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A STUDY OF THE RELATIONSHIP OF ORAL *LACTOBACILLUS ACIDOPHILUS* AND SALIVA CHEMISTRY TO DENTAL CARIES [1]

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The observations appearing in this report were made on a group of seventh grade school children living in Arlington County, Virginia, a suburban area of Washington, D. C. A clinical examination of each child's teeth was made in March 1939, and again in March 1940. Saliva samples for *Lactobacillus acidophilus* counts were collected in March 1939, April 1939, October 1939, and March 1940. A specimen of saliva for chemical analysis was collected from each child in October 1939, December 1939, and in March 1940. The saliva samples, each totaling about 20 cc., were collected by paraffin stimulation between the hours of 9:30 and 11:30 a. m. Usually about one-half hour was required for collecting each specimen.

The children in this study represent a sample from a population of better than average economic level. None of these children were given any advice by the examiner concerning their oral hygiene or their dental needs during the period of the study. Their communal water supply is the same as that of the city of Washington (*1*) and, according to Elvove (*2*), is practically free of fluorides.

RESULTS OF THE CLINICAL AND BACTERIOLOGICAL EXAMINATIONS

In order to correlate bacteriological and chemical findings with dental caries, it is essential to know whether or not the individual under observation has active dental caries. At the present time the basis for determining caries activity is repeated clinical examinations, with sufficient time intervening to allow the lesions to progress or new lesions to appear. For this study a group of 127 [2] seventh grade pupils, selected at random, was examined clinically at the beginning

[1] From the Division of Infectious Diseases, National Institute of Health. The clinical and bacteriological examinations were made by Francis A. Arnold, Jr., and the chemical analyses by F. J. McClure.

[2] There were 155 children in the original group in 1939, but, owing to changes in school residence, absences, and sickness, only 127 of these children could be followed through the entire year.

and end of the study year. The average age of this group when the study began was 12.9 years (4 were 11 years old, 71 were 12, 44 were 13, 6 were 14, and 2 were 15). The examination was made with the aid of a mouth mirror and explorer, and took from 10 to 15 minutes for each patient. The child was seated facing a window.

The condition of each tooth was recorded and the approximate size of each carious lesion or filling was drawn on a chart. All pits and fissures were recorded as such. Any area in which the explorer caught and which showed any of the macroscopic signs of dental caries (slight opacity around the edges, a perceptible soft decalcified character, or underlying dark stain) was diagnosed and recorded as dental caries. Teeth thus affected were considered as carious, regardless of the size of the lesion.

The second, or repeat, examination was made by the same examiner (F. A. A., Jr.) under the same conditions as the original examination. The chart for each child was referred to as a guide in the second examination, and any changes in size of lesion, any new lesions, or new fillings were recorded on the original chart.

Table 1 summarizes the conditions as found by the two examinations.

TABLE 1.—*Summary of findings on the permanent teeth of 127 Arlington, Va., school children on 2 examinations 1 year apart*

Item	All permanent teeth				1st permanent molars			
	1939		1940		1939		1940	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Number of children examined	127	100	127	100	127	100	127	100
Children without caries	10	7.9	5	3.9	14	11.0	8	6.3
Children showing caries experience [1]	117	92.1	122	96.1	113	89.0	119	93.7
Number of carious teeth	267		402		98		122	
Number of filled teeth [2]	293		401		228		241	
Number of extractions indicated	4		4		1		2	
Number of extracted teeth	20		25		18		21	
Total number of teeth with caries experience	584		832		345		386	
Number of teeth with caries experience per 100 children	460		655		272		304	
Caries increase per 100 children (1 year)			195				32	

[1] This includes all children whose teeth show any evidence of dental caries, such as carious lesions, fillings, or missing (extracted) teeth.
[2] This includes teeth in which all carious lesions are filled, plus those teeth which have fillings and other unfilled carious lesions.

The study group was divided into four classes according to the amount or degree of dental caries activity. These four classes are defined as follows:

Inactive.—Those cases where neither progression of old lesions nor development of new lesions was observed.

± *Active.*—Those cases in which progression in size of any lesion was doubtful and no new lesions were found. Also included in this group are those children in whom it was impossible to make a correct diagnosis because of changes occurring during the interim, such as fillings being placed in the original lesions.

+ *Active.*—Those cases which showed either minor progression of existing lesions or the development of one or two new lesions or both.

++++ *Active.*—Those cases which represent the rampant type of dental caries activity characterized by either the rapid progression of existing lesions or the development of three or more new lesions or both.

At the end of the second examination and before the dismissal of the child, the degree of caries activity was recorded according to the standards just outlined. Thus the examiner could study the original record of the case and compare it with the conditions noted a year later. This method seemingly offers a relatively accurate estimation of the progress of dental caries for each individual. The results of this classification as regards the 127 children studied were as follows: Inactive, 22; ±active, 23; +active, 60; ++++active, 22.

At least two methods other than the clinical examination have received wide acceptance for diagnosing caries activity (*3*, *4*). Both methods depend primarily on the presence of *L. acidophilus* in the mouth. In this study a quantitative estimation of the number of lactobacilli present in the saliva of each child was made at four different times during the study year (March, April, and October 1939, and March 1940). The procedure for the bacteriological examination was as follows:

Each child was given a small piece of paraffin and instructed to chew the paraffin so that it would touch every tooth in the mouth. The stimulated saliva sample was collected in a small sterile bottle. Three to five cubic centimeters of saliva were collected from each individual, approximately 5 minutes being required to collect each sample. The child was then given a small beaker and instructed to continue chewing, the saliva being collected in the individual beaker. This sample of saliva (approximately 20 cc.) was used for chemical analysis.

One cc. of the saliva for bacteriological study was mixed thoroughly with 4 cc. of 1 percent dextrose beef infusion broth. One-tenth cc. of this dilution was placed on Kulp's tomato juice agar pH 5 as modified by Hadley (*3*, *5*) and spread over the surface with glass rods. These plates and the broth dilution were incubated for 4 days at 37° C. An estimation of the number of lactobacilli per cc. of saliva was obtained by counting the characteristic colonies on the tomato agar by use of a wide-field microscope and a Frost counting chart.

The counts recorded for each separate examination were classified into the following groups:

0=counts showing no lactobacilli on the agar plate and no gram-positive rods growing in the dextrose broth and those salivas showing negative plate growth and positive broth culture.

± = those counts which showed from 100 to 3,000 lactobacilli per cc. of saliva.

+ = those counts which showed from 3,000 to 30,000 lactobacilli per cc. of saliva.

++++ = those counts which showed 30,000 or more lactobacilli per cc. of saliva.

The results of these counts of lactobacilli, grouped according to the clinical diagnosis of dental caries activity, are shown in table 2.

TABLE 2.—*Counts of L. acidophilus found in four separate samples of saliva from 127 Arlington, Va., school children grouped according to the degree of dental caries activity*

INACTIVE DENTAL CARIES

Case No.	March 1939	April 1939	October 1939	March 1940	Case No.	March 1939	April 1939	October 1939	March 1940
13	0	0	0	0	30	++++	±	±	±
34	0	0	0	0	36	±	0	0	0
38	0	0	0	0	40	0	0	±	±
45	0	0	+	++++	53	0	+	0	±
65	±	(1)	±	±	66	+	+	++++	++++
79	0	0	0	0	82	0	0	0	0
94	0	±	±	±	113	++++	++++	+	+
117	+	++++	+	±	132	0	±	0	+
136	+	++++	+	++++	145	0	0	+	+
148	+	±	±	0	150	++++	++++	++++	++++
151	++++	++++	0	0	155	0	0	0	0

± ACTIVE DENTAL CARIES

6	++++	++++	++++	++++	18	±	±	++++	++++
22	+	+	+	+	25	++++	++++	++++	+
27	±	++++	++++	++++	55	+	±	±	±
56	±	++++	++++	+	57	+	++++	±	++++
62	0	0	+	+	73	+	±	±	±
85	±	0	±	0	86	±	±	0	+
87	±	+	±	0	92	0	0	+	+
96	+	+	+	+	101	+	++++	+	0
102	±	+	±	±	110	++++	++++	++++	+
112	++++	++++	++++	++++	128	++++	++++	++++	+
129	±	+	±	+	135	±	0	±	±
69	+	++++	0	±					

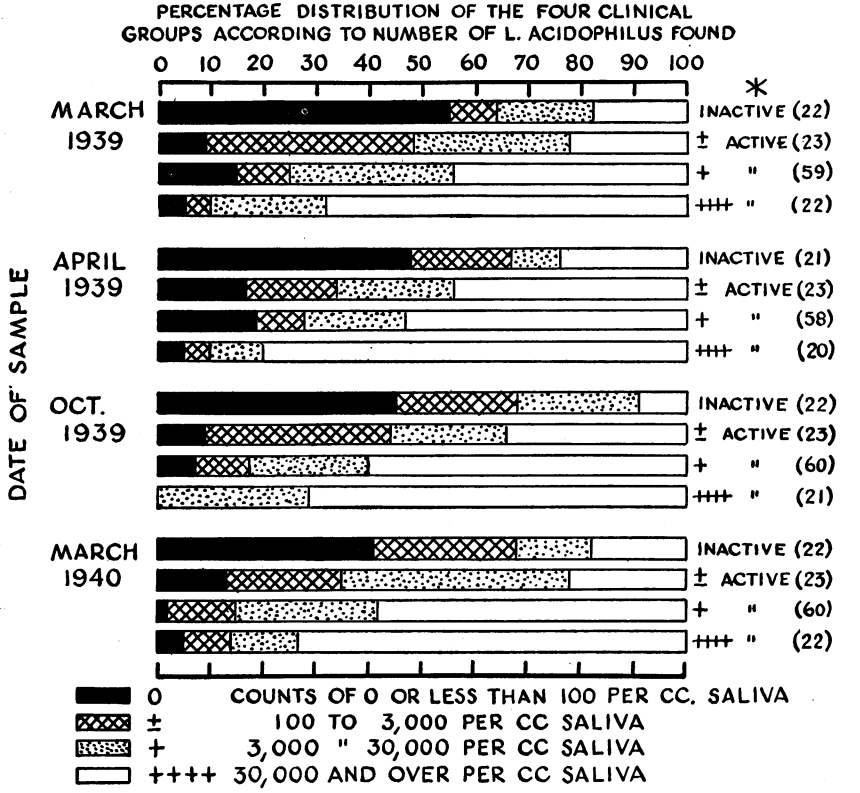
+ ACTIVE DENTAL CARIES

1	++++	++++	++++	±	3	+	++++	+	+
7	+	+	++++	±	9	++++	++++	++++	±
12	0	0	+	±	16	+	++++	+	+
17	0	++++	++++	++++	20	++++	+	++++	++++
21	++++	++++	++++	++++	28	±	0	++++	++++
29	++++	+	++++	++++	31	++++	++++	++++	+
35	++++	++++	++++	+	37	±	(1)	0	±
39	0	+	++++	+	41	+	+	++++	+
46	++++	++++	++++	++++	47	++++	++++	±	+
49	+	±	++++	++++	50	++++	±	++++	+
51	0	+	+	±	54	++++	++++	++++	+
58	++++	++++	++++	++++	60	+	++++	+	+
61	0	±	0	++++	64	++++	+	++++	+
68	++++	++++	+	++++	71	++++	++++	++++	++++
74	++++	+	++++	++++	77	+	±	±	+
78	++++	++++	++++	++++	83	++++	(1)	++++	++++
89	++++	++++	++++	++++	90	++++	++++	+	+
91	0	++++	++++	++++	93	+	++++	++++	++++
95	+	+	±	++++	97	±	+	+	++++
98	+	++++	++++	++++	99	++++	++++	++++	++++
100	++++	++++	++++	++++	103	±	0	+	++++
104	+	++++	+	++++	105	(1)	0	±	±
106	+	0	0	±	111	+	++++	++++	++++
116	+	++++	+	++++	120	±	0	±	++++
121	++++	++++	++++	++++	122	+	++++	++++	++++

[1] Cases which were absent on day of sampling or cases where mold growth prevented counting the plate

TABLE 2.—*Counts of L. acidophilus found in four separate samples of saliva from 127 Arlington, Va., school children grouped according to the degree of dental caries activity*—Continued

Case No.	March 1939	April 1939	October 1939	March 1940	Case No.	March 1939	April 1939	October 1939	March 1940
125	0	0	0	0	126	+	++++	++++	++++
131	±	±	++++	++++	137	+	0	±	++++
139	0	0	+	++++	141	++++	+	++++	+
143	++++	++++	+	±	153	0	0	±	+
154	+	0	++++	++++	70	++++	++++	++++	++++
++++ ACTIVE DENTAL CARIES									
4	+	+	+	0	8	++++	(1)	++++	++++
10	+	(1)	+	+	11	++++	++++	++++	++++
14	++++	++++	++++	++++	15	++++	++++	++++	++++
19	++++	++++	+	+	26	+	±	+	+
32	++++	++++	++++	++++	33	±	+	+	±
43	0	0	++++	++++	48	+	++++	(1)	++++
52	++++	++++	++++	++++	59	++++	++++	++++	++++
67	++++	++++	++++	++++	75	++++	++++	++++	++++
76	++++	++++	++++	++++	84	++++	++++	++++	++++
116	++++	++++	++++	++++	119	++++	++++	++++	±
123	++++	++++	++++	++++	133	+	++++	+	++++



* NUMBER OF SAMPLES AND CLINICAL CLASSIFICATION OF CARIES ACTIVITY AS DEFINED IN THE TEXT.

FIGURE 1.—Summary of bacteriological results on 127 school children from Arlington, Va.

A summary of the bacteriological results of the four separate examinations compared with the degree of dental caries activity is shown in table 3.

A graphic representation of the relationship of *L. acidophilus* counts and dental caries activity is presented in figure 1. This graph shows that approximately 50 percent (41–55 percent) of the children with inactive dental caries had less than 100 lactobacilli per cc. of saliva at

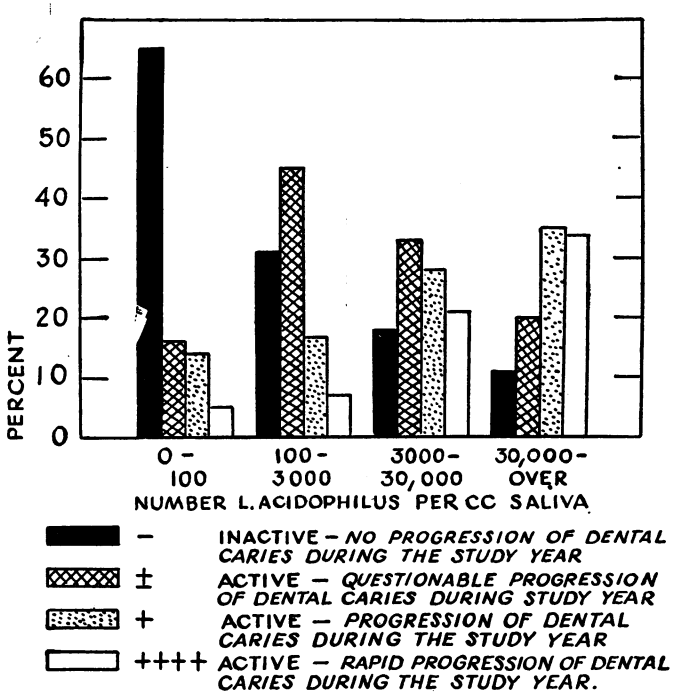


FIGURE 2.—Summary of the clinical classification of dental caries activity observed in 127 Arlington, Va., school children during a 1 year period and its relation to the number of *L. acidophilus* in the saliva noted in 501 estimations made during the study year.

each separate examination. Conversely, only about 5 percent of the children who experienced very active dental caries during the year had counts of less than 100 lactobacilli per cc. of saliva on each examination. In order to show the percentage of the four different clinical classes of dental caries activity occurring in the various bacteriological groups, the percentage distribution of all the bacteria counts is illustrated in figure 2.

TABLE 3.—*A summary of the distribution of L. acidophilus in salivas from 127 Arlington, Va., school children according to the degree of dental caries activity*

Clinical classification according to activity	Number in group	Percentage distribution of the number of *L. acidophilus* according to the degree of dental caries activity [1]							
		March 1939				April 1939			
		0	±	+	++++	0	±	+	++++
Inactive	22	55	9	18	18	48	19	9	24
± Active	23	9	39	30	22	17	17	22	44
+ Active	60	15	10	31	44	19	9	19	53
++++ Active	22	5	5	22	68	5	5	10	80

Clinical classification according to activity	Number in group	Percentage distribution of the number of *L. acidophilus* according to the degree of dental caries activity							
		October 1939				March 1940			
		0	±	+	++++	0	±	+	++++
Inactive	22	45	23	23	9	41	27	14	18
± Active	23	9	35	22	34	13	22	43	22
+ Active	60	7	11	22	60	2	13	27	58
++++ Active	22	0	0	29	71	5	9	13	73

[1] The group classification of the *L. acidophilus* counts and the degree of dental caries activity are defined in the text.

DISCUSSION OF THE CLINICAL AND BACTERIOLOGICAL FINDINGS

Attention is called to certain observations made in the two clinical examinations. This study group is representative of school children who were exposed to an intensive dental health program during their attendance at the Arlington (Va.) schools. A State supervised school dental program has been in operation in this county since about 1922 and has been under the supervision of the same dentist since 1933. The program is planned to take care of all children who present themselves to the school clinic from preschool age up to and including the sixth-grade pupils. A nominal fee for each filling is charged those children able to pay; indigents are treated free of charge. Seventy-one percent of the study group spent their entire school life in the Arlington school system and the remaining 29 percent averaged approximately 3 years' exposure to the school program. It is interesting to note that in 1939 a high percentage (54 percent) of all the teeth showing evidence of dental caries experience had been treated (filled or extracted teeth). In 1940 in the same children 51 percent of the teeth with dental caries experience had evidence of dental treatment. Since the school program does not extend into the seventh grade it may be assumed that these children obtained their dental treatment from private practitioners. Considering the increase in the number of defective teeth, these findings seem to indicate that children accustomed to dental health education and care during grade-school years continue

to have their dental needs supplied by private practitioners after they have passed beyond the age limits of the school dental program.[3]

It appears from the results obtained from the bacteriological studies that there is a close relationship between dental caries activity and the number of lactobacilli present in the mouth. *L. acidophilus* was found to be absent or present in small numbers in the mouths of those children in whom dental caries was inactive. High *L. acidophilus* counts were found in those who had very active dental caries. These findings are in accord with the results reported by other workers (*6, 7, 8*). The consistency of the results obtained on the four separate saliva samples, as shown in table 3 and figure 1, is worthy of note. Such results suggest the possibility of comparing the amount of dental caries activity in group populations by single *L. acidophilus* counts as might be inferred from the observations of Dean, Jay, Arnold, McClure, and Elvove (*9*).

OBSERVATIONS ON PROPERTIES OF SALIVA

The biochemistry of the mixed saliva has long been suspected of having an important relation to the etiology of dental caries. Many analytical data and clinical observations have been accumulated and comparisons made between salivas secreted by groups of caries-free and caries-active individuals. It has been difficult in many instances to attach much significance to the differences reported although it would appear, perhaps, that the calcium, inorganic phosphorus, and carbon dioxide capacity of the saliva may be related to caries susceptibility (*10, 11*).

The results reported in the following discussion include several determinations which have been studied before by other investigators and several factors not previously reported. A summary of the analytical data appears in table 4. The distribution curves shown in figure 3 are based on the averages for the three saliva specimens analyzed.

Total solids, ash, loss on ignition.—The saliva for these three determinations was preserved with thymol and the samples were kept in the refrigerator prior to analysis. A 5 cc. portion was dried to constant weight at 100° C. to obtain the weight of total solids. This dried residue was ashed to constant weight at 600° C. to obtain weight of ash. The loss in weight during ignition represents the organic matter.

[3] It must be noted that the increase in dental caries from 1939 to 1940 is very great. Since the second examination was made using the chart of the original examination it is evident that the increase in the number of carious teeth, many of which are based on subjective assessment, probably results in a high value. The number of filled teeth, however, is based on objective assessment, which will give a truer value for the yearly increase.

TABLE 4.—*Summary of saliva analyses*

	October		December		March		Grand average
	Number	Average	Number	Average	Number	Average	
	Total solids, mg. per 100 cc.						
All samples [1]	128	533.4	116	524.6	126	530.8	528.8
Caries inactive	22	541.7	18	534.2	21	539.8	542.2
Caries active ±	22	519.8	19	527.5	23	526.6	522.2
Caries active +	57	539.7	54	523.1	60	537.8	530.5
Caries active ++++	21	514.4	21	522.7	22	507.2	512.7
L. acidophilus count:							
0–3,000	40	521.1	----------	----------	36	534.9	540.2
3,000–30,000	25	532.6	----------	----------	27	535.4	506.7
<30,000	65	525.5	----------	----------	63	535.1	520.0
>30,000	63	541.6	----------	----------	63	522.0	535.9
	Loss on ignition (organic matter), mg. per 100 cc.						
All samples	128	303.7	116	296.2	125	318.1	303.5
Caries inactive	22	310.5	18	289.2	22	312.4	306.5
Caries active ±	22	295.0	19	302.5	23	306.4	305.1
Caries active +	57	305.5	54	294.9	59	328.6	309.5
Caries active ++++	21	296.7	21	299.6	21	306.9	296.5
L. acidophilus count:							
0–3,000	40	293.2	----------	----------	35	319.7	305.2
3,000–30,000	25	299.8	----------	----------	26	319.9	290.1
<30,000	65	295.7	----------	----------	61	319.8	296.1
>30,000	62	307.8	----------	----------	62	321.9	314.3
	Ash, mg. per 100 cc.						
All samples	128	229.7	116	228.4	126	212.9	223.9
Caries inactive	22	231.2	18	245.0	22	213.7	234.4
Caries active ±	22	224.8	19	225.0	23	211.1	223.1
Caries active +	56	230.9	54	229.9	59	211.9	221.3
Caries active ++++	21	217.7	21	223.1	22	202.4	214.4
L. acidolphilus count:							
0–3,000	40	227.9	----------	----------	35	215.2	237.7
3,000–30,000	25	232.8	----------	----------	27	208.3	215.7
<30,000	65	229.8	----------	----------	62	212.2	224.4
>30,000	63	223.0	----------	----------	62	207.1	222.8
	Percent ash in total solids						
All samples	128	43.1	116	43.8	125	40.1	42.4
Caries inactive	22	43.3	18	45.9	21	40.8	43.0
Caries active ±	22	43.1	19	43.0	23	39.7	42.2
Caries active +	57	43.3	54	43.9	59	39.6	42.1
Caries active ++++	21	42.7	21	42.9	22	40.5	42.4
L. acidophilus count:							
0–3,000	40	44.0	----------	----------	35	41.2	43.5
3,000–30,000	25	43.9	----------	----------	27	40.0	43.1
<30,000	65	44.0	----------	----------	62	40.7	43.3
>30,000	63	42.4	----------	----------	62	39.6	41.7

[1] Not all the children were available for the entire year's study and thus the total classified samples do not equal the total samples analyzed for the first two months. In several instances there are differences in actual samples on which chemical data were obtained and in samples on which bacterial counts were obtained.

TABLE 4.—*Summary of saliva analyses*—Continued

	October		December		March		Grand average
	Number	Average	Number	Average	Number	Average	
	Total nitrogen, mg. per 100 cc.						
All samples	128	49.4	131	47.3	127	48.3	48.5
Caries inactive	22	50.3	21	47.1	22	50.5	49.5
Caries active ±	22	46.9	23	49.4	23	47.9	48.1
Caries active +	57	50.3	67	47.5	60	49.7	49.3
Caries active ++++	21	47.9	22	45.7	22	44.7	45.9
L. acidophilus count:							
0–3,000	41	49.2	----	----	36	48.4	49.2
3,000–30,000	24	48.7	----	----	27	49.1	46.7
<30,000	65	49.0	----	----	63	48.7	47.7
>30,000	63	49.6	----	----	63	48.7	49.3
	Percent nitrogen in total solids						
All samples	128	9.3	116	9.0	127	9.1	9.2
Caries inactive	22	9.3	18	8.8	22	9.3	9.1
Caries active ±	21	9.6	19	9.7	23	9.2	9.3
Caries active +	57	9.5	54	9.0	60	9.2	9.2
Caries active ++++	21	9.2	21	8.7	22	8.8	8.9
L. acidophilus count:							
0–3,000	40	9.4	----	----	36	9.0	9.1
3,000–30,000	25	9.3	----	----	27	9.2	9.3
<30,000	65	9.4	----	----	63	9.1	9.2
>30,000	63	9.3	----	----	63	9.2	9.1
	Ammonia nitrogen, mg. per 100 cc.						
All samples	127	7.3	130	8.1	123	8.8	8.0
Caries inactive	20	6.9	20	7.9	20	9.1	7.7
Caries active±	22	7.0	23	8.3	23	8.4	7.7
Caries active+	58	7.4	60	8.2	58	9.3	8.3
Caries active++++	21	7.4	22	7.8	22	8.1	7.6
L. acidophilus count:							
0-3,000	37	7.2	----	----	34	8.1	7.8
3,000–30,000	24	6.9	----	----	25	8.8	7.5
<30,000	61	7.1	----	----	59	8.4	7.6
>30,000	65	7.5	----	----	63	9.3	8.3
	Corrected nitrogen (total nitrogen minus ammonia nitrogen), mg. per 100 cc.						
All samples	127	42.3	130	39.2	126	39.5	40.4
Caries inactive	22	43.7	20	39.3	21	40.4	41.4
Caries active±	21	41.0	23	43.6	23	40.9	40.6
Caries active+	58	42.9	60	39.2	60	40.4	40.7
Caries active++++	21	40.5	22	37.7	22	36.1	38.0
L. acidophilus count:							
0-3,000	39	41.3	----	----	35	39.6	40.9
3,000–30,000	25	43.1	----	----	27	40.4	39.2
<30,000	64	42.0	----	----	62	39.9	39.9
>30,000	62	43.3	----	----	63	39.3	40.8
	Percent corrected nitrogen in organic matter						
All samples	123	14.3	112	13.3	122	12.4	13.2
Caries inactive	22	14.3	17	13.5	20	12.7	13.6
Caries active±	19	15.1	17	13.8	20	13.2	13.4
Caries active+	54	14.1	53	13.4	58	12.4	13.3
Caries active++++	21	13.7	21	12.7	21	12.1	12.9
L. acidophilus count:							
0–3,000	40	14.5	----	----	33	12.7	13.7
3,000–30,000	25	14.5	----	----	26	12.5	13.5
<30,000	65	14.5	----	----	59	12.6	13.6
>30,000	58	13.7	----	----	62	12.3	13.1

TABLE 4.—*Summary of saliva analyses*—Continued

	October		December		March		Grand average
	Number	Average	Number	Average	Number	Average	
	pH of isoelectric zone						
All samples	130	2.08	131	2.18	126	2.24	2.30
Caries inactive	22	2.27	21	2.28	22	2.40	2.37
Caries active±	22	2.26	23	2.28	23	2.16	2.34
Caries active+	60	2.00	60	2.14	59	2.26	2.34
Caries active++++	21	1.97	22	2.13	22	2.21	2.37
L. acidophilus count:							
0–3,000	42	2.10	----------	----------	36	2.32	2.31
3,000–30,000	24	2.35	----------	----------	27	2.07	2.24
<30,000	66	2.19	----------	----------	63	2.21	2.26
>30,000	65	1.80	----------	----------	63	2.21	2.27
	Oxygen consumed from potassium permanganate, p. p. m.						
All samples	132	902.0	128	908.0	121	935.0	911.0
Caries inactive	22	846.0	21	866.0	20	946.0	888.0
Caries active±	22	966.0	23	913.0	23	946.0	920.0
Caries active+	60	922.0	59	932.0	57	950.0	933.0
Caries active++++	21	876.0	20	893.0	21	897.0	877.0
L. acidophilus count:							
0–3,000	42	848.0	----------	----------	34	979.0	892.0
3,000–30,000	25	912.0	----------	----------	27	874.0	867.0
<30,000	67	872.0	----------	----------	61	933.0	877.0
>30,000	65	934.0	----------	----------	60	938.0	940.0
	Oxygen consumed (p. p. m.) per mg. organic matter						
All samples	127	3.0	109	3.1	117	2.9	3.0
Caries inactive	22	2.8	18	2.9	20	2.9	2.9
Caries active±	21	3.3	18	3.0	21	2.9	3.0
Caries active+	56	3.0	51	3.2	64	2.5	3.1
Caries active++++	21	3.0	19	3.0	20	2.9	3.0
L. acidophilus count:							
0–3,000	40	2.9	----------	----------	32	3.1	3.0
3,000–30,000	25	3.1	----------	----------	26	2.8	3.1
<30,000	65	3.0	----------	----------	58	3.0	3.1
>30,000	62	3.0	----------	----------	58	2.9	3.0

Total nitrogen.—Total nitrogen was determined on 1 cc. of thymol-preserved saliva, kept in a refrigerator. The usual micro-Kjeldahl method for total nitrogen was followed. Total nitrogen present in the 1 cc. analytical sample averaged approximately 0.40 to 0.50 mg. The method is accurate to about 2 percent.

Ammonia nitrogen.—The formol titration method, used for a rapid clinical estimation of ammonia plus free amino acid nitrogen in urine (*12*), was applied to the determination of ammonia in saliva within a few hours after collection. The specimens of saliva preserved with thymol were kept in a refrigerator. One cc. of this saliva was placed in a small cylindrical vial (approximately 4.5 cm. x 1.4 cm.) and 1 cc. of 10 percent potassium oxalate and 1 drop of phenolphthalein (0.5 gm. phenolphthalein in 50 cc. of alcohol plus 50 cc. of water) were added. This was titrated to a faint pink color with 0.002 N NaOH, followed by the addition of 1 cc. of formol solution (50 cc. of 30 to 40

percent commercial formaldehyde, plus 1 cc. of the phenolphthalein, and made a faint pink color with 0.2 N NaOH). The neutral saliva-formol mixture was then titrated with 0.002 N NaOH.

The method had an average accuracy of about 0.0015 mg. nitrogen. The 1 cc. saliva samples taken for analysis contained on the average from 0.06 to 0.10 mg. of total ammonia nitrogen.

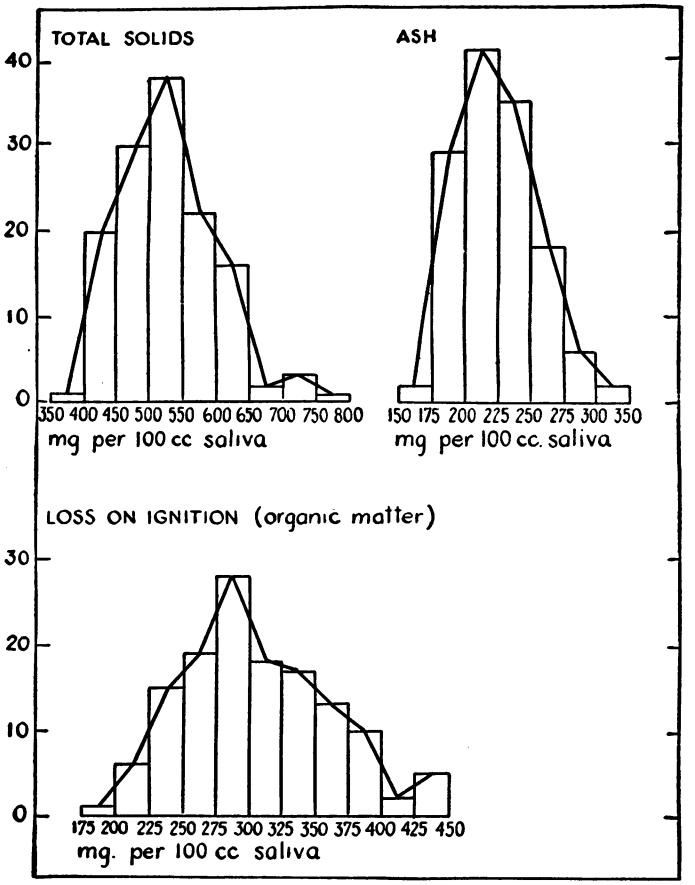
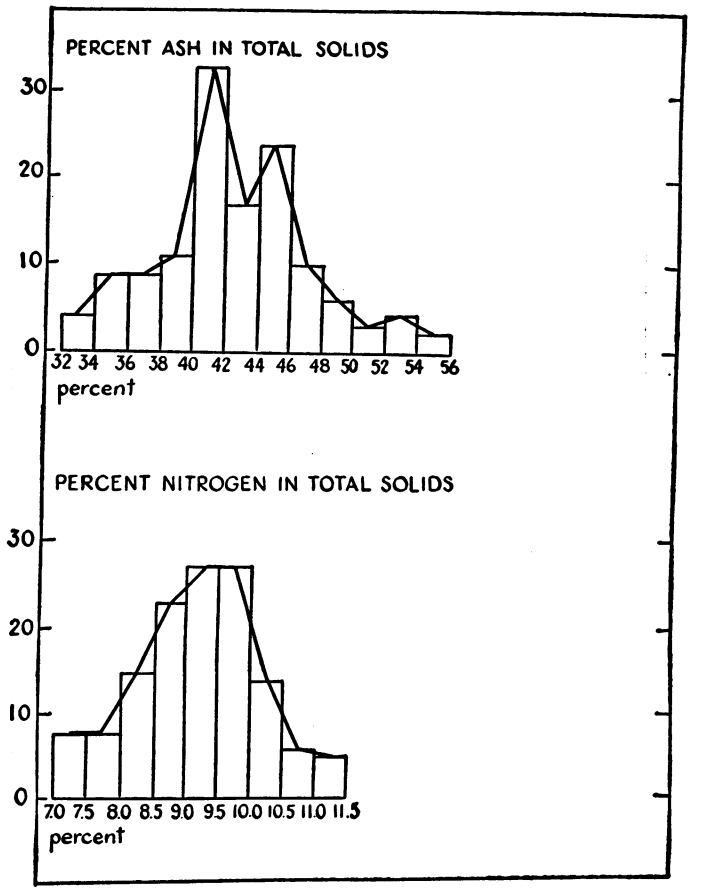


FIGURE 3.—Distribution curves based on average data for the three specimens of saliva obtained from each individual.

It will be noted that in this determination formaldehyde reacts with both ammonia and free amino acid nitrogen. It would appear that amino acid nitrogen is present in saliva in very small amounts, if at all (*13*). This was demonstrated to our satisfaction also by determining ammonia nitrogen in several saliva samples by a method of direct nesslerization (*14*) and comparing these results with the

above formol titration procedure. The two methods agree satisfactorily, as shown by the following data:

Saliva sample	Ammonia nitrogen by—	
	Nesslerization	Formol titration
	Mg. per 100 cc.	*Mg. per 100 cc.*
1	7.1	7.0
2	4.9	5.1
3	7.3	7.3
4	3.9	3.7
5	6.7	6.4
6	6.8	6.2



[FIGURE 3.—Continued.

Our results for ammonia nitrogen found by formol titration are similar to results reported by Youngburg (*15*) who determined ammonia in saliva by alkaline distillation and titration with standard acid. His values range from 1.28 to 13.66 mg. of ammonia nitrogen

per 100 cc. of saliva under normal conditions. Karshan (*16*) studied ammonia nitrogen by a permutit absorption method, and reported values varying from 1.3 to 10.0 mg. of ammonia nitrogen per 100 cc. of saliva. Results reported in this paper vary from 2.0 to 16.0 mg. of ammonia nitrogen per 100 cc. The determination of ammonia in saliva by formol titration is a relatively rapid and simple method and may be applied to a small sample of saliva. It appears to have satis-

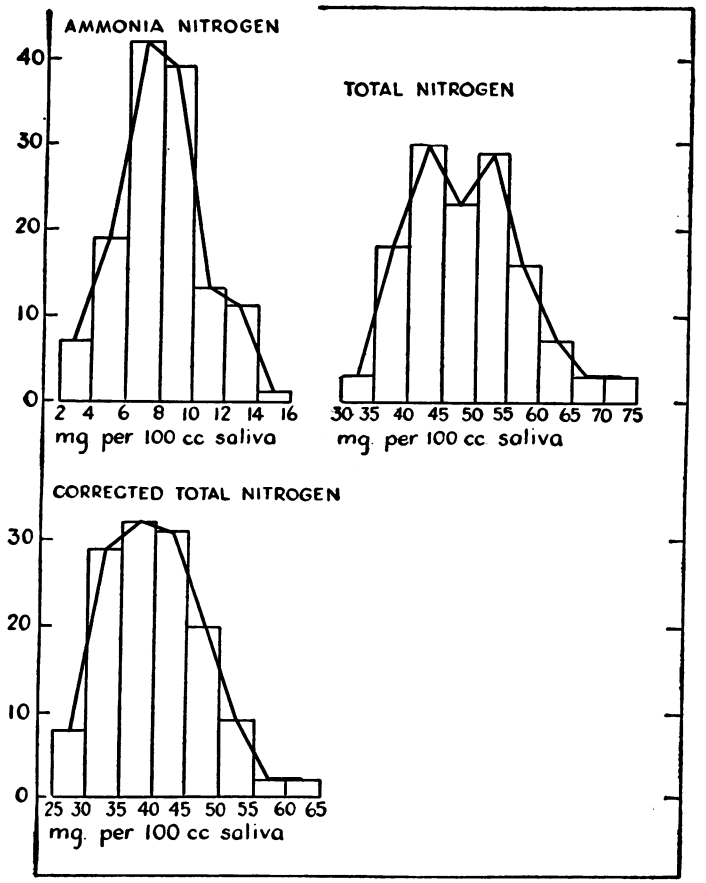


FIGURE 3.—Continued.

factory accuracy for clinical purposes. The wide range in values of ammonia nitrogen is usually accounted for by variable bacterial decomposition of salivary urea (*13*). The presence of thymol and storage of the saliva in the refrigerator were found to prevent any increase in ammonia over a period of 2 to 3 hours, the maximum time our samples stood prior to the ammonia determinations.

Corrected total nitrogen.—This was obtained by subtracting ammonia nitrogen from total nitrogen. Salivary nonprotein nitrogen, as reported by Updegraff and Lewis (*13*), equals about 13.0 mg. of nitro-

gen per 100 cc. This consists of 5.0 to 6.0 mg. of ammonia nitrogen, 4.0 to 5.0 mg. of urea nitrogen, and 1.0 to 1.5 mg. of uric acid nitrogen. Our corrected nitrogen figure represents, therefore, mostly protein nitrogen, but it also includes some urea and uric acid nitrogen. As has been stated, free amino acids, according to the results of Updegraff and Lewis (*13*), are probably not present in saliva.

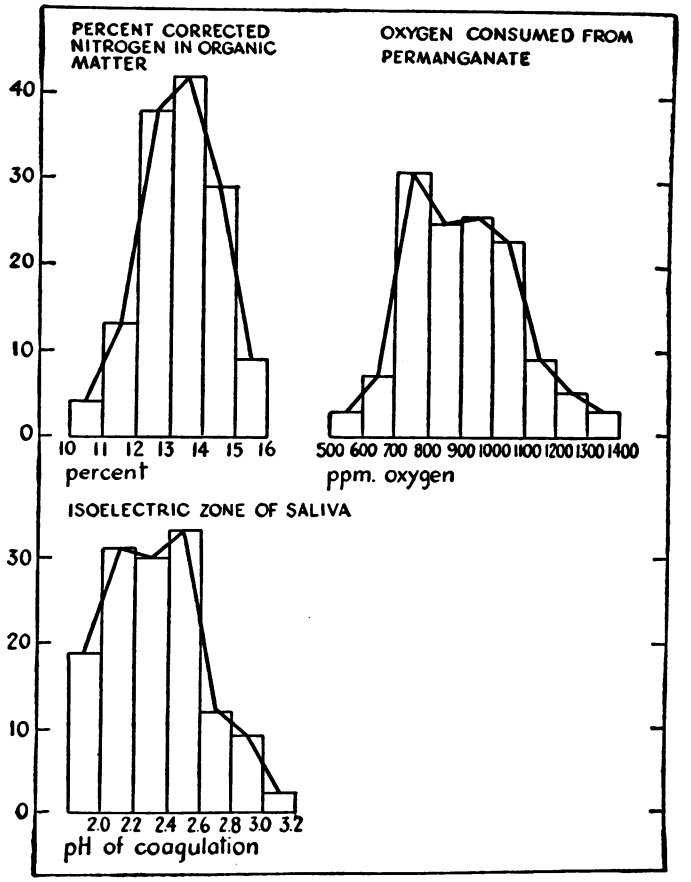


FIGURE 3.—Concluded.

Percent corrected nitrogen in organic matter.—An average of about 13.0 percent of corrected nitrogen was found in organic matter and this represents largely mucin nitrogen (pure salivary mucin contains 10 to 11 percent total nitrogen). It was not converted to total protein since this corrected nitrogen figure includes some urea and uric acid nitrogen.

Percent total nitrogen in total solids.—This figure has only relative value, being calculated solely to differentiate the total solids.

OXYGEN CONSUMED FROM POTASSIUM PERMANGANATE

The sample of fresh saliva as collected was added to a 1:3 dilution of H_2SO_4 (2 cc. of saliva plus 2 cc. of the diluted acid). This sulfuric acid dilution of saliva was tested as follows: In a 250 cc. Erlenmeyer flask were placed 10 cc. of 1:3 H_2SO_4, 70 cc. of water, and 1 cc. of the 1:2 sulfuric acid-diluted saliva. To this was added 20 cc. of standard $KMnO_4$. The flask was placed immediately in a boiling water bath and let stand exactly one-half hour. The flask was removed from the bath, and an excess (20 cc.) of standard ammonium oxalate was added immediately. This solution was then back titrated with the standard $KMnO_4$. The net cc. of $KMnO_4$ used for this back titration represented permanganate reduced by the organic matter in the saliva. This method is modified from a similar procedure applied to sewage and polluted water (*14*). While the results would appear to depend largely on the total organic matter present, there was also the possibility that certain qualitative differences in the saliva organic matter might become apparent from this test. The method is entirely empirical and has only relative value. As carried out it has an accuracy of about ± 50 p. p. m. It gave results fairly constant for the same individual's saliva, collected from day to day, as shown by the following data:

Date	Oxygen consumed from permanganate, p. p. m.			
	F. J. M.	C. M.	J. S.	W. T. H.
Sept. 12	1,425	1,050	950	2,420
Sept. 13	1,490	1,280	1,020	2,160
Sept. 14	1,210	1,350	900	1,850
Sept. 15	1,250	1,090	950	2,040

OXYGEN CONSUMED BASED ON TOTAL ORGANIC MATTER

This figure was obtained by dividing the value for oxygen consumed (p. p. m. of oxygen) by the total organic matter (mg. per 100 cc.). It evaluates the oxygen consumption on the basis of organic matter alone, by eliminating variations due to different quantities of organic matter present in the analytical sample.

pH of isoelectric zone.—It has been reported by Inouye (*17*) that the reaction of maximum precipitation of salivary mucin by dilute acid (the isoelectric zone) is pH 2.95 to 2.75. Mucins from different sources may vary in this property. Thus Oldfeldt (*18*) has shown the pH of minimum solubility in citrate buffer of mucins from submaxillary gland, umbilical cord, cornea, and vitreous humor to be, respectively, pH 2.5, 3.8, 3.6, and 3.0. On testing the coagulation of saliva in buffer solutions it was noted that salivas from different

individuals did not all coagulate at the same pH, and this appeared to be a relatively constant characteristic of each individual saliva.

In making this test of saliva coagulation, 1 cc. of fresh saliva is added to 5 cc. quantities of a series of buffer solutions ranging from pH 2.0 to pH 3.8, at 0.2 intervals. The saliva-buffer mixture is whipped up gently with a stirring rod and coagulation is indicated by protein precipitation and collection in clumps on the stirring rod.

Using McIlvanes sodium phosphate-citric acid buffer solutions (*19*), the following are typical results obtained in some preliminary tests:

Date saliva specimen taken	Saliva isoelectric zone, pH			
	F. J. M.	W. T. H.	J. S.	W. S. M.
Dec. 1, a. m.	3.0	3.2	2.2	2.2
1, p. m.	3.1	3.4	2.4	2.4
2, a. m.	3.1	3.2	2.6	2.2
Feb. 3, p. m.	3.1	3.4	2.8	2.4
9, a. m.	3.4	3.6	2.6	2.6
13, a. m.	3.2	3.3	2.4	2.4

From these results and others obtained in similar tests it appeared worth while to apply this test on a number of salivas to determine the relation, if any, to the condition of the teeth. It should be noted that the pH of coagulation as reported applies to a phosphate-citric acid buffer. Other buffer solutions such as sodium citrate, sodium acetate, lactic acid, and sodium phosphate-lactic acid, were tried and it was found that the pH of coagulation varies slightly with the type of buffer solution used. In obtaining the average figures reported in table 4 samples which did not coagulate at pH 2.0 were credited with a value of 1.0.

DISCUSSION OF RESULTS OF SALIVA ANALYSES

The results of the saliva analyses have been studied by classifications based on the clinical diagnosis of the teeth as well as on the counts of *L. acidophilus* in the saliva. As was pointed out, the degree of caries activity was determined by two examinations made one year apart. The average counts of *L. acidophilus* represent saliva specimens taken at the time of the final clinical examination and twice during the study year. In view of the evidence that there is a direct relationship between caries activity and numbers of *L. acidophilus* in the saliva, the average data resulting from either of these two criteria for classification should be somewhat similar. In general, the data bear out this expectation.

A careful inspection of our analytical data leads to the conclusion that none of the properties of saliva studied has any really significant connection with the individual's caries activity or with the numbers

of *L. acidophilus* in his saliva. As regards total solids, ash, total nitrogen, and ammonia, which have been studied previously by other investigators, this conclusion is in agreement with other published work. Perhaps it may be noted, however, that our results for ash and for percentage of ash in total solids may be indicative of a tendency, at least for the inactive caries groups, to have slightly more ash in their saliva than the more active caries groups. A similar result for ash for a caries-free group is reported by Hubbell (*20*). However, Hubbell did not attach any significance to differences in her data on ash.

It may be noted that loss on ignition, total nitrogen, corrected nitrogen, and oxygen consumed from permanganate are essentially similar measures of the same fraction of the saliva, namely, the organic matter. Results for none of these determinations show any relation to caries activity or *L. acidophilus* counts. The figures for percentage nitrogen in total solids and percentage corrected nitrogen in organic matter are slightly lower in the most active caries groups. However, no real importance may be attached to such small differences between groups.

No observations have appeared in the literature concerning variations in the pH of the isoelectric zone of salivas. Saliva from different individuals may vary in the pH of the isoelectric zone from somewhat less than pH 2.0 to pH 3.2. The observed differences in coagulation which different salivas show when added to buffer solutions are rather striking and interesting. It seemed that this response to acid precipitation, being indicative of qualitative differences in individual saliva protein, might be related to the formation of tooth surface plaques. However, nothing in our work thus far indicates that caries activity is related to this saliva characteristic.

SUMMARY

The dental caries experience rate and the increase in that rate over a period of 1 year has been determined on 127 white school children living in Arlington, Va. The study group was classified according to the degree of dental caries activity during the year. Bacteriological studies of the saliva were made on individuals belonging to the various clinical types. A close correlation was found to exist between dental caries activity, measured by repeated clinical examination, and the number of *L. acidophilus* in the saliva.

Three specimens of stimulated saliva collected at 2- and 3-month intervals from the same 12–14-year-old school children were tested

for the following properties: (*a*) Total solids, (*b*) loss on ignition (organic matter), (*c*) ash, (*d*) percentage ash in total solids, (*e*) total nitrogen, (*f*) percentage nitrogen in total solids, (*g*) ammonia nitrogen, (*h*) total nitrogen minus ammonia nitrogen (corrected nitrogen), (*i*) corrected nitrogen in organic matter, (*j*) pH of isoelectric zone, (*k*) p. p. m. oxygen consumed from permanganate, and (*l*) oxygen consumed from permanganate per mg. of organic matter in saliva.

The data were studied in relation to numbers of *L. acidophilus* in the saliva and to the degree of caries activity as determined by clinical examination. No significant relationship was present.

A method of formol titration for ammonia nitrogen in urine was applied to the determination of ammonia nitrogen in saliva and is reported as a satisfactory rapid clinical method for saliva analysis.

The pH of the isoelectric zone of saliva protein was found to vary among different salivas, but this variation was not correlated with caries activity or with numbers of *L. acidophilus* organisms in the saliva.

ACKNOWLEDGMENTS

The writers wish to express their indebtedness to Professor Fletcher Kemp, superintendent of education of Arlington, Va., Mr. Charles J. Walsh, principal of Thomas Jefferson Junior High School, and Dr. Thomas W. Pumphrey, school dentist of Arlington, Va., for their cooperation in this study.

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PROVISIONAL MORTALITY RATES FOR THE FIRST QUARTER OF 1941

The mortality rates in this report are based upon preliminary data for 27 States and the District of Columbia. Comparative data are presented for the same States for the 2 previous years as well as such reports as have been received from five additional States, Alaska, and Hawaii.

This report is made possible through a cooperative arrangement with the respective States, which voluntarily furnish provisional quarterly and annual tabulations of current birth and death records. The reports are analyzed and published by the United States Public Health Service.

Because of lack of uniformity in the method of classifying deaths according to cause, as well as some delay in filing certificates, these data are preliminary and may differ in some instances from the final figures subsequently published by the Bureau of the Census.

In the past, these preliminary reports have accurately reflected the trend in mortality rates for the country as a whole. Some deviation from the final figures for individual States may be expected because of the provisional nature of the information. However, it is believed that the trend of mortality within each State is correctly represented. Comparisons of specific causes for different States are subject to error because of differences in tabulation procedure and completeness of reporting. Such comparisons should be based upon the final figures published by the Bureau of the Census.

In spite of a widespread epidemic of influenza which started in late 1940 and continued throughout the first quarter of 1941, the crude death rate from all causes, 12.0 per 1,000 population, was slightly less than the corresponding rate for the first quarter of 1940, 12.2 per 1,000 population, and equalled that for the first quarter of 1939. Seventeen of the 28 States for which records are available reported a lower rate in 1941 than in 1940.

The relative number of deaths attributed to influenza was 35 percent greater than in either of the 2 previous years and was the highest reported since 1937. This increase in the death rate occurred in 26 of the 28 reporting States. Measles as well as influenza was epidemic during the first quarter of 1941. As a result, the death rate from this disease, 1.5 per 100,000 population, was the highest since 1938 and was nearly 4 times last year's rate. Other communicable diseases with a higher death rate during the first quarter of this year than during the first quarter of 1940 are whooping cough and encephalitis.

The death rate from tuberculosis was slightly higher than in 1940 but was still below that in 1939. The increase, although small, was fairly widespread; 16 of the 28 States reported a higher rate in 1941 than in 1940.

The largest relative increase in the death rate from the major causes of death, with the exception of influenza, was in the death rate from automobile accidents. This rate increased 22 percent from that in 1940 and was the highest since 1937. The increase in the number of employed persons during the first quarter of the year undoubtedly has brought about a greater use of automobiles, which may be responsible for part of the increase in the death rate from automobile accidents. The death rate from accidents exclusive of those due to automobiles was slightly less than in 1940.

With the exception of the death rates from heart disease and diarrhea and enteritis, which were slightly higher than in 1940, and the death rate from poliomyelitis, which showed no change, the rates for the remaining causes of death presented in the following table were less than in 1940. In spite of the influenza epidemic the death rate from pneumonia decreased about 8 percent from the previous year's rate and was only three-fourths of the rate in 1939.

Twenty of the 28 States reported a higher birth rate than during the previous year. The reported rate, 17 per 1,000 population, is the highest in recent years.

Provisional mortality from certain causes in the first 3 months of 1941, with comparative provisional data for the corresponding period in preceding years

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths), per 1,000 population (annual basis)	Rate per 1,000 live births		Death rate per 100,000 population (annual basis)																	
			Total infant mortality	Maternal mortality	Typhoid fever (1–2)	Cerebrospinal (meningococcus) meningitis (6)	Scarlet fever (8)	Whooping cough (9)	Diphtheria (10)	Tuberculosis, all forms (13–22)	Influenza (grippe) (33)	Measles (35)	Acute poliomyelitis and polioencephalitis (36)	Acute infectious encephalitis (lethargic) (37)	Cancer, all forms (45–55)	Diabetes mellitus (61)	Cerebral hemorrhage, embolism, and thrombosis (83a, b)	Diseases of the heart (90–95)	Pneumonia, all forms (107–109)	Diseases of the digestive system (115–129)	Diarrhea and enteritis under 2 years (119)	Nephritis, all forms (130–132)	All accidents, including automobile accidents (169–195)	Automobile accidents (170a, b, c)
28 States:[1]																								
1941	12.0	17.0	51	2.9	0.4	0.7	0.4	3.1	0.8	48.4	42.8	1.5	0.3	0.6	121.5	32.7	99.4	349.7	80.7	50.8	3.4	86.4	67.6	22.7
1940	12.2	16.1	52	3.9	.5	.8	.9	1.9	1.2	48.1	31.6	.4	.3	.5	122.3	33.0	104.5	348.1	87.2	54.3	3.3	91.4	65.6	18.6
1939	12.0	16.3	55	4.1	.7	.8	1.1	2.4	1.8	49.2	31.8	1.1	.1	.6	119.8	31.4	97.7	327.6	105.9	56.3	4.5	85.6	63.8	18.3
Industrial policyholders, Metropolitan Life Insurance Co.[2]																								
1941	8.5	----	----	----	.5	----	.6	1.5	.7	45.3	20.8	.8	----	----	106.8	33.5	68.0	[3] 245.5	51.2	----	[4] 3.3	[5] 59.6	46.8	19.8
1940	8.5	----	----	----	.5	----	.8	1.5	1.3	45.8	16.6	.4	----	----	104.9	33.5	67.1	[3] 238.6	57.0	----	[4] 3.7	[5] 63.8	44.4	15.8
1939	8.8	----	----	----	.4	----	1.2	2.3	1.6	47.4	18.7	1.0	----	----	101.9	30.1	66.0	[3] 234.6	78.4	----	[4] 4.9	[5] 58.3	44.2	17.6
Alaska:																								
1941	21.0	29.2	132	7.4	5.4	(6)	(6)	21.7	(6)	498.5	113.8	162.6	5.4	(7)	81.3	5.4	81.3	205.9	146.3	43.3	(6)	43.3	146.3	(6)
1940	19.0	23.4	175	(6)	(6)	(6)	(6)	76.6	(6)	404.8	16.4	136.8	(6)	(6)	82.1	(6)	71.1	180.5	164.1	10.9	10.9	10.9	142.2	(6)
1939	12.5	23.0	44	2.4	(6)	(6)	(6)	5.6	5.6	292.1	(6)	(6)	(6)	5.6	61.8	5.6	44.9	185.4	162.9	22.5	(6)	11.2	123.6	(6)
Colorado:																								
1941	11.5	17.6	58	3.7	1.4	1.1	.7	4.3	.4	58.2	49.7	1.1	1.4	(6)	108.2	13.6	84.3	300.8	93.6	64.3	5.0	88.6	67.5	24.3
1940	12.0	18.7	56	2.3	1.1	1.1	.4	2.9	2.1	48.6	24.3	2.1	1.1	.4	122.9	18.2	91.8	310.1	113.6	66.5	2.9	76.8	71.5	17.9
1939	12.6	18.3	69	5.2	1.1	1.1	1.8	6.2	4.0	52.7	49.1	1.5	(6)	.4	109.4	18.9	102.1	266.3	148.7	61.8	6.2	89.8	69.4	20.0
Connecticut:																								
1941	10.2	11.6	41	4.3	.5	.5	.5	.2	(6)	31.3	14.4	.2	.2	(6)	133.6	40.5	90.6	367.3	50.4	48.5	2.1	79.5	52.5	15.3
1940	11.6	14.0	38	3.0	(6)	.5	(6)	.7	.2	36.2	8.2	.5	(6)	(6)	157.2	21.1	125.0	369.1	73.5	47.7	1.6	70.9	53.8	15.5
1939	11.6	13.6	37	2.8	(6)	(6)	.5	1.9	1.2	39.8	10.7	.7	(6)	(6)	150.7	30.8	99.7	288.1	88.5	50.8	2.4	88.5	57.2	16.0
Delaware:																								
1941	14.1	19.2	49	(6)	(6)	(6)	3.0	7.5	(6)	58.5	36.0	1.5	(6)	(6)	115.5	22.5	126.0	442.5	102.0	52.5	4.5	162.0	61.5	24.0
1940	13.4	16.2	55	3.7	(6)	1.5	3.0	3.0	(6)	46.7	33.1	(6)	(6)	(6)	153.5	46.7	117.4	426.0	91.8	52.7	3.0	133.9	37.6	12.0
1939	13.7	17.5	49	4.4	(6)	(6)	(6)	4.6	3.1	70.6	24.6	(6)	(6)	1.5	116.6	39.9	119.7	415.9	144.3	53.7	6.1	127.4	67.5	29.2

District of Columbia:																							
1941	14.3	26.3	46	3.7	.6	1.8	(6)	1.8	1.2	65.4	13.9	.6	.6	(6)	167.2	32.7	94.5	375.1	128.5	85.4	7.9	116.3	78.2	24.2
1940	14.4	21.4	48	2.0	(6)	.6	.6	3.0	.6	63.3	20.5	(6)	.6	(6)	145.8	39.8	98.8	410.3	131.3	77.1	5.4	138.0	63.3	16.3
1939	14.1	20.9	49	5.4	.6	1.2	(6)	1.9	.6	69.9	21.2	(6)	(6)	.6	159.2	31.8	92.4	399.6	109.3	78.7	7.5	109.9	74.9	18.1
Florida:																							
1941	14.7	18.1	57	5.3	1.2	1.2	(6)	2.1	1.0	51.0	76.2	.2	1.9	.6	101.5	29.6	147.2	392.1	75.7	67.7	5.4	105.0	143.9	45.9
1940	14.9	16.1	60	6.9	.6	.4	.2	1.7	1.3	54.1	69.0	.4	.2	.4	105.6	27.8	139.7	398.0	90.5	74.7	5.0	108.1	107.1	41.4
1939	12.6	15.9	62	6.3	.9	.7	.2	3.1	1.8	52.9	37.9	.7	(6)	.2	93.2	24.5	109.0	286.8	73.3	75.9	10.3	100.2	102.2	41.1
Georgia:[7]																							
1941	10.6	17.9	72	4.1	.4	.2	.4	4.3	1.8	40.6	110.1	.4	.4	(6)	55.1	15.3	100.5	202.5	78.5	36.9	3.3	99.7	67.9	28.1
1940	10.6	16.8	73	5.0	.4	.2	.6	.8	1.8	42.3	85.8	.4	.4	(6)	57.7	12.7	101.6	197.7	112.5	27.9	2.1	82.6	56.7	15.2
1939	9.2	16.6	74	6.8	1.2	.8	.4	3.4	1.0	40.0	38.2	2.0	(6)	(6)	51.4	10.4	76.9	154.2	105.2	40.4	3.8	85.9	47.2	17.7
Hawaii:																							
1941	7.5	22.0	55	1.7	.9	(6)	(6)	1.9	(6)	53.8	3.8	3.8	.9	.9	87.7	12.3	54.7	135.8	55.6	47.2	10.4	59.4	56.6	16.0
1940	7.8	22.0	55	1.7	3.8	1.0	(6)	3.8	2.9	75.1	5.7	(6)	1.9	(6)	66.5	16.2	50.4	133.0	54.2	49.4	5.7	67.5	47.5	8.6
1939	7.8	19.0	62	5.2	3.9	(6)	(6)	2.9	2.9	63.4	4.9	(6)	(6)	(6)	58.5	20.5	42.0	145.4	64.4	62.4	11.7	64.4	48.8	12.7
Idaho:																							
1941	8.6	22.0	43	1.4	.8	1.5	(6)	6.1	(6)	7.6	28.0	(6)	(6)	2.3	83.3	20.5	81.1	223.5	47.0	46.2	1.5	57.6	72.7	18.2
1940	9.3	21.5	38	5.0	(6)	3.1	2.3	(6)	.8	16.0	24.4	1.5	(6)	.8	84.7	17.6	60.3	250.3	53.4	48.1	2.3	64.1	70.2	18.3
1939	10.1	20.6	58	2.3	3.9	3.9	.8	2.3	.8	18.8	27.4	.8	(6)	.8	92.3	25.8	86.0	270.6	103.2	53.2	2.3	50.8	73.5	25.0
Illinois:[7]																							
1941	12.0	14.0	44	3.2	.3	.1	.9	1.4	.7	46.1	20.7	.5	(6)	.4	146.8	33.4	85.5	394.6	71.9	57.9	2.0	101.0	65.2	24.2
1940	12.8	13.3	43	3.6	.2	.2	1.4	.6	1.5	47.5	24.5	.2	.1	.4	144.5	40.9	95.4	410.3	84.1	60.7	1.5	106.8	63.5	22.9
1939	12.5	13.2	49	3.2	(6)	.2	1.7	2.2	2.3	46.7	23.7	.2	.3	.4	140.2	34.6	84.8	399.9	106.0	58.4	1.9	114.2	59.1	22.6
Indiana:																							
1941	12.4	16.7	48	2.9	5	.7	.7	2.0	1.9	38.9	54.0	.9	.2	.1	122.7	15.8	145.8	310.8	87.2	(6)	1.6	72.9	83.0	36.2
1940	13.1	16.3	46	3.3	.6	.2	2.3	2.8	1.4	40.2	50.8	.1	.2	.7	124.3	19.3	165.7	367.7	99.3	(6)	2.6	94.3	72.0	27.4
1939	13.1	16.1	49	4.2	.4	.6	2.5	1.1	1.9	45.3	70.8	.2	(6)	.7	115.2	21.3	149.8	282.6	142.1	(6)	2.9	69.4	63.2	24.0
Iowa:[7]																							
1941	11.0	(6)	(6)	(6)	.2	.5	.7	1.2	.5	14.3	42.0	.2	(6)	.2	132.3	29.9	111.6	321.1	88.1	46.4	1.0	66.5	55.6	17.7
1940	12.3	16.7	46	2.7	.7	.7	1.0	.2	.5	17.0	46.8	.5	.7	2.4	145.0	30.3	136.9	343.9	68.4	54.5	1.2	80.7	67.7	16.6
1939	11.0	17.6	43	1.5	.7	1.2	1.5	2.2	.5	19.3	31.5	2.4	(6)	1.2	121.9	32.3	117.8	299.1	92.4	60.6	1.7	61.8	65.2	16.1
Kansas:																							
1941	11.9	16.6	47	2.7	(6)	1.3	.2	4.7	.4	25.6	58.5	2.5	(6)	1.1	119.8	30.9	110.6	331.5	67.1	54.9	2.5	115.7	71.1	26.9
1940	11.6	14.3	45	4.4	(6)	1.1	.9	1.6	1.1	21.2	45.4	2.0	(6)	.7	125.0	31.6	111.7	309.9	58.7	59.6	2.0	113.0	70.5	18.7
1939	11.2	14.8	48	4.9	.7	.4	1.3	.4	1.1	25.1	40.2	.2	(6)	1.8	117.1	36.1	93.8	280.5	85.7	54.3	2.9	107.9	92.4	17.5
Kentucky:																							
1941	11.6	17.8	71	5.2	1.0	1.8	1.1	9.6	1.0	75.4	115.9	6.1	1.0	.1	81.2	21.1	110.4	241.2	104.2	40.9	3.5	83.0	64.0	22.4
1940	11.5	18.6	66	5.4	.8	.8	.8	4.1	1.8	73.2	63.6	1.1	1.3	.4	78.6	16.2	118.0	239.9	106.3	50.9	4.2	75.6	73.5	17.9
1939	11.7	21.3	45	4.2	2.0	1.9	1.9	1.9	4.0	66.6	72.0	3.2	.4	1.3	79.8	16.1	104.7	227.0	126.5	48.9	5.5	70.3	62.1	19.8
Maine:																							
1941	14.5	16.8	62	2.3	(6)	.9	.5	2.4	(6)	34.7	59.8	.5	.5	.9	159.1	39.9	132.9	401.7	101.6	56.0	4.7	114.9	73.1	21.8
1940	13.0	16.7	57	5.7	.5	1.9	1.9	2.4	1.4	25.6	22.7	1.4	(6)	.5	135.1	34.6	135.5	395.3	72.5	54.0	7.6	88.6	64.5	19.9
1939	14.3	17.2	67	4.2	2.4	.5	.5	4.8	6.7	34.2	33.2	1.0	(6)	(6)	152.0	30.3	138.6	431.0	115.9	50.0	4.8	82.7	53.9	12.5
Maryland:																							
1941	13.6	17.9	54	1.8	.4	1.3	.2	5.3	(6)	78.0	27.5	(6)	.2	(6)	148.2	38.4	104.3	408.9	97.5	46.6	5.9	135.5	81.0	28.8
1940	14.7	16.8	58	3.7	.7	.4	.7	3.7	.7	90.7	22.7	.2	.4	.2	138.7	41.0	117.8	421.7	117.2	51.5	2.9	172.0	73.1	18.9
1939	13.5	16.5	55	2.7	.4	1.1	.4	1.3	2.2	75.9	21.6	2.5	(6)	.7	129.6	30.5	115.0	372.3	128.0	49.0	4.0	143.7	68.7	17.5
Michigan:[7]																							
1941	10.9	16.3	49	4.1	(6)	(6)	.8	1.5	.2	34.4	29.3	2.3	.1	.2	113.9	30.9	98.6	334.6	75.5	47.1	3.1	59.2	68.2	30.1
1940	10.6	16.2	53	3.8	.2	.1	1.2	1.2	.6	32.6	8.8	.5	(6)	.2	115.0	29.1	95.0	326.9	68.2	59.7	4.8	54.1	63.3	25.3
1939	11.1	16.7	55	3.8	.5	.4	1.7	1.4	1.1	36.9	17.0	1.2	(6)	.1	119.3	30.5	92.5	314.9	103.1	57.0	4.4	61.1	62.8	19.7

See footnotes at end of table.

Provisional mortality from certain causes in the first 3 months of 1941, with comparative provisonal data for the corresponding period in preceding years—Continued

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths), per 1,000 population (annual basis)	Rate per 1,000 live births		Death rate per 100,000 population (annual basis)																
			Total infant mortality	Maternal mortality	Typhoid fever (1–2)	Cerebrospinal (meningococcus) meningitis (6)	Scarlet fever (8)	Whooping cough (9)	Diphtheria (10)	Tuberculosis, all forms (13–22)	Influenza (grippe) (33)	Measles (35)	Acute poliomyelitis and polioencephalitis (36)	Acute infectious encephalitis (lethargic) (37)	Cancer, all forms (45–55)	Diabetes mellitus (61)	Cerebral hemorrhage, embolism, and thrombosis (83a, b)	Diseases of the heart (90–95)	Pneumonia, all forms (107–109)	Diseases of the digestive system (115–129)	Diarrhea and enteritis under 2 years (119)	Nephritis, all forms (130–132)	All accidents, including automobile accidents (169–195)	Automobile accidents (170a, b, c)
Montana:																					
1941	10.6	19.9	46	2.2	.7	(6)	1.4	(6)	2.9	48.3	49.7	(6)	1.4	(6)	99.5	14.4	100.2	253.0	67.0	62.7	2.2	55.5	81.4	29.5
1940	10.2	19.8	39	4.3	(6)	1.4	3.6	1.4	.7	43.8	20.8	2.9	(6)	.7	113.5	7.9	97.7	228.4	63.2	67.5	3.6	64.6	66.1	19.4
1939	11.5	18.1	66	4.8	2.2	.7	1.5	8.0	.7	38.6	34.9	8.7	(6)	2.2	111.3	16.0	93.1	254.6	117.1	64.7	5.1	61.8	87.3	18.9
Nebraska:																					
1941	10.7	16.7	44	2.8	.3	.9	(6)	1.9	(6)	16.7	68.5	(6)	.9	.3	131.3	27.3	125.8	253.7	67.5	36.9	.9	73.4	50.8	14.9
1940	10.8	16.4	39	2.4	(6)	.9	1.5	(6)	.9	19.9	38.2	.3	(6)	(6)	134.3	35.2	129.1	272.0	74.4	58.7	.9	60.3	56.0	14.1
1939	10.3	16.7	35	3.1	.9	.6	.9	.6	.9	16.6	37.8	1.2	.3	1.2	110.6	27.7	100.2	203.4	99.0	58.1	1.5	75.0	61.8	13.5
Nevada:																					
1941	11.8	17.2	44	4.2	7.2	(6)	(6)	3.6	(6)	50.4	21.6	(6)	(6)	(6)	125.9	14.4	64.8	316.7	64.8	79.2	(6)	57.6	169.1	79.2
1940	12.1	18.7	39	5.8	(6)	3.6	(6)	(6)	(6)	40.0	10.9	(6)	3.6	(6)	109.0	18.2	79.9	272.5	123.5	76.3	(6)	58.1	123.5	40.0
1939	11.9	17.8	54	2.1	(6)	(6)	(6)	(6)	(6)	52.2	14.9	3.7	(6)	(6)	123.1	3.7	82.1	317.1	156.7	37.3	(6)	67.2	74.6	14.9
New Jersey:																					
1941	12.2	14.3	40	2.2	.1	.3	.2	.8	.1	46.4	14.9	1.0	.1	.3	147.5	41.3	109.4	412.0	74.6	55.1	2.3	90.6	60.2	21.7
1940	11.9	13.4	40	2.4	.3	(6)	1.0	.7	.7	43.2	10.1	.1	.2	.2	140.3	42.8	100.9	403.8	74.3	51.5	2.1	90.8	57.0	16.1
1939	12.1	13.6	47	3.5	.2	.6	1.4	2.2	.7	47.0	14.7	(6)	.2	.7	138.8	40.1	96.5	409.1	92.3	58.7	3.5	82.2	50.4	17.4
New Mexico:																					
1941	11.1	26.7	99	3.1	3.0	(6)	(6)	11.9	3.0	71.3	42.4	17.8	(6)	(6)	60.2	12.6	37.9	134.5	86.9	44.6	8.9	51.3	86.2	39.4
1940	11.3	33.6	76	3.6	2.3	(6)	(6)	6.8	.8	73.0	27.1	(6)	(6)	(6)	51.2	11.3	53.4	123.4	80.5	45.9	7.5	54.2	83.5	34.6
1939	13.5	28.8	125	7.0	.8	2.3	1.5	7.7	7.7	82.1	52.7	1.5	.8	(6)	52.7	8.5	40.3	126.3	185.2	62.8	8.5	58.9	72.8	37.2
New York:																					
1941	12.4	14.6	38	2.1	.1	.6	.5	.9	(6)	48.6	10.9	.5	(6)	1.3	157.7	46.6	80.9	453.8	70.3	56.0	2.8	69.4	55.8	14.8
1940	12.2	14.0	39	3.4	.1	.3	.5	1.3	.1	48.8	6.3	.2	(6)	.9	157.7	45.2	81.3	436.0	67.4	60.3	2.9	73.0	58.2	14.0
1939	12.7	14.4	46	3.2	.2	.7	.8	1.1	.3	52.0	8.8	.5	(6)	.3	157.0	44.7	73.3	435.2	101.2	60.8	5.2	81.2	57.8	13.3
North Carolina:																					
1941	10.2	22.7	72	4.8	.6	.3	.3	5.6	2.7	50.5	75.6	1.9	.3	.2	59.0	15.2	85.9	168.3	100.9	38.8	3.8	92.3	73.8	34.1
1940	10.5	21.4	69	5.8	.7	.6	.4	2.1	4.7	52.7	61.0	.6	.1	.1	57.7	18.0	96.0	158.9	102.3	40.8	5.3	110.4	63.2	23.4
1939	9.6	21.5	65	5.5	.6	.5	.7	7.2	4.6	53.7	34.6	2.9	.1	.3	58.7	14.1	88.0	168.0	103.2	47.0	6.2	87.4	58.9	21.9

North Dakota:																						
1941	8.0	22.7	46	.6	(6)	(6)	.6	1.3	2.5	23.5	21.0	1.3	.6	.6	85.2	17.8	70.6	212.5	43.9	37.5	4.5	39.4	49.0	12.7
1940	8.6	21.3	45	2.1	1.3	(6)	2.5	1.9	2.5	20.1	17.6	.6	(6)	1.9	107.3	28.9	77.2	208.9	50.2	51.4	5.0	42.7	49.6	13.8
1939	9.1	21.4	58	3.8	.6	1.3	3.1	3.1	.6	34.5	33.3	6.9	(6)	1.3	96.3	32.1	78.7	208.9	86.2	50.3	8.8	50.3	32.1	8.2
Ohio:																						
1941	12.2	14.7	46	2.5	.2	.4	.4	2.9	.4	42.6	40.1	1.2	.3	.7	133.3	34.6	111.4	354.0	72.6	53.3	3.6	79.8	85.3	30.5
1940	12.8	15.5	44	3.9	.6	.8	1.0	1.9	.6	43.9	27.9	(6)	.1	.3	139.8	33.5	123.8	362.9	87.5	54.7	3.3	87.6	87.0	25.5
1939	12.8	14.1	55	4.0	.3	.4	2.0	1.2	1.5	46.0	39.4	.2	.1	.9	131.9	33.0	125.4	345.9	110.8	60.8	3.3	88.7	75.4	23.4
Oklahoma:																						
1941	10.2	20.5	58	3.6	.3	.3	.5	4.9	3.7	48.0	71.2	.3	.2	.3	81.1	20.0	87.0	208.7	100.9	45.3	1.9	60.6	58.5	22.8
1940	10.3	18.5	54	3.5	1.2	2.1	.5	1.4	4.8	50.8	54.4	.3	1.7	.3	79.9	19.6	88.2	192.4	102.3	50.1	2.9	63.9	56.7	17.2
1939	10.5	18.8	63	4.1	2.4	.2	1.7	2.1	3.6	46.5	48.2	6.6	.5	.7	77.0	17.3	91.5	182.4	130.5	47.3	4.5	67.6	111.3	24.1
Pennsylvania:																						
1941	12.5	18.7	40	2.3	.2	.3	.4	1.8	.4	43.0	30.3	1.0	.2	.5	122.0	40.9	94.5	409.9	74.7	47.3	3.7	104.3	55.4	15.7
1940	12.8	14.4	54	3.3	.6	1.3	.9	1.2	.8	42.5	27.4	.1	.3	.7	124.9	44.1	96.7	397.6	85.0	53.1	3.9	116.2	53.9	14.0
1939	12.4	16.4	53	3.3	.9	.8	.9	2.2	1.2	42.3	25.8	.2	(9)	.9	128.9	40.2	96.5	380.9	88.0	54.8	4.7	99.7	51.0	13.3
Rhode Island:																						
1941	13.2	14.8	42	1.9	(6)	.6	.6	.6	(6)	46.0	19.1	(6)	(6)	1.1	164.9	49.4	102.7	458.3	92.0	58.3	2.8	125.1	44.9	11.2
1940	12.5	14.3	37	2.4	1.1	1.7	(6)	(6)	.6	35.4	6.7	.6	.6	(6)	153.5	42.7	112.5	422.3	84.3	65.8	.6	110.8	59.6	12.9
1939	12.2	14.5	39	2.8	(6)	1.1	(6)	5.7	(6)	40.7	10.3	(6)	(6)	(6)	142.7	38.4	91.1	420.1	104.3	61.9	5.2	98.6	57.9	13.2
South Carolina: [7]																						
1941	11.2	18.9	100	7.2	(6)	1.0	1.3	6.4	.3	46.0	116.5	1.3	.3	(6)	42.5	17.1	86.3	217.6	109.5	29.9	1.6	85.3	64.1	25.4
1940	11.2	17.1	98	7.7	1.0	(6)	.3	1.9	3.5	46.5	113.1	.3	1.0	(6)	46.8	16.0	108.3	204.7	110.2	33.0	1.0	89.4	77.5	24.7
1939	8.9	16.2	79	7.7	2.6	1.0	.7	7.2	1.6	37.4	42.0	.3	.7	.3	39.7	12.8	94.8	158.0	98.7	13.8	1.3	77.4	55.7	22.6
Tennessee:																						
1941	10.7	15.8	75	3.6	.7	1.8	.3	6.6	1.0	82.2	92.5	3.2	.3	.8	76.3	15.4	79.9	180.3	108.7	41.7	3.8	69.8	54.1	17.2
1940	11.4	15.5	71	5.9	.3	.7	1.0	2.8	1.7	77.4	71.1	1.1	.1	.3	70.3	19.3	95.1	225.7	128.3	49.9	2.2	64.0	63.4	13.2
1939	9.7	14.5	64	5.7	.7	1.1	.4	3.6	2.2	73.2	57.8	2.1	.6	.1	64.4	11.8	77.8	172.6	110.0	53.0	3.4	57.1	52.6	16.3
Utah:																						
1941	8.6	22.7	38	.3	(6)	(6)	(6)	1.5	(6)	13.1	22.6	(6)	(6)	(6)	67.8	21.9	57.6	288.1	41.6	54.0	6.6	52.5	60.5	23.3
1940	8.9	23.2	41	2.8	(6)	.7	2.9	1.5	(6)	17.5	23.3	2.2	.7	.7	90.4	15.3	65.6	254.5	48.1	45.9	2.2	59.1	65.6	27.0
1939	8.8	23.2	49	3.2	(6)	2.2	(6)	(6)	(6)	20.8	13.4	(6)	(6)	.7	89.7	14.1	40.8	256.6	69.0	63.0	.7	66.0	54.9	19.3
Vermont:																						
1941	12.9	17.6	51	4.5	(6)	2.3	(6)	(6)	(6)	49.6	44.0	(6)	(6)	(6)	155.7	31.6	137.6	435.5	80.1	55.3	6.8	106.0	60.9	11.3
1940	11.9	18.5	42	1.8	1.1	1.1	(6)	2.2	(6)	41.4	28.0	(6)	(6)	(6)	125.4	21.3	135.5	371.7	94.0	35.8	4.5	87.3	82.8	9.0
1939	13.4	15.7	37	5.0	(6)	1.1	1.1	5.6	1.1	40.7	41.8	(6)	(6)	1.1	151.4	37.3	151.4	397.6	158.1	48.6	5.6	83.6	70.0	22.6
Virginia:																						
1941	13.1	18.7	87	4.0	.7	1.0	.3	9.9	1.3	66.3	85.3	6.6	.3	(6)	83.3	21.4	116.5	299.8	106.7	41.9	3.4	117.9	86.5	30.5
1940	12.9	18.0	78	4.6	.6	1.6	.4	5.1	2.5	59.2	65.9	.7	.3	.9	78.8	24.1	115.8	296.2	125.9	41.8	4.2	123.2	77.9	21.7
1939	12.0	17.7	77	6.6	.3	1.7	.5	6.3	3.8	64.4	49.1	.5	.2	.5	76.6	21.1	116.8	263.3	116.0	41.7	2.1	93.1	67.3	22.0
Wyoming:																						
1941	8.9	16.9	62	4.7	(6)	1.6	(6)	(6)	6.4	16.0	54.3	3.2	(6)	3.2	68.6	16.0	78.2	218.6	57.5	39.9	1.6	83.0	70.2	30.3
1940	8.1	16.5	41	5.8	(6)	3.2	(6)	(6)	3.2	12.8	12.8	(6)	1.6	1.6	76.8	16.0	78.4	201.6	36.8	49.6	1.6	65.6	78.4	38.4
1939	9.4	18.3	59	3.6	1.6	(6)	(6)	1.6	3.3	19.6	24.5	1.6	(6)	(6)	84.8	14.7	73.4	239.7	81.5	47.3	1.6	79.9	79.9	17.9

[1] Includes all States with data for the 3-month period of 1941, 1940, and 1939. The District of Columbia is included as a State. Estimated population July 1, 1941, 68,609,800.

[4] These data are taken from the April 1941 and April 1940 Statistical Bulletins published by the Metropolitan Life Insurance Co. All figures are provisional and are subject to correction, since they are based on provisional estimates of lives exposed to risk. Data do not include all diseases reported to the Public Health Service.

[3] Excludes pericarditis, acute endocarditis, and acute myocarditis.
[4] Classified as diarrhea and enteritis, age not specified.
[5] Chronic nephritis only.
[6] No deaths reported.
[7] January and February only.
[8] Data not available.
[9] Less than 0.1 per 100,000 population.

PLAGUE INFECTION IN NORTH DAKOTA AND CANADA

Under date of July 12, 1941, Dr. N. E. Wayson, Medical Officer in Charge of Plague Suppressive Measures on the Pacific coast, reported that plague infection had been demonstrated in fleas collected on June 23, 1941, from ground squirrels shot in North Dakota. This is the first recorded evidence of plague infection in that State, and the locality of occurrence is believed to be the farthest east that so-called sylvatic plague, that is, plague in wild rodents or their ectoparasites, has been recorded in the United States. In May 1939, plague infection was proved in tissue from a kangaroo rat trapped 10 miles west of Las Cruces, Dona Ana County, New Mexico, which was farther south and east than any other area in which plague in wild rodents had been demonstrated to exist in the United States prior to that date. This was also believed to be the first instance of the proof of plague infection among kangaroo rats in this country.[1]

On July 14, 1941, Dr. R. E. Wodehouse, Deputy Minister of the Department of Pensions and National Health of Canada, reported that plague infection had been proved bacteriologically in a ground squirrel taken southeast of Stanmore, Alberta, about 180 miles north of the international boundary. This locality is near that in which an epizootic in ground squirrels occurred during the summer of 1939 and the plague organism was demonstrated in one of the dead squirrels.

In 1938 a survey was made jointly by the Dominion Department of Pensions and National Health and the Health Departments of Alberta and British Columbia.[2] In that survey, 3,569 wild rodents and 7,582 fleas were examined and no evidence of plague infection was found. During the epizootic among squirrels in southeastern Alberta in August of 1939, however, plague infection was demonstrated in the tissue of a Richardson squirrel found dead and 2 fleas recovered from the same squirrel were also found to be infected.

Investigations were continued in the same locality during the following spring, when 5 out of 80 pools of fleas and 1 out of 60 tissue specimens were proved positive for plague. The area of demonstrated infection was reported to cover at least 144 square miles.

Before the discovery of plague infection in wild rodents in the Province of Alberta in 1939, there had been a death, which in retrospect was suspicious of plague and was believed to have been contracted from infected mink.[1] This fatal case occurred in a farmer, aged 35, who raised mink. The animals had been healthy until the owner started feeding them ground squirrels from a locality later proved to harbor rodent plague infection. Several of the animals

[1] Pub. Health Rep., May 19, 1939, p. 850.

[2] Plague Surveys in Western Canada. By R. J. Gibbons and F. A. Humphreys. Canadian Public Health Journal, January 1941, pp. 24-28.

became ill and died. While skinning one of the dead minkt he, farmer scratched his hand with a knife. While the diagnosis at the time of death was acute septicemia, the recorded clinical symptoms and the other circumstances mentioned indicate that death was due to plague infection of which ground squirrels were the original source.

Further investigations are being conducted by both Canadian and United States Public Health Service officers in the border areas concerned. A field unit of the Public Health Service is making a survey in North Dakota in the areas adjacent to the locality where the infection was found in squirrel fleas. The early hibernation of the squirrels in this locality, however, may prevent a thorough search this year.

TULAREMIA INFECTION FOUND IN FLEAS FROM PRAIRIE DOGS IN WYOMING

Under date of July 10, 1941, Dr. N. E. Wayson reported that the plague laboratory in San Francisco had found tularemia infection in a pool of 43 fleas taken from 24 prairie dogs (*Cynomys leucurus leucurus*) in Wyoming. The prairie dogs were killed on June 14, 1941, on a ranch 9 miles east and 4 miles south of Parco, Carbon County, and infection was demonstrated in the laboratory by the injection of the fleas in guinea pigs.

The fact that this is the first instance at this laboratory in which tularemia has been produced in guinea pigs by the injection of infected fleas emphasizes the inefficiency of the flea as a transmitter of tularemia infection as compared with its efficiency in harboring and transmitting the plague organism. It is believed that the only other recorded instances of the demonstration of tularemia infection in fleas collected in nature in the United States were those reported by Dr. R. G. Green and Dr. J. E. Shillinger in Minnesota, as follows:[1]

In July 1933, in a single flea from a cottontail rabbit found dead in an area where an epizootic of tularemia among rabbits had been observed. This is believed to be the first reported instance of the infection being found in fleas in the United States.

In October 1933, in a pool of 9 fleas from another cottontail rabbit found dead.

In May 1934, in a pool of 3 fleas from a cottontail rabbit.

In April 1935, in 4 fleas from a hare (snowshoe rabbit), believed to be the first demonstration of tularemia infection in fleas from this species in the United States.

Naturally infected fleas have been reported in Russia by N. G. Olsoufjev.[2]

[1] Minnesota Wild Life Disease Investigation, July 1933, October 1933, May 1934, and April 1935. (A mimeographed publication issued by the Bureau of Biological Survey, U. S. Department of Agriculture.)

[2] Résumé of Researches upon Transmitters of Tularemia in the U. S. S. R. Works of All-Union Congress of Microbiologists, Epidemiologists and Infectionists, 1939, Moscow, 1940.

DEATHS DURING WEEK ENDED JULY 12, 1941

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

	Week ended July 12, 1941	Corresponding week, 1940
Data from 88 large cities of the United States:		
Total deaths	7,985	7,927
Average for 3 prior years	7,769	
Total deaths, first 28 weeks of year	246,751	246,399
Deaths per 1,000 population, first 28 weeks of year, annual rate	12.3	12.3
Deaths under 1 year of age	590	448
Average for 3 prior years	477	
Deaths under 1 year of age, first 28 weeks of year	14,709	14,117
Data from industrial insurance companies:		
Policies in force	64,375,458	65,102,755
Number of death claims	11,583	11,048
Death claims per 1,000 policies in force, annual rate	9.4	8.9
Death claims per 1,000 policies, first 28 weeks of year, annual rate	10.0	10.1

PREVALENCE OF DISEASE

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

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JULY 19, 1941

Summary

The incidence of poliomyelitis increased sharply for the second successive week. A total of 246 cases was reported for the current week, as compared with 187 for last week and with 82 for the next preceding week. For the past 2 weeks the incidence has been considerably above the 5-year (1936–40) median.

The South Atlantic and East South Central States reported 202, or 82 percent, of the total number of cases. The only States reporting more than 6 cases are as follows, with last week's figures in parentheses: Georgia 91 (40); Alabama 46 (40); Florida 13 (11); Tennessee 12 (5); Mississippi 12 (2); North Carolina 8 (0); South Carolina 13 (9). No cases were reported in the New Englnd States and only 1 case in the Pacific States (California). Information regarding local distribution for the current week is not available, except that 19 cases were reported in Atlanta, Ga., and 15 cases in Birmingham, Ala.

A total of 1,223 cases of poliomyelitis has been reported this year to date, a larger number than for the same period of any of the past 5 years, with the exception of 1937 (1,670 cases). The largest number of cases for an entire year during that period was reported in 1940 (9,799), and 94 percent of these cases occurred after July 1.

For the current week 31 cases of encephalitis were reported in North Dakota.

Of 18 cases of Rocky Mountain spotted fever, 11 cases occurred in the Mountain and Pacific areas and 7 in the eastern States. The number of cases of endemic typhus fever increased from 52 to 61, of which 20 cases were reported in Texas, 16 in Georgia, 11 in Florida, and 9 in Louisiana.

The death rate for the current week in 87 large cities in the United States was 10.1 per 1,000 population, as compared with 11.1 for the preceding week and with a 3-year (1938–40) average of 10.2.

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

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

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1936-40	Week ended		Median 1936-40	Week ended		Median 1936-40	Week ended		Median 1936-40
	July 19, 1941	July 20, 1940		July 19, 1941	July 20, 1940		July 19, 1941	July 20, 1940		July 19, 1941	July 20, 1940	
NEW ENG.												
Maine	0	2	1	-------	-------	-------	68	93	25	0	1	0
New Hampshire	0	0	0	-------	-------	-------	6	2	2	0	0	0
Vermont	0	0	0	-------	-------	-------	25	12	13	0	0	0
Massachusetts	1	2	5	-------	-------	-------	307	605	207	0	0	0
Rhode Island	1	0	0	-------	-------	-------	13	41	19	0	1	0
Connecticut	3	0	1	2	-------	1	117	36	36	0	0	0
MID. ATL.												
New York	11	5	11	[1] 1	-------	[1] 3	491	486	491	4	3	4
New Jersey	3	6	6	-------	1	2	251	273	171	0	1	1
Pennsylvania	2	3	13	-------	-------	-------	679	201	275	2	2	2
E. NO. CEN.												
Ohio	7	3	8	5	4	3	250	21	58	0	1	1
Indiana	2	4	4	13	3	8	23	4	8	2	2	1
Illinois	15	14	18	7	4	4	106	123	58	1	0	2
Michigan [2]	3	3	10	1	-------	-------	253	241	115	0	2	1
Wisconsin	1	2	2	9	6	6	373	390	124	0	0	0
W. NO. CEN.												
Minnesota	1	1	1	2	1	1	6	23	23	0	1	0
Iowa	1	0	1	1	2	-------	31	53	41	0	1	1
Missouri	3	4	5	-------	-------	1	49	11	10	0	0	0
North Dakota [3]	1	0	0	-------	-------	-------	8	0	2	0	0	0
South Dakota	5	1	0	-------	-------	-------	2	3	1	1	0	0
Nebraska	0	0	1	3	-------	-------	7	3	3	0	0	0
Kansas	1	4	2	1	-------	1	44	41	17	0	0	1
SO. ATL.												
Delaware	0	0	0	-------	-------	-------	4	0	3	0	0	0
Maryland [2 4]	0	1	5	1	2	2	181	5	13	5	0	2
Dist. of Col.	0	2	3	-------	-------	-------	30	1	14	0	0	0
Virginia [4]	1	13	8	36	17	-------	182	45	47	0	5	4
West Virginia [2 4]	1	3	3	4	1	9	171	6	6	0	0	1
North Carolina	7	1	11	1	-------	-------	176	51	51	0	0	1
South Carolina [5]	3	3	3	78	46	46	116	3	3	0	1	1
Georgia [4 5]	3	1	7	11	9	-------	73	9	0	1	0	1
Florida [5]	3	0	2	9	-------	1	6	10	7	0	0	0
E. SO. CEN.												
Kentucky	4	3	2	-------	-------	-------	49	24	24	2	2	2
Tennessee [4]	0	1	2	12	4	14	67	25	25	0	0	2
Alabama [5]	3	5	8	3	14	9	41	76	6	3	4	2
Mississippi [2 5]	1	1	7	-------	-------	-------	-------	-------	-------	0	0	0
W. SO. CEN.												
Arkansas	3	3	3	15	1	3	57	5	6	2	0	0
Louisiana [5]	5	2	7	1	4	6	1	3	3	1	0	1
Oklahoma	2	3	3	16	2	5	11	6	6	0	1	1
Texas [5]	7	12	21	253	56	39	80	118	55	1	1	1
MOUNTAIN												
Montana [4]	2	2	0	1	1	-------	6	7	7	0	2	0
Idaho [4]	0	0	0	-------	-------	-------	2	3	9	0	0	1
Wyoming [4]	0	0	0	-------	1	-------	3	2	4	0	0	0
Colorado	11	10	4	5	3	-------	24	29	20	0	0	0
New Mexico	1	0	1	-------	2	-------	17	21	8	0	0	0
Arizona	0	6	1	25	25	11	49	14	14	1	1	0
Utah [3]	0	0	0	2	-------	-------	8	37	37	0	0	0
Nevada	0	-------	-------	-------	-------	-------	1	-------	-------	0	-------	-------
PACIFIC												
Washington [4]	0	1	1	-------	-------	-------	8	22	24	0	1	0
Oregon [4]	0	0	2	1	-------	7	30	38	8	0	0	0
California	13	15	18	30	11	11	146	91	277	0	1	2
Total	131	142	281	549	220	238	4,648	3,313	2,801	26	34	45
29 weeks	6,982	8,192	12,525	597,090	167,533	150,548	821,675	220,680	265,634	1,301	1,060	2,008

See footnotes at end of table.

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

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
	July 19, 1941	July 20, 1940		July 19, 1941	July 20, 1940		July 19, 1941	July 19, 1940		July 19, 1941	July 20, 1940	
NEW ENG.												
Maine	0	0	0	6	5	5	0	0	0	1	0	1
New Hampshire	0	0	0	3	3	1	0	0	0	0	0	0
Vermont	0	0	0	1	4	3	0	0	0	0	0	0
Massachusetts	0	1	1	37	29	38	0	0	0	0	1	2
Rhode Island	0	0	0	5	2	8	0	0	0	0	0	0
Connecticut	0	1	1	10	12	12	0	0	0	1	2	1
MID. ATL.												
New York	6	4	4	90	134	84	0	0	0	33	14	11
New Jersey	5	0	0	44	55	24	0	0	0	5	5	5
Pennsylvania	6	1	1	43	101	101	0	0	0	6	15	15
E. NO. CEN.												
Ohio	0	1	2	51	80	40	0	0	1	8	3	9
Indiana	2	1	1	9	30	26	0	2	4	2	7	9
Illinois	5	1	2	59	100	100	1	1	10	8	15	15
Michigan [3]	[6] 6	8	6	79	61	81	1	0	1	17	3	3
Wisconsin	0	5	0	29	38	43	2	2	2	0	0	0
W. NO. CEN.												
Minnesota	1	0	0	27	17	21	0	7	7	0	0	1
Iowa	4	6	1	13	12	13	0	3	9	8	2	3
Missouri	0	1	1	12	21	21	4	1	3	4	12	21
North Dakota [3]	1	0	0	0	4	4	0	3	4	0	0	0
South Dakota	1	0	0	6	5	8	0	3	3	0	0	0
Nebraska	0	2	1	10	3	3	0	0	1	0	0	0
Kansas	0	8	0	9	20	20	0	0	0	1	6	6
SO. ATL.												
Delaware	0	0	0	0	0	1	0	0	0	0	1	1
Maryland [3 4]	4	1	0	14	9	9	0	0	0	20	3	7
Dist. of Col.	1	0	0	1	4	3	0	0	0	0	0	2
Virginia [4]	2	2	2	3	12	12	0	0	0	7	4	16
West Virginia [3 4]	0	4	1	15	18	13	0	0	0	4	3	8
North Carolina	8	1	2	7	11	11	0	0	0	6	12	25
South Carolina [3]	9	0	0	2	2	2	0	0	0	12	15	15
Georgia [4 5]	91	1	2	11	8	8	0	0	0	23	24	41
Florida [5]	13	0	0	3	0	3	0	0	0	1	4	5
E. SO. CEN.												
Kentucky	4	4	2	15	18	13	0	0	0	8	11	30
Tennessee [4]	12	1	2	11	10	10	0	0	0	14	11	33
Alabama [5]	46	5	1	8	6	6	0	1	0	6	8	12
Mississippi [3 5]	12	1	3	1	5	5	0	0	0	7	6	12
W. SO. CEN.												
Arkansas	1	0	0	4	2	2	1	0	0	14	53	26
Louisiana [5]	2	7	3	8	1	3	0	0	0	13	28	28
Oklahoma	0	2	0	13	5	11	1	0	0	8	9	24
Texas [5]	1	8	7	10	17	23	0	0	1	27	43	52
MOUNTAIN												
Montana [4]	1	4	0	10	6	6	0	0	2	0	0	0
Idaho [4]	0	1	0	2	2	3	0	0	2	0	3	1
Wyoming [4]	0	0	0	2	1	1	0	0	0	0	0	0
Colorado	0	0	0	8	9	9	0	3	1	4	2	2
New Mexico	1	1	1	1	3	7	0	0	0	7	2	3
Arizona	0	0	0	0	4	3	1	1	1	0	5	2
Utah [3]	0	1	0	4	6	9	0	0	0	1	2	0
Nevada	0	----	----	0	----	----	0	----	----	0	----	----
PACIFIC												
Washington [4]	0	18	0	11	14	14	0	0	0	1	1	2
Oregon [4]	0	2	0	1	13	10	0	1	2	4	4	3
California	1	15	15	42	38	68	1	1	1	10	6	7
Total	246	119	119	750	960	960	12	29	78	291	345	464
29 weeks	[6] 1,223	1,067	1,067	89,407	116,252	133,844	1,161	1,872	7,693	3,235	3,444	5,065

See footnotes at end of table.

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

Division and State	Whooping cough	
	Week ended	
	July 19, 1941	July 20, 1940
NEW ENG.		
Maine	28	32
New Hampshire	7	0
Vermont	0	8
Massachusetts	172	132
Rhode Island	28	5
Connecticut	38	45
MID. ATL.		
New York	291	205
New Jersey	118	79
Pennsylvania	336	399
E. NO. CEN.		
Ohio	337	387
Indiana	14	30
Illinois	158	126
Michigan [2]	302	235
Wisconsin	161	83
W. NO. CEN.		
Minnesota	92	34
Iowa	45	27
Missouri	56	69
North Dakota [3]	19	10
South Dakota	10	10
Nebraska	13	7
Kansas	147	53
SO. ATL.		
Delaware	5	12
Maryland [2 4]	103	163
Dist. of Col	9	5
Virginia [4]	101	36
West Virginia [2 4]	38	51
North Carolina	297	146
SO. ATL.—continued		
South Carolina [5]	106	11
Georgia [4 5]	46	40
Florida [5]	4	7
E. SO. CEN.		
Kentucky	49	83
Tennessee [4]	39	48
Alabama [5]	23	21
Mississippi [2 5]	----------	----------
. SO. CEN.		
Arkansas	23	47
Louisiana [5]	43	4
Oklahoma	38	19
Texas [5]	203	253
MOUNTAIN		
Montana [4]	35	3
Idaho [4]	26	3
Wyoming [4]	15	9
Colorado	165	15
New Mexico	37	88
Arizona	24	13
Utah [3]	112	87
Nevada	9	----------
PACIFIC		
Washington [4]	110	45
Oregon [4]	46	19
California	408	276
Total	4,486	3,430
29 weeks	131,783	93,431

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Encephalitis, week ended July 19, 1941: North Dakota, 31.
[4] Rocky Mountain spotted fever, week ended July 19, 1941, 18 cases as follows: Maryland, 2; Virginia, 2; West Virginia, 1; Georgia, 1; Tennessee, 1; Montana, 3; Idaho, 1; Wyoming, 3; Washington, 2; Oregon, 2.
[5] Typhus fever, week ended July 19, 1941, 61 cases as follows: South Carolina, 3; Georgia, 16; Florida, 11; Alabama, 1; Mississippi, 1; Louisiana, 9; Texas, 20.
[6] Information has been received that the report of 6 cases of poliomyelitis in Michigan for the week ended May 3, 1941, Public Health Reports of May 9, p. 1031, was an error, no cases having occurred.
[7] Delayed report of 6 cases included.

PLAGUE INFECTION IN CALIFORNIA

Plague infection, proved by animal inoculation and cultures, in ground squirrels and parasites from ground squirrels, *C. beecheyi*, submitted to the laboratory on June 4, 19, 24, 28, and 30, 1941, has been reported by Dr. Bertram P. Brown, State Director of Public Health of California, as follows:

Under date of July 9

IN FLEAS FROM GROUND SQUIRRELS IN SANTA CRUZ COUNTY

In a pool of 241 fleas from 9 ground squirrels from a ranch 6 miles east of Watsonville.

IN GROUND SQUIRRELS AND IN FLEAS AND TICKS FROM GROUND SQUIRRELS IN KERN COUNTY

In a pool of 89 fleas from 6 ground squirrels from a ranch 6 miles south of Davis Ranger Station.

In a pool of 69 fleas from 15 ground squirrels from a ranch 2 miles south of Davis Ranger Station.

In 3 ground squirrels, submitted June 25, in a pool of 36 ticks from 25 ground squirrels, and in a pool of 764 fleas from 65 ground squirrels, submitted on June 24, all taken from a ranch at Keene, Kern County.

Under date of July 12

In 3 ground squirrels, submitted to the laboratory on June 28 and 30, and in a pool of 361 fleas from 27 ground squirrels, collected on June 28, from the same ranch, at Keene, Kern County.

PLAGUE INFECTION IN FLEAS IN NORTH DAKOTA

Under date of July 12, 1941, Dr. N. E. Wayson, Medical Officer in Charge, Plague Suppressive Measures, San Francisco, Calif., reported plague infection demonstrated in fleas collected on June 23, 1941, from ground squirrels (*C. richardsonii*) shot in an area located about 7 miles northeast of Crosby, Divide County, N. Dak., and about 6 miles south of the Saskatchewan-North Dakota boundary.[1]

This is the first recorded evidence of plague infection in North Dakota, and it is believed that the locality is the farthest east in which infection has been found in wild rodents or their ectoparasites in the United States.[2]

[1] See page 1520.

[2] In 1939 plague infection was found in a kangaroo rat in Dona Ana County, N. Mex. (See PUBLIC HEALTH REPORTS, March 19, 1939, p. 850.)

WEEKLY REPORTS FROM CITIES

City reports for week ended July 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	88	26	12	1,717	294	531	7	348	42	1,300	------
Current week [1]	35	20	11	1,675	255	330	1	301	17	1,061	------
Maine: Portland	0	------	0	0	2	0	0	0	0	3	19
New Hampshire:											
Concord	0	------	0	0	0	1	0	0	0	0	7
Nashua	0	------	0	0	0	0	0	0	0	0	7
Vermont:											
Barre	0	------	0	0	0	0	0	0	0	0	1
Burlington	0	------	0	1	0	0	0	0	0	0	10
Rutland	0	------	0	0	0	0	0	0	0	0	5
Massachusetts:											
Boston	0	------	0	65	9	25	0	7	0	14	198
Fall River	2	------	0	1	1	3	0	1	0	0	22
Springfield	0	------	1	61	0	1	0	1	0	6	24
Worcester	0	------	0	4	1	1	0	2	0	1	40
Rhode Island:											
Pawtucket	0	------	0	0	0	1	0	0	0	0	8
Providence	0	------	0	1	1	0	0	2	0	18	42
Connecticut:											
Bridgeport	0	------	0	9	1	2	0	1	0	0	25
Hartford	0	------	0	2	0	1	0	3	0	1	43
New Haven	0	------	0	12	1	2	0	0	0	1	38
New York:											
Buffalo	0	------	0	33	8	4	0	5	0	6	118
New York	7	3	0	200	46	69	0	77	2	89	1,381
Rochester	0	------	0	37	2	2	0	0	0	4	68
Syracuse	0	------	0	11	5	2	0	0	0	21	58
New Jersey:											
Camden	0	------	0	4	1	2	0	1	0	2	22
Newark	0	------	0	23	3	6	0	4	0	21	68
Trenton	0	------	0	5	2	1	0	2	0	0	33
Pennsylvania:											
Philadelphia	0	------	0	32	14	31	0	19	1	44	437
Pittsburgh	2	------	0	109	9	0	0	9	0	40	159
Reading	0	------	0	4	1	0	0	1	0	2	21
Scranton	0	------	--------	34	-------	0	0	-------	0	0	--------
Ohio:											
Cincinnati	0	------	0	5	0	4	0	2	0	2	106
Cleveland	1	1	0	4	9	13	0	6	0	46	193
Columbus	0	------	0	16	2	3	0	1	0	28	73
Toledo	0	------	0	178	4	1	0	4	0	37	79
Indiana:											
Anderson	0	------	0	9	0	2	0	0	0	0	6
Fort Wayne	0	------	0	2	0	0	0	0	2	0	22
Indianapolis	0	------	0	30	3	2	0	4	0	2	89
Muncie	0	------	0	2	0	0	0	0	0	2	10
South Bend	0	------	0	2	0	0	0	0	0	0	12
Terre Haute	0	------	0	0	0	0	0	2	0	0	14
Illinois:											
Alton	0	------	0	0	1	0	0	0	0	0	13
Chicago	9	1	2	41	20	35	0	36	0	39	639
Elgin	1	------	0	2	0	0	0	1	0	2	13
Moline	0	------	0	0	0	0	0	0	0	0	12
Springfield	0	------	0	42	1	0	0	0	0	0	20
Michigan:											
Detroit	0	1	2	139	8	42	0	14	1	78	271
Flint	0	------	0	5	0	0	0	0	0	3	25
Grand Rapids	0	------	0	34	1	4	0	0	0	3	38
Wisconsin:											
Kenosha	0	------	0	3	0	0	0	0	0	0	7
Madison	0	------	0	1	0	6	0	0	0	0	15
Milwaukee	0	1	1	235	1	10	0	0	0	31	92
Racine	0	------	0	27	0	1	0	1	0	4	9
Superior	0	------	0	0	0	0	0	0	0	8	6

[1] Figures for Raleigh and Helena estimated; reports not received.

City reports for week ended July 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								
Minnesota:											
Duluth	0	------	0	0	1	1	0	0	0	18	12
Minneapolis	0	------	0	5	3	2	0	1	0	10	95
St. Paul	0	------	0	0	3	1	0	0	0	26	44
Iowa:											
Cedar Rapids	0	------	--------	3	-------	1	0	-------	0	1	--------
Davenport	0	------	--------	1	-------	1	0	-------	0	0	--------
Des Moines	0	------	--------	2	-------	2	0	-------	0	4	25
Sioux City	0	------	--------	0	-------	0	0	-------	0	8	--------
Waterloo	0	------	--------	11	-------	0	0	-------	0	0	--------
Missouri:											
Kansas City	0	------	0	15	5	3	0	1	0	8	87
St. Joseph	0	------	0	0	7	1	0	0	0	0	32
St. Louis	1	------	0	50	8	13	0	7	0	30	191
North Dakota:											
Fargo	0	------	0	0	1	0	0	0	0	7	6
Grand Forks	0	------	--------	1	-------	0	0	-------	0	0	--------
Minot	0	------	--------	4	-------	0	0	-------	0	0	8
South Dakota:											
Aberdeen	0	------	--------	1	-------	1	0	-------	0	2	--------
Sioux Falls	0	------	--------	0	-------	0	0	-------	0	0	9
Nebraska:											
Lincoln	0	------	--------	2	-------	2	0	-------	0	2	--------
Omaha	0	------	0	5	1	0	0	0	0	0	41
Kansas:											
Lawrence	0	------	0	0	0	1	0	0	0	0	2
Topeka	0	------	0	1	2	0	0	1	0	42	23
Wichita	0	------	0	1	1	0	0	0	0	8	26
Delaware:											
Wilmington	0	------	0	0	2	2	0	1	0	1	29
Maryland:											
Baltimore	0	------	0	190	9	7	0	7	0	58	242
Cumberland	0	------	0	1	0	0	0	0	0	2	13
Frederick	0	------	0	0	0	0	0	0	0	0	1
Dist. of Col.:											
Washington	1	------	0	60	6	3	0	13	0	9	177
Virginia:											
Lynchburg	0	------	0	18	0	0	0	2	0	4	16
Norfolk	0	------	0	3	2	0	0	1	0	0	29
Richmond	1	------	0	10	0	1	0	1	0	0	60
Roanoke	0	------	0	1	0	0	0	0	0	3	16
West Virginia:											
Charleston	0	------	0	0	2	0	0	0	0	0	31
Huntington	0	------	--------	1	-------	0	0	-------	0	1	--------
Wheeling	0	------	0	12	0	0	0	0	0	3	24
North Carolina:											
Gastonia	0	------	--------	3	-------	0	0	-------	0	0	--------
Raleigh	-------	------	--------	-------	-------	-------	-------	-------	-------	-------	--------
Wilmington	0	------	0	4	0	0	0	0	0	25	7
Winston-Salem	0	------	0	8	1	0	0	1	0	1	18
South Carolina:											
Charleston	0	2	0	0	0	0	0	3	0	0	14
Florence	0	------	0	0	1	0	0	0	0	3	7
Greenville	0	------	0	0	0	1	0	0	0	3	13
Georgia:											
Atlanta	1	------	0	1	2	1	0	3	1	0	62
Brunswick	0	------	0	0	0	0	0	0	0	0	5
Savannah	0	------	0	3	0	1	0	0	0	1	28
Florida:											
Miami	0	------	0	5	1	0	0	2	0	2	19
St. Petersburg	0	------	0	4	1	0	0	1	0	0	21
Tampa	0	------	0	0	2	0	0	0	0	1	31
Kentucky:											
Ashland	0	------	0	5	0	0	0	2	1	0	11
Covington	0	------	0	0	1	1	0	0	0	0	17
Lexington	0	------	0	0	0	0	0	1	0	0	15
Louisville	0	------	0	22	2	17	0	4	0	4	56
Tennessee:											
Knoxville	0	------	0	10	1	0	0	1	0	0	38
Memphis	0	------	0	11	1	0	1	7	0	15	87
Nashville	0	------	1	2	3	0	0	0	0	5	49
Alabama:											
Birmingham	0	------	0	7	2	0	0	4	1	6	73
Mobile	0	------	0	0	2	0	0	0	0	0	20
Montgomery	0	------	--------	0	-------	0	0	-------	0	0	--------

City reports for week ended July 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								
Arkansas:											
Fort Smith	0	------	-------	1	------	0	0	------	1	0	-------
Little Rock	0	------	0	5	2	0	0	0	0	4	31
Louisiana:											
Lake Charles	0	------	0	0	0	0	0	0	0	0	2
New Orleans	0	1	2	0	4	0	0	8	2	11	146
Shreveport	1	------	0	0	4	0	0	4	0	0	43
Oklahoma:											
Oklahoma City	0	1	0	4	5	1	0	0	0	0	33
Tulsa	0	------	0	1	1	0	0	0	0	11	6
Texas:											
Dallas	1	1	1	7	2	0	0	4	0	3	65
Fort Worth	0	------	0	0	1	1	0	0	0	4	35
Galveston	0	------	0	0	0	1	0	3	1	2	17
Houston	0	------	0	0	4	1	0	3	1	0	72
San Antonio	0	1	1	1	3	1	0	4	0	1	65
Montana:											
Billings	0	------	0	0	0	0	0	0	0	0	6
Great Falls	0	------	0	1	2	0	0	0	1	1	9
Helena	-------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Missoula	0	------	0	0	0	0	0	0	0	0	6
Idaho:											
Boise	0	------	0	0	0	0	0	0	0	0	5
Colorado:											
Colorado Springs	0	------	0	0	0	1	0	1	0	5	12
Denver	2	5	0	25	1	2	0	4	0	60	71
Pueblo	0	------	0	2	1	0	0	0	0	2	6
New Mexico:											
Albuquerque	1	------	0	0	0	0	0	3	0	1	13
Arizona:											
Phoenix	0	11	-------	2	-------	0	0	-------	1	7	-------
Utah:											
Salt Lake City	1	------	0	2	1	0	0	0	0	18	28
Washington:											
Seattle	2	------	0	0	5	3	0	4	0	25	113
Spokane	0	------	0	1	1	2	0	0	1	7	28
Tacoma	0	------	0	0	0	0	0	0	0	5	10
Oregon:											
Portland	0	1	0	3	0	4	0	2	0	1	53
Salem	0	------	-------	0	-------	0	0	-------	0	0	-------
California:											
Los Angeles	0	1	0	14	5	10	0	8	0	48	278
Sacramento	2	------	0	1	0	4	0	1	3	19	28
San Francisco	1	2	0	3	4	3	0	4	0	43	163

State and city	Meningitis, meningococcus		Poliomyelitis cases	State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				South Carolina:			
Worcester	1	0	0	Charleston	1	0	0
New York:				Georgia:			
New York	8	0	1	Atlanta	0	0	9
Pennsylvania:				Florida:			
Pittsburgh	1	0	0	Miami	1	0	0
Illinois:				Kentucky:			
Chicago	1	0	0	Louisville	1	0	0
Minnesota:				Texas:			
St. Paul	0	0	5	Galveston	0	0	1
Maryland:				California:			
Baltimore	4	2	0	Los Angeles	0	1	1
Cumberland	1	0	0				
District of Columbia:							
Washington	1	0	0				

Encephalitis, epidemic or lethargic.—Cases: Bridgeport, 1; New York, 3; Norfolk, 2. Deaths: New York, 1; Pittsburgh, 1; Topeka, 1.

Pellagra.—Cases: Atlanta, 1; Savannah, 4.

Typhus fever.—Cases: New York, 2; Savannah, 2; Miami, 1; Fort Worth, 1.

FOREIGN REPORTS

CUBA

Habana—Communicable diseases—4 weeks ended June 28, 1941.—During the 4 weeks ended June 28, 1941, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	9		Scarlet fever	3	
Malaria	1		Tuberculosis		2
Poliomyelitis	1		Typhoid fever	32	3

SWEDEN

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

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	13	Poliomyelitis	7
Diphtheria	5	Scarlet fever	1,082
Dysentery	8	Syphilis	16
Epidemic encephalitis	2	Typhoid fever	33
Gonorrhea	770	Undulant fever	5
Paratyphoid fever	12		

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–April 1941	May 1941	June 1941—week ended—			
				7	14	21	28
ASIA							
China:							
Canton	C		131	41			
Hong Kong	C	684	148	36			
Macao	C		162	59	57	73	58
India:							
Calcutta	C	1,664					
Rangoon	C	32	10				
India (French)	C	15	6				
Japan: Taiwan	C	[1] 2					

[1] For February and March.

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

PLAGUE

[C indicates cases; D, deaths]

Place		January–April 1941	May 1941	June 1941—week ended— 7	14	21	28
AFRICA							
Belgian Congo	C	1					
British East Africa:							
Kenya	C	11	9				
Uganda	C	51	5				
Egypt: Port Said.[1]							
Madagascar	C	183	8	2			
Morocco	C	798	346	50	112	105	
Casablanca.[2]							
Tunisia: Tunis	C	2					
Union of South Africa	C	59					
ASIA							
China: Foochow	C		3				
Dutch East Indies:							
Java and Madura	C	287					
West Java	C	193					
India:							
Calcutta	C	3					
Rangoon	C	2	2				
Palestine: Haifa—							
Plague-infected rats			7				
Thailand: Lampang Province	C	1					
NORTH AMERICA							
Canada: Alberta—Plague-infected ground squirrel							1
SOUTH AMERICA							
Argentina: Cordoba Province	C	1					
Peru:							
Ancash Department	C	1					
Lambayeque Department	C	2					
Libertad Department	C	6					
Lima Department	C	6					
Moquegua Department	C		4				
Piura Department	C	2					
OCEANIA							
Hawaii Territory: [3] Plague-infected rats		11	24	3	3	3	
New Caledonia	C	9					

[1] During the week ended July 12, 1941, 8 cases of plague, including 2 suspected cases, with 4 deaths were reported in Port Said, Egypt.

[2] A report dated June 23, 1941, stated that an outbreak of plague had occurred in Casablanca, Morocco, where several deaths had occurred.

[3] During April and May, 4 lots of plague-infected fleas were reported in Hawaii Territory.

SMALLPOX

[C indicates cases; D, deaths]

AFRICA							
Algeria	C	93	19				
Belgian Congo	C	48					
British East Africa	C	9	7				
Dahomey	C	367	85	2			
French Guinea	C	23	22				
Ivory Coast	C	30		2			
Morocco	C	31					
Nigeria	C	412	57				
Niger Territory	C	195	26	5	3		
Portuguese East Africa	C	9					
Rhodesia: Southern	C	86					
Senegal	C	43	9	1	3		
Sierra Leone	C	15					
Sudan (Anglo-Egyptian)	C	7					
Sudan (French)	C	19					
Union of South Africa	C	94					

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

SMALLPOX—Continued

[C indicates cases; D, deaths]

Place		January–April 1941	May 1941	June 1941—week ended— 7	14	21	28
ASIA							
Ceylon	C		32				
China	C	142	49	2	4	1	2
Chosen	C	464					
India	C	10,006					
India (French)	C	4	2				
India (Portuguese)	C	44					
Indochina (French)	C	505	197			[1] 64	
Iran	C	4					
Iraq	C	939					
Japan	C	109	15				
Straits Settlements	C	1					
Syria	C	1					
Thailand	C	103	115	2	4		
EUROPE							
France	C	1					
Portugal	C	20	3				
Spain	C	98	31				
NORTH AMERICA							
Canada	C	13	9				
Cuba	C	1					
Dominican Republic	C	2					
Guatemala	C	4	1				
Mexico	C	21					
SOUTH AMERICA							
Colombia	C	223	1			2	
Peru	C	249					
Uruguay	C	7					
Venezuela (alastrim)	C	79	8		3		

[1] For 3 weeks.

TYPHUS FEVER

[C indicates cases; D, deaths]

AFRICA							
Algeria	C	3,561	2,036		[1] 706		
British East Africa: Kenya	C	[2] 2					
Egypt	C	2,740	843				
Morocco	C	241	144	37	44	69	
Sierra Leone	C	5					
Tunisia	C	1,706	1,058				
Union of South Africa	C	115					
ASIA							
China	C	86	59	24			
Chosen	C	68					
Iran	C	70					
Iraq	C	20					
Japan	C	240	55				
Palestine	C	9	5				
Straits Settlements	C	2					
EUROPE							
Bulgaria	C	85	60	9			
Germany	C	554	270				
Gibraltar	C		2				
Greece	C	7					
Hungary	C	136	97	9	6	21	
Irish Free State	C	13	13				

See footnotes at end of table.

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

TYPHUS FEVER—Continued

[C indicates cases; D, deaths]

Place		January–April 1941	May 1941	June 1941—week ended—			
				7	14	21	28
EUROPE—continued							
Poland	C	145	97				
Rumania	C	486	76	8	8		
Spain	C	1,277	1,073	405			
Switzerland	C	2			1		
Turkey	C	[1] 175					
Yugoslavia	C	78					
NORTH AMERICA							
Guatemala	C	92	11				
Mexico	C	21	2	2			
Panama Canal Zone	C	3					
SOUTH AMERICA							
Chile	C	58	9				
Ecuador	C	50	15				
Peru	C	453					
Venezuela	C	26					
OCEANIA							
Australia	C	8					
Hawaii Territory	C	10	3		1	1	1

[1] For June 1–10, 1941.
[2] For the month of April 1941.
[3] For January and February 1941.

YELLOW FEVER

[C indicates cases; D, deaths]

AFRICA							
Belgian Congo:							
Kimvulu	C					1	
Libenge	C					1	
French Equatorial Africa	C	2					
Gold Coast	C	1					
Ivory Coast	C	[1] 3					
Spanish Guinea	D		4				
SOUTH AMERICA [2]							
Colombia:							
Antioquia Department	D	2					
Boyaca Department	D	5	1		1		
Intendencia of Meta	D	1	1				1
Santander Department	D	2	1				
Tolima Department	D	1					
Peru: Junin Department	C	5					

[1] Includes 2 suspected cases.
[2] All yellow fever reported in South America is of the jungle type unless otherwise specified.

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