carolina		
	Median 1928-32	1933	1934	Median 1931-35	1936	1937	Median 1931-35	1936	1937	Median 1933-37	1938	1939
1	0	1	0	0	0	1	0	1	1	0	0	0
2	0	1	5	0	0	1	1	0	2	1	0	0
3	1	0	5	0	0	1	0	0	2	0	0	2
4	1	0	2	0	0	2	0	0	1	0	0	1
5	0	0	1	0	0	2	0	0	0	0	0	3
6	0	0	0	0	0	3	0	1	1	0	2	0
7	1	0	0	0	0	3	0	0	1	0	0	2
8	0	1	0	0	0	0	0	1	2	0	0	0
9	1	1	0	0	1	0	0	1	0	0	0	0
10	0	0	3	0	0	1	0	1	0	0	0	1
11	0	0	1	0	1	0	0	0	1	0	0	0
12	0	0	1	0	0	0	0	0	1	0	0	4
13	0	1	1	0	0	0	0	0	0	0	0	0
14	1	0	0	0	0	0	0	0	0	0	0	5
15	0	3	1	0	0	0	0	0	0	0	0	8
16	0	0	0	0	0	0	0	0	0	0	0	6
17	0	0	1	0	1	0	0	0	0	0	0	8
18	0	1	0	0	0	2	0	0	3	0	3	13
19	0	2	0	1	0	0	0	0	1	0	0	22
20	0	0	1	0	1	0	0	0	0	0	0	28
21	0	1	0	0	0	0	1	0	0	0	0	22
22	1	0	1	0	0	1	0	0	0	0	0	22
23	0	1	0	0	0	4	0	0	3	0	0	27
24	1	0	2	0	0	3	0	0	1	0	0	28
25	0	0	2	0	0	7	0	0	8	1	0	30
26	0	0	1	0	0	26	1	0	7	0	0	29
27	1	0	2	0	0	36	0	1	55	0	0	20
28	1	0	8	0	0	36	0	0	46	1	0	20
29	1	1	12	0	0	48	0	0	53	0	1	12
30	0	0	34	0	0	26	0	0	28	1	0	12
31	1	1	41	0	0	21	0	0	30	1	2	17
32	1	0	45	0	0	19	0	0	23	2	0	14
33	1	2	70	1	0	10	0	0	19	0	2	15
34	0	2	42	0	1	7	0	1	25	1	0	16
35	1	3	50	1	0	6	0	0	9	1	1	6
36	4	3	42	1	1	12	1	0	14	1	0	12
37	1	11	61	0	0	9	0	1	19	0	2	5
38	1	4	71	1	1	12	1	1	13	0	0	8
39	4	14	25	0	1	13	1	0	21	0	1	5
40	3	5	47	0	0	7	1	2	15	0	1	3
41	3	4	39	0	1	3	0	0	10	0	1	11
42	4	6	25	0	9	8	0	0	2	1	0	0
43	4	3	25	0	4	7	0	2	3	0	0	1
44	2	3	14	1	4	1	0	6	2	0	0	1
45	2	4	16	1	8	3	1	31	1	1	0	4
46	1	5	4	0	7	3	0	25	1	0	0	1
47	2	2	7	0	5	3	1	17	0	1	2	1
48	2	0	9	0	1	0	0	11	2	0	0	0
49	3	3	3	0	2	1	0	4	1	1	2	4
50	2	4	8	0	4	0	1	3	1	0	0	0
51	1	------	6	0	3	2	0	4	2	0	3	0
52	1	2	0	0	1	0	0	3	0	0	3	0

[3] See Public Health Reports, vol. 53, June 24, 1938, pages 1016-1017 (maps 4 and 5).

TABLE 2.—*Number of cases reported by weeks in Wisconsin, Iowa, West Virginia, and Virginia*—Continued

Week	Wisconsin			Iowa			West Virginia			Virginia	
	Median 1934-38	1939	1940	Median 1934-38	1939	1940	Median 1934-38	1939	1940	Median 1935-39	1940
1	1	0	6	0	0	3	0	0	0	0	0
2	0	1	1	0	0	2	0	0	1	0	2
3	0	0	0	0	0	1	1	0	0	0	0
4	1	0	0	0	0	6	0	2	2	0	0
5	0	0	1	0	0	1	0	1	0	0	0
6	0	0	1	0	0	4	1	0	0	0	0
7	1	0	3	0	0	1	0	2	1	0	0
8	0	0	5	0	0	1	0	0	2	0	2
9	0	0	3	0	0	0	0	2	0	0	0
10	0	0	4	0	0	0	0	0	1	1	0
11	0	1	1	0	0	0	0	0	0	0	0
12	0	0	1	1	0	0	0	0	1	0	1
13	0	0	0	0	0	1	0	0	1	0	0
14	0	0	1	0	0	0	0	1	1	0	1
15	0	0	0	0	0	0	0	1	2	0	0
16	0	0	0	0	1	1	0	0	1	0	0
17	0	1	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	1	0
19	1	0	1	0	0	0	0	0	2	0	0
20	0	0	0	1	0	1	0	0	1	0	0
21	1	0	0	0	0	0	0	1	0	0	0
22	0	1	0	1	0	1	1	0	0	0	0
23	0	0	0	0	0	1	0	0	1	0	0
24	0	0	0	0	0	0	0	0	0	1	0
25	1	0	0	0	0	1	0	0	1	2	2
26	1	0	5	0	0	4	1	0	0	2	1
27	1	0	1	0	0	1	1	0	2	2	2
28	1	2	1	0	0	5	2	0	2	1	1
29	0	0	5	1	0	6	0	2	4	2	2
30	1	0	1	0	0	2	1	0	6	3	3
31	2	0	0	1	3	9	0	0	13	4	1
32	1	3	0	0	1	19	2	0	20	2	5
33	2	0	2	1	0	25	3	0	31	2	9
34	3	6	12	2	1	73	4	0	46	2	6
35	8	7	19	2	2	56	3	2	41	4	7
36	6	5	30	4	2	80	3	1	51	4	17
37	8	2	31	4	12	100	4	0	48	3	16
38	4	6	27	4	5	121	3	2	66	4	22
39	6	8	40	3	16	101	2	0	64	3	24
40	6	10	36	3	14	70	4	3	48	1	20
41	7	9	25	3	12	75	1	2	37	1	15
42	3	7	29	2	12	55	1	3	37	1	16
43	1	3	52	7	17	48	1	1	31	2	12
44	3	3	36	3	21	21	1	10	25	2	12
45	1	5	23	2	23	12	0	4	13	1	13
46	1	5	11	2	12	6	0	7	19	0	5
47	1	7	18	2	5	6	0	3	18	1	7
48	0	3	17	1	10	6	1	4	10	1	12
49	1	3	17	0	9	4	0	0	5	1	9
50	0	1	13	1	12	3	0	1	3	0	4
51	0	3	10	0	4	2	0	6	3	1	5
52	0	0	5	0	3	2	0	3	1	0	3

In April 1939 a severe outbreak began in Charleston which later involved a number of nearby counties. The occurrence of the cases in the fall and winter led the health officer of Charleston to predict the epidemic which followed.

Thus there appears to be evidence indicating that when there is an increased prevalence of poliomyelitis in the late fall and early winter, particularly in small localized areas, a more widespread epidemic will follow in the same general region during the summer immediately following. All outbreaks occurring in the summer do not exhibit these premonitory signs; as a matter of fact only a comparatively few do. However, these localized outbreaks occurring late in the fall and

in winter should be studied in more detail and followed carefully. If it can be shown in which general area certain outbreaks of poliomyelitis may be expected there would be opportunities to carry on valuable preliminary studies on the epidemiology and immunology of the disease. It would also be possible to study more advantageously the effect of a preventive measure if such can be devised.

In connection with the above observations it is a matter of interest to note that in the State of Virginia poliomyelitis cases were reported in larger numbers than usual during the months of November and December 1940. Most of these late cases were reported from counties located in the southwestern part of the State. It will be interesting to see whether this instance of occurrence of the disease in this locality in the late fall will be the forerunner of a more widespread outbreak in Virginia and the surrounding area in the summer of 1941.

Comparatively few contributions on the epidemiology of poliomyelitis appeared in the medical literature in 1940. However, in the laboratory the isolation of the virus from stools has been continued and the procedure has been simplified by nasal instillation of fecal suspensions in monkeys (*4*). This procedure of isolating virus undoubtedly will prove to be an effective tool in epidemiological studies, but up to the present time it has not been proved that sewage is an important source of infection either during epidemic or interepidemic periods. One study (*5*) reported the failure of chlorine in concentrations greater than that used to disinfect drinking water to inactivate the virus when an emulsion of infected monkey cord was mixed with tap water. This failure to inactivate virus is far from conclusive and does not indicate that the poliomyelitis virus is transmitted through the medium of drinking water. Under actual field conditions the following factors would have to be taken into consideration before considering water an important transmitting medium: Dilution, oxidation, action of sunlight, filtration through artificial filters and soil, effect of chemicals other than chlorine, and also storage.

A report (*6*) on serum-virus protection tests, using human serum from two areas where the disease had been epidemic and the Lansing strain of virus, seemed to indicate that mice could be used with consistent and trustworthy results. A wider application of this protection test using mice should prove a valuable aid in epidemiological studies, particularly so since other investigators (*7*) suggest that "aside from the neutralization test, the hope for a specific immunologic reaction for poliomyelitis is somewhat remote."

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A PRELIMINARY SURVEY OF THE ANOPHELINE MOSQUITO FAUNA OF SOUTHEASTERN MINNESOTA AND ADJACENT WISCONSIN AREAS [1]

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Despite common belief that malaria does not occur in Minnesota and Wisconsin it is well known to those in touch with the situation that locally acquired cases occasionally present themselves. There is current an impression that such cases are on the increase since the installation of the dams for improvement of navigation along the Mississippi River. The increasing number of cases of the disease reported to the Minnesota and Wisconsin State Health Departments would seem to afford some evidence in support of this view.

There were reported in Minnesota for the three seasons 1935–1937, inclusive, a total of 19 cases, of which 7 were clearly indigenous and 2 others presumably so. In 1938 there were 8 reported cases, of which 3 were indigenous. In 1939 there were recorded 22 cases. Parallel conditions prevailed in Wisconsin where a total of 20 cases was reported for the three seasons 1935–1937, of which 12 were indigenous.

[1] This paper embodies partial results of a cooperative study made by the Minnesota and Wisconsin State Health Departments with the aid of the U. S. Public Health Service, covering the period August 25–September 26, 1939.

Associated in the work were Harold Peters, H. Laurence Burdick, and Robert Dicke, without whose efficient aid the scope of the work would have been greatly restricted. Acknowledgments are also due Theodore Olson, biologist of the Minnesota State Department of Health, who kept in close touch with the studies and who made numerous photographs illustrating typical breeding places, as did Mr. Peters.

In 1938 there were 7 cases reported, of which 5, occurring in cities bordering the Mississippi River, were indigenous. The number of cases reported in 1939 reached 28.

Four species of anophelines, each a potential malaria carrier, occur in Minnesota. These are *Anopheles maculipennis*, *A. punctipennis*, *A. quadrimaculatus*, and *A. walkeri*. Data regarding their incidence and distribution are few, as compared with those relating to other insects of economic importance. In view of the awakened interest in malaria, Dr. A. J. Chesley, secretary and executive officer of the Minnesota State Board of Health, in August 1939, suggested to Dr. C. A. Harper, State health officer of Wisconsin, that an intensive survey be made of the anopheline fauna along the Mississippi River, on both sides, from Wabasha, Minn., to La Crosse, Wis. Late as the season was, it was evident that important data relative to the incidence and breeding habits of the various species might still be obtained.

The project and the necessary expenditures of Federal funds were promptly approved and equipment assembled. On August 26 a general survey of the area under consideration (see fig. 1) was made to determine the most favorable location for the field laboratory. Ready access to a bridge, to boats, and to typical flooded areas on both sides of the Mississippi led to the selection of Wabasha, Minn., as headquarters for both the Minnesota and the Wisconsin field workers. A cabin adjacent to a considerable swampy area was available and intensive work was begun on August 27.

METHODS OF WORK

Insofar as the limited time permitted, four main lines of work were carried out:

1. Building collections were made over as many scattered localities in the area as was feasible. Regardless of species, mosquitoes resting in sheds, privies, bathhouses, basements, and similar shelters were collected by the use of an aspirator. Search was also made beneath bridges and culverts. The total collections were counted and the anophelines identified.

2. Collection of anophelines attacking the workers was carried out to only a limited degree.

3. Light trap catches, utilizing the available two, and for part of the time three, of the well-known New Jersey electrically controlled mosquito traps, were made during the entire period of the survey.

4. Larval collections were particularly emphasized, with a view to determining the extent of favorable breeding places. To insure correct identifications the specimens were usually bred out.

The survey was most fortunate in securing, through the courtesy of the District Engineer, U. S. War Department, a set of the maps pre-

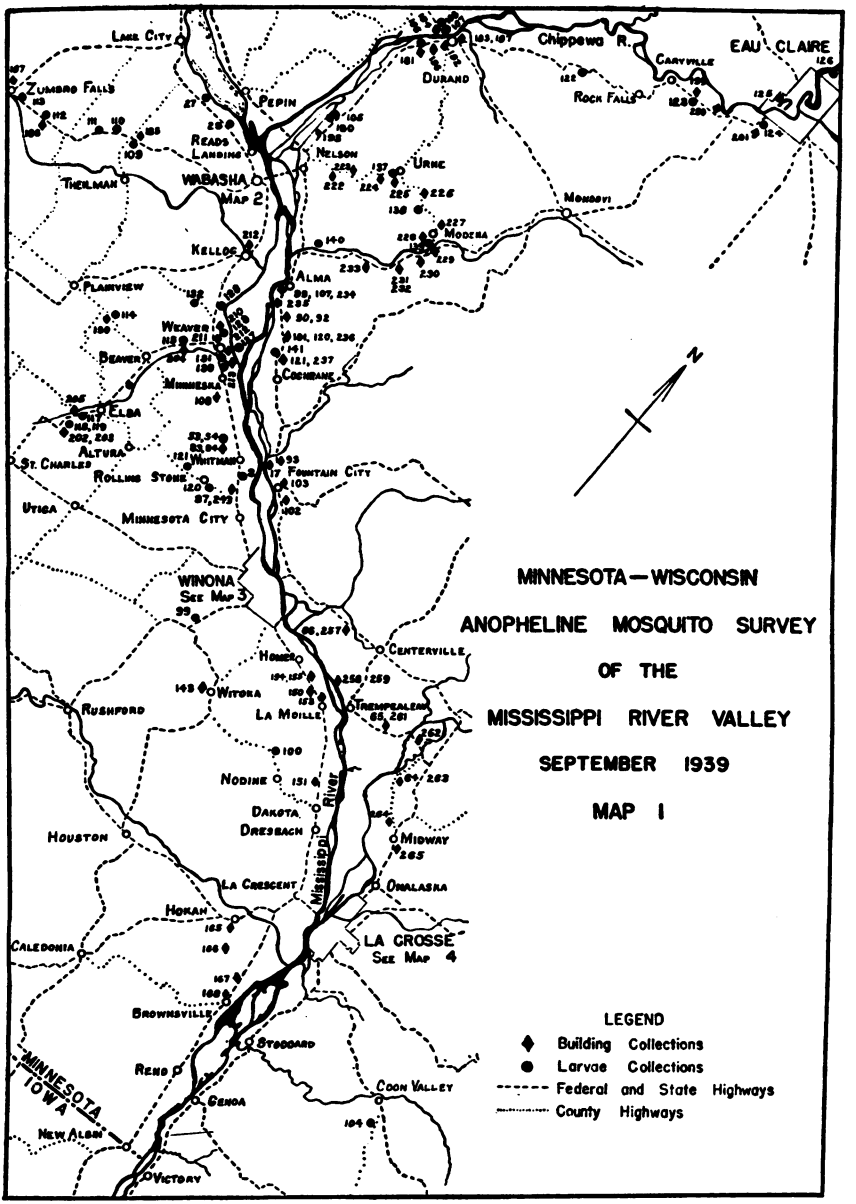

FIGURE 1.—The survey area.

pared in connection with the river improvement project. These consisted of key maps to the various regions in the valley as well as a number of detailed maps showing areas of marsh, open water, flood plain forest, streams, etc., on a large scale. Although various changes have occurred in the course of completion of the dams, the maps were invaluable aids for the field studies.

Records of temperature and other weather conditions were kept throughout the work. These and other details will be filed for future reference and additions.

September weather in Minnesota is very undependable and the group was fortunate in having a full month, August 27 to September 27, of practically uninterrupted field work. According to the Weather Bureau monthly summary the mean temperature for September was 69.1° F., a departure of +6.6°.

COLLECTIONS FROM BUILDINGS AND OTHER SHELTERS

In the course of the work, mosquitoes were taken from many kinds of diurnal resting places. These included privies, basements, sheds, bathhouses, bridges, culverts, cattle underpasses, and other shelters. All resting mosquitoes, including the nonanophelines, were collected from as many different localities in the area as time permitted. Of the 12,321 specimens thus secured, 11,798, or 95.7 percent, were anophelines.

As illustrative of the conditions in buildings, exclusive of other shelters, we may consider the results at Wabasha, where collections were made daily in the basement of the field laboratory and in each of three privies near the laboratory.

For the period August 27–September 26, 1939, there were 4,853 mosquitoes collected from these four stations. Of the total only 79, or 1.6 percent, were nonanophelines.

There were 4,774 anophelines, or 98.4 percent of the total catch. These were distributed as follows:

	Number	*Percent*
Anopheles quadrimaculatus	4,500	94.4
A. punctipennis	262	5.4
A. walkeri	12	0.2
A. maculipennis	—	—

The enormous preponderance of *A. quadrimaculatus* in building collections was clearly indicated from the outset but was quite at variance with such distribution records as were available in the entomological collections of the University of Minnesota. Such records indicated a probable greater incidence of *A. punctipennis* in southeastern Minnesota. As we shall see, this was due to the fact that most of the previous collections had been made at points not on the Mississippi.

Examination of the detailed report of collections shows that there was a daily influx of anophelines and particularly of *quadrimaculatus* into these buildings. Even though removed daily, large numbers were always present the following morning. Thus, on the morning of September 3, 243 specimens were captured in the basement, although it had been cleared carefully the day before. On September 16, 231 specimens of *quadrimaculatus* were collected from one of the privies.

The picture is essentially the same when the total collections of 11,191 mosquitoes from buildings and other resting places throughout the river valley area are considered. The anophelines constituted 95.9 percent of the catch and of these *quadrimaculatus* represented 91.7 percent.

A significant contrast is afforded by the collections made in the surrounding hills and valleys, outside of the river valley proper. In these localities, referred to in subsequent discussion as "inland," there were taken 1,130 adult specimens from resting places comparable to those searched in the river valley. Again the anophelines were dominant, being represented by 1,070 specimens, or 94.7 percent. The distribution of species was strikingly different from that found in the river valley. *Punctipennis* led with 917 specimens, or 85.7 percent, while *quadrimaculatus* was represented by only 151, or 14.1 percent, as compared with the total of 94.7 percent found in the river valley collections from similar shelters. *A. walkeri* and *A. maculipennis* were each represented by a single specimen.

These findings agree with previous records indicating that *punctipennis* is the most common widely distributed anopheline in southern Minnesota. It breeds by preference in spring-fed streams and pools among the hills of this region, a fact which is in agreement with the known habits of the species.

While there is ample evidence to support the view that *quadrimaculatus* is the chief carrier of malaria in the southern United States, there should be further investigation before it is concluded that it plays an equally important role in Minnesota. As bearing on this question it should be noted that most of the dwelling houses in the area are well screened and that *walkeri*, also an efficient carrier, readily attacks man in the open, even in mid-day, in bright sunlight.

ANOPHELINES CAUGHT WHILE ATTACKING

Throughout the survey specimens of anophelines feeding on man in the open were collected. Unfortunately time did not permit extensive collecting of this type and the following data represent occasional catches during the course of other work. On three occasions a definite attempt was made to obtain feeding records.

Of the total catch of 134 mosquitoes, *quadrimaculatus* supplied 16, or 11.9 percent. *A. walkeri* was represented by 114, or 85.1 percent, *punctipennis* by 4, or 3 percent, and no specimens of *maculipennis* were taken.

Of the 114 *walkeri*, 55 were collected when a definite effort was made to obtain feeding records. These collections were made on 3 successive days.

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Obviously the data on feeding habits are so meager as to be merely suggestive. However, the preponderance of *walkeri* was also noted in similar catches of feeding mosquitoes made by William Chalgren, in 1938, in the Minneapolis–St. Paul area. Of 4,166 specimens, representing 21 species, *walkeri* was the only anopheline, and 47 specimens of it were taken. The relative frequency with which it occurred in trap catches also indicates that it may be more important than ordinarily has been considered.

LIGHT TRAP CATCHES

Three electrically controlled mosquito traps of the New Jersey type, which has become standard for mosquito survey work, were available and two of them were in use for the entire period at Wabasha. The third was operated for a 5-day period at La Crosse, Wis.

Of those in use at Wabasha, trap A was suspended in an apple tree close to the laboratory, on a ridge overlooking an extensive mosquito-breeding swamp (fig. 2). Trap C was located in a back yard in the residential district known as West Wabasha.

From trap A 15,804 mosquitoes were taken during the period August 26 to September 25 (table 1). Of these, 3,482, or 22 percent, were anophelines, the percentage in the daily catches ranging from 4 on August 29, to a high of 51.4 on September 18. The total daily catch as well as the percentage of anophelines varied. On two occasions no mosquitoes were collected. This occurred on September 23 and again on September 25, when the light trap studies were concluded because of cold weather.

The largest single catch occurred on the night of September 15 when 2,264 mosquitoes were collected. Of these, 740, or 30.6 percent, were anophelines. This record catch was made at the hottest period of the survey, a situation noted by other workers using light traps in sampling mosquito populations in other regions. Examination of the humidity records did not show any definite effects due to variations in this factor.

TABLE 1.—*Summary of light trap catches at Wabasha, Minn., August 26–September 25, 1939*

	Trap A		Trap C		Traps A and C	
	Number	Percent	Number	Percent	Number	Percent
Anopheles quadrimaculatus	632	18.2	1,061	74.4	1,693	34.5
Anopheles punctipennis	493	14.1	130	9.1	623	12.7
Anopheles walkeri	2,357	67.7	234	16.4	2,591	52.8
Anopheles maculipennis			1		1	
Total anophelines	3,482	100.0	1,426	100.0	4,908	100.0
Total anophelines	3,482	22.0	1,426	21.3	4,908	28.1
Total nonanophelines	12,322	78.0	5,272	78.7	17,594	71.9
Total	15,804	100.0	6,698	100.0	22,502	100.0

FIGURE 2.—Trap A and a portion of the extensive swampy area below the laboratory at Wabasha, Minn. (Photograph by Harold Peters.)

FIGURE 3.—Backwater area with algal mats in which anophelines were breeding in numbers, near the field laboratory. (Photograph by Theodore Olson.)

In considering the distribution of the species captured by trap A, the preponderance of *walkeri*, which is generally referred to in literature as an uncommon species, is striking. In the course of the month during which this trap was operated 2,357 specimens of *walkeri*, or 67.7 percent of the total anophelines, were taken as contrasted with 632, or 18.2 percent, of *quadrimaculatus*. It is the more striking in view of the fact that the trap was hung in the location where such large collections of *quadrimaculatus* were made in buildings. That it was not due to failure of the traps to attract the latter is evident when it is noted that the condition was almost completely reversed with trap C where 74.4 percent were *quadrimaculatus* and only 16.4 percent were *walkeri*. When the catches of the two traps are combined it is seen that a little over half of the anophelines were *walkeri*, about one-third *quadrimaculatus*, and an eighth *punctipennis*.

Trap C, instead of hanging in the open near the edge of an extensive breeding place, as was trap A, was in a yard with crowded shrubbery, in a residential district. The total number of mosquitoes caught here during the period was 6,698, as compared with 15,804 at trap A. It is interesting to find that the percentages of anophelines were almost identical—22 for trap A and 21.3 for trap C.

In the absence of more complete data it is difficult to explain these differences in the catches from the two traps located only 2 miles apart. They were identical in construction and light bulbs of the same intensity were used. Breeding conditions for anophelines were more favorable in the surroundings of trap A, but also existed more remotely within range of trap C. That *quadrimaculatus* was present in abundance in the former locality is shown by the fact that 4,500 specimens were collected from the basement and the three outbuildings routinely inspected. Unfortunately only meager indoor collections were made in the region of C and hence comparisons between the two areas in this respect are not possible.

The discrepancies in the performance of the two traps serve to emphasize a fact well known to workers accustomed to their use, that it is not safe to rely on one or two traps to give a true picture of the mosquito fauna of a region. Care must be taken to select different significant locations or to select comparable areas if information concerning relative breeding is sought.

While more extensive collections from buildings might have cleared up the discrepancies in the data relative to catches of *quadrimaculatus*, there remains the more puzzling question as to the reason for the great numbers of *walkeri* taken with trap A as compared with those from trap C. Earlier studies had convinced us that the species is common in Minnesota and that it feeds readily in the open at any time of day.

That *walkeri* is not a household mosquito is indicated by the fact that only 12 specimens were included in the routine collections from buildings at Wabasha. It seems probable that it does not penetrate into residential districts as readily as does *quadrimaculatus* or is more restricted in its flight from breeding places. However, the fact that *walkeri* may overwinter in the egg stage (*3*, *7*) might account for its being less attracted to houses during the period covered by this survey.

Light trap collections in the Minneapolis–St. Paul area, as well as our experience with trap A, suggest that *walkeri* may more readily be attracted to lights than are the other anophelines in this region. Johnson (*4*) found that from 15 to 50 percent of the anophelines caught by a light trap at Reelfoot Lake, Tenn., were of this species, although it was very scarce in collections from buildings and in the larval surveys.

It is evident that further studies of the biology, distribution, and incidence of *A. walkeri* are highly desirable, particularly since it is known to be capable of transmitting both *Plasmodium vivax* (experiments of Matheson, Boyd, and Stratman-Thomas (*6*) and *Plasmodium falciparum* (experiments of Kitchen and Bradley (*5*)). Recently Bang, Quinby, and Simpson (*1*) reported finding a wild-caught specimen harboring malarial parasites. The salivary glands were heavily infected and 6 oocysts were found on the stomach.

The above-discussed light trap data relate to conditions at Wabasha, Minn., where the two traps were run throughout the entire period, August 26–September 25. A third trap of the same type was operated at La Crosse, Wis., for the 5-day period September 12–16, when larval surveys and building collections were being made in the vicinity. The trap was located on the edge of the main channel of the Mississippi River, on La Plume Island. A total of 1,751 mosquitos was collected here, less than that of either of the Wabasha traps for the same period. Of these, *walkeri* was by far the most abundant anopheline, constituting 84.7 percent of the 483 taken, while *quadrimaculatus* made up 15.1 percent. A single specimen of *punctipennis* was included in the catch.

For purposes of comparison the catches of the La Crosse and the two Wabasha traps for the same 5-day period are given in table 2. Since the La Crosse trap was in a position somewhat similar to that of trap A at Wabasha, the catches of the two might be expected to be comparable. The percentages of *quadrimaculatus* were almost identical. *Punctipennis*, with its single representative, was practically lacking in the La Crosse catch, while *walkeri* was even more predominant than in trap A at Wabasha.

TABLE 2.—*A comparison of the light trap catches at La Crosse and at Wabasha for the 5-day period September 12–16, 1939*

	La Crosse		Wabasha			
			Trap A		Trap C	
	Number	Percent	Number	Percent	Number	Percent
Anopheles quadrimaculatus	73	15.1	290	16.6	478	75.8
Anopheles punctipennis	1	.2	249	14.3	43	6.8
Anopheles walkeri	409	84.7	1,206	69.1	110	17.4
Anopheles maculipennis						
Total anophelines	483	100.0	1,745	100.0	631	100.0
Total anophelines	483	27.6	1,745	35.4	631	26.6
Total nonanophelines	1,268	72.4	3,191	64.6	1,740	73.4
Total	1,751	100.0	4,936	100.0	2,371	100.0

In view of this close agreement it is apparent that the anopheline populations at the two extremes of the surveyed area are very much alike. It is believed from these and supplementary studies that the entire valley between these points would yield similar results if the mosquito populations were similarly sampled.

LARVAL SURVEY

Most of the actual time for the month of the survey was spent in the field locating important anopheline breeding places. The surveys were more or less centered at Wabasha, Reads Landing, Winona, and La Crosse, which, as seen by the map, afforded typical conditions for the river valley. Some collections were made at additional points of interest and 2 days were devoted to inland surveys, away from the valley proper.

A total of 102 collections of anopheline larvae were made in the river valley, the larvae being taken to the laboratory and usually reared. No mosquitoes were reared from 13 of the collections, in most of which the anophelines were not abundant and such as were present were in early instars. From the other 89 collections numerous adults were recovered. Detailed records were kept as to the stations studied, the typical vegetation, the amount of shade or exposure, presence of fish, and other significant data. These and the field notes are on file and will serve as a basis for more extended work in the future.

The anopheline larvae were generally found in clean, quiet waters with abundant vegetation. Sloughs, sluggish streams, impounded waters behind wing dams, and similar situations all through the surveyed area were favored breeding places. Dense tangled thickets of submerged *Ceratophyllum*, *Myriophyllum*, and occasionally of *Potamogeton* with algal mats of *Spirogyra* and, more often, of *Hydro-*

dictyon (fig. 3) were particularly favored by *quadrimaculatus* and *punctipennis*. The duckweeds *Lemna* and *Wolffia* were often scattered over these areas, but when they were present in thick, almost solid layers, the larvae were not present in numbers. As was to be expected, situations where vegetation was not abundant, and where the water was deeper and accessible to fish, yielded few anopheline larvae.

All four species were obtained in these larval collections. Of a total of 948 reared, 544, or 57.4 percent, were *quadrimaculatus*. *Punctipennis* was second with a total of 366 reared adults, or 38.6 percent. *Walkeri* was represented by only 37 reared adults, or 3.9 percent, and *maculipennis* by a single one.

From these data, obviously very meager and based on restricted seasonal collecting, it would appear that *quadrimaculatus* and *punctipennis* are the most common two anophelines breeding in the sloughs and impounded waters in the valley. Of the 89 larval collections, 34 yielded adults of both species, while 20 yielded only *punctipennis* and 22 *quadrimaculatus*. It should be pointed out that only 1 or 2 adults were reared from many of these latter samples.

How this condition compares with that which existed before the installation of the dams cannot accurately be determined. The whole area was swampy and subject to overflow, and afforded many favorable breeding places, especially for *quadrimaculatus*. However, much of the swamp was covered by trees which were removed in the course of the river improvement program and this exposure to light rendered it more attractive to the anophelines. It is highly probable that there is greatly increased breeding by *quadrimaculatus* in the river valley.

Relative to *walkeri* there are a number of puzzling questions which can be answered only by further detailed studies. As we have seen, it was by a very wide margin the dominant species taken in light trap A and at La Crosse, both of which traps were located near marshy breeding areas and not in a residential district as was trap C. It was also the species most frequently taken while attacking man. Why was it so meagerly represented (3.9 percent) in the larval collections?

The most obvious answer to this question would appear to be that the particular breeding places favored by *walkeri* were overlooked in the larval survey. This may be the case although the larval survey was most intense in the Wabasha area and particularly in the area from which trap A attracted mosquitoes. It seems improbable that any important concentrated breeding area of *walkeri* would be overlooked, especially when all types were being examined here from the beginning of the survey. Another possibility is that the favorable breeding period for *walkeri* had passed before the survey began. Of this we have no evidence beyond indications that the species overwinters in the egg stage in the north.

Such limited data as are at present available suggest that *walkeri* favors flooded grassy areas in shallow water for breeding. These areas were, on some occasions, cut grass, but probably included sedges and rushes as well. In most cases these stations were rated as poor because larvae were not abundant. However, these grassy areas do cover large extents of bottom land and even though *walkeri* larvae are sparsely scattered over them, the total emergence might be very great.

If this proves to be the breeding habit of *walkeri*, it affords one explanation of why the species was obtained so infrequently in the larval survey. With the time strictly limited, the area to be examined very extensive, and the possibility of weather conditions limiting the survey, each collecting stop was brief and if no larvae or only a very few were found, the collectors moved on to another station. This resulted in emphasis on areas where larvae were concentrated. Thus, if *walkeri* does not breed in concentrated areas as do *quadrimaculatus* and *punctipennis* it would very likely be missed.

This may also account for difficulties experienced by others in locating the breeding places of this species. Bradley and McNeel (*2*), in Florida, and Johnson (*4*), in Tennessee, found *walkeri* readily attracted to light traps but also had great difficulty in locating breeding places. Johnson reared only 1 adult from all nearby breeding places, while Bradley collected only 8 larvae.

In order to learn how extensively the four species of anophelines occurred elsewhere in the general region, 2 days were spent in a survey away from the river valley. The topography of these areas of southeastern Minnesota and corresponding sections of Wisconsin is rough and hilly. Much of it is unglaciated and hence drainage is well developed, with no ponds, lakes, or marshes to serve as mosquito breeding places. The only favorable places are springs, spring pools, seepage pools, and small clear streams. In all of these locations larvae were found in numbers.

By far the dominant species in the whole range of differing habitats was *A. punctipennis*, which constituted 98.8 percent of all the anophelines reared from these inland collections. The remaining 1.2 percent consisted of 13 *quadrimaculatus*. The latter were all reared from static water while *punctipennis* alone was found in all the streams and springs examined. The streams were usually rather small, clean, with sand bottoms and a marginal fringe of green filamentous algae. In this fringe *punctipennis* larvae were always found in numbers. Many were observed on the very edge of the algal margins, moving back and forth in the currents. On many occasions the larvae were so numerous that they could easily be collected in a teaspoon. In a number of places, 12 to 15 could be obtained in a single teaspoonful.

SUMMARY

In considering the results of this preliminary survey, it should again be emphasized that it covered a period of only 1 month, beginning on August 26, 1939. Weather conditions were unusually favorable, the mean temperature for the month being 69.1° F., which was 6.6° F. above the average. It did not fall below the freezing point during the month, which was very unusual.

Under these conditions it is probable that the anopheline populations were at their peak. The situation is complicated, too, by the fact that the hibernation periods for the various species were approaching. No data were available regarding the early or midseason conditions.

The findings for the period of the survey, August 26 to September 25, may be summarized as follows:

1. Anopheline mosquitoes were found to be much more abundant in the Mississippi River valley, from Wabasha, Minn., to La Crosse, Wis., than had previously been supposed.

2. Four species of anophelines already reported for Minnesota were found: *Quadrimaculatus*, *walkeri*, *punctipennis*, and *maculipennis*. *Maculipennis*, which occurs commonly in northern Minnesota, was so rare as to indicate that it is of no significance in the survey area.

3. On the basis of building collections alone, where it constituted 91.7 percent of the anopheline catch, *quadrimaculatus* would appear to be the most common species in the valley proper, while *punctipennis* was the most abundant inland (85.7 percent). *Walkeri* was almost absent in these collections although there is reason to believe that it may be the most common of the four.

4. In light trap collections in the residential district of Wabasha *quadrimaculatus* was present to the extent of 74.4 percent while in the catches by traps located near extensive swamp areas at both Wabasha and La Crosse *walkeri* made up 67.7 percent and 84.7 percent, respectively, of the total anophelines.

5. In the small collection of anophelines attacking man in the open, *walkeri* was the dominant species. This is in agreement with observations elsewhere in Minnesota, and emphasizes the need for detailed studies on the biology of the species.

6. Anophelines were breeding abundantly throughout the valley in the extensive sloughs and backwaters. Larval collections yielded 57.4 percent *quadrimaculatus* and 38.6 percent *punctipennis*. Such evidence as is available indicates that *walkeri* oviposition is less concentrated but that it occurs in submerged grassy areas which are extensive in the region. An alternative is that the favorable season for larval development of the species had passed.

7. Data from collections from buildings, from light traps, hand catches, and larval collections revealed a surprisingly high incidence of anophelines, with *quadrimaculatus* and *walkeri* the dominant species.

While there are no data relative to the abundance of these species prior to installation of the dams for improvement of navigation, there is evidence that there has been a marked increase in favorable breeding places in the river valley for *quadrimaculatus* and apparently for *walkeri* as well.

8. Inland, in contrast to conditions in the river valley proper, *punctipennis* was the only anopheline found breeding in numbers. It constituted 98.8 percent of the specimens reared from the inland collections.

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POST-SANATORIUM TUBERCULOSIS SURVIVAL RATES IN MINNESOTA[1]

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In order to plan wisely for after-care and rehabilitation of tuberculous patients discharged from sanatoria, accurate statistics should be made available regarding mortality and survival rates. Consideration should be given in the determination of these rates to such factors as the age and sex of the patient, the extent of the tuberculosis, status of the sputum, the effect of collapse therapy, and the condition of the patient on discharge. The purpose of this report is to present statistics on survival rates of persons with tuberculosis discharged from public sanatoria in Minnesota during the years 1926 to 1935, inclusive.

The data used in this study have been obtained from 1 State and 14 county sanatoria which serve a population of approximately

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2,600,000 in Minnesota, scattered over an area of more than 84,000 square miles. These institutions comprise all of the public sanatoria in the State. There is only 1 small private sanatorium in Minnesota.

The 1 large State sanatorium, with a bed capacity of 365, serves a predominantly rural area; the county sanatoria group consists of 2 large sanatoria with bed capacities of 694 and 226, respectively, each of which serves a metropolitan area; 1 large sanatorium with 235 beds serving a rural area which contains 1 metropolitan center of 100,000 people; and the 11 small county sanatoria, with bed capacities ranging from 26 to 100, serving the remainder of the rural population.

On January 1, 1940, there were available in these 15 sanatoria 2,287 beds for tuberculous patients. With the exception of facilities for Indians, which have been increased in number, approximately the same number of beds have been available for several years. On January 1, 1940, vacancies existed in several of these institutions. The ratio of beds to positive-sputum cases indicates adequate sanatorium facilities for proper treatment.

The total number of persons discharged from these sanatoria during 1926–35 was 10,990. In table 1 these individuals have been grouped according to the type of sanatorium from which they were discharged and have been classified by the diagnosis at the time of discharge. Of the total group, 81.5 percent (8,958) had reinfection type, 4.7 percent (513) had first-infection type, and 3.1 percent (339) had nonpulmonary tuberculosis, according to the classification of the National Tuberculosis Association. There were 19 patients with miliary tuberculosis and 47 with pleurisy of a nonspecific type. Of the total group, 3.9 percent (425) were discharged as not having tuberculosis. In addition, 6.3 percent (689) were discharged as "suspects," after careful examination by qualified specialists. Most of these latter patients had been admitted to the sanatoria with a diagnosis of tuberculosis.

TABLE 1.—*Distribution of discharged patients by diagnosis on discharge from urban and rural sanatoria, Minnesota, 1926–35, inclusive*

Diagnosis on discharge[1]	2 large urban		1 large urban and rural		1 large rural		11 small rural		Total, 15 sanatoria	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Reinfection type tuberculosis	4,448	81.3	970	75.6	1,449	81.7	2,091	85.0	8,958	81.5
First-infection type tuberculosis	277	5.1	125	9.8	62	3.5	49	2.0	513	4.7
Miliary tuberculosis	12	.2	3	.2			4	.2	19	.1
Nonpulmonary tuberculosis	203	3.7	64	5.0	13	.8	59	2.5	339	3.1
Pleurisy, nonspecific	28	.5	2	.1			17	.6	47	.4
Suspect	220	4.0	112	8.7	197	11.1	160	6.5	689	6.3
Nontuberculous	287	5.2	7	.6	52	2.9	79	3.2	425	3.9
Total	5,475	100.0	1,283	100.0	1,773	100.0	2,459	100.0	10,990	100.0

[1] According to the National Tuberculosis Association classification.

Only patients with the diagnosis of reinfection type of pulmonary tuberculosis based upon careful history, physical examination, examination of the sputum, tuberculin tests when indicated, and X-ray films were included in this study. Table 2 shows the distribution of these patients separated into 3 classifications; 14.3 percent were minimal, 26.5 percent moderately advanced, and 59.2 percent far advanced. Thus, 86 out of every 100 of these patients had advanced tuberculosis.

TABLE 2.—*Distribution of discharged patients with reinfection type tuberculosis by pulmonary (National Tuberculosis Association) diagnosis on discharge from urban and rural sanatoria, Minnesota, 1926–35, inclusive*

Diagnosis on discharge	2 large urban		1 large urban and rural		1 large rural		11 small rural		Total, 15 sanatoria	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Minimal	359	8.1	89	9.2	485	33.5	346	16.6	1,279	14.3
Moderately advanced	1,080	24.3	242	24.9	335	23.1	720	34.4	2,377	26.5
Far advanced	3,009	67.6	639	65.9	629	43.4	1,025	49.0	5,302	59.2
Total reinfection type tuberculosis	4,448	100.0	970	100.0	1,449	100.0	2,091	100.0	8,958	100.0

An important factor in the determination of survival rates of tuberculous patients is the number of readmissions to sanatoria during the period. Of the 8,958 patients of all ages, 6,822 were 20 to 49 years old. Seventy-five percent (5,100) were admitted only once, 36.9 percent (2,515) were discharged and were alive at the end of the period of observation (including those untraced after discharge), 11.2 percent (767) were alive on discharge but died during the period of observation, and 26.6 percent (1,818) were dead on discharge after their first admission. There were 22.4 percent (1,526) who had more than 1 admission and discharge; 12.3 percent (837) were alive on discharge and at the end of the follow-up period; 3.4 percent (235) were discharged alive but died thereafter, and 6.7 percent (454) were persons who were readmitted and were dead on discharge. The remaining 2.9 percent (196) were persons who were readmitted after their last discharge and were in residence in the sanatorium at the end of the study in 1937. Only the interval of time from the last discharge to readmission was included in the follow-up period of these 196 persons.

The variation in age-specific death rates indicates the part played by age in the mortality from pulmonary tuberculosis. These rates are low for persons under 5 years of age, very low for those between 5 and 15 years, and very high for those from 15 to 50 years; the mortality rates decrease after age 50 only to rise again after 60 years of age. Because the age-specific annual death rates from tubercu-

losis among persons 20 to 49 years of age seemed similar, it was decided to include in this study only persons in that age group.

It is recognized also that sex is a factor in the mortality experience of individuals with tuberculosis, but this was not considered in this study.

Table 3 shows the distribution of patients with reinfection type tuberculosis who were discharged alive, grouped by 5-year class intervals for persons 20 to 49 years of age. Of the total group of 8,958 persons with this type of tuberculosis, 5,772 were discharged alive, and 4,550 of these were between 20 and 49 years of age. Persons in this age group comprised, therefore, 78.8 percent of the total alive on discharge. There was a slightly greater number of persons 20 to 24 years of age and a correspondingly smaller number in the age groups 40 to 44 years and 45 to 49 years among the patients with minimal disease than among those with moderately advanced and far-advanced disease. Otherwise, the distribution of patients by 5-year age groups and by stage of the disease on discharge among those 20 to 49 years of age was fairly uniform.

TABLE 3.—*Patients discharged alive, by age groups and National Tuberculosis Association classification, for public sanatoria in Minnesota, 1926–35, inclusive*

Age on discharge	Stage of disease on discharge						Total	
	Minimal		Moderately advanced		Far advanced			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
20–24	267	29.9	356	21.4	389	19.5	1,012	22.2
25–29	236	26.4	447	26.9	529	26.5	1,212	26.6
30–34	181	20.2	331	19.9	381	19.1	893	19.6
35–39	101	11.3	222	13.4	257	12.9	580	12.8
40–44	61	6.8	167	10.0	241	12.1	469	10.3
45–49	48	5.4	140	8.4	196	9.9	384	8.5
Total, 20–49	894	100.0	1,663	100.0	1,993	100.0	4,550	100.0
All other ages	350	28.0	403	19.5	469	19.0	1,222	21.2
20–49	894	72.0	1,663	80.5	1,993	81.0	4,550	78.8
Total, group	1,244	100.0	2,066	100.0	2,462	100.0	5,772	100.0

Table 4 shows the distribution of persons with reinfection type tuberculosis, aged 20 to 49 years, by the total number discharged alive, dead, traced and untraced, for each of the sanatoria groups.

The untraced persons were not observed after the date of discharge; therefore, they were not included in the survival tables. For any particular year after discharge, the traced persons included those present at the beginning of the ensuing year, and also one-half of the experience of those followed 1 to 11.9 months during that year, but not present at the beginning of the ensuing year.

TABLE 4.—*Discharged patients 20 to 49 years of age, traced and untraced and dead on discharge, by stage of disease (National Tuberculosis Association), for Minnesota sanatoria (public), 1926–35, inclusive*

Sanatoria	Status on discharge	Stage of disease on discharge					
		Minimal		Moderately advanced		Far advanced	
		Number	Percent	Number	Percent	Number	Percent
2 large urban	Alive on discharge	279	100.0	755	100.0	1,095	100.0
	Traced	265	95.0	707	94.0	1,050	96.0
	Untraced	14	5.0	48	6.0	45	4.0
	Dead on discharge	11	3.8	114	13.1	1,157	51.4
	Number discharged	290		869		2,252	
1 large urban and rural	Alive on discharge	41	100.0	175	100.0	291	100.0
	Traced	38	93.0	167	95.0	283	97.0
	Untraced	3	7.0	8	5.0	8	3.0
	Dead on discharge	1	2.4	13	6.9	195	40.1
	Number discharged	42		188		486	
1 large rural	Alive on discharge	339	100.0	245	100.0	287	100.0
	Traced	203	60.0	172	70.0	222	77.0
	Untraced	136	40.0	73	30.0	65	23.0
	Dead on discharge	10	2.9	22	8.2	192	40.1
	Number discharged	349		267		479	
11 small rural	Alive on discharge	235	100.0	488	100.0	320	100.0
	Traced	181	77.0	441	90.0	285	89.0
	Untraced	54	23.0	47	10.0	35	11.0
	Dead on discharge	5	2.0	75	13.3	477	59.9
	Number discharged	240		563		797	
All sanatoria	Alive on discharge	894	100.0	1,663	100.0	1,993	100.0
	Traced	687	77.0	1,487	89.0	1,840	92.0
	Untraced	207	23.0	176	11.0	153	8.0
	Dead on discharge	27	2.9	224	11.9	2,021	50.4
	Number discharged	921		1,887		4,014	

Of the 4,550 persons discharged alive, 11.8 percent (536) were untraced after discharge. In general the percentages untraced by individual sanatoria are under 10, with the exception of the large rural sanatorium which serves 46 of the 87 counties in Minnesota. These 46 counties are scattered widely throughout the State. There have been insufficient funds and personnel to carry on an adequate follow-up service for this sanatorium, and principally for this reason more patients were untraced (31.5 percent of the total) than from the other institutions. In contrast, among persons discharged from the one large urban and rural sanatorium which has an efficient follow-up system (with local clinics, nurses, and social workers in the field) only 7 percent of the minimal, 5 percent of the moderately advanced, and 3 percent of the far-advanced patients were untraced after discharge.

Of the 6,822 persons 20 to 49 years of age (table 4) 13.5 percent (921) were classified as minimal, and of this group, 2.9 percent (27) were dead on discharge. There were 27.7 percent (1,887) with moderately advanced disease, and of this group 11.9 percent (224) were dead on discharge. There were 58.8 percent (4,014) far advanced on discharge, and of this group 50.4 percent (2,021) were dead on discharge.

SURVIVAL RATES

Studies on death and survival rates of tuberculous patients were reviewed by the author (*1*) in 1936, and by Brieger (*2*) in 1937. Several studies of a similar nature have appeared in the literature since the discussion by Frost (*3*), in 1933, on the use of life-table methods in studying mortality experience of those coming in contact with tuberculous patients.

The use of a modified and simplified method of life-table analysis, as formulated recently by Puffer (*4*), is convenient for a follow-up study of individuals where the periods of continuous observation vary. The procedure as explained by Puffer is as follows:

The death rate which it is desired to obtain is the rate known in life-tables as the "probability of death" (q_x) within a year. This is expressed by the ratio $q_x=\frac{d_x}{l_x}$ where l_x is the number present at the beginning of the year and d_x is the number of those who died within the year. This statement, however, assumes that all those not known to have died within the year can be known to have survived through the year. In the data available, some of the cases were under observation less than a full year while others moved from the county, so that the period of observation terminated within a year after first observation. Thus a certain number (w_x) of those who entered the experience (l_x) were withdrawn from the experience during the year. Each of the persons thus withdrawn is counted as having been exposed to (and survived) ½ year's experience so that the number at risk for the whole year is taken as

$$l_x-\tfrac{1}{2}w_x \text{ and } q_x=\frac{d_x}{l_x-\tfrac{1}{2}w_x}.$$

The probability of survival can be obtained by subtraction of the probability of death (q_x) from 1, as $p_x=1-q_x$. If $100q_x$ is the percentage dying during a year, $100p_x$ is the percentage surviving through the year.

From the percentages surviving each year the percentage of those originally at risk who survived h years can be obtained. Thus, since $100p_x$ survive the first year and $100p_{x+1}$ of these survive through the second year, the proportion of the original number who survive through 2 years (100_2p_x) is equal to $100(p_x\times p_{x+1})$. The risk of dying within the first h years (100_hq_x) is $100(1-{}_hp_x)$.

By this simple method, either the risk of dying or the probability of surviving may be obtained at certain time intervals after discharge. The actual operation of this method may be followed by observing the first line of figures in table 5.

Survival rates on tuberculous patients discharged from sanatoria should not be used as a measure of the results of sanatorium treatment. This can be done only by comparing one group of patients which has had sanatorium care with another group which has had no sanatorium care. However, survival rates can be of real value in vocational rehabilitation planning. It is essential to know the effect of such factors as the stage of the disease, the age of the patient, and the status of the sputum on the probability of survival over a period of time for persons with tuberculosis, for whom future plans of vocational training and placement are being made. Accurate statistics on sur-

vival experience in the hands of the medical consultant will provide him with additional facts upon which to base sound recommendations for the use of the vocational counselor.

In this study of survival rates, because of the limited number of individuals, only certain factors were considered. These were: (1) Age, which was limited to those persons from 20 to 49 years; (2) the stage of disease on discharge, according to the classification of the National Tuberculosis Association as minimal, moderately advanced, and far-advanced pulmonary tuberculosis; (3) the condition of the sputum on discharge, whether positive or negative. Some important factors which were not considered in this study were the length of stay in a sanatorium, the number of admissions to and discharges from the sanatorium, the sex of patients, the influence of collapse therapy, and the occupational groups from which the individuals were drawn. Statements regarding survival rates on these patients should be qualified by the effects of such factors.

Table 5 shows the survival rates from 1 through 6 years after discharge for patients 20 to 49 years old, by stage of disease and status of sputum, from all 15 public sanatoria and for each of the sanatoria groups.

TABLE 5.—*Survival rates of patients 20 to 49 years of age, by stage of disease and sputum on discharge, from public sanatoria in Minnesota, 1926–35, inclusive*

Stage of disease	Interval after discharge (years)	Present at beginning of year	Withdrawn during year	Average at risk during year	Number dying during year	Percentage surviving through specified year	Percentage surviving through past and specified years
	15 public sanatoria—Positive-sputum patients [1]						
Moderately advanced	0–1	234	5	231.5	41	82.3	82.3
	1–2	188	7	184.5	42	77.2	63.6
	2–3	139	8	135	16	88.2	56.0
	3–4	115	17	106.5	13	87.8	49.2
	4–5	85	10	80	9	88.8	43.6
	5–6	66	8	62	3	95.2	41.6
Far advanced	0–1	633	18	624	213	65.8	65.8
	1–2	402	20	392	119	69.6	45.8
	2–3	263	26	250	43	82.8	38.0
	3–4	194	30	179	26	85.4	32.4
	4–5	138	28	124	22	82.2	26.7
	5–6	88	14	81	4	95.0	25.4
	15 public sanatoria—Negative-sputum patients						
Minimal	0–1	664	46	641	3	99.5	99.5
	1–2	615	54	588	6	99.0	98.5
	2–3	555	72	519	7	98.6	97.2
	3–4	476	89	431.5	2	99.5	96.7
	4–5	385	70	350	1	99.7	96.4
	5–6	314	61	283.5	0	100.0	96.4
Moderately advanced	0–1	1,253	50	1,228	23	98.1	98.1
	1–2	1,180	65	1,147.5	34	97.0	95.2
	2–3	1,081	126	1,018	21	97.9	93.3
	3–4	934	145	861.5	14	98.4	91.8
	4–5	775	134	708	17	97.6	89.6
	5–6	624	114	567	6	98.9	88.6
Far advanced	0–1	1,207	34	1,190	50	95.8	95.8
	1–2	1,123	50	1,098	50	95.4	91.4
	2–3	1,023	121	962.5	38	96.0	87.8
	3–4	864	175	776.5	34	95.6	84.0
	4–5	655	136	587	22	96.2	80.8
	5–6	497	134	430	9	97.9	79.1

[1] Insufficient number of persons (23) to set up survival rates for those classified as minimal with positive sputum.

TABLE 5.—*Survival rates of patients 20 to 49 years of age, by stage of disease and sputum on discharge, from public sanatoria in Minnesota, 1926–35, inclusive*—Continued

Stage of disease	Interval after discharge (years)	Present at beginning of year	Withdrawn during year	Average at risk during year	Number dying during year	Percentage surviving through specified year	Percentage surviving through past and specified years
	2 large urban sanatoria—Positive-sputum patients						
Moderately advanced	0–1	66	4	64	10	84.4	84.4
	1–2	52	3	50.5	7	86.1	72.7
	2–3	42	4	40	3	92.5	67.2
	3–4	35	7	31.5	3	90.5	60.8
	4–5	25	4	23	2	91.3	55.5
	5–6	19	3	17.5	2	88.6	49.2
Far advanced	0–1	272	13	265.5	82	69.1	69.1
	1–2	177	4	175	45	74.3	51.3
	2–3	128	11	122.5	20	83.7	42.9
	3–4	97	13	90.5	10	89.0	38.2
	4–5	74	18	65	14	78.5	30.0
	5–6	42	8	38	3	92.1	27.6
	1 large urban and rural sanatorium—Positive-sputum patients						
Moderately advanced	0–1	19	0	19	5	73.7	3.77
	1–2	14	0	14	5	64.3	47.4
	2–3	9	0	9	2	77.8	36.9
	3–4	7	0	7	2	71.4	26.3
	4–5	5	1	4.5	1	77.8	20.5
	5–6	3	0	3	0	100.0	20.5
Far advanced	0–1	91	1	90.5	40	55.8	55.8
	1–2	50	3	48.5	24	50.5	28.2
	2–3	23	2	22	5	77.3	21.8
	3–4	16	1	15.5	3	80.6	17.6
	4–5	12	2	11	1	90.9	16.0
	5–6	9	0	9	0	100.0	16.0
	1 large rural sanatorium—Positive-sputum patients						
Moderately advanced	0–1	63	1	62.5	7	88.8	88.8
	1–2	55	4	53	14	73.6	65.4
	2–3	37	2	36	3	91.7	60.0
	3–4	32	7	28.5	5	82.5	49.5
	4–5	20	3	18.5	2	89.2	44.2
	5–6	15	2	14	0	100.0	44.2
Far advanced	0–1	123	1	122.5	32	73.9	73.9
	1–2	90	10	85.	25	70.6	52.2
	2–3	55	7	51.5	7	86.4	45.1
	3–4	41	11	35.5	5	85.9	38.7
	4–5	25	3	23.5	6	74.5	28.8
	5–6	16	4	14	0	100.0	28.8
	11 small rural sanatoria—Positive-sputum patients						
Moderately advanced	0–1	86	0	86	19	77.9	77.9
	1–2	67	0	67	16	76.1	59.3
	2–3	51	2	50	8	84.0	49.8
	3–4	41	3	39.5	3	92.4	46.0
	4–5	35	2	34	4	88.2	40.6
	5–6	29	3	27.5	1	96.4	39.1
Far advanced	0–1	147	3	145.5	59	59.5	59.5
	1–2	85	3	83.5	25	70.1	41.7
	2–3	57	6	54	11	79.6	33.2
	3–4	40	5	37.5	8	78.7	26.1
	4–5	27	5	24.5	1	95.9	25.0
	5–6	21	2	20	1	95.0	23.8

TABLE 5.—*Survival rates of patients 20 to 49 years of age, by stage of disease and sputum on discharge, from public sanatoria in Minnesota, 1926–35, inclusive*—Continued

Stage of disease	Interval after discharge (years)	Present at beginning of year	Withdrawn during year	Average at risk during year	Number dying during year	Percentage surviving through specified year	Percentage surviving through past and specified years
	2 large urban sanatoria—Negative-sputum patients						
Minimal	0–1	259	23	247.5	1	99.6	99.6
	1–2	235	18	226	1	99.6	99.2
	2–3	216	41	195.5	1	99.5	98.7
	3–4	174	36	156	1	99.4	98.1
	4–5	137	25	124.5	0	100.0	98.1
	5–6	112	30	97	0	100.0	98.1
Moderately advanced	0–1	641	35	623.5	13	97.9	97.9
	1–2	593	36	575	14	97.6	95.6
	2–3	543	75	505.5	6	98.8	94.5
	3–4	462	83	420.5	9	97.9	92.5
	4–5	370	67	336.5	10	97.0	89.7
	5–6	293	56	265	3	98.9	88.7
Far advanced	0–1	778	34	761	23	97.0	97.0
	1–2	721	32	705	25	96.5	93.6
	2–3	664	79	624.5	26	95.8	89.7
	3–4	559	122	498	21	95.8	85.9
	4–5	416	77	377.5	13	96.6	83.0
	5–6	326	93	279.5	7	97.5	80.9
	1 large rural and urban sanatorium—Negative-sputum patients						
Minimal	0–1	38	1	37.5	1	97.3	97.3
	1–2	36	5	33.5	0	100.0	97.3
	2–3	31	1	30.5	0	100.0	97.3
	3–4	30	6	27	0	100.0	97.3
	4–5	24	3	22.5	0	100.0	97.3
	5–6	21	4	19	0	100.0	97.3
Moderately advanced	0–1	148	4	146	5	96.6	96.6
	1–2	139	13	132.5	5	96.2	92.9
	2–3	121	13	114.5	1	99.1	92.1
	3–4	107	19	97.5	2	97.9	90.2
	4–5	86	16	78	3	96.2	86.8
	5–6	67	16	59	2	96.6	83.8
Far advanced	0–1	192	0	192	19	90.1	90.1
	1–2	173	4	171	11	93.6	84.3
	2–3	158	21	147.5	6	95.9	80.8
	3–4	131	27	117.5	2	98.3	79.4
	4–5	102	31	86.5	4	95.4	75.7
	5–6	67	14	60	1	98.3	74.4
	1 large rural sanatorium—Negative-sputum patients						
Minimal	0–1	195	21	184.5	1	99.5	99.5
	1–2	173	29	158.5	3	98.1	97.6
	2–3	141	18	132	3	97.7	95.4
	3–4	120	26	107	1	99.1	94.5
	4–5	93	19	83.5	0	100.0	94.5
	5–6	74	18	65.	0	100.0	94.5
Moderately advanced	0–1	109	8	105.	0	100.0	100.0
	1–2	101	12	95.	5	94.7	94.7
	2–3	84	15	76.5	5	93.5	88.5
	3–4	64	12	58	1	98.3	87.0
	4–5	51	7	47.5	1	97.9	85.2
	5–6	43	7	39.5	0	100.0	85.2
Far advanced	0–1	99	0	99	3	97.0	97.0
	1–2	96	11	90.5	10	89.0	86.3
	2–3	75	10	70	2	97.1	83.8
	3–4	63	13	56.5	9	84.1	70.5
	4–5	41	11	35.5	2	94.4	66.6
	5–6	28	8	24	0	100.0	66.6

TABLE 5.—*Survival rates of patients 20 to 49 years of age, by stage of disease and sputum on discharge, from public sanatoria in Minnesota, 1926–35, inclusive*—Continued

Stage of disease	Interval after discharge (years)	Present at beginning of year	Withdrawn during year	Average at risk during year	Number dying during year	Percentage surviving through specified year	Percentage surviving through past and specified years
	11 small rural sanatoria—Negative-sputum patients						
Minimal	0–1	172	1	171.5	0	100.0	100.0
	1–2	171	2	170	2	98.8	98.8
	2–3	167	12	161	3	98.1	96.9
	3–4	152	21	141.5	0	100.0	96.9
	4–5	131	23	119.5	1	99.2	96.1
	5–6	107	9	102.5	0	100.0	96.1
Moderately advanced	0–1	355	3	353.5	5	98.6	98.6
	1–2	347	4	345	10	97.1	95.7
	2–3	333	23	321.5	9	97.2	93.0
	3–4	301	31	285.5	2	99.3	92.3
	4–5	268	44	246	3	98.8	92.1
	5–6	221	35	203.5	1	99.5	91.6
Far advanced	0–1	138	0	138	5	96.4	96.4
	1–2	133	3	131.5	4	97.0	93.5
	2–3	126	11	120.5	4	96.7	90.4
	3–4	111	13	104.5	2	98.1	88.7
	4–5	96	17	87.5	3	96.6	85.7
	5–6	76	19	66.5	1	98.5	84.4

There was an insufficient number of persons (23) with minimal tuberculosis and positive sputum in the 15 public sanatoria to set up survival rates for that group. The minimal group with negative sputum (664) had a survival rate of 99.5 percent for the first year after discharge (0–1 year interval) which gradually decreased to 96.4 percent for the 6-year period after discharge (0–6 year interval).

The moderately advanced, positive-sputum group (234) had a survival rate of 82.3 percent for the first year after discharge, which decreased to 63.6 percent for the first 2 years and then leveled off to 56.0, 49.2, 43.6, and 41.6 percent for the first 3, 4, 5, and 6 years after discharge, respectively. Rates for the negative-sputum patients in the moderately advanced group (1,253) were markedly different from the rates for those with positive sputum in the same group. The rate for the negative-sputum patients during the first year after discharge was 98.1 percent; it decreased to 95.2 percent for the first 2 years after discharge, and remained at the relatively high level of 88.6 percent for the entire 6-year period.

The far-advanced, positive-sputum group (633) had a low survival rate of 65.8 percent for the 0–1 year interval; it decreased to 45.8 percent for the 2-year interval, to 38.0 percent for the 3-year interval, and leveled off to 32.4, 26.7, and 25.4 percent for the periods of 4, 5, and 6 years after discharge, respectively. The far-advanced, negative-sputum group (1,207) had a high survival rate of 95.8 percent at the 0–1 year interval; the rate decreased to 84 percent for the 0–4 year period, and leveled off to 80.8 percent for the 0–5 year interval and 79.1 percent for the entire 6-year period.

The survival rates of the groups from the different sanatoria show minor variations among themselves, as may be seen in table 5.

Table 6 gives a summary of the survival rates for intervals after discharge of persons 20 to 49 years old with reinfection type tuberculosis, by stage of disease and status of sputum on discharge. The most striking fact is the influence of the status of the sputum on discharge on the survival rates of persons in various stages of pulmonary tuberculosis. There is a surprising uniformity in the rates for the various sanatoria groups; these sanatoria vary in type of rural and urban population served as well as in size and facilities.

TABLE 6.—*Survival rates at intervals after discharge of persons with reinfection type tuberculosis 20 to 49 years of age, by stage of disease (National Tuberculosis Association) and sputum on discharge, by rural and urban sanatoria, for public sanatoria in Minnesota, 1926–35, inclusive*

Stage of disease	Sputum examination	2 large urban		1 large urban and rural		1 large rural		11 small rural		Total, 15 sanatoria	
		Interval after discharge in years									
		0–1	0–6	0–1	0–6	0–1	0–6	0–1	0–6	0–1	0–6
Minimal	Positive										
	Negative	99.6	98.1	97.3	97.3	99.5	94.5	100.0	96.1	99.5	96.4
Moderately advanced	Positive	84.4	49.2	73.7	20.5	88.8	44.2	77.9	39.1	82.3	41.6
	Negative	97.9	88.7	96.6	83.8	100.0	85.2	98.6	91.6	98.1	88.6
Far advanced	Positive	69.1	27.6	55.8	16.0	73.9	28.8	59.5	23.8	65.9	25.4
	Negative	97.0	80.9	90.1	74.4	97.0	66.6	96.4	84.4	95.8	79.1

At the beginning of each of the first 2 years after discharge patients with advanced tuberculosis and positive sputum experienced poor survival rates, which, however, had a tendency to level off at a low rate for the 0–5 and 0–6 year intervals.

It is noteworthy that the far-advanced, negative-sputum group had a survival rate of 79.1 percent for the 6-year period in spite of the fact that the patients in this group have more than one whole lung showing evidence of pulmonary tuberculosis.

In the total group of patients from all 15 sanatoria (table 6) the minimal negative-sputum group had a survival rate from 99.5 percent to 96.4 percent for the 0–1 and 0–6 year intervals, respectively. The number of patients in the minimal positive-sputum group was too small for the computation of significant survival rates. The moderately advanced, positive-sputum group had survival rates of 82.3 percent to 41.6 percent for the 0–1 and 0–6 year intervals, respectively. The rate for the moderately advanced, negative-sputum group was 98.1 percent for the first year after discharge and 88.6 percent for the entire 6-year period. The far-advanced, positive-sputum group experienced low survival rates; only 65.8 percent survived the first year and only 25.4 percent survived 6 years after discharge. The nega-

tive-sputum group had survival rates of 95.8 and 79.1 percent during the same intervals.

DISCUSSION

In a previous paper (*5*), the term, "annual case-survivorship rate," was suggested for general use in describing the experience after discharge of tuberculous patients who had required sanatorium care. After further consideration, it is suggested that this term be modified for the sake of clarity and simplicity to the "survival rate" at the 0–*h* year intervals, as used in the present study.

In Minnesota's fairly stable population of 2,600,000 a marked decline has occurred in the annual tuberculosis death rate during the last 15 years. In 1925 the rate was 64.3 per 100,000 persons, and in 1939 the low death rate of 30.0 had been reached. It is difficult to determine accurately what proportions of this decrease are assignable to (1) early diagnosis, (2) adequate sanatorium care, or (3) after-care and rehabilitation, because no common yardstick is available with which to measure the effect of each factor in a program for the control of tuberculosis.

It is true, however, that after-care and rehabilitation have received little attention up to the present time in tuberculosis programs. On the basis of experience in this field at Papworth Colony, England, the Central Station for Tuberculosis Control in Copenhagen, Denmark, the Metropolitan Life Insurance Co. in New York, Olive View Sanatorium in California, and Glen Lake Sanatorium in Minnesota, there are definite indications that rehabilitation may become an important factor in the further reduction of the mortality rate from tuberculosis in the United States.

By furnishing specialists in tuberculosis and vocational counselors with accurate statistics on survival rates, it is hoped that a sound basis may be established for vocational guidance, training, and placement of tuberculous persons discharged from sanatoria.

SUMMARY

Data for this study were derived from records of 10,990 persons discharged from public sanatoria in Minnesota from 1926 to 1935, inclusive; 8,958 of these persons had reinfection type tuberculosis; and 4,550 of this group were 20 to 49 years of age and alive on discharge.

Survival rates for varying intervals after discharge are presented for all persons 20 to 49 years of age, by stage of disease, status of sputum, and type of sanatorium in which care has been given.

The survival rates for the period of 6 years after discharge were as follows: Minimal negative-sputum group, 96.4 percent, moderately

advanced group, positive sputum, 41.6 percent, and negative sputum 88.6 percent; far-advanced group, positive-sputum group, 25.4 per-percent, and negative sputum, 79.1 percent.

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CHORIOMENINGITIS VIRUS INFECTION WITHOUT CENTRAL NERVOUS SYSTEM MANIFESTATIONS [1]

REPORT OF A CASE

By CHARLES ARMSTRONG, *Senior Surgeon*, and J. W. HORNIBROOK, *Passed Assistant Surgeon, United States Public Health Service*

The occurrence of choriomeningitis virus infection in man, in which the central nervous system escaped demonstrable involvement, was postulated by Wooley, Armstrong, and Onstott (*1*) in 1937. At that time the clinical picture of this type of infection acquired in nature had not been identified. Its existence, however, was surmised on the basis of animal experimentation, as well as by human inoculation experiments carried out in France (*2*), and on the finding of specific antibodies in the sera of many persons from various parts of the United States who denied a history of central nervous system involvement (approximately 11 percent of over 2,000 sera contained antibodies) (*1*).

The object of this paper is to record the symptoms and the clinical picture, insofar as it was observed, of the first naturally occurring, proven case of the systemic type of the infection. The case occurred in a laboratory worker (V. H. H.) engaged in choriomeningitis research at the National Institute of Health.

It is regretted that the case was not more carefully observed but the patient was treated in his home and the clinician considered the case to be one of uncomplicated influenza until well into convalescence when its true identity was established by recovery of a strain of choriomeningitis virus from the blood stream. Subsequent to the attack the patient, moreover, developed specific neutralizing antibodies in his serum.

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

For the temperature record (figure 1) we are indebted to the patient's wife, a trained nurse.

CASE REPORT

The patient, V. H. H., a white male, aged 31, was engaged in choriomeningitis research. He had been well until March 11, 1940, when he experienced troublesome but not severe pains in his arms, shoulders, and back. His temperature was 37.4° C. The following day (March 12) he felt ill and the lumbar pain was intensified. At 3 p. m. his temperature was 38.5° C. Lumbar pain, malaise, and anorexia were his only complaints. On March 14 his temperature ranged from 37.5°

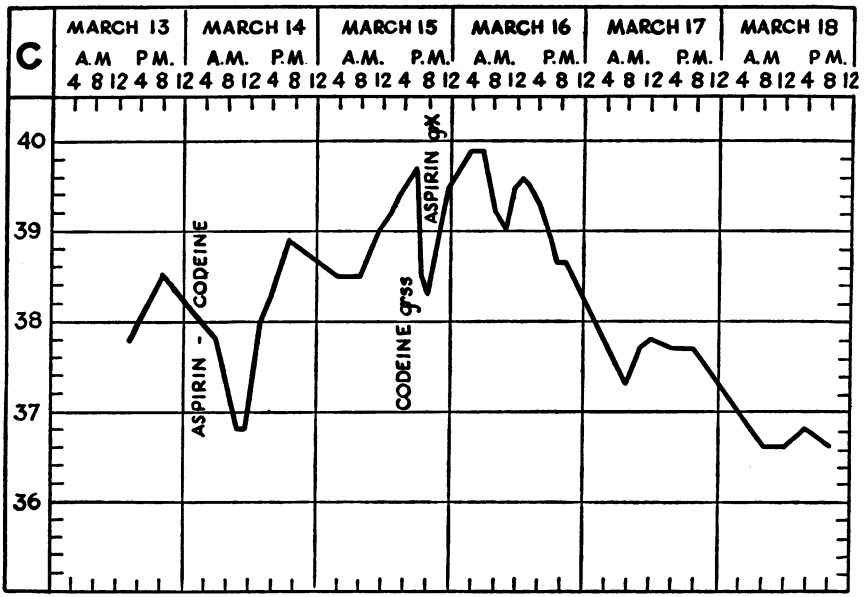

FIGURE 1.—Temperature chart of patient.

C. to 38.9° C. Prostration was fairly marked and the lumbar pain severe, requiring codeine for relief. Physical examination by J. W. H. on that day revealed a well-developed and well-nourished man, resting quietly in bed. The face was slightly flushed. He was well coordinated and cooperative. The only complaint was malaise and lumbar pain. The head was normal. There was no stiffness of the neck; the pupils were equal and reacted normally. The mouth presented no lesions; the throat was not congested. Chest expansion was equal and normal; no impaired resonance or rales were present and the voice sounds were normal. The heart was not enlarged and there were no murmurs. The pulse was regular and of good quality. There was no abdominal tenderness; the spleen and liver were not palpable. The extremities were normal. Kernig's sign was absent. The knee kicks were equal and active. On March 15 the patient's temperature

reached 39.7° C. and prostration was marked, but otherwise he was comfortable. A blood count revealed 2,900 white cells. The differential count based on 300 cells revealed polymorphonuclear neutrophiles, 45.3 percent; lymphocytes 49.6 percent, and mononuclear cells, 5 percent. The red cells appeared normal. On the sixth day of illness, March 16, the temperature reached its highest, 39.9° C. There was marked prostration and backache. The next day his fever was lower and the symptoms definitely improved. Weakness and prostration, however, were marked and persisted for a full week following the return of the temperature to normal on March 18.

In the absence of symptoms pointing to a central nervous system involvement, a spinal tap was not attempted.

Blood drawn on March 16, 1940, five days after onset, when inoculated intracerebrally into white mice produced the typical clinical and pathological picture of choriomeningitis and the strain of the virus was identified immunologically.

A sample of the patient's blood drawn on November 22, 1939, was negative when tested for specific antibodies, while a sample of blood drawn on April 28, 1940 (6 weeks after the attack) was markedly protective, only 2 of 16 mice succumbing to the inoculation, while with the earlier drawn serum 12 of 16 mice died.

DISCUSSION

The identification of an influenza-like systemic infection due to the virus of lymphocytic choriomeningitis is of interest in view of the fact that approximately 11 percent of 2,000 sera collected at random from various parts of the United States contained antibodies for this virus. These immune individuals, with rare exceptions, denied a history of central nervous system affection. These findings suggest, therefore, that a portion of the cases resembling grippe or uncomplicated influenza may be due to choriomeningitis virus.

SUMMARY

An influenza-like clinical picture occasioned by the virus of lymphocytic choriomeningitis is described. The only symptoms were fever, with pains in the arms, shoulders, and, especially, in the back, malaise, anorexia, and marked prostration. There was a marked leucopenia on the fifth day (2,900 cells); symptoms pointing to a central nervous system involvement were absent.

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FURTHER NEW SPECIES OF *ORNITHODOROS* FROM BATS (ACARINA: ARGASIDAE)[1]

By R. A. Cooley, *Entomologist*, and Glen M. Kohls, *Assistant Entomologist*, *United States Public Health Service*

Two new species of argasid ticks, *Ornithodoros concanensis*, taken from a bat cave in Texas and a bat-inhabited mine tunnel in Arizona, and *O. kelleyi*, collected from bats, *Pipistrellus* sp., in Utah and Colorado, are described.

Ornithodoros concanensis n. sp.

Sexes similar; nymphs and adults similar.

ADULT

Body.—Suboval, sides nearly parallel, anterior margin bluntly pointed, posterior margin rounded. Marginal projection opposite coxa II moderate. Length of female 5.1 mm., width, 2.7 mm.

Mammillae.—Large, close but not crowded; sides and tops with a mixed pattern of ridges with but little appearance of radiation; the majority have one or two circular or crescentic pits on top, with a short, indistinct hair present in some of the pits, especially in the peripheral areas. Sizes about equal in lateral and median areas of dorsum, slightly larger on posterior margin; on the venter somewhat smaller than those on the dorsum, but larger on the posterior margin; absent on supracoxal folds.

Discs.—Those on the dorsum depressed and with edges elevated. Venter with the discs in lineal arrangement in the preanal and median postanal grooves; present also in three depressions caudad of the transverse postanal groove.

Legs.—Moderate in length and small in diameter; surfaces micromammillated. Tarsus I with a mild subapical dorsal protuberance; absent on all others. Dorsal humps absent on all tarsi. Length of tarsus I, 0.6 mm.; metatarsus, 0.45 mm.; length of tarsus IV, 0.72 mm.; metatarsus, 0.6 mm.

Coxae.—Coxae I and II well separated; all others contiguous. Surface micromammillated and also with mild excrescences.

Hood.—Limited to a short apical elevation which is separated from the anterior extension of the dorsal body wall by a depressed line.

Cheeks.—Oval, with the anterior end wider and free; attached by the side of the narrower portion.

Capitulum.—Basis capituli about as wide as long, surface with transverse wrinkles and numerous micromammillae; with a pair of

[1] From the Rocky Mountain Laboratory, Hamilton, Mont., Division of Infectious Diseases, National Institute of Health.

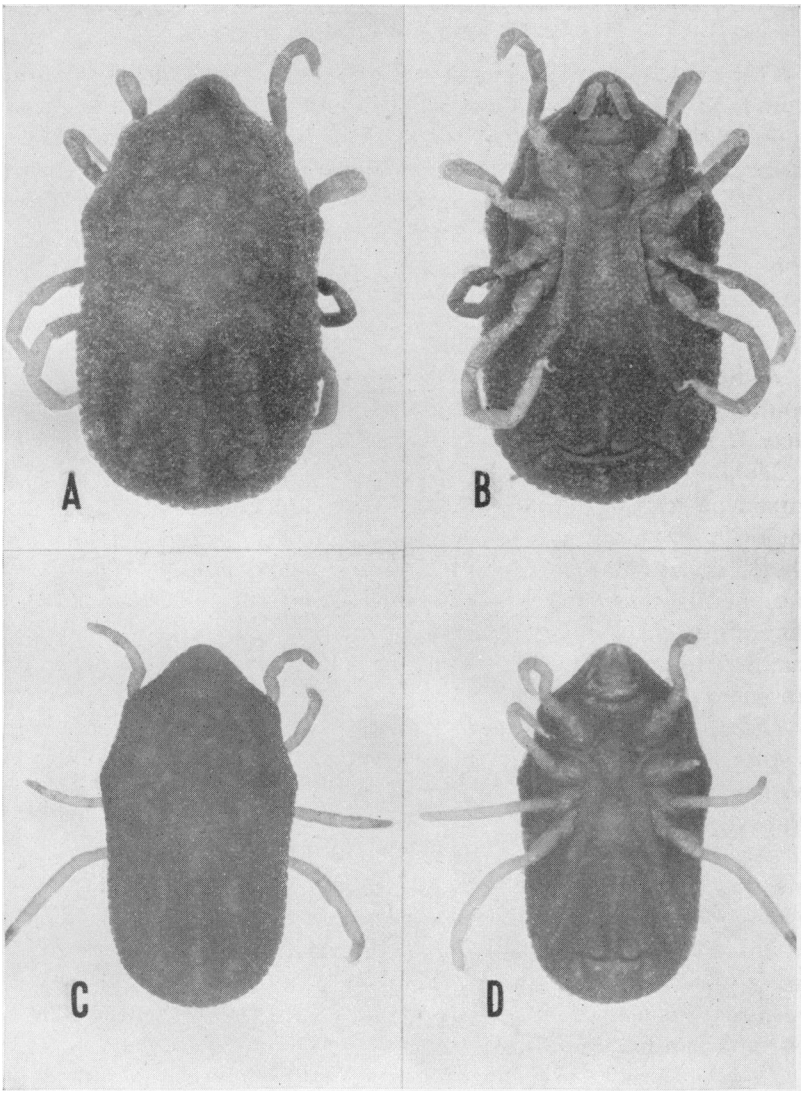

FIGURE 1.—*Ornithodoros concanensis* n. sp. and *Ornithodoros kelleyi* n. sp. A. *O. concanensis* dorsum. B. *O. concanensis*, venter. C. *O. kelleyi*, dorsum. D. *O. kelleyi*, venter.

fine hairs posterior to the posthypostomal hairs and a group of smaller hairs on each side behind. Article 1 of palpus micromammillated.

Hypostome.—Moderately long, sides nearly parallel, notched apically. Denticles in a 2/2 pattern with about four in each file and limited to the distal one-third. Length about 0.21 mm.

Folds.—Coxal and supracoxal folds present. Supracoxal fold reaching anteriorly to the hood.

Grooves.—Preanal, transverse postanal, and median postanal grooves present, the latter terminating at the transverse postanal groove. Dorso-ventral groove absent.

Sexual opening.—Placed at the level of the interval between coxae I and II.

Eyes.—Absent.

Anus.—In an oval frame.

This species resembles *talaje* and *kelleyi*. From *talaje* it is distinguished by being smaller, proportionately longer, more rounded on the posterior margin, the marginal projection opposite coxa II less pronounced, the hood shorter and the depressed areas occupied by the discs less depressed and less extensive. From *kelleyi* it is distinguished by being proportionately shorter and having the cheeks larger, as well as by having the hypostome wider beyond the middle and the palpi having more hairs.

Holotype.—Female from A. P. 17261.

Allotype.—Male from A. P. 17261.

Paratypes.—Adults and nymphs from A. P. 17261.

The holotype, allotype, and several paratypes are at the Rocky Mountain Laboratory. Paratypes have been sent to the following: United States National Museum, Washington, D. C.; Zoological Division, Bureau of Animal Industry, Washington, D. C.; Museum of Comparative Zoology, Harvard University, Cambridge, Mass.; Department of Entomology, Cornell University, Ithaca, N. Y.; Division of Entomology and Parasitology, University of California, Berkeley, Calif.; Division of Entomology and Economic Zoology, University of Minnesota, Minneapolis, Minn.

The two known collections are from Texas and Arizona as follows: A. P. 17261, from guano and from rock crevices in a bat cave near Concan, Uvalde County, Tex., September 16, 1940, several adults and nymphs (Glen M. Kohls and Wm. L. Jellison); A. P. 17875, from rock crevices in a bat-inhabited mine tunnel, Las Guijas, Pima County, Ariz., May 25, 1940, two males, one nymph (Glen M. Kohls).

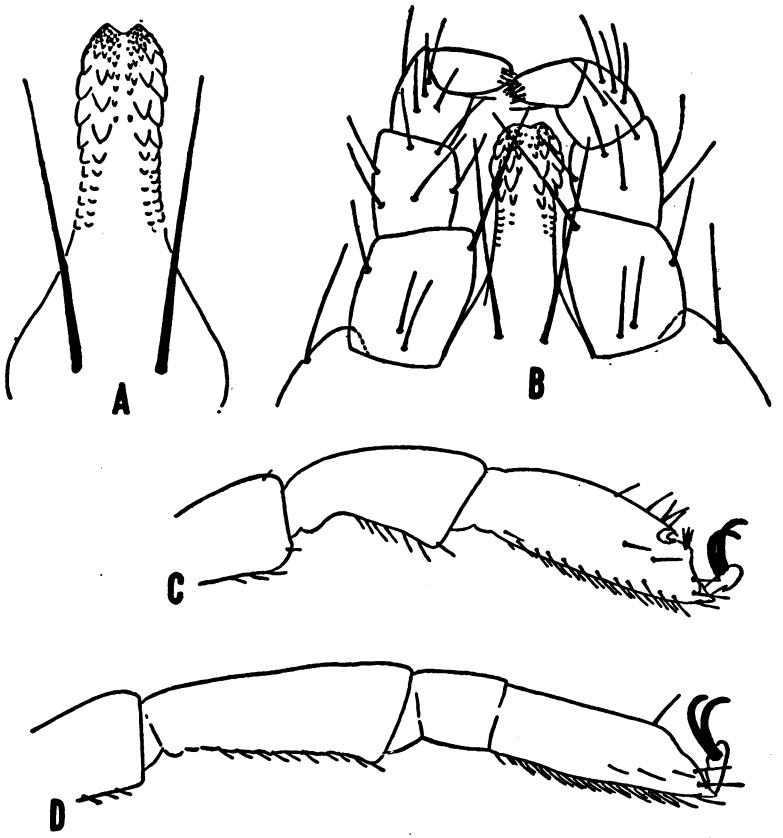

FIGURE 2.—*Ornithodoros concanensis* n. sp. A. Hypostome of adult. B. Hypostome and palpi of second nymphal stage. C. Leg I of adult. D. Leg IV of adult.

Ornithodoros kelleyi n. sp.

SECOND STAGE NYMPH

Body.—Suboval, widest at coxae II, bluntly pointed anteriorly and rounded behind; lateral view showing the anterior projection bent ventrad. Length, 3.6 mm.; width at coxae II, 2.0 mm.

Mammillae.—Moderate in size and number, close but not crowded, same in size in median and lateral areas, a little larger in posterior margin. Individual mammillae are irregular in shape, with irregular radiating ridges at their bases and with apical pits on some. Very short hairs, few in number, arise from some of the pits. Venter with the mammillae less elevated, more irregular on the supracoxal folds.

Discs.—Small, depressed, with their surfaces irregular and in the posterior area arranged in three lineal rows; on venter present in lineal arrangement in the preanal and median postanal grooves.

Legs.—Moderate in length and diameter. Surface mildly micromammillated. Subapical dorsal protuberance on tarsus I very small; absent on all other tarsi. Dorsal humps absent on all tarsi. Length

of tarsus I, 0.3 mm.; metatarsus, 0.21 mm. Length of tarsus IV, 0.33 mm.; metatarsus, 0.27 mm.

Coxae.—Coxae I and II separated; all others contiguous. Surface micromammillated and with irregular elevations.

Hood.—Absent or indistinct.

Cheeks.—Long oval, with the anterior end much wider and free, with the narrow, posterior end attached on one side.

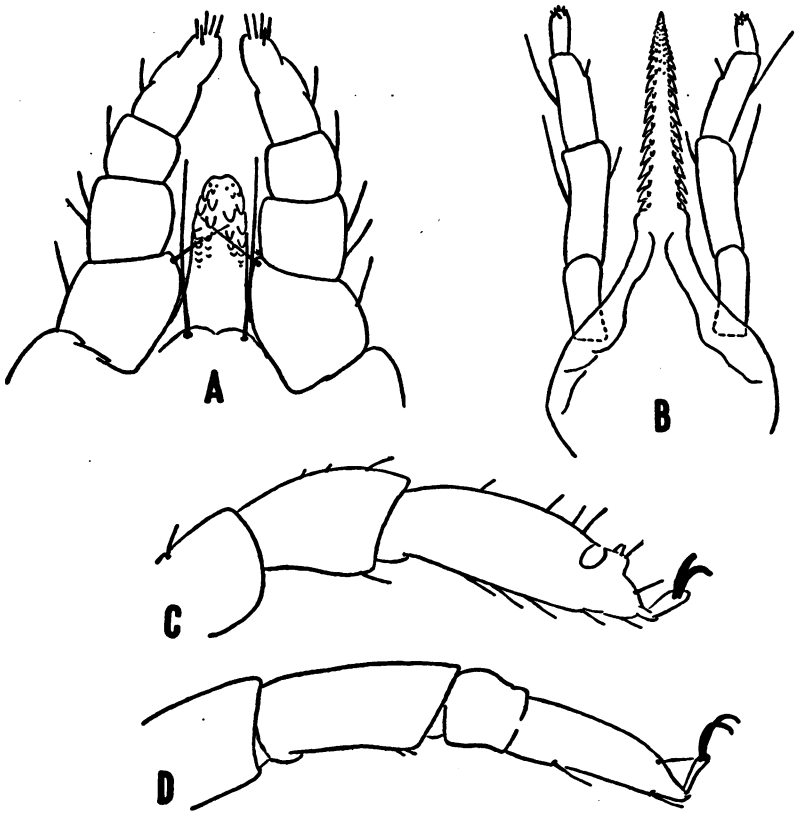

FIGURE 3.—*Ornithodoros kelleyi* n. sp. A. Hypostome and palpi of second nymphal stage, ventral view. B. Capitulum of larva, ventral view. C. Leg I of second nymphal stage. D. Leg IV of second nymphal stage.

Capitulum.—Basis capituli longer than wide, wider behind. Mildly protrusile, with the surface of basis capituli and "neck" micromammillated, and with a group of about three short hairs on each side behind. Surface of palpal article 1 faintly micromammillated.

Hypostome.—Sides about parallel, notched apically. Denticles in 2/2 arrangement with about four in each file. Posthypostomal hairs long, slightly longer than the hypostome. Length about 0.135 mm.

Folds.—Coxal and supracoxal folds present, the latter reaching anteriorly to near the capitulum.

Grooves.—Preanal, transverse postanal, and median postanal grooves present, the latter terminating at the transverse postanal groove which is short and without lateral extensions. Dorso-ventral groove absent.

Eyes.—Absent.

Anus.—In an elliptical frame.

Differs from *talaje* and *concanensis* by having the body more elongated, with the posterior margin well rounded and showing no tendency to become truncate, and by having the hypostome tapering from the middle apically as well as by other characters.

Holotype.—Nymph from A. P. 17473.

Paratypes.—Two nymphs from A. P. 17043 and one nymph, A. P. 17044.

The holotype and one paratype (17044) are at the Rocky Mountain Laboratory. One paratype (17043) has been sent to the United States National Museum and one (17043) has been sent to the Division of Entomology and Parasitology, University of California, Berkeley, Calif.

The three known collections of this species, all by Mr. J. Frenkel from *Pipistrellus* sp., are as follows: A. P. 17473, 4 miles north of Thompsons, Grand County, Utah, July 31, 1940, one nymph; A. P. 17044, locality and date as above, one nymph; A. P. 17043, 3 miles east of Utah-Colorado State line on highway US 50, July 29, 1940, two nymphs.

The species is named in honor of Mr. Thomas F. Kelley, Division of Entomology and Parasitology, University of California, who placed the specimens at our disposal.

SIPHONAPTERA. A STUDY OF THE SPECIES INFESTING WILD HARES AND RABBITS OF NORTH AMERICA NORTH OF MEXICO [1]

A Review

The material embodied in this bulletin represents the results of a study carried out at the Rocky Mountain Laboratory (Hamilton, Montana) of the Division of Infectious Diseases, National Institute of Health, U. S. Public Health Service, and the Division of Entomology and Economic Zoology, University of Minnesota.

Available data are presented pertaining to the distribution and host relationships of the nine species and subspecies of fleas infesting wild hares and rabbits of North America north of Mexico. These species are: *Cediopsylla simplex* (Baker) 1895, *C. inaequalis inaequalis* (Baker) 1895, *C. inaequalis interrupta* Jordan 1925, *Hoplopsyllus glacialis*

[1] Siphonaptera. A study of the species infesting wild hares and rabbits of North America north of Mexico, by Glen M. Kohls. National Institute of Health Bulletin No. 175. U. S. Government Printing Office, 1940. Available from the Superintendent of Documents, Washington, D. C., at 20 cents per copy.

glacialis (Tasch.) 1880, *H. glacialis lynx* (Baker) 1904, *H. affinis* (Baker) 1904, *H. foxi* Ewing 1924, *Odontopsyllus multispinosus* (Baker) 1898, and *O. dentatus* (Baker) 1904.

All known collection records are listed, maps are presented showing localities where the several species have been collected, and the distributional range of each species as now known is discussed. A key and illustrations are given to aid in identifying the species. The occurrence of *Echidnophaga gallinacea* (West.) on wild hares and rabbits is reported and new States and counties are listed where *Pulex irritans L.* has been collected from these hosts. A brief section giving pertinent information relating to the wild hares and rabbits of the region concerned precedes the flea data.

DEATHS DURING WEEK ENDED APRIL 12, 1941

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

	Week ended Apr. 12, 1941	Corresponding week, 1940
Data from 88 large cities of the United States:		
Total deaths	8,528	8,693
Average for 3 prior years	8,748	
Total deaths, first 15 weeks of year	140,813	140,990
Deaths under 1 year of age	463	496
Average for 3 prior years	515	
Deaths under 1 year of age, first 15 weeks of year	8,039	7,754
Data from industrial insurance companies:		
Policies in force	64,566,401	65,810,905
Number of death claims	11,620	13,144
Death claims per 1,000 policies in force, annual rate	9.4	10.4
Death claims per 1,000 policies, first 15 weeks of year, annual rate	10.7	10.7

PREVALENCE OF DISEASE

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

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 19, 1941

Summary

The number of cases of measles increased slightly during the current week, with a total of 53,593 cases reported as compared with 53,256 for the preceding week. The highest incidence rates were recorded for the Middle Atlantic, East North Central, and South Atlantic States—3,232, 3,154, and 2,649 (annual basis), respectively, per 100,000 population as compared with 2,105 for the country as a whole. The Pacific States, with a rate of 405, reported the lowest case rate. The same relative incidence was shown for these areas for the first quarter of the year.

To date this year (first 16 weeks) a total of 488,774 cases of measles has been reported in the United States, as compared with a 5-year (1936–40) median of 141,594 and with a total of 523,973 cases for the corresponding period of 1938, the year of highest incidence in the preceding 5 years.

The incidence of each of the 9 important communicable diseases included in the following weekly table, with the exception of scarlet fever, smallpox, and typhoid fever, was higher for the current week than for the corresponding period last year, but only influenza, measles, and whooping cough were above the 5-year (1936–40) median.

Of 35 cases of smallpox, 22 cases were reported in the two North Central areas and 8 cases in California. No State reported more than 2 of the 16 cases of poliomyelitis. Of 77 cases of typhoid fever, 51 cases occurred in the South Atlantic and two South Central areas. Eleven cases of Rocky Mountain spotted fever were reported, all in the northwest States, and 11 cases of endemic typhus fever, 1 of which occurred in Wisconsin, the remainder in the southern States.

Three cases of tularemia and 2 cases of undulant fever were reported.

The death rate for the current week for 88 major cities in the United States was 12.3 per 1,000 population, the same as the 3-year (1938–40) average. This is a slight increase over the rate of 11.9 for the preceding week.

Telegraphic morbidity reports from State health officers for the week ended April 19, 1941, and comparison with corresponding week of 1940 and 5-year median

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1936–40	Week ended—		Median 1936–40	Week ended—		Median 1936–40	Week ended—		Median 1936–40
	Apr. 19, 1941	Apr. 20, 1940		Apr. 19, 1941	Apr. 20, 1940		Apr. 19, 1941	Apr. 20, 1940		Apr. 19, 1941	Apr. 20, 1940	
NEW ENG.												
Maine	2	0	2	-------	1	4	135	507	117	0	0	0
New Hampshire	0	0	0	-------	-------	-------	72	30	26	0	0	0
Vermont	2	0	0	-------	-------	-------	73	1	58	0	0	0
Massachusetts	2	2	2	-------	-------	-------	746	513	621	1	0	2
Rhode Island	0	0	0	1	-------	-------	5	181	78	0	0	1
Connecticut	0	1	2	2	4	5	276	47	104	0	0	0
MID. ATL.												
New York	13	17	31	[1] 16	[1] 15	[1] 13	6,971	711	1,782	3	4	8
New Jersey	12	9	11	19	5	7	4,269	534	534	1	0	1
Pennsylvania	11	14	38	-------	-------	-------	5,928	410	1,112	6	11	8
E. NO. CEN.												
Ohio	7	7	11	16	23	23	4,746	14	360	2	2	2
Indiana	10	4	9	11	24	24	1,487	25	25	0	0	1
Illinois	21	16	35	21	26	54	3,451	99	99	2	0	4
Michigan [2]	0	7	9	7	1	2	4,503	671	493	6	0	3
Wisconsin [2]	0	0	0	104	62	62	2,017	478	478	2	0	1
W. NO. CEN.												
Minnesota	0	1	1	2	4	2	24	170	292	0	1	1
Iowa	3	4	4	8	10	10	290	98	98	[4] 0	0	1
Missouri	3	7	7	5	8	45	518	45	45	1	0	1
North Dakota	2	0	1	6	2	7	32	1	2	1	0	0
South Dakota [5]	0	0	0	-------	1	-------	7	6	6	0	0	0
Nebraska	3	0	1	-------	5	-------	8	8	93	0	0	0
Kansas	7	11	3	11	8	8	1,084	638	47	1	0	0
SO. ATL.												
Delaware	0	0	1	-------	-------	-------	208	5	6	0	0	0
Maryland [2]	2	4	2	9	5	10	378	18	255	4	1	2
Dist. of Col.	0	0	2	3	2	1	346	4	96	1	0	2
Virginia	7	9	9	324	224	224	2,589	131	457	4	1	2
West Virginia [2]	6	1	4	9	44	44	678	14	99	2	2	4
North Carolina	5	14	14	4	3	18	1,776	218	218	0	2	2
South Carolina [2]	4	10	5	448	416	388	1,365	8	35	1	1	1
Georgia	5	12	4	76	55	131	697	140	91	0	1	1
Florida [2]	0	0	2	117	8	7	1,145	107	107	0	0	0
E. SO. CEN.												
Kentucky	3	8	7	27	9	15	1,639	77	77	2	1	4
Tennessee	9	3	3	69	147	147	790	154	85	4	0	4
Alabama [2]	5	5	5	148	85	151	622	57	60	0	4	4
Mississippi [2]	4	2	2	-------	-------	-------	-------	-------	-------	2	0	1
W. SO. CEN.												
Arkansas	5	7	6	103	95	107	467	27	27	0	0	0
Louisiana [2]	3	5	11	14	9	15	70	9	15	0	1	3
Oklahoma	7	3	5	156	183	183	106	40	77	0	0	0
Texas [2]	37	16	29	933	555	564	2,197	1,140	418	2	6	4
MOUNTAIN												
Montana [5]	0	2	0	2	17	17	32	25	23	0	0	0
Idaho [5]	0	1	0	1	-------	7	54	42	42	0	0	0
Wyoming [5]	0	2	0	-------	-------	-------	74	23	11	0	0	0
Colorado [5]	10	6	7	42	6	-------	522	35	35	0	0	0
New Mexico	2	0	3	2	-------	2	264	41	49	0	1	1
Arizona [2]	4	2	2	84	122	119	104	151	144	0	0	0
Utah [2]	0	0	0	10	10	-------	57	638	146	0	0	0
Nevada	0	-------	-------	-------	-------	-------	0	-------	-------	0	-------	-------
PACIFIC												
Washington	1	2	0	-------	-------	-------	159	836	451	0	0	0
Oregon [5]	5	5	1	15	8	28	365	678	96	0	0	0
California	16	19	24	315	41	69	247	504	685	5	1	2
Total	238	238	355	3,140	2,243	2,243	53,593	10,309	12,898	53	40	64
16 weeks	4,596	5,723	8,084	579,891	157,526	134,670	488,774	106,305	141,594	[4] 791	654	1,359

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 19, 1941, and comparison with corresponding week of 1940 and 5-year median—Continued

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

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1936–40	Week ended—		Median 1936–40	Week ended—		Median 1936–40	Week ended—		Median 1936–40
	Apr. 19, 1941	Apr. 20, 1940		Apr. 19, 1941	Apr. 20, 1940		Apr. 19, 1941	Apr. 20, 1940		Apr. 19, 1941	Apr. 20, 1940	
NEW ENG.												
Maine	0	0	0	5	9	23	0	0	0	2	0	0
New Hampshire	0	0	0	4	4	6	0	0	0	0	0	0
Vermont	0	0	0	7	21	11	0	0	0	0	3	0
Massachusetts	1	0	0	152	173	245	0	0	0	0	0	1
Rhode Island	0	0	0	3	29	24	0	0	0	0	1	0
Connecticut	0	0	0	75	94	94	0	0	0	1	0	1
MID. ATL.												
New York	0	0	0	531	918	918	0	0	0	1	2	5
New Jersey	0	0	0	443	478	205	0	0	0	1	4	4
Pennsylvania	0	1	1	401	379	589	0	0	0	8	11	7
E. NO. CEN.												
Ohio	2	1	1	258	220	229	0	0	2	1	3	6
Indiana	0	0	0	154	181	181	0	1	19	0	1	1
Illinois	0	0	0	413	875	705	2	1	17	3	5	4
Michigan [3]	[6] 0	0	0	326	323	454	7	3	3	[6] 2	4	2
Wisconsin [3]	[7] 0	0	0	156	128	169	6	6	6	0	1	1
W. NO. CEN.												
Minnesota	1	1	0	41	80	102	3	3	10	0	0	0
Iowa	0	1	1	52	54	179	1	38	38	1	0	0
Missouri	0	0	0	130	85	86	1	1	27	1	2	2
North Dakota	0	0	0	5	11	30	1	2	12	0	2	1
South Dakota [8]	0	0	0	11	19	20	0	4	8	0	0	0
Nebraska	0	0	0	13	10	21	0	0	9	0	0	0
Kansas	1	1	0	47	50	111	1	1	20	0	1	1
SO. ATL.												
Delaware	0	0	0	8	15	10	0	0	0	0	0	0
Maryland [3]	0	0	0	50	22	58	0	0	0	0	1	1
Dist. of Col.	0	0	0	14	19	18	0	0	0	1	0	0
Virginia	1	0	0	20	49	33	0	0	0	3	1	1
West Virginia [3]	2	1	1	38	29	36	2	0	0	10	0	1
North Carolina	0	0	1	17	20	24	0	0	0	0	2	2
South Carolina [3]	0	2	0	11	5	3	1	0	0	0	1	1
Georgia	0	0	0	15	10	10	0	0	0	2	2	4
Florida [3]	1	0	0	9	5	5	0	0	0	6	1	3
E. SO. CEN.												
Kentucky	1	0	0	112	83	60	0	0	1	2	5	0
Tennessee	0	0	0	92	99	30	0	0	0	6	1	4
Alabama [3]	0	1	0	6	15	10	0	6	0	0	5	1
Mississippi [3]	0	0	1	1	7	3	0	1	1	1	3	1
W. SO. CEN.												
Arkansas	0	1	0	10	1	7	0	2	2	6	1	3
Louisiana [3]	0	0	0	5	6	9	0	1	0	4	3	6
Oklahoma	2	0	0	22	16	23	1	0	3	6	3	2
Texas [3]	2	1	2	50	35	59	0	6	7	4	10	7
MOUNTAIN												
Montana [8]	0	0	0	28	31	25	0	0	4	0	0	0
Idaho [8]	0	0	0	4	11	11	0	0	3	1	0	0
Wyoming [8]	0	0	0	11	3	5	0	0	0	0	0	0
Colorado [8]	0	0	0	36	30	47	0	7	6	0	0	1
New Mexico	0	0	0	8	12	16	0	0	0	0	2	2
Arizona [3]	0	0	0	5	8	8	0	0	0	0	2	1
Utah [2]	0	0	0	8	11	22	0	0	1	0	0	0
Nevada	0	------	------	0	------	------	0	------	------	0	------	------
PACIFIC												
Washington	1	0	0	24	46	39	1	0	3	2	1	1
Oregon [5]	0	0	0	5	11	30	8	0	11	0	0	0
California	1	2	2	102	141	173	0	3	11	2	6	7
Total	16	13	16	3,938	4,881	5,042	35	86	366	77	90	106
16 weeks	[6] [7] 389	401	326	59,716	76,587	95,816	706	1,161	5,097	[6] 1,206	1,255	1,751

See footnotes at end of table

Telegraphic morbidity reports from State health officers for the week ended April 19, 1941, and comparison with corresponding week of 1940—Continued

Division and State	Whooping cough	
	Week ended—	
	Apr. 19, 1941	Apr. 20, 1940
NEW ENG.		
Maine	45	19
New Hampshire	14	5
Vermont	22	23
Massachusetts	151	116
Rhode Island	10	7
Connecticut	44	25
MID. ATL.		
New York	230	442
New Jersey	102	105
Pennsylvania	318	265
E. NO. CEN.		
Ohio	284	187
Indiana	45	36
Illinois	84	104
Michigan [2]	336	181
Wisconsin [3]	100	77
W. NO. CEN.		
Minnesota	119	38
Iowa	25	32
Missouri	42	22
North Dakota	23	2
South Dakota [4]	50	4
Nebraska	33	2
Kansas	105	20
SO. ATL.		
Delaware	2	14
Maryland [2]	81	147
Dist. of Col	13	7
Virginia	110	91
West Virginia [2]	46	38
North Carolina	223	92
South Carolina [3]	246	33
SO. ATL.—continued		
Georgia	39	23
Florida [3]	19	6
E. SO. CEN.		
Kentucky	110	80
Tennessee	62	33
Alabama [3]	34	22
Mississippi [3]	----------	----------
W. SO. CEN.		
Arkansas	13	11
Louisiana [3]	10	9
Oklahoma	45	22
Texas [3]	337	293
MOUNTAIN		
Montana [5]	5	5
Idaho [5]	1	10
Wyoming [5]	1	4
Colorado [5]	201	18
New Mexico	8	21
Arizona [3]	26	36
Utah [3]	73	97
Nevada	0	----------
PACIFIC		
Washington	120	67
Oregon [5]	21	53
California	612	418
Total	4,640	3,362
16 weeks	69,697	48,330

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended Apr. 19, 1941, 11 cases as follows: Wisconsin, 1; South Carolina, 1; Florida, 3; Alabama, 2; Louisiana, 1; Texas, 2; Arizona, 1.
[4] Information has been received that of 5 cases of meningitis reported in Iowa thus far in 1941, only 1 case, that reported for the week ended Apr. 12, was meningococcus meningitis.
[5] Rocky Mountain spotted fever, week ended Apr. 19, 1941, 11 cases as follows: South Dakota, 1; Montana, 3; Idaho, 1; Wyoming, 3; Colorado, 2; Oregon, 1.
[6] A delayed report has been received of 1 case of poliomyelitis and 2 cases of typhoid fever in Michigan for the week ended Mar. 29, 1941.
[7] Information has been received from Wisconsin that the report of 17 cases of poliomyelitis for the week ended Jan. 4, 1941, was a delayed report of cases occurring in 1940, and that only 6 cases occurred in January instead of the 7 additional cases reported.

WEEKLY REPORTS FROM CITIES

City reports for week ended April 5, 1941

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	117	349	89	5,609	738	2,146	22	388	20	1,182	----
Current week [1]	62	247	29	19,763	466	1,551	0	324	18	1,192	----
Maine:											
Portland	0	----	0	0	4	2	0	0	0	2	20
New Hampshire:											
Concord	0	----	0	0	0	0	0	0	0	0	14
Nashua	0	----	0	0	0	0	0	0	0	4	3
Vermont:											
Barre	0	----	0	0	0	0	0	0	0	0	1
Burlington	0	----	0	0	0	1	0	0	0	0	8
Rutland	0	----	0	0	2	0	0	0	0	0	6
Massachusetts:											
Boston	0	----	0	250	9	88	0	11	0	56	220
Fall River	0	----	0	3	2	4	0	2	0	0	28
Springfield	2	----	0	3	0	14	0	1	0	1	55
Worcester	0	----	0	26	11	15	0	2	0	0	72
Rhode Island:											
Pawtucket	0	----	0	0	0	1	0	0	0	0	17
Providence	0	----	0	4	5	4	0	3	0	26	70
Connecticut:											
Bridgeport	0	1	0	5	2	7	0	2	0	0	37
Hartford	0	----	0	5	1	6	0	0	1	1	42
New Haven	0	1	0	3	0	25	0	0	1	9	38
New York:											
Buffalo	0	----	0	92	3	47	0	11	0	10	118
New York	17	24	3	6,560	103	332	0	74	1	108	1,536
Rochester	0	----	0	81	1	6	0	1	0	11	80
Syracuse	0	----	0	0	0	2	0	0	0	10	46
New Jersey:											
Camden	2	2	0	20	2	20	0	1	0	4	38
Newark	0	----	0	240	2	40	0	4	0	13	103
Trenton	0	----	0	34	2	41	0	2	1	0	33
Pennsylvania:											
Philadelphia	0	2	1	1,617	19	95	0	30	1	38	499
Pittsburgh	1	3	1	270	14	17	0	7	0	53	174
Reading	0	----	0	114	1	2	0	1	0	2	34
Scranton	0	----	----	23	----	0	0	----	0	1	----
Ohio:											
Cincinnati	0	----	0	669	4	16	0	2	0	5	109
Cleveland	0	13	1	2,817	10	43	0	9	0	66	215
Columbus	0	1	1	219	6	23	0	2	1	27	94
Toledo	0	----	2	98	3	13	0	4	0	18	----
Indiana:											
Anderson	0	----	0	3	3	0	0	0	0	0	12
Fort Wayne	0	----	0	78	1	2	0	0	0	3	25
Indianapolis	2	----	2	368	14	19	0	6	0	7	111
Muncie	0	----	0	59	0	15	0	1	0	0	10
South Bend	0	----	0	52	0	0	0	0	0	0	20
Terre Haute	0	----	0	1	1	0	0	0	0	0	16
Illinois:											
Chicago	8	2	3	1,509	26	205	0	32	0	30	701
Elgin	0	----	0	290	0	0	0	0	0	0	8
Moline	0	----	0	15	1	1	0	0	0	0	4
Springfield	0	----	0	2	3	3	0	0	0	0	34
Michigan:											
Detroit	1	1	0	1,151	15	155	0	13	2	128	254
Flint	0	----	0	191	2	4	0	0	0	19	19
Grand Rapids	1	----	0	574	2	5	0	0	0	10	32
Wisconsin:											
Kenosha	0	----	0	153	0	1	0	0	0	1	5
Madison	0	----	0	26	2	10	0	0	0	1	9
Milwaukee	0	----	0	310	5	26	0	0	0	26	90
Racine	0	----	0	16	0	3	0	0	0	3	17
Superior	0	----	0	1	0	1	0	0	0	2	10
Minnesota:											
Duluth	0	----	1	0	4	1	0	1	0	12	26
Minneapolis	1	----	0	2	8	12	0	1	0	35	105
St. Paul	0	----	0	1	4	11	0	2	0	12	63

[1] Figures for Wilmington, N. C., Tampa, Little Rock, and Boise estimated; reports not received.

City reports for week ended April 5, 1941—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								
Iowa:											
Cedar Rapids	0			10		3	0		0	0	
Davenport	0			4		1	0		0	0	
Des Moines	0			0		5	0		0	4	39
Sioux City	1			6		2	0		1	4	
Waterloo	0			50		1	0		0	2	
Missouri:											
Kansas City	0		0	52	10	9	0	5	0	18	94
St. Joseph	0		0	17	5	1	0	0	0	1	31
St. Louis	1		0	217	13	101	0	5	0	37	212
North Dakota:											
Fargo	0		0	0	0	1	0	0	0	10	7
Grand Forks	0			1		0	0		0	1	
Minot	1			6		1	0		0	0	8
South Dakota:											
Aberdeen	0			0		1	0		0	1	
Nebraska:											
Lincoln	0			3		5	0		0	2	
Omaha	0		0	3	4	6	0	1	0	1	48
Kansas:											
Lawrence	0	5	0	48	2	0	0	0	0	0	8
Topeka	0		0	240	4	1	0	0	0	7	35
Wichita	0		0	2	1	1	0	2	0	19	29
Delaware:											
Wilmington	0		0	130	6	4	0	0	0	0	19
Maryland:											
Baltimore	1	12	3	93	16	19	0	12	1	50	235
Cumberland	0		0	2	0	0	0	0	0	0	12
Frederick	0		0	0	2	0	0	0	0	0	3
Dist. of Col.:											
Washington	1	3	0	328	9	14	0	5	0	18	169
Virginia:											
Lynchburg	0		0	6	2	0	0	1	0	0	9
Norfolk	0	32	0	243	2	3	0	1	1	1	23
Richmond	0		0	43	3	0	0	2	0	0	49
Roanoke	0		0	106	2	2	0	0	0	2	13
West Virginia:											
Charleston	0		0	5	0	0	0	0	0	0	19
Huntington	0			77		0	0		0	4	
Wheeling	0		0	15	3	2	0	0	0	5	16
North Carolina:											
Gastonia	0			41		0	0		0	4	
Raleigh	0		0	191	1	0	0	0	0	23	13
Wilmington											
Winston-Salem	0	4	0	38	1	1	0	2	0	19	19
South Carolina:											
Charleston	0	12	1	84	2	0	0	0	7	0	27
Florence	0	8	0	3	5	0	0	0	0	0	24
Greenville	0		0	78	2	0	0	0	0	5	10
Georgia:											
Atlanta	2		1	23	6	4	0	4	0	2	67
Brunswick	0		0	79	1	0	0	0	0	0	6
Savannah	0	14	2	9	1	1	0	2	0	0	35
Florida:											
Miami	0	2	0	16	0	1	0	0	0	3	31
Tampa											
Kentucky:											
Ashland	0		0	3	2	0	0	1	0	0	16
Lexington	0		0	1	1	0	0	2	0	0	19
Tennessee:											
Knoxville	0		0	73	1	4	0	1	0	8	27
Memphis	0	5	1	132	5	3	0	0	0	17	88
Nashville	0		1	93	4	7	0	1	0	5	43
Alabama:											
Birmingham	1	5	0	42	11	3	0	0	0	3	72
Mobile	1	3	0	3	2	1	0	0	0	0	27
Montgomery	0			21		0	0		0	2	
Arkansas:											
Fort Smith	0	1		20		1	0		0	0	
Little Rock											
Louisiana:											
Lake Charles	0		0	0	0	0	0	0	0	0	3
New Orleans	2	5	2	0	11	4	0	8	0	2	116
Shreveport	0		0	3	3	0	0	0	0	0	43

City reports for week ended April 5, 1941—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								
Oklahoma:											
Oklahoma City	0	10	-------	3	2	9	0	2	0	0	36
Tulsa	1	0	-------	92	4	0	0	0	0	10	30
Texas:											
Dallas	2	2	2	56	6	4	0	3	0	2	71
Fort Worth	1	-------	0	168	5	5	0	0	2	4	39
Galveston	0	-------	0	1	1	1	0	2	0	0	16
Houston	2	3	1	1	9	5	0	8	0	0	89
San Antonio	0	6	0	1	8	1	0	5	0	8	60
Montana:											
Billings	0	-------	0	0	1	0	0	0	0	0	8
Great Falls	0	-------	0	1	0	1	0	0	0	0	13
Helena	0	-------	0	1	0	1	0	0	0	0	1
Missoula	0	-------	0	0	0	1	0	0	0	0	8
Idaho:											
Boise	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Colorado:											
Colorado Springs	0	-------	0	0	0	2	0	1	0	3	8
Denver	5	-------	0	209	5	4	0	6	0	65	91
Pueblo	0	-------	0	4	1	0	0	0	0	20	7
New Mexico:											
Albuquerque	0	-------	0	39	1	2	0	4	0	0	19
Utah:											
Salt Lake City	0	-------	0	5	0	1	0	0	0	15	37
Washington:											
Seattle	0	-------	0	0	7	4	0	1	1	11	94
Spokane	0	-------	0	8	1	2	0	0	0	0	19
Tacoma	0	-------	1	4	2	0	0	0	1	11	41
Oregon:											
Portland	0	2	-------	13	4	1	0	2	0	0	79
Salem	0	1	-------	0	-------	0	0	-------	0	1	-------
California:											
Los Angeles	6	25	0	39	11	28	0	19	0	42	327
Sacramento	2	2	0	10	3	9	0	1	0	10	26
San Francisco	0	82	0	8	3	4	0	8	0	30	186

State and city	Meningitis, meningococcus		Poliomyelitis cases	State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				South Carolina:			
Worcester	1	1	0	Charleston	1	0	0
New York:				Florida:			
New York	4	0	1	Miami	0	0	3
Pennsylvania:				Tennessee:			
Pittsburgh	1	1	0	Knoxville	1	0	0
Maryland:				Louisiana:			
Baltimore	3	0	0	Shreveport	0	2	0
District of Columbia:				Oregon:			
Washington	1	0	0	Portland	1	0	0
Virginia:							
Norfolk	1	0	0				

Encephalitis, epidemic or lethargic.—Cases: Boston, 1; Bridgeport, 1; New York, 1; Flint, 1; Los Angeles, 1 (equine). Deaths: New York, 1; St. Joseph, 2.
Pellagra.—Cases: Wichita, 1; Birmingham, 1.
Typhus fever.—Cases: New York 1; Miami, 1; New Orleans 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 15, 1941.—During the week ended March 15, 1941, 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		5	2	9	13	2	1	1	4	37
Chickenpox		5	21	136	242	26	13	7	89	539
Diphtheria	3	11		10		1	1			26
Influenza		27			20	3			29	79
Measles		163	50	465	912	127	196	175	1,329	3,417
Mumps		3		298	250	35	27	25	32	670
Pneumonia		20			12	1	10		3	46
Poliomyelitis				1	1					2
Scarlet fever		34	10	123	209	14	5	18	18	431
Smallpox							1			1
Tuberculosis	1	10	7	78	47	3	22	1		169
Typhoid and paratyphoid fever				7	1					8
Whooping cough		3	10	72	113		24	12	31	265

SWEDEN

Notifiable diseases—January 1941.—During the month of January 1941, cases of certain notifiable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	7	Poliomyelitis	15
Diphtheria	29	Scarlet fever	913
Dysentery	3	Syphilis	24
Gonorrhea	786	Typhoid fever	2
Lethargic encephalitis	1	Undulant fever	4
Paratyphoid fever	10	Weil's disease	2

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

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

CHOLERA

[C indicates cases; D, deaths]

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

Place		January–December, 1940	January–February, 1941	March 1941—week ended— 1	8	15	22	29
ASIA								
Ceylon	C	1						
China	D	[1] 41,181						
Dairen	C	2						
Foochow	C	625						
Hong Kong	C	867	18	7	24			
Macao	C	513						
Manchuria	C	31						
Shanghai	C	571						
Shantung Province	C	244						
India	C	[2] 43,094						
Bassein	C	164						
Bombay	C	13						
Calcutta	C	2,434	276					
Cawnpore	C	333						
Chittagong	C	4						
Karachi	C	65						
Madras	C	1						
Moulmein	C	16						
Porto Novo	C	1						
Rangoon	C	61						
Vizagapatam	C	21						
India (French)	C	34						
Indochina (French)	C	436						
Thailand	C	235						

[1] From the middle of June to the end of August 1940.
[2] January to August 10, 1940.

PLAGUE

[C indicates cases; D, deaths]

AFRICA								
Algeria	C	23						
Plague-infected rats		2						
Belgian Congo	C	26	1					
British East Africa:								
Kenya	C	9	3					
Uganda	C	277	23					
Egypt	C	[1] 409						
Madagascar	C	598	103					[2] 69
Morocco	C	1,099	375	44	57	35	35	71
Rhodesia, Northern	C	1						
Senegal:								
Dakar	D	[3] 1						
Thies	C	1						
Tivaouane	C	3						
Tunisia: Tunis	C	10	2					
Plague-infected rats		1						
Union of South Africa	C	[4] 37	13	2				

[1] Includes 5 cases of pneumonic plague.
[2] For the month of March 1941.
[3] Imported.
[4] Includes 6 cases of pneumonic plague.

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

PLAGUE—Continued

[C indicates cases; D, deaths]

Place		January-December, 1940	January-February, 1941	March 1941—week ended— 1	8	15	22	29
ASIA								
China: [5]								
Dutch East Indies:								
Java and Madura	C	378						
West Java	C	8						
India	C	[6] 14,438						
Bassein	C	18						
Cochin	C	1						
Plague-infected rats		5						
Rangoon	C	6	2					
Indochina (French)	C	5						
Thailand:								
Bangkok	C	3						
Plague-infected rats		2						
Bisnulok Province	C	3						
Chingmai	C	3						
Dhonpuri Province	C	1						
Jayanad Province	C	3						
Kamphaeng Bajr Province	C	29						
Kanchanapuri Province	C	12						
Koan Kaen Province	C	5						
Nagara Svarga Province	C	30						
Noangkhay Province	C	4						
Sukhodaya Province	C	22						
EUROPE								
Portugal: Azores Islands	C	4						
SOUTH AMERICA								
Argentina:								
Catamarca Province	C	10						
Cordoba Province	C	[7] 54	1					
Jujuy Province	C	9						
La Pampa Territory	C	1						
La Rioja Province	C	1						
Salta Province	C	8						
San Luis Province	C	2						
Santiago del Estero Province	C	85						
Tucuman Province	C	21						
Brazil:								
Alagoas State	C	9						
Pernambuco State	C	4						
Ecuador: El Oro Province	C	6						
Peru:								
Cajabamba Department	C	1						
Cajamarca Department	C	28						
Lambayeque Department	C	15	1					
Libertad Department	C	53	5					
Lima Department	C	57	2					
Piura Department	C	9						
Tumbes Department	C	[8] 21						
OCEANIA								
Hawaii Territory: Plague-infected rats		[9] 54	7			1	1	1
New Caledonia	C		7					

[5] Information dated July 7, 1940, states that up to July 6, 17 cases of plague had been reported near Tungliao, Hsingan Province, China; and a report dated July 13 states that an outbreak of bubonic plague occurred along the Yunnan-Burma border in the districts of Loiwing, Chefang, Juili, and Muchieh. Information dated Aug. 17 states that 45 cases of plague with 36 deaths have occurred in Nungen District and a telegram dated Oct. 2 states that 15 cases of bubonic plague with 3 deaths occurred in Hsinking, Manchuria. During the week ended Nov. 16, 1940, an epidemic of bubonic plague was reported in Ningpo District, Chekiang Province, China.

[6] January to August 10, 1940.

[7] Includes 15 cases of pneumonic plague.

[8] Includes 3 suspected cases.

[9] During the week ended Dec. 7, a positive mass inoculation of 12 rats and 1 mouse was also reported.

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

SMALLPOX

[C indicates cases; D, deaths]

Place		January–December, 1940	January–February, 1941	March 1941—week ended— 1	8	15	22	29
AFRICA								
Algeria	C	6	38	------	5	------	------	------
Angola	C	271	------	------	------	------	------	------
Belgian Congo	C	4,765	------	------	------	------	------	------
British East Africa	C	59	7	------	------	------	------	------
Dahomey	C	89	270	------	1	------	47	------
French Guinea	C	16	11	------	8	------	------	------
Gibraltar	C	[1] 1	------	------	------	------	------	------
Ivory Coast	C	132	15	------	------	------	6	------
Morocco	C	103	27	------	------	------	------	------
Nigeria	C	2,319	83	------	------	------	------	------
Niger Territory	C	664	52	------	------	------	40	------
Nyasaland	C	75	------	------	------	------	------	------
Portuguese East Africa	C	1	------	------	------	------	------	------
Rhodesia:								
Northern	C	6	------	------	------	------	------	------
Southern	C	259	62	18	------	------	------	------
Senegal	C	160	18	------	10	------	------	------
Sierra Leone	C	10	------	------	------	------	------	------
Sudan (Anglo-Egyptian)	C	535	1	------	------	------	------	------
Sudan (French)	C	3	10	------	4	------	------	------
Union of South Africa	C	180	------	------	------	------	------	------
ASIA								
Arabia	C	255	------	------	------	------	------	------
China	C	981	69	------	2	2	3	1
Chosen	C	720	------	------	------	------	------	------
Dutch East Indies—Sabang	C	4	------	------	------	------	------	------
India	C	[2]154,740	------	------	------	------	------	------
India (French)	C	5	------	------	------	------	------	------
India (Portuguese)	C	20	------	------	------	------	------	------
Indochina (French)	C	1,572	155	------	50	------	------	38
Iran	C	177	4	------	------	------	------	------
Iraq	C	935	528	63	74	------	------	------
Japan	C	502	80	12	------	------	------	------
Straits Settlements	C	1	------	------	------	------	------	------
Sumatra	C	1	------	------	------	------	------	------
Syria	C	------	------	1	------	------	------	------
Thailand	C	209	70	------	------	1	1	3
EUROPE								
France	C	[3] 4	1	------	------	------	------	------
Great Britain	C	2	------	------	------	------	------	------
Greece	C	23	------	------	------	------	------	------
Portugal	C	504	5	------	------	------	------	------
Spain	C	1,090	95	------	------	------	------	------
Turkey	C	139	------	------	------	------	------	------
NORTH AMERICA								
Canada	C	17	1	------	------	1	1	------
Guatemala	C	35	3	------	------	------	------	------
Mexico	C	61	18	------	------	------	------	------
SOUTH AMERICA								
Bolivia	C	352	------	------	------	------	------	------
Brazil	C	5	------	------	------	------	------	------
Colombia	C	1,990	127	------	------	------	------	------
Ecuador	C	1	------	------	------	------	------	------
Peru	C	245	------	------	------	------	------	------
Venezuela (alastrim)	C	224	34	------	------	------	------	------

[1] Imported.
[2] January to August 10, 1940.
[3] For the month of June 1940.

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

TYPHUS FEVER

[C indicates cases; D, deaths]

Place		January–December, 1940	January–February, 1941	March 1941—week ended— 1	8	15	22	29
AFRICA								
Algeria	C	2,146	807		270			
Belgian Congo	C	1,210						
British East Africa	C	2						
Egypt	C	3,636						
Eritrea	C	63						
Morocco	C	355	29	12	12	33	29	24
Rhodesia, Northern	C	7						
Tunisia	C	651	418		94	168	132	
Union of South Africa	C	298	11					
ASIA								
China	C	2,191	31	3				
Chosen	C	359						
India	C	3						
Indochina (French)	C	2						
Iran	C	256	1					
Iraq	C	159	5	1	3			
Japan	C	2						
Palestine	C	203						
Straits Settlements	C	15	2					
Sumatra	C	[1] 196						
Trans-Jordan	C	15						
EUROPE								
Bulgaria	C	155	39	11	5	3	4	9
France	C	1						
Germany	C	230	209	29	40	41		
Greece	C	43	7					
Hungary	C	93	40		7	22		22
Irish Free State	C	10	1					
Lithuania	C	115						
Rumania	C	1,403	337	22	25	35		20
Spain [2]	C	14						
Turkey	C	716	91					
Yugoslavia	C	282	50					
NORTH AMERICA								
Guatemala	C	309	62					
Mexico	C	219						
Panama Canal Zone	C	3	1					
Salvador	C	1						
SOUTH AMERICA								
Bolivia	C	733						
Chile	C	430						
Ecuador	C	2	21					
Peru	C	1,256						
Venezuela	C	14	17					
OCEANIA								
Australia	C	12	3					
Hawaii Territory	C	28	2			1		

[1] For the period May to August 1940, inclusive.
[2] For the period Feb. 2 to Apr. 5, 1941, 426 cases of typhus fever were reported in Spain, including 300 cases reported in Madrid Province.

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

YELLOW FEVER

[C indicates cases; D, deaths]

Place		January–December, 1940	January–February, 1941	March 1941—week ended— 1	8	15	22	29
AFRICA								
Belgian Congo: Yatolet	C	1						
Cameroon: Nkongsamba	C	[1] 1						
French Equatorial Africa	C	[1] 1				1		1
Gold Coast	C	1						
Ivory Coast	C	[2] 6	[2] 3					
Nigeria:								
Ibadan	C	1						
Oshogbo	C	[1] 1						
Sudan (Anglo-Egyptian): Kordofan Province [4]	C	858						
Sudan (French): Segou	C	[1] 1						
Togo (French)	C	1						
SOUTH AMERICA [5]								
Bolivia: Beni Department	C	1						
Brazil:								
Bahia State	D	1						
Espirito Santo State	D	140						
Minas Geraes State	D	2						
Para State	D	1						
Rio de Janeiro State	D	5						
Santa Catarina State	D	2						
Colombia:								
Antioquia Department—San Luis	D	2						
Boyaca Department	D		3					
Caldas Department—								
La Pradera	D	1						
Samana	D	1						
Victoria	D	1						
Cundinamarca Department	D	2						
Intendencias and Commissaries	C	5						
Meta Department	D	7	1					
Municipality of Jesus Maria	D	1						
Santander Department	D	3	2					
Tolima Department	D	12	1					

[1] Suspected.
[2] Includes 4 suspected cases.
[3] Includes 2 suspected cases.
[4] A report dated Nov. 13, 1940, also states that 8,000 cases of yellow fever with 800 deaths have been reported in Kordofan Province, Anglo-Egyptian Sudan.
[5] All yellow fever reported in South American countries is jungle type unless otherwise specified.

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