Public Health Reports

Vol. 54 • FEBRUARY 10, 1939 • No. 6

AN EPIDEMIOLOGICAL STUDY OF POLIOMYELITIS IN THE DISTRICT OF COLUMBIA

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A study of the available epidemiological data on poliomyelitis in the District of Columbia for recent years has revealed certain points of interest which have seemed worth reporting. The data used in this report were taken principally from the routine epidemiological records of cases reported to the District of Columbia Health Department during the years 1925 to 1937, inclusive.

As in most large cities in the United States, poliomyelitis has been reported every year in the District of Columbia since the disease was made reportable in 1911. The incidence rate has been relatively low in most years, but at irregular intervals there has been a marked increase in the number of cases. There have been no epidemics in the District of Columbia of unusual severity or intensity. Even in 1916 the incidence rate was comparatively low (10.8 per 100,000 population including nonresident cases). The highest rate of incidence ever recorded in the District of Columbia was in 1935, when the rate was 11.4 (14.3 including nonresidents). These rates are far below the maximum rates reported for a number of cities.

Year		Cases			Death	5	Case	rate per populati	1 00,000 on	Death rate per 100.009	Case fatality	
1 Cal	Total	White	Colored	Total	White	Colored	Total	White	Colored	popula- tion	(percent)	
1925 1926 1927 1928 1929 1930 1931 1932 1933 1934 1935 1934 1934 1935 1936 1937	18 3 7 29 7 11 12 31 10 8 68 68 21	17 2 4 29 3 10 10 27 9 6 38 5 19	1 3 0 4 1 2 30 1 2	2114240531622	$2 \\ 0 \\ 1 \\ 4 \\ 2 \\ 4 \\ 0 \\ 4 \\ 3 \\ 1 \\ 6 \\ 1 \\ 2 \\ 2 \\ 1 \\ 1 \\ 2 \\ 2 \\ 1 \\ 2 \\ 1 \\ 2 \\ 2$	01 00 00 01 00 01 00 10	3.8 .7 1.5 6.1 1.4 2.2 2.3 5.9 1.8 1.4 11.4 1.0 3.3	4.9 .6 1.1 8.3 2.8 2.7 7.0 2.5 1.4 8.9 1.1 4.1	0.8 .8 3.1 0 3.0 .7 1.4 2.8 .7 1.3 18.8 .6 1.1	0.4 .2 .8 .4 .8 0 .9 .5 2 1.0 .3 .3	11. 1 83. 3 14. 3 14. 0 28. 5 36. 3 0 16. 0 30. 0 12. 5 9. 0 33. 3 9. 5	
Total	231	179	52	33	30	3	3. 2	3.9	3. 0	. 43	14.8	

TABLE 1.—Numbers of cases and deaths, case rates and death rates per 100,000 population, and case fatality rates, for white and colored persons in the District of Columbia, 1925-37

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The data used in this paper refer only to resident cases reported to the health department. Each case was seen by a medical inspector in order to confirm the diagnosis and to make an epidemiological investigation. Between 90 and 95 percent of the 231 cases recorded in the 13-year period had paralysis of varying degrees, and the remainder had at least an increase in the number of cells in the spinal fluid.

In table 1 the numbers of cases, and deaths and the fatality rates are tabulated for each year from 1925 to 1937, inclusive. The case rates indicate that the disease has been at a very low endemic level in most years, and even in the years of increased prevalence the rate of incidence was not high. The average annual rate for the period was 3.2 per 100,000 population and the median rate was 2.2. Seventyseven percent of all the cases and 90 percent of the deaths reported were in white persons (73 percent of the population of the city is white). During the period covered by this study the case rates for the white population were usually higher than those for the colored population. However, in 1935 the incidence rate of the latter was 18.8 as compared to 8.9 for the white population.

The death rate from poliomyelitis has never been high in the District of Columbia, and this is especially true for the colored population. Only three deaths from this cause among colored residents were recorded in the period from 1925 to 1937, and none of these occurred in 1935, when the incidence rate was comparatively high among them. For the whole period covered by this study the case fatality rate was 5.7 percent for the colored cases while that for the white was 16.7 percent. The wide difference in case fatality rates is also apparent for the various age groups of white and colored cases.

Age group (years)	Percer	t of case group	s in age	Percent	t of deatl group	ns in age	Case fatality rates			
	Total	White	Colored	Total	White	Colored	Total	White	Colored	
0-4 5-9 10-14 16 and over	31. 6 39. 0 11. 2 17. 3	28.6 41.0 11.2 19.1	42. 3 36. 5 9. 6 11. 6	30. 3 24. 2 9. 9 36. 4	30. 0 23. 3 10. 0 36. 6	33. 3 33. 3 0 33. 3	13. 7 8. 7 12. 0 30 . 0	17. 6 9. 6 15. 0 32. 0	4.5 5.3 0 16.6	

 TABLE 2.—Percentage distribution of cases and deaths from poliomyelitis and case fatality rates per 100 cases by age groups, 1925-37

The distribution of cases according to specific age groups has shown no unusual characteristics. (See table 2.) In the years of increased prevalence the age distribution of cases was essentially the same as that during the intervening years. The principal item of interest in table 2 is the higher percentage of cases under 5 years of age in the colored than in the white group. About one-third of the white deaths were under 5 years of age and another third were 15 years of age and over. Case fatality rates were highest in the older age groups of white cases, i. e., 15 years and over.

In the epidemiological investigations of the cases reported, statements on the economic status of the family were recorded on 90 percent of the records. A study of these data revealed no evidence of a greater incidence of the disease in one economic group than another. Similarly, the data on sanitation of the premises where the cases resided yielded no evidence of any significant differences in the incidence of groups living in poor, fair, or good hygienic surroundings.

Few of the cases reported gave any history of contact with previous cases, and in only a few instances was there any statement regarding contact of other members of the family with outside cases. Considering the close proximity of some cases there may have been more contact than the histories revealed. One of the 231 cases, a white male 7 years of age, gave a history of having had a tonsillectomy and adenoidectomy three weeks prior to the onset of symptoms. He died 6 days after the onset; the cause of death was stated to be polioencephalitis. Five percent of the cases gave a history of upper respiratory infections or gastrointestinal disorders within a month previous to the onset of the disease.

The whole series of cases was studied from the standpoint of geographical location in the city. During the 13-year period cases occurred in every section, but there was a certain amount of concentration in various sections in different years. In order to facilitate the location of groups of cases figure 1 was prepared and the various sections will be referred to in the description given below. Case rates for these sections for certain years are tabulated in table 3.

In 1925 more than half of the cases reported (11 of the 18 cases) lived in sections 1 and 2, and in a circumscribed area in these sections. In 1927 all except 1 case occurred in sections 3, 4, 5, and 6, while sections 1 and 7 were entirely free from the disease. In 1928, cases were reported from every section of the city, but a group of 8 patients resided in section 2. In 1929 all the cases were scattered through the central part of the city in sections 3 and 4. In 1930 the cases reported were mostly residents of the eastern half of the city, and the western half remained almost free. In 1931 the few cases which were reported came from various parts of the city. Most of the poliomyelitis reported in 1932 occurred in the north-central part of the city, principally sections 2, 3, and 7. The number of cases reported in 1933 was small but distributed very much as in 1932. In 1935 the cases were concentrated in sections 3, 4, and 5, and in 1937 they were distributed about equally in the various sections of the city. There were too few cases reported in 1926, 1934, and 1936 to show any evidence of concentration.



FIGURE 1.-Division of the District of Columbia into sections. See table 3 for case rates.

TABLE	3.—Case	rates	per	100,000 sections	population shown in fi	for gure	white 1	and	colored	persons	by
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Contine No.	Estimated	Case rates per 100,000 population					
Section No.	1937	1928	1932	1935	1925-37 1		
			White				
12 23 45 66	63, 319 102, 676 113, 374 15, 746 93, 254 2 18, 657 44, 821	10.0 11.2 7.7 0 7.0 5.5 5.7	4.0 11.2 2.0 0 9.6 0 20.0	6.3 8.7 7.0 6.3 12.8 0 9.0	4.4 5.0 2.8 3.1 3.8 8 2.2 4.4		
			Colored				
1 2 4 5 6 7	6, 316 7, 688 95, 945 15, 115 27, 745 2 13, 736 3, 096	0 0 0 0 0 0 0	0 16.6 2.6 0 4.5 0	16. 0 26. 0 15. 6 13. 3 32. 5 6. 0 0	4.6 3.8 2.8 1.9 5.2 .6 0		

¹ Average annual rate. ² Exclusive of St. Elizabeths Hospital.

By studying in detail the geographical distribution of cases of poliomyelitis in various years it became apparent that there was a considerable amount of grouping with respect to time and place in 1928, 1932, 1935, and 1937. A more detailed description of these groups follows.

Group 1, 1928.—This group of eight cases occurred in an area located in section 2. The area involved is shown in figure 2. This area is made up almost exclusively of single homes occupied by the owners. The general character of the area is excellent, there is little crowding, and sanitation is good. The population is almost exclusively white and in moderately good economic circumstances.



FIGURE 2.—Geographical location of cases reported in group 1, 1928, and color, sex, age, and date of onset of each case.

As indicated in figure 2, the onset of the first case reported in this area was in May, the second in July, and the remainder of the cases followed one after another at intervals of 1 to 11 days. Cases 5 and 6 were in the same family; case 6 had its onset 1 week after case 5. An aunt of these children (cases 5 and 6) who had very close contact with them while they were in the acute stages of the disease, also was in contact with another niece living in another section of the city. The latter niece had no contact with cases 5 and 6, but developed poliomyelitis; the onset was reported as being on September 14.

Five of the eight cases in this group had not been out of the city during 1 month previous to the onset of their infections, and the other three had been on very short visits to nearby summer resorts. Three families purchased milk from the same dairy, two from another dairy, one from a store, and no information was available for the remaining family. Except for case 6 there was no history of direct or indirect contact with other cases of poliomyelitis. Group 2, 1932.—This group, which consisted of four cases, was reported from the extreme north-central part of the city, section 7. Two of these cases, both white males 3 years of age, lived in adjoining houses on the same street. The dates of onset were August 22 and 27, respectively. The other cases in this group were reported from an institution for small children. One of these children, a white male 5 years of age, became ill on September 21, and the other, a white female also 5 years of age, had her onset on September 24. There seems to have been no connection between these pairs of cases since they lived several blocks apart and because of the long interval of time between the dates of onset.

Group 3, 1932.—This group of three cases resided in the southeastern part of the city in section 5. The first reported was a case in a white male 12 years of age, with the onset on August 7. Two days later another case in a white male 19 years old was reported from an address just around the corner in the same block. The third case, a white male 3 years of age, had its onset 12 days following that of case 2. Cases 2 and 3 lived in adjoining houses. These cases occurred in a section of the city where economic conditions are at a comparatively low level and where sanitary conditions have been unsatisfactory. None of these cases had been out of the city and there was no history of any contact with previously reported cases.

Group 4, 1935.—This group of three cases lived on the same street in one block. All were colored children, 1, 3, and 8 years of age, respectively. The onset of the first case, which resided at No. 76, was on August 14; the second, living at No. 35, became ill on August 26; and the third, at No. 19, had its onset on September 24.

The street from which these cases were reported is only one block in length. The houses are all of the row, or attached, type. These dwellings have always been crowded and have proved to be very unsatisfactory and unwholesome living quarters. Flush toilets in outhouses and backyards filled with refuse have added to the generally bad sanitary state of the neighborhood.

Group 5, 1935.—This group consisted of but two cases, two adults living at the same address in section 5. The onset of the first case was on July 13 and the second was on July 18. These cases belonged to different families. The dwelling was a large residence divided into three housekeeping suites. There was no statement that there had been any contact between these cases or with any outside cases.

Group 6, 1935.—This group of cases, eight in number, resided in the eastern part of the city in section 5. The location of the cases is shown in figure 3. Some of the blocks in this area are populated exclusively by white and others exclusively by colored persons. Most of the dwellings are row houses which have been maintained in a fairly good sanitary condition.

Case 1 of the group had its onset on July 15 and case 2, who lived almost across the street, 8 days later. The onset in cases 3 and 4, living on the same side of the street in another block, occurred on August 30 and September 4, respectively. Within a period of 2 weeks the remaining cases of the group developed, cases 6 and 7 being in close proximity to cases 3 and 4.



FIGURE 3.—Geographical location of cases reported in group 6, 1935, and color, sex, age, and date of onset of each case.

Only one of these cases, case 2, gave a history of having been out of the city during the month previous to the date of onset, and none gave any information regarding contact with the other cases.

Group 7, 1937.—This group consisted of three cases, all white boys, who lived on the same side of the street in one block of a fairly well-to-do section of the city in section 1. The first case, onset August 27, resided at one end of the block. The second and third cases, both in the same family and living at the other end of the block, developed the disease on September 13 and 22, respectively.

DISCUSSION

Poliomyelitis has been reported in the District of Columbia in persons living under a variety of conditions. Localized outbreaks have occurred in different areas where economic and environmental conditions have varied from good to bad.

The distribution of the disease has been very uneven from year to year, some sections having had comparatively high rates in some years and low rates of incidence in others. This unevenness in distribution has been a prominent characteristic of the disease in other localities.

The distribution of the disease according to race has shown some very curious variations in the District of Columbia. The case rates were higher in white persons in 9 out of the 13 years from 1925 to 1937. The ratio of white and colored rates for these 9 years varied from 2 to 1 to 6 to 1, except in 1928, when no colored cases were reported. In 1926, 1927, and 1929 the number of cases reported was too small to warrant comparing case rates of white and colored persons. In 1935 the colored rate was twice as high as the white. The high colored rate in 1935 was present in five of the seven sections of the city considered in this report. The rates in these five sections varied from 13.3 to 32.5 for colored persons and 6.3 to 12.8 for the white. The maximum rate for white and colored persons occurred in the same section, i. e., section 5. In all sections of the city except section 5, the incidence in the white population was essentially the same as in 1928 and 1932. It is evident that the high rate for the city as a whole in 1935 was due to a comparatively high rate of incidence in the colored population. The reason for this high colored rate is not apparent. It was not limited to a section where a large part of the colored population has been concentrated.

Poliomvelitis has occurred in certain areas of the District of Columbia in different years under circumstances which suggest some connection or association between cases occurring within these areas. When consideration is given to the dates of onset of these cases the possibility of some form of direct or indirect contact between cases, or a common source of infection, or both, is strengthened. The frequency of close proximity of cases in various areas does not seem to have occurred by chance alone. There were two instances of two cases in the same family, two cases in an institution for children, two cases in different families living in the same dwelling, and three instances of cases reported from adjoining houses. The interval between the onset of the first and second case varied from 3 to 12 days for these six pairs of The dates of onset of other groups of cases living in close cases. proximity on the same street or in the same block are equally suggestive of some close relationship.

MOTTLED ENAMEL IN SOUTH DAKOTA *

By H. TRENDLEY DEAN, Dental Surgeon; ELIAS ELVOVE, Senior Chemist, National Institute of Health, United States Public Health Service; and RICHARD F. POSTON, Assistant Sanitary Engineer, South Dakota State Board of Health

Mottled enamel has been endemic in South Dakota for a number of years. As early as 1916 McKay (1) demonstrated by surveys its presence at Kidder, Britton, Langford, Pierpont, Andover, Groton,

[•] From the Division of Infectious Diseases and the Division of Chemistry, National Institute of Health.

and Aberdeen. In each of these communities the endemicity was associated with the use of artesian well water obtained from the Dakota sandstone.

In 1932 (2) one of us (HTD), while studying selenium poisoning in South Dakota, observed endemic mottled enamel at Wolsey, Vayland, St. Lawrence, Miller, and at the Spear's School midway between Miller and Ree Heights. Evidence of mottled enamel was also noted in children living south and east of Harrold and in the rural districts north of Holabird and Highmore. A mild degree of mottled enamel was also observed in children residing on ranches in the northwest section of Lyman county and a border line degree of affection was present at Edgemont, apparently associated with the common water supply. Time did not permit detailed studies, but the development of mottled enamel in each locality was seemingly associated with the use of deep well water.

In the questionnaire study of geographical distribution of mottled enamel conducted by the United States Public Health Service and published in 1933 (2), questionnaires were sent to 142 selected South Dakota dentists, of whom 78 replied. Their answers pointed to numerous other localities which were listed in the 1933 report as "reported" mottled enamel areas. These places included Cavour, Yale, Iroquois, Hitchcock, Chelsea, Lake Preston, Bancroft, Fedora, Roswell, Vilas, Carthage, Esmond, the Whetstone Valley of Roberts County, Artesian, Forestburg, Doland, Conde, and Frankfort.

METHOD OF SURVEY

The present study was made by the United States Public Health Service with the active cooperation and assistance of the South Dakota State Board of Health. The planning of the itinerary was facilitated by the extensive preliminary chemical studies of common water supplies made by the division of sanitary engineering of the State board of health, in cooperation with the State chemist.

Each of the communities hereinafter referred to was visited, and subsequently with the cooperation of the local superintendent of education, school children, generally of the third to the eighth grades, inclusive, were examined. A total of 53 cities, towns, or rural communities in 21 counties was visited and $3,350^{-1}$ school children were examined. The survey provided general information on the extent of the affected territory and an approximate index of the degree of severity of the mottled enamel being produced.

Upon visiting a classroom, the purpose of the survey was first explained and those children who stated that they had lived in the

Includes 15 children examined at Harrold and 8 at Bristol but not included in tables that follow, and the 35 examined at Andover which are discussed separately in the text.

community continuously since birth and had always used the common water supply for domestic purposes (drinking and cooking) were assembled in a separate group. This group was then further questioned to determine whether there had been any breaks in the continuity of their residence and water consumption. If questioning disclosed breaks in the continuity of exposure (30 days in any calendar year excepted) the child was eliminated from this group. This group in the tables to follow is listed as "(a) Continuous residence". The remaining pupils in the classroom were then divided into two groups-those who had always lived in the surrounding rural district (boundaries of the school district) and shown in the tables under the heading "(b) Nearby rural", and those with two or more residences and water supplies and shown in the tables as "(c) Discontinuities". With the pupils divided into three groups, under good illumination each child was examined by one of us (HTD) and the presence or absence of mottled enamel recorded, the degree of severity being noted in accordance with a standard of classification previously described (3).²

The examination of the first group indicated the degree of endemicity associated with the use of the communal water supply; the examination of the second group showed whether or not the types of water used on the nearby farms were producing mottled enamel; while the examination of the third group, those with different residences and water histories, frequently revealed clinical mottled enamel developed either in other areas of known endemicity or in localities hitherto unreported as endemic areas.

SURVEY FINDINGS

The results of this survey are summarized as follows: Table 1 details the mottled enamel findings and history of the common water supply of 37 communities where a sufficient number of children were examined to warrant the computation of an approximate or tentative community mottled enamel index. Figure 1 shows the percentage distribution according to severity of affection of that part of the group examined who stated that they had resided continuously in the community and had always used the common water supply. In addition the percentage incidence of affection and the approximate or tentative mottled enamel index of the community is listed.

² This classification of diagnosis has since been abridged by combining "Moderately Severe" and "Severe" into one classification: "Severe".—HTD.

	:	of chil- ined		C act e	hi or na	ldre din me	en cl g to l dia	assi mo agno	fied ttie sis	a			
T	own and population (Census of 1930)	Total number	Total number dren exami	dren exam Normal Austionable Muld Bevere Severe		History of water supply	Remarks						
میں	LANGFORD (444)												
(8) (b) (c)	Continuous residence. Nearby rural Discontinuities	}	74	{	0 2 9	0 2 4	3 3 10	0 8 6	6 6 9	3 2 1	From 3 134-inch and 2 2- inch, 1,000-foot wells. In 1937 1 43-inch, 977- foot well was added but is not in general use be- cause of high turbidity.	All children 3d to 8th grade, inclusive, were examined.	
	HECLA (558)										1		
(8) (b) (c)	Continuous residence. Nearby rural Discontinuities	}	79	{ ;	02	1 3 5	239	3 0 14	8 4 10	0 2 1	From 1 4-inch and 1 6- inch, 1,000-foot wells in stalled in 1910 and 1931, respectively.	All children 3d to 8th grade, inclusive, were examined.	
	BRITTON (1,812)												
(a) (b)	Continuous residence. Nearby rural and dis- continuities.	}	180	{	2 12	4	11 19	10 13	26 24	10 11	From 1 3-inch and 1 8- inch, 1,000-foot wells in- stalled in 1902 and 1933, respectively.	All children 3d to 8th grade, inclusive, were examined, plus all high school pupils with con- tinuous exposure.	
	BATMOND (200)											•	
(a) (b) (c)	Continuous residence. Nearby rural Discontinuities	}	42	ł	1 3 7	1 0 1	4 1 4	2 1 1	8 2 1	2 3 0	From a 4-inch 1,100-foot well installed in 1920.	Do.	
1	LAKE PRESTON (944)												
(a) (b) (c)	Continuous residence. Nearby rural Discontinuities	}	81	{ 1	1 3 16	1 1 1	5 0 3	18 0 4	19 0 2	6 0 1	From 2 492-incn 1,178-1000 wells installed in 1913 and 1920, respectively.	(a) Children continu- ous exposure 3d to 12th grade, inclu- sive, examined; (b) (rural) 6th, 7th, and 8th grades only; (c) (discon- tinuities) 3d, 4th, and 5th grades only.	
(a)	Continuous residence.	h		ſ	0	1	7	3	6	1	From 1 2-inch 975-foot	All children 4th to	
Ъ́ С	Nearby rural Discontinuities	ľ	49	ĺ	3 4	03	2 5	1 2	2 9	0	well drilled in 1916.	8th grade, inclu- sive, were examin- ed plus all high- school pupils with continuous expo- sure.	
	NORTHVILLE (260)												
(a) (b) (c)	Continuous residence. Nearby rural Discontinuities	}	53	ł	1 6 9	0 0 3	1 4 3	8 2 6	4 1 2	2 1 0	From 2 2-inch 900-foot wells installed in 1920.	All children 4th to 12th grade, inclu- sive, were exa ined.	
	CONDE (431)												
(a) (b) (c)	Continuous residence. Nearby rural Discontinuities	}	48	{	1 0 4	2 0 5	6 0 7	3 0 4	4 0 8	2 1 1	From I 3-inch 1,000-foot well installed in 1905.	All children 3d to 8th grade, inclusive, were examined plus all high-school pupils with contin- uous exposure.	
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TABLE 1.—Summary of mottled enamel findings and history of water supply in certain cities and towns of eastern South Dakota

TABLE	1.—Summary of mottled enamel findings and history of water supply in
	certain cities and towns of eastern South Dakota-Continued

_		of chil-	ped	Ch acco en	ildr ordin am	ren d ng ta	lass o m lagn	ifie ottl osis	d ød		
	Town and population (Census of 1930)	Total numbe		Normal	Questionable	Very mild	Mild	Mild Moderate Severe		History of water supply	Remarks
_	ST. LAWRENCE (413)										
(8) (b) (c)	Continuous residence. Nearby rural Discontinuities	}	62	{ 5 4 14	2 0 2	6 0 6	6 2 2	9 1 3	000	From 1 2-inch 1,300-foot well installed in 1920.	All children 3d to 5th grade, inclusive, were examined, plus 1st and 2d grades and high- school pupils with continuous expo- sure.
	PIERPONT (379)									(From 1 6-inch 1.165-foot	All children 3d to 8th
(a) (b) (c)	Continuous residence. Nearby rural Discontinuities	}	69	$\begin{cases} 1 \\ 6 \\ 15 \end{cases}$	2 4 3	7 2 4	9 0 2	7 3 4	0 0 0	well drilled in 1912 and from 1 6-inch 90-foot well. The shallow well furnishes only about 1 percent of the town's water.	grade, inclusive, were examined.
	WOLSEY (455)										
(8) (8) (8) (8) (8) (8) (8) (8) (8) (8)	Continuous residence. Nearby rural Discontinuities	} •	ю	$\left\{ \begin{array}{c} 1\\ 37\\ 20 \end{array} \right.$	3 3 0	234	6 1 5	4 1 0	000	From 1 4-inch 980-foot well installed in 1920.	All children 3d to 12th grade, inclu- sive, with continu- ous exposure in Wolsey or rural district were ex- amined. (c) In- cludes children from 3d to 8th grades only.
	PLATTE (1,207)									(From 2 wells, 1 6-inch	All children 3d to
(a) (b)	Continuous residence. Discontinuities	} 7	75	{ 9 14	10 3	12 2	12 1	10 0	2 0	465-foot installed in 1914 and from an 8-inch 850- foot well installed in 1936. A 6-inch 465-foot well constructed in 1924 was abandoned in 1926 and an 8-inch 290-foot well drilled in 1926 was abandoned in 1936.	12th grade, inclu- sive, with continu- ous residence were examined.
	HITCHCOCK (334)									(Between 1910 and 1937	All children 4th to
(8) (b) (c)	Continuous residence. Nearby rural Discontinuities	}	0	2 8 9	2 1 2	5 0 3	2 0 2	3 0 1	000	from a 3-inch, 900-foot well. Since 1937 from a 1½-inch, 1,040-foot well.	8th grade, inclu- sive, examined.
(a) (b)	BEDFIELD (2664) Continuous residence. Discontinuities	} 11	7	{ 14 48	5 3	14 12	5 2	9 4	10	(From 4 wells; 2 4½-inch drilled in 1906 and 1911, respectively; 1 6 -inch drilled in 1917 and 1 8- inch drilled in 1920. A 3-inch well drilled in 1908 and a 6-inch well drilled in 1914 were aban- doned in 1933. All wells approximately 1,000 feet deep.	All children of the 4th, 5th, and 6th grades were exam- ined.
(a) (b) (c)	IROQUOIS (531) Continuous residence. Nearby rural Discontinuities	9	9	8 8 30	2 0 5	8 4 10	5 8 7	4 2 2	1 0 0	(Present supply obtained from 2 6-inch, 900-foot wells installed in 1900 and 1923. Between 1908 and 1937 the supply was augmented with water from a 2½-inch 900-foot well, now abandoned.	All children 4th to 12th grade, inclu- sive, were exam- ined.

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		of chil-	ned	C act	bi cor	ldre din me	en cl g to l dia	lassi 100 agno	ified ottle osis	d		
1	Fown and population (Census of 1930)	Total number	dren exami	Normal		Questionable	Very mild	Mild	Moderate	Severe	History of water supply	Remarks
	DOLAND (538)										(From 1.6 inch and 1.3 inch	All children 3d to 8th
(a) (b) (c)	Continuous residence. Nearby rural Discontinuities	}	54	{	5 3 3	4 3 3	2 1 7	10 1 3	4 1 4	0 0 0	well drilled in 1925 and 1935, respectively. Both wells a pproximately	grade, inclusive, were examined.
	MELETTE (363)											
(a) (b)	Continuous residence. Discontinuities	}	42	{	5 8	43	4	63	2 1	1	From 2 2-inch, 930-foot wells installed in 1910.	All children 4th to 8th grade, inclu- sive, were exam- ined, plus all high- school pupils with continuous expo- sure.
(a) (b) (c)	Continuous residence. Nea:by rural Discontinuities	}	99	{	11 6 21	9 0 5	15 1 7	12 1 5	5 0 0	1 0 0	From 3 2-inch wells, 1,200 feet, 1,470 feet, and 1,540 feet deep, respec- tively. Date of installa- tion unknown.	All children 3d to 12th grade with continuous expo- sure examined; in addition, rural chil- dren, 3d to 6th grade and broken histories, 3d to 8th grade.
	GETTYSBURG (1,400)										(From 1 1½-inch, 2,130-	All children 3d to 8th
(a) (b) (c)	Continuous residence . Nearby rural Discontinuities	}	151	{	17 15 70	7 1 3	16 2 1	8 0 5	3 0 1	2 0 0	foot well drilled in 1900 and from a 4-inch, 1,920- foot well installed in 1922.	grade with contin- uous exposure ex- amined. Rural and broken histories from 4th to 8th grade, inclusive.
(a) (b) (c)	FAULETON (739) Continuous residence. Nearby rural Discontinuities	}	96	{	15 2 23	5 0 2	24 ປ 6	7 0 3	5 0 4	000	From a 3-inch, 1,400-foot well drilled in 1922. Prior 1922 from a well similar in diameter and depth abandoned in	All children 3d to 8th grade, inclusive, were examined.
(a) (b) (c)	MILLER (1,447) Continuous residence. Nearby rural Discontinuities		105	{	17 6 29	9 0 2	15 0 11	7 1 2	3 0 3	000	(From a 1,650-foot, 6-inch well installed in 1926. Prior to that time from 3 4 inch, 1, 650-foot wells directly connected to the mains. Those wells are at present connected with the mains but due to lowered artesian pres- sure furnish but a small amount of water. Six- inch well is numped.	All children 4th to 7th grade exam- ined, plus 8th grade pupils with continuous expo- sure.
	CARTHAGE (590)										· men word is pumpour	
(a) (b) (c)	Continuous residence. Nearby rural Discontinuities	}	77	{	9 2 12	7 0 3	8 0 9	8 3 5	2 0 8	0	From 1 4-inch, 1,100-foot well installed in 1908.	All children 3d to 8th g r a d e examined, plus high school pupils with con- tinuous exposure.
(8) (b) (c)	FEDORA (225) Continuous residence. Nearby rural Discontinuities	}	67	{	8 9 5	2 9 4	4 8 7	2 3 1	14	0000	Communal supply. Town is supplied by groups of individuals sharing the expense of drilling and piping flowing artesian wells. Wells are all 1 inch or 1¼ inches in diameter and are approx- imately 700 feet deep.	All children exam- ined, 4th to 8th g r a d e, inclusive, plus high school pupils of contino- ous exposure in both Fedora and surrounding rural districts.

TABLE	1.—Summary of	' mottled enamel	findings and l	history of water	supply in
	certain cities at	rd towns of easte	rn South Dak	ota-Continue	1

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TABLE 1Summa	ry of mottled enamel	findings and history of	water supply in
certain citi	es and towns of east	ern South Dakota-Co.	ntinued

		_	_	-	_	_		_	_	_		
				Children classified according to motified enamel diagnosis								
_	Town and population (Census of 1930)	Total number		Normal	Questionable	Very mild	Mild	Moderate	denote the	Severe	History of water supply	Remarks
	KIMBALL (111)											
(i) (i)	 a) Continuous reisdence. b) Discontinuities ABERDEEN (16,465) 	} :	58 {	24 14	4	61	50		1	10	}From 1 432-inch, 1,300-foot & ell installed in 1915.	All children of con- tinuous exposure 4th to 12th grade, examined. Broken- history group from 7th grade only.
(4	ABERDEEN (16,465) (a) Continuous residencè		6	109	20	24	10		3	0	At present from im- pouncied surface (river) supply installed in 1935. Previously from 46-inch and 2 8-inch wells. Water from 3 of the wells emptied into cov- ered reservoir southeast section of city; water from 2 wells emptied into open reservoir in north west part of city: water from each reservoir pumped di- rectly into distribution system. In addition there are reports of other artesian wells (number unknown) connected di- rectly to the distribu- tion system. Wells ap- proximately 1,200 fect	All children of con- tinuous exposure in 4th, 5th, and 6th grades of 3 schools plus pupils of 7th and 8th grades of l school examined.
	TULARE (305)										deep.	
(a) (b) (c)	Continuous residence. Nearby rural Discontinuities	44	{	2 8 15	1 2 3	4 1 3	3 1 0	0 1 0	0 0 0	}	From 1 3-inch 1,200-foot well installed in 1916.	All children 4th to 8th grade, inclu- sive, examined.
	LEOLA (724)									ľ	From 1 4-inch 1,600-foot	Do.
(a) (b) (c)	Continuous residence. Nearby rural Discontinuities	103	{	9 19 37	6 1 6	10 1 6	6 0 1	0 1 0	0 0 0	ľ	well installed in 1930. Prior to that year from a 1-inch 1,636-foot well installed in 1911 and abandoned in 1930.	
(a)	Continuous residence	1	1	17	3	6	5	0	0	ſ	From 2 wells. One 2½- inch 1,640-foot installed	All children 3d to 8th
(6) (c)	Nearby rural Discontinuities	- 75	ĺ	11 25	0	0 5	0 1	10	0	ľ	in 1911 and 1 6-inch 1,700-foot well put in in 1933.	amined.
	FRANKFORT (367)											
(a) (b) (c)	Continuous residence- Nearby rural Discontinuities	- 59	{	9 2 17	5 3 2	3 6 1	2 1 6	0 1 1	000	ľ	from 2 2-inch 1,000-foot wells installed in 1926 and from 1 3-inch 1,020- foot well drilled in 1929.	Do.
(a) (b) (c)	GEOTON (1,009) Continuous residence. Nearby rural Discontinuities	104	{	11 4 28	5 2 5	13 2 11	2 4 7	0 0 6	0 1 3	ſ	From 2 wells, a 4-inch 900-foot well installed in 1927, owned by the city, and a 6-inch 900- foot well owned by C. M. St. P. and P. R. R. Most of common water supply from city well.	All children 4th to 8th grade, inclu- sive, examined.

		of chil-	fned	ac	Chi cor ens	ldre din me	en cl g to l dia	assing	ified ottle osis	d	
1	Town and population (Census of 1930)		Total number dren exam		Normal Quectionable		Very mild	Mild	Moderate	Severe	History of water supply Remarks
(a) (b) (c)	HOWARD (1,224) Continuous residence. Nearby rural Discontinuities	}	111	{	31 8 38	8 0 5	6 0 9	3 1 0	0 0 2	000	From 2 8-inch 405-foot wells drilled in 1900 and 1910 and still in use. pupils of constant exposure.
(a) (b) (c)	ASHTON (314) Continuous residence. Nearby rural Discontinuities	}	38	{	8 0 9	1 0 3	8 1 4	1 1 2	000	C C C	From 2 2-inch 1,100-foot wells installed in 1915 and 1929, respectively.
(a) (b) (c)	CAVOUR (202) Continuous residence. Nearby rural Discontinuities	}	78	{	13 20 19	5 2 4	4 3 2	6 1 1	0 1 3	с С 0	From 1 2-inch 850-foot well drilled in 1924. Prior that date from a well of same depth abandoned in 1926.
(a)	ABLINGTON (1,920) Continuous residence.		47		40	6	1	0	C	0	From 2 wells, 2½ inches and 4 inches in diameter, 1,320 feet deep and in- stalled in 1915 and 1930, respectively. 1915 well used for reserve pur- poses since 1930.
(a) (b) (c)	DE SMET (1,017) Continuous residence. Nearby rural Discontinuities	}	75	{	25 26 14	2 0 3	0 1 2	0000	02		(From a 42-foot grave) packed "Kelly Well" installed in 1927. Prior that date from a shallow well of same depth. (From a 42-foot grave) that date from a shallow and rural, exam ined. Broken his tories from 8th grade only
(a) (b) (c)	ALPENA (499) Continuous residence. Nearby rural Discontinuities	}	58	{	13 16 22	0 1 4	0 0 2	0000	0	0000	From 1 20-foot dug well 12 feet in diameter in- stalled in 1920 and now used for reserve, and 2 44-inch flowing artesian wells, one 837 feet deep, installed in 1927, and one 784 feet deep, in- stalled in 1935.
(a) (b) (c)	WESSINGTON (681) Continuous residence. Nearby rural Discontinuities	}	76	{	21 16 33	003	0 0 2	001			(Present supply from grav- el packed 32-foot shallow well installed in 1936. Prior to 1936 from 2 0 30-foot dug wells put in in 1920 and 1928 and from 1 2½-inch 1,100- foot drilled well installed in 1903.
	Total	2,	941							 	-

TABLE 1.—Summary of mottled enamel findings and history of water supply in certain cities and towns of eastern South Dakota—Continued

In some instances the fluoride (F) content of the common water supply at the time of the clinical examination is also given. Extreme caution, however, should be followed in correlating many of these chemical findings with the clinical observations. Because of inadequateness of the sample in certain communities or the frequency with which new wells were added or old ones abandoned during the life-

CHILDREN	IN CO	ITINUOUS RESIDENCE AND UNINTERR MUNICIPAL WATER.	UPTEC	USE OF
PLACE	SIZE OF SAMPLE	PERCENTAGE DISTRIBUTION OF SAMPLE	CIDENCE OF AFFECTION "F"CONTENT OF WATER	COMMUNITY MOTTLED ENAMEL INDEX
LANGFORD	12		00	+MARKED
HECLA	14		93 5.0	+ "
BRITTON	63		9.0 6.6	, a
RAYMOND	18	XXXX//////////////////////////////////	89	+ "
LAKE PRESTON	50		96 5.9	
CLAREMONT	18		94 1	TRATHER MARKED
NORTHVILLE	16		93	+ " "
CONDE	18		83	+MEDIUM
ST. LAWRENCE	28		75 2.9	*
PIERPONT	26		88 4.7	u
WOLSEY	16		75 2.4	+ "
PLATTE	55		65 3.0	SLIGHT
HITCHCOCK	14		71	+ "
REDFIELD	48		60 2.7	
IROQUOIS	28		64 2.1	
DOLAND	25		64 2.9	MEDIUM
MELLETTE	22		28	TSLIGHT
CETTYPOUDO	55		66 24	ä
EAUL KTON	50		60 2.4	
MULEP	51		49 22	
CARTHAGE	34		50 28	
FEDORA	17	XXXX//////////////////////////////////	41	+ *
KIMBALL	42		30	BORDER LINE
ABERDEEN	166		22 1.7	u u
TULARE	10		70	+ SLIGHT
LEOLA	31		61 2.3	a,
ONIDA	31		35 2.6	
FRANKFORT	19		26	†BORDER LINE
GROTON	31		48	SLIGHT
HOWARD	48		18 1.4	BORDER LINE
ASHTON	18		50	+SLIGHT
CAVOUR	22		18	+ BORDER LINE
ARLINGTON	47	20.000	2	NEGATIVE
DE SMET	27			_ " ·
ALPENA	13			т " + 8
WESSINGTON	21		0	т "
LEGEND:	RATE TO) 10 20 30 40 50 60 70 80 90 100 SEVERE CONTRACTIONABLE * TOTAL	NO. CH	LDREN IN
EXXXXX MILD	MILD	THE 37	7 SAMPI	_ES: 1261.

FIGURE 1.—Severity of mottled enamel in children of certain selected communities of eastern South Dakota.

⁴ Lake Preston and Pierpont seemingly warrant further comment, each community having the requisites for quantitative evaluation. But if the degree of clinical severity is compared with areas studied in other States (Pub. Health Rep., 52: 1249-1264 (September 10, 1937)) one would get the impression that the degree of clinical severity is less than that commonly associated with a domestic water containing fluoride (F) in the concentration found at these places. Thus Lake Preston showed a fluoride concentration of 5.9 p. p. m., but the degree of clinical severity was not appreciably greater than that found in communities in other States where the fluoride concentration was in the neighborhood of 4.0 p. p. m. Whether or not this phenomenon is due to a lessened water intake because of meteorological conditions (long severe winters) or whether the rather unusual mineral concentration of these waters influences to some extent the activity of the fluorine, would, of course, require further investigation. It is to be remembered, also, that in many of the other areas with which comparisons are made, the figure for fluoride concentration is based on an arithmetical mean of twelve consecutive monthly samples. In the case of these South Dakota communities, the figure of the fluoride concentration is based upon a single determination.

In table 2 is listed the summary of mottled enamel findings in certain communities having a common water supply but where an insufficient number of children were examined to permit the computation of even a tentative community mottled enamel index. Table 3 summarizes the findings in six communities, four of which have no common water supply and two where the mineral composition of the common water supply is such that the water is not used for domestic purposes.



The geographical distribution of mottled enamel is shown in figure 2, the indexes being computed upon the basis of the percentage distribution of clinical severity in the manner previously cited (3).

Clinical evidence suggestive of other endemic areas.—During the examinations in the school, numerous children were examined who had lived in two or more places. In tables 1, 2, and 3 such children are listed under the heading "(c) Discontinuities". In this group were many children who presented clinical evidence of mottled enamel. Cross questioning often revealed residence during the susceptible period in a known endemic area. There were, however, other children showing clinical signs of mottled enamel, who stated that they had resided during the susceptible period in areas not as yet surveyed. The actual observation of clinical mottled enamel from

TABLE 2.—Summary of motiled enamel findings in certain communities of eastern South Dakota with a common water supply, but where an insufficient number of examinations precluded the computation of a motiled enamel index

	of children	C	hildi acco tled nosi	ren rdin ens	cla lg t sme	o m l di	led ot- ag-		
Town and population (Census of 1930)	Total number examin	Normal	Questionable	Very mild	Mild	Moderate	Severe	History of water supply	Remarks
AGAB (200) (a) Continuous residence (b) Nearby rural (c) Discontinuities	23	{ 8 6 6	003	0 1 2	2 0 0	0000	0000	From a 4-inch 1,800-foot well installed in 1926.	All children 4th to 8th grade, inclusive, ex- amined.
(a) Continuous residence. (b) Nearby rural	42	{ 1 1 5	1 2 1	1 8 8	1 8 2	000	0 1 0	From a 3-inch 1,200-foot well drilled in 1917.	All children 4th to 8th grade, inclusive, ex- amined. A mottled enamel of moderate severity is being de- veloped in immediate rural district.
(a) Continuous residence. (b) Nearby rural	41	{5 10 15	0 1 1	008	030	0 0 3	0 0 0	From a 3-inch 740-foot well installed in 1915.	All children 4th to 8th grade and 10th grade examined. Motiled enamel being devel- oped in immediate rural district.
(a) Town and rural (con- tinuous).	27	20	1	6	0	0	0	From a 1¼-inch 780-foot well drilled in 1928 and continuous use since.	All children 3d to 12th grade of continuous residence examined, Mottled e n a m e i mostly from rural district.
(a) Continuous residence.	3	2	1	0	0	0	0	From 2 900-foot wells 6- inch and 3-inch in- stalled in 1910 and 1916, respectively. Wells were receased to 3-inch and 2-inch, respective- ly, in 1933.	Only 3 children 1st to 8th grade have con- tinuously used city water. Others use individual wells or cisterns.
 (a) Continuous residence. (b) Nearby rural (c) Discontinuities WHITE LAKE (530) 	} 16	$\left\{\begin{array}{c}3\\6\\2\end{array}\right.$	2 0 2	0 0 0	0 0 0	0 1 0	000	From a 2-inch 611-foot well installed in 1912.	All children in school examined. One "moderate" case re- ports using water from a 380-foot well.
(a) Continuous residence. (b) Discontinuities	} 24	{ 2 19	0 2	01	00	00	8))	From a 4½-inch 907-foot well drilled in 1923.	5th and 6th grades ex- amined; town has a common water sup- ply, but residents une mostly cistern water.
Total	176								

	of children	Ch ti n	ildr ccor led osis	en din ena	cla g to mel	ssifi m di	ed ot- ag-		
Town and population (Census of 1930)	Total number exami	Normal	Questionable	History of water supp History of water supp Pilu Araba Pilu Ara		History of water supply	Remarks		
ARTESIAN (556) (e) Town and rural (con- tinuous). (b) Discontinuities	} 51	{ ¹² 13	5 4	6 1	3	4	0	(City has a 4-inch 700- foot well installed in 1905 which with a number of individual wells are connected to a common distribu- tion system.	All children 3d to 8th grades examined.
EUERKA (1,308) (a) Town and rural (con- tinuous). (b) Discontinuities	} [:] 35	{17 {16	1 1	0	0	0	0	From a 3-inch 2,300-foot well installed in 1919. For domestic purposes residents use cistern and shallow well wat- er almost exclusively.	All of 4th grade ex- amined. In addition all of 5th and 6th grade were ques- tioned and no child found who used city water continuously.
HERREID (544) (a) Town (continuous) (b) Rural (continuous) (c) Discontinuities VAYLAND (550)	62	25 5 29	2 0 1	0 0 0	0 0 0	0 0 0	0 0 0	No common water sup- ply. Residents obtain domestic water from 12-15-foot dug wells and cisterns.	All children 3d to 6th grades, inclusive, ex- amined.
 (c) Town and rural (continuous). (b) Discontinuities	} 19	$\left\{ \begin{array}{c} 5\\ 8\end{array} \right\}$	2 1	2 1	0 0	0 0	0 0	{No common water sup- ply.	All children 1st to 8th grades examined.
VILAS (106) All pupils present	8	7	1	0	0	0	0	No common water sup- ply.	Enrollment of school: 9.
woonsocket (1,108) ¹ Total	175								

TABLE 3.—Summary of motiled enamel findings in certain communities of eastern South Dakota having no common water supply and 2 places where the common water supply is not used.

¹ Due to extreme hardness and magnesium sulfate content of city water, common water supply little used for domestic purposes. A few children in 3d and 4th grades stated they had used the common water supply but it was not possible to find a single pupil in the 5-8 grades who had used city water continuously. Local superintendent of education states there are approximately 300 individual wells in the community. Mottled enamel observed in children using water from artesian wells in this locality.

County	Towns or Rural Districts
Aurora	Stickney and northern part of county.
Beadle	Yale, Virgil.
Brown	Putney, Ferney, Bath, and rural districts north
· · · · · · · · · · · · · · · · · · ·	of Aberdeen.
Edmunds	Craven, Mina.
Faulk	Chelsea, Cresbard, Orient.
Hamlin	Hazel.
Kingsbury	Bancroft, Hetland.
Marshall	Newark, Amherst.
McPherson	Wetonka.
Perkins	Lemmon.
Potter	Gorman.
Sanborn	Northeast and western section of county.
Spink	Athol, Crandon, Turton.
Turner	Parker.
Union-Lincoln	Beresford.4

these places warrants their listing as "probable" endemic areas pending confirmation by surveys. These places are:

As has been previously noted, endemic mottled enamel has also been observed in children residing in the rural districts north of Holabird and Highmore.

Effects following the change of water supply at Andorer, South Dakota.—The previously mentioned survey by McKay in 1916 (1) disclosed endemic mottled enamel at Andover associated with the use of the town artesian well water. In 1928 this community changed its common water supply from the 800-foot artesian well to a dug shallow well 22 feet deep. There is a local record that the supply from the 800-foot artesian well was augmented between 1926 and 1928 by a small amount of water from a 170-foot well. Both the 800-foot well and the 170-foot well were abandoned in 1928, and since that date the common water supply of Andover has been obtained wholly from the dug shallow well.

This survey revealed the marked clinical difference resulting from the change in the common water supply. In the Andover school were 35 children who stated that they were born in Andover, had resided there continuously, and had always used the common water supply. Fourteen of this group were between 7 and 10 years of age, a group that obviously used the shallow well water exclusively for domestic purposes. None of the 14 showed evidence of mottled enamel. In the intermediate group there were 8 children, ages 11 to 13, who had calcified their permanent teeth while using both water supplies, and 3 of the 8, or 37 percent, showed mottled enamel; and in the highest age group, 14 to 18, there were 13 children who apparently calcified their teeth while using the artesian water, and 9 of these, or 69 percent,

⁴ A recent survey by Dr. R. H. Wilcox, epidemiologist, State Board of Health, has demonstrated endemic mottled enamel at Beresford.

showed mottled enamel. These differences are presented in tabular form in the following table:

 TABLE 4.—Clinical differences following a change in the common water supply at Andover, S. Dak.

Age at time of examination	18-14	13–11	10-7
Water used during period of tooth calcification. Number of children examined Percentage with mottled enamel	Deep well (artesian) 13 69	Both supplies 8 37	Dug shallow well. 14. 0.

Water supplies.—Endemic mottled enamel in South Dakota seems limited to the users of artesian water obtained from the Dakota sandstone. For a complete description of this aquifer the reader is referred to the work of Darton (Water Supply Paper No. 227, United States Geological Survey, and earlier publications). Data respecting the common water supplies referred to in the tables under the heading "History of Water Supplies" were obtained by one of the authors (RFP).

During the survey, samples of the present common water supply of 18 communities and 2 samples of the "old" Aberdeen supply were collected for chemical analyses. The mineral composition of the samp'es, Aberdeen excepted, indicated merely the type of domestic water used at the time of the survey; it must be remembered that the clinical effects noted at the same time reflect the type of water used 8 to 15 years previously, dependent upon the age group examined. Reference to the data recorded in the tables under "History of Water Supplies" will reveal whether or not a correlation of the fluoride (F) content of the water with the clinical condition observed is warranted.

The fluoride content was estimated colorimetrically by means of the zirconium-alizarin reagent (5). In accordance with our usual custom, constituents of the water, other than fluoride, were likewise determined. These analyses are shown in table 5.

DISCUSSION

On the basis of studies to date endemic mottled enamel in South Dakota seems limited solely to users of artesian water obtained from the Dakota sandstone. Fortunately none of the larger cities in eastern South Dakota (Sioux Falls, Aberdeen, Huron, Watertown, or Mitchell) obtain their common water supplies from this aquifer ⁵ and the endemicity is limited to the smaller communities and rural districts.

Chronic endemic dental fluorosis (mottled enamel) is widely distributed in South Dakota. The known endemic and "probable" areas with few exceptions are in that part of the State lying east of

Aberdeen changed to a surface supply in 1935.

No.	1	8688176 5 F3551608400400	
Fluo- ride (F)		5659495499999999999	
Boron (B)		0+1-10 0+1-10 0+0+4 0+0+4 0+0+0+0+0+0+0+0+0+0+0+0+0+	
Phos- phate (PO4)	а	00,00 0 00,00000,0,00	
Chlo- ride (Cl)		375.0 3335.0 1591.5 2545.5 2545.5 2691.5 2691.5 2690.0 218.5 267.0 218.5	
Nitrate (N03)		54556666646511 4 456664 5455666666511 4 456664 5477687482000 0 407800	
Sul- phate (SO4)		1, 407.9 1, 1132.0 1, 1147.0 1, 1147	
Bicar- bonate (HCO ₂)		311.1 341.6 341.6 192.7 192.7 192.8 192.8 192.8 192.8 175.6	
Car- bonate (CO ₃)	р. р. ш.)	000%0000%0000 0 0%000	
Sodium and po- tassium (calcu- lated as Na)	million (965. 5 870. 4 870. 4 8827. 6 885. 7 885. 7 885. 7 7744. 7 7744. 7 7744. 7 7744. 7 7744. 7 885. 8 885. 7 7744. 7 7744. 7 885. 8 884. 6 884. 6 8	od in 1036
Mag- nesium (Mg)	Parts per	నిన4ర్లో లేశులు లే. రోగ్ లే. క్రిపెట్టి కి లాలా లేదింది. లే. రోగ్ లే. కిల్లాలే లాలా లాలు లాలా లాలు లాలా లాలు	a fratall
Cal- clum (Ca)		225 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	m n la cu
Alu- minum (Al)			IBY ITUO
Iron (Fe)		0.000000000000000000000000000000000000	And survey
Silica (SiO ₂)		1222 1222 1222 1222 1222 1222 1222 122	
Fixed residue		999992 99 10388999929992999299992999999999999999999	
Loss on ignition		31833889 F PEF83328383888	Surnn "
Residue on evap- oration		2000 2000 2000 2000 2000 2000 2000 200	
City or town		Hecla Britton St. Lawrence St. Lawrence Piercont Vision Piercont P	1 Comples from molls
No.		80887 9 6423510084924	

A samples from wells of the "old" supply; a "new" impounded surface water supply was installed in 1935.

Norr.- Assistant Chemist C. G. Remsburg carried out the determinations other than flouride and boron, using mostly the methods given in the Standard Methods of Water (Analysis of the horder Fublic Health Association. The prosphate was determined confrimerically by an adaptation of the Benefict and Theis Method (J. Buk. Chem., 41: 68 (1994)). The boron determinations were made essentially by the method of Foote (J. Ind. Eng. Chem., Anal. Ed. 4: 80 (1991).

TABLE 5.—Analyses of selected South Dakota common water supplies #

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the Missouri River; together they embrace a total of 26 counties. Briefly, the data presented in the distribution map shows that endemic mottled enamel has been demonstrated in 41 communities divided among 20 counties. In addition, a "border-line" degree of endemicity was observed in 5 communities. Furthermore, there are 30 other places listed as "probable" endemic areas on the basis of observed clinical mottled enamel in children who resided in these places during the period of susceptibility. Thirteen other communities either included in this survey or subject to observations made in 1932 are listed as "negative."

Although the Andover studies were only incidental to the main investigation, the facts disclosed deserve further attention. This community represents the third recorded instance of mottled enamel being prevented simply by changing the water supply from one containing comparatively high concentrations of fluorides to one that is free, or nearly free, from fluorides. The difficulty of obtaining evidence of this nature in a human population is evident when it is realized that a lapse of 8 to 10 years is required after the change in the water supply before the clinical consequence is demonstrable. The various aspects of the evidence of clinical differences, together with the report of the results noted in two other communities, Oakley, Idaho, and Bauxite, Arkansas, have been discussed in detail in another paper (6).

SUMMARY

1. There are 41 communities in South Dakota divided among 20 counties where endemic mottled enamel has been demonstrated by survey.

2. In addition there are 30 other places where mottled enamel is probably endemic.

3. The endemicity is seemingly limited to the smaller communities and rural districts where the inhabitants obtain their domestic water from the Dakota sandstone.

ACKNOWLEDGEMENT

The authors are greatly indebted to State Sanitary Engineer W. W. Towne for his assistance in planning the study and providing much preliminary information on the fluorine content of numerous South Dakota public water supplies. This basic information permitted the outlining of an itinerary that resulted in considerably enlarging the region of known endemicity in South Dakota.

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THE EFFECT OF ARTIFICIAL TEMPERATURES ON STABIL-**ITY OF NEOARSPHENAMINE**

By T. F. PROBEY, Associate Pharmacologist, and W. T. HARRISON, Senior Surgeon, United States Public Health Service

The regulations for the control of arsphenamine and its derivatives prior to 1938 (1) required that the stability of these preparations should be determined by exposing the ampuled product to a temperature of 56° C. for 24 hours, during which time it should show no marked change in color, consistency, or solubility. Similar tests are required by the United States Pharmacopoeia, XI (2), and are also included in the control regulations of certain other countries. Since the adoption of this test all of the arsphenamine products received for official examination have been tested routinely for stability. Roth (3), in 1921, reported that temperature is an important factor in hastening the deterioration of some lots of neoarsphenamine. His investigation included temperatures of 37° C. and 100° C. as well as the control at 20° C. Some lots were affected by exposure for 9 months at 37° C., while at 100° C. changes were noted after 20 minutes in 3 of 6 lots examined.

The simultaneous influence of time and temperature upon the stability of neoarsphenamine in ampule was reported by van den Branden and Dumont (4), in 1933. In a series of tests with the temperature range from 30° C. to 70° C. they reported no change after 34 days' exposure to 30° C., but as the temperature was increased deterioration became progressively more marked.

Stability of the arsphenamines, especially neoarsphenamine, in the presence of temperatures higher than average room temperature has been investigated to determine proper storage conditions and, also, to ascertain the influence of tropical or semitropical temperatures. The use of artificial heat as a means of determining stability, and to develop a test to estimate the keeping quality of these drugs, apparently has not been accomplished. This "heat test" at 56° C. has been performed routinely at the National Institute of Health and by the arsphenamine manufacturers, but very little was known of the relation between the results of these tests and the actual deterioration which took place after distribution of the products.

Investigations of the stability of neoarsphenamine have indicated a number of factors which influence its keeping qualities. Roth (3), and van den Branden and Dumont (4) have demonstrated that stability varies directly with the increase in temperature and with age. Probey and Harrison (5) demonstrated that age and moisture content of neoarsphenamine are both factors influencing the stability of the drug, removal of moisture greatly increasing the period during which the product retains its color and solubility.

	Days of exposure														Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	ber lots tested
Daily samples stable Daily samples unstable	1 0	4	15 0	371 3	292 2	155 3	311 11	64 5	27 3	39 2	19 1	6 0	7 0	12 0	1, 323 30
Total	1	4	15	374	294	158	322	69	30	41	20	6	7	12	1, 353

 TABLE 1.—Stability of neoarsphenamine at 56° C. Total lots, 1,353. Moisture content up to 7.0 percent. Tested January 1932 to March 1937

During the period from January 1932 to March 1937 the "heat test" was applied to 1,353 different lots of neoarsphenamine, representing all brands holding American license. The exposure time varied from 1 to 14 days at the then required temperature of 56° C. The results of these tests are presented in table 1, covering 1,323 stable lots and 30 unstable lots, instability being first noted after 4 days' exposure. Subsequently, 439 of these lots of neoarsphenamine from the reserve file of the National Institute of Health for the period 1932 to 1937 were included in investigations of the effect of moisture and age on stability. It was found (table 2) that 15 percent of 1-year-old

TABLE 2.—The effect of age and moisture on the stability of neoarsphenamine stored at lower than average room temperature

				Ag	e, in ye	ears, fr	om offi	cial rel	ease				
Moisture content, per- cent	5 Lots			4		3		2		1		1-5	
			Lots		Lots		Lots		Lots		Lots		
	8	U	8	υ	s	υ	s	U	s	υ	s	U	
0.0 to 1.5 1.5 to 7.0	21 17	14 38	13 19	9 39	24 23	2 36	34 26	0 32	37 41	0 14	129 126	25 159	
Total number Percent	38 42	52 58	32 40	32 48 40 60		47 38 55 45		60 32 65 35		78 14 85 15		184 41.9	

S-stable; U=unstable.

material showed evidence of deterioration. As the age increased, instability increased to 58 percent of 5-year-old lots; and of the total lots examined for the entire period, 42 percent showed deterioration. It is evident, therefore, that the "heat test" at 56° C. for 24 hours, or even for 48 hours, is valueless as a test to predetermine the stability of neoarsphenamine.

In the effort to adjust the "heat test" to be of value in measuring stability of neoarsphenamine it becomes apparent that a temperature of 56° C. would require an exposure time greatly in excess of the observation time for the toxicity tests, and so in order to shorten the time factor the temperature was raised to 70° C. The necessity for this adjustment became apparent, as the moisture content of neoarsphenamine was reduced and stability increased.

The "heat tests" were conducted at 56° C. with exposure up to 28 days, and at 70° C. with exposure up to 12 days. When sufficient material was available, the stability was determined at both temperatures with readings for the maximum days stable and also the minimum days necessary to produce deterioration.

In table 3 are presented the detailed results of exposure at the two temperatures. The material, essentially the same as that referred to as current (1937) lots in the report on stability of neoarsphenamine, is classified according to moisture content and also to days of exposure to the artificial temperatures. The evidence of stability in this investigation is the same as that required in the previous study (5), i. e., the powder must be completely soluble and a 10 percent solution clear and transparent.

The records indicate that 28 days' exposure at 56° C. approximates the results obtained by 4 days at 70° C. The former showed approximately 70 percent unaffected as compared with 70.9 percent of the latter. The same relation is noted in the lots with moisture content of 0 to 1.5 percent—92 percent stable as compared with 89.8 percent at the higher temperature.

It is evident that the "heat test" at 70° C. offers a reliable and sensitive procedure for the determination of the stability of neoarsphenamine, and in a shorter time than the former official temperature requirement of 56° C. Deterioration at 70° C. for 48 hours approximates that observed after 3 years' storage at average room temperature (δ).

That moisture is a contributing factor influencing the stability of neoarsphenamine, as previously recorded by Probey and Harrison (δ) , is confirmed in these observations. It is noted that under artificial heat instability increased directly with the moisture content, this increase being apparent at both temperatures and also at the various exposure times. The stability of neoarsphenamine is affected by the

TABLE 3.---Stability of neoarsphenamine when exposed to artificial temperatures. Tested during 1987 (current material)

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			Þ	4145.48119	97 2228
		2	20	18420-00	1. 0 1. 0 1. 0 23. 2 23. 2
			Þ	° 133 4 63 33 8	97 97
с С			20	12880-00	95 47.7 1.0 1.0 32.3
11e 7	osur		Þ	911333899 911333899	58 58 58 141
erati	s exi		20	ar 34400	147 71.7 71.7 18 17.8 17.8 53.9
l'em p	Day		Þ	0188242	21 68 89
5		-	ø	8888 % 000	185 89.8 32.0 32.0 70.9
			Þ	-0-02000	43 45
		~	80	%8888 5700	204 99.0 58.0 262 85.3
			Þ	0000000	21 2
			80	8883844	205 99.5 79.0 92.8
		~	Þ	0 10 4 <u>10 10 10</u>	11 23 29
		ম	202	004165551	128 92. 0 20 27. 4 148 69. 8
		4	Þ	554 <u>855</u> 55	6 62
		â	20	00 4 10 00 00 00 00 00 00 00 00 00 00 00 00	130 93. 5 30. 3 71. 1
		•	Þ	0484855	39 39 46
		8	æ	113 1652 1652 160 100 100 100 100 100 100 100 100 100	172 95.0 61.4 83.6
۰ ۲		9	U	04882859	7 37 44
6° 0	ยา	1	202	$ \begin{array}{c} 25 \\ 115 \\ 211 \\ 211 \\ 212 \\ 212 \\ $	231 97.0 67.6 87.6 87.5
ure 5	rpost	5	Þ	34200320	30 52 2
perat	tys e.	-	20	^{2 2 2} 30 23 150 52	236 97.9 90 78.3 91.6
Tem	Ã	80	Þ	0000430	18 18
			Ø	298851138	238 98.8 98.8 37.0 338 94.9
		4	Þ	0010041	8
			ø	53 53 53 53 53 53 53 53 53 53 52 52 52 52 52 52 52 52 52 52 52 52 52	242 99.5 94.0 94.0 97.8
		5	Þ	000000	
			æ	0 188286 13 K	245 99. £ 100 367 99. 7
		-	Þ	000000	
			æ	0 18882557%	245 99. { 11(100 357 99. 7
Moisture content		D-0.5. D-1.0. D-1.6. D-1.5. D-2.8. D-2.8. D-2.8. D-2.8. D-2.8. D-2.8. D-2.8. D-2.8. D-2.8. D-2.8. D-2.8. D-2.8. D-2.8. D-2.8. D-2.8. D-2.8. D-2.8. D-1.8. D-	.).0-1.5: Number Percent L-5-3: Percent Percent Percent		

S=stable; U=unstable.

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temperature, time of exposure, and the moisture content of the powder. Deterioration varies directly with these factors.

REFERENCES

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DEATHS DURING WEEK ENDED JANUARY 21. 1939

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

	Week ended Jan. 21, 1939	Correspond- ing week, 1938
Data from 88 large cities of the United States: Total deaths. Average for 3 prior years. Total deaths, first 3 weeks of year. Deaths under 1 year of age. Average for 3 prior years. Deaths under 1 year of age. Average for 3 prior years. Deaths under 1 year of age. Average for a prior years. Deaths under 1 year of age. Average for a prior years. Deaths under 1 year of age. Number of death claims. Policies in force. Number of death claims. Death claims per 1,000 policies in force, annual rate. Death claims per 1,000 policies, first 3 weeks of year, annual rate.	8, 924 1 9, 547 27, 248 500 1 557 1, 611 68, 391, 428 14, 844 11. 3 9, 7	¹ 8, 990 27, 635 i 522 1, 634 69, 764, 818 14, 031 10, 5 9, 7
Death claims per 1,000 policies, first 3 weeks of year, annual rate	9.7	

1 Data for 86 cities.

PREVALENCE OF DISEASE

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

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers. In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (....) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended January 28, 1939, rates per 100,000 population (annual basis), and com-parison with corresponding week of 1938 and 5-year median

		Diph	theria			Infit	ienz a		Measles			
Division and State	Jan. 28, 1939, rate	Jan. 28, 1939, cases	Jan. 29, 1938, cases	1934- 38, me- dian	Jan. 28, 1939 rate	Jan. 28, 1939, cases	Jan. 29, 1938, cases	1934- 38, me- dian	Jan. 28, 1939, rate	Jan. 28, 1939, cases	Jan. 29, 1938, cases	1934- 38, me- dian
NEW BNG.												
Maine New Hampshire Vermont Massachusetts Rhode Island Connecticut	60 0 5 0 6	10 0 4 0 2	0 0 2 0 2	2 0 0 6 0 2	60 10 12	10 1 4	2 10 6	7 1 1 40	48 20 228 648 53 1, 505	8 2 17 551 7 507	143 62 264 192 10	143 31 35 344 31 87
MID. ATL.												
New York New Jersey Pennsylvania	11 15 27	28 13 53	33 12 37	50 14 48	¹ 107 23	1 155 19	¹ 14 12	1 21 30	486 30 71	1, 214 25 140	564 1, 011 5, 953	629 139 1, 667
E. NO. CEN.												
Ohio Indiana Illinois Michigan ^a Wisconsin	28 27 30 8 9	37 18 46 8 5	41 83 41 18 3	41 30 41 18 3	6 20 2 83	4 30 2 47	13 35 1 44	8 55 56 4 53	16 22 20 451 961	21 15 31 427 547	1, 574 340 5, 915 971 944	263 220 214 52 299
W. NO. CEN.												
Minnesota Iowa Missouri North Dakota South Dakota Nebraska	14 12 33 29 38 0 20	7 6 26 4 5 0 7	3 29 19 3 0 7	5 7 31 5 3 8 11	4 42 44 15 4 17	2 2 33 6 2 1 6	4 145 3 4 25	3 18 214 11 4 25	2, 437 276 10 2, 169 2, 983 122 22	1, 257 135 8 297 397 32 8	9 98 933 18 1 553	104 80 441 18 14 56 61

Cases of certain diseases reported by telegraph by State health officers for the week ended January 28, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

		Diph	theria			Infi	enza		Measles			
Division and State	Jan. 28, 1939, rate	Jan. 28, 1939, cases	Jan. 29, 1938, cases	1934– 38, me- dian	Jan. 28, 1939 rate	Jan. 28, 1939, cases	Jan. 29, 1933, cases	19 34 - 38, me- dian	Jan. 28, 1939, rate	Jan. 28, 1939, cases	Jan. 29, 1938, cases	1934- 38, me- dian
50. ATL.												
Delaware. Maryland ³ Dist of Col	96 19 24 43 46 26 41 13 80	5 6 3 23 17 18 15 8 10	1 17 12 10 30 5 16 29	1 7 9 26 19 33 5 16 15	31 1, 156 110 13 1, 773 153 15	617 617 41 9 649 110	8 47 47 711 13	47 5 63 47 744 193 13	2, 630 178 253 30 825 14 65 217	853 22 135 11 565 5 89 72	11 20 399 280 976 159 310	87 64 2 23 396 3 396 5 27 728 44 2 25
E. SO. CEN. '												
Kentucky Tennessee ⁴ Alabama ⁴ Mississippi ³ ⁴	19 14 21 20	11 8 12 8	δ 10 23 δ	14 16 23 8	47 192 297	27 103 169	46 185 362	46 185 362	83 235 204	48 133 116	473 525 215	68 96 162
W. SO. CEN.												
Arkansas Louisiana Oklahoma Texas 4	20 85 26 48	8 35 13 58	13 10 21 73	10 19 10 73	345 19 388 582	139 8 193 703	190 22 217 719	94 20 187 697	79 462 223 62	32 191 111 75	196 3 13 60	18 41 32 154
MOUNTAIN												
Montana Idaho Wyoming Colorado New Mexico Arizona Utah ¹	28 0 22 116 25 37 0	3 0 1 24 2 3 0	0 4 0 10 4 4 6	2 1 0 8 4 3 0	468 10 217 124 994 89	50 1 45 10 81 9	6 1 130	57 6 3 130 	3, 791 653 982 231 358 12 367	405 64 45 48 29 1 87	6 3 9 174 157 2 54	11 45 9 14 61 11 54
PACIFIC												
Washington Oregon California 4	3 10 23	1 2 28	4 8 31	0 2 82	263 27	53 33	4 53 144	53 144	348 109 1, 660	113 22 2, 025	21 9 174	94 85 239
Total	24	601	691	735	160	3, 395	3, 256	3, 256	438	10, 844	21, 929	15, 782
4 weeks	25	2, 491	2, 761	3, 001	151	12, 765	11, 628	11, 628	370	36, 655	71, 269	40, 478

	Me	ningiti: coc	s, meni cus	ngo-		Polion	nyelitis	•	Scarlet fever			
Division and State	Jan.	Jan.	Jan.	1934–	Jan.	Jan.	Jan.	1934-	Jan.	Jan.	Jan.	1934-
	28,	28,	29,	38,	28,	28,	29,	38,	28,	28,	29,	88,
	1939,	1939,	1938,	me-	1939,	1939,	1938,	me-	1939,	1939,	1938,	me-
	rate	cases	cases	dian	rate	cases	cases	dian	rate	cases	cases	dian
NEW ENG. Maine New Hampshire Massachusetts Mode Island Connecticut MID. ATL.	0 0 2 4 8	0 0 2 0 1	0 0 0 0 1	0 0 0 0 1	000000	000000000000000000000000000000000000000	000000000000000000000000000000000000000	0 0 1 0 0	78 81 80 228 153 220	18 8 194 20 74	22 13 13 286 28 92	21 13 11 265 18 68
New York	1.6	4	11	7	0	0	1	2	223	556	677	715
New Jersey	0	0	1	1	1.2	1		1	211	177	139	172
Pennsylvania	4	7	9	6	0	0		1	178	851	569	620

Cases of certain diseases reported by telegraph by State health officers for the week ended January 28, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

	Me	ningitis COC	, meni cus	ngo-		Polion	1 ye litis	1	Scarlet fever			
Division and State	Jan. 28, 1939, rate	Jan. 28, 1939, cases	Jan. 29, 1938, cases	1934- 38, me- dian	Jan. 28, 1939, rate	Jan. 28, 1939, cases	Jan. 29, 1938, cases	1934- 38, me- dian	Jan. 28, 1939, rate	Jan. 28, 1939, cases	Jan. 29, 1938, cases	1934 38, me- dian
E. NO. CEN. Obio Indiana Illinois. Michigan ¹ Wisconsin	0 0 2.6 2.1 0	0 0 4 2 0	8 1 5 1 0	9 4 7 2 0	0 0.7 0	0 0 1 0 0	0 0 3 0 0	1 0 1 0 0	380 324 343 604 508	495 218 524 571 289	486 195 837 560 221	461 195 584 463 348
W. NO. CEN.												
Minnesota Iowa Missouri North Dakota South Dakota Nebraska Kansas	1.9 0 2.6 7 0 0 0	1 2 1 0 0	0 4 2 0 0 1 1	1 2 2 1 0 1	0 0 0 0 0 0	0 0 0 0 0 0	1 0 1 0 0 0	1 0 0 0 0 0	328 249 166 153 158 164 472	169 123 129 21 21 43 169	178 224 231 28 13 47 250	147 191 210 36 44 57 213
80. ATL.												
Delaware. Maryland ^a Dist. of Col Virginia ^a West Virginia. North Carolina ^a Georeta ^a Florida	0 3 8 9 5 9 0 0 0	0 1 5 2 2 0 0 0	0 3 0 5 7 5 1 2 4	0 32 4 1 3 1 2 1	0 0 5 29 27 0 9	0 0 0 2 2 1 0 3	0 1 0 0 1 0 1	0 0 0 0 1 0 0 0	0 154 105 88 175 85 38 30 42	0 50 13 47 65 58 14 18 14	14 67 15 41 51 62 1 11 11	14 94 18 53 51 50 6 16 11
E. SO. CEN.											ł	
Kentucky Tennessee 4 Alabama 4 Mississippi ¹ 4	9 4 2.5	5 2 2 1	10 3 8 2	8 5 2 0	17 0 0 0	1 0 0 0	2 0 1 1	0 0 1 0	123 93 23 80	71 53 13 12	85 32 31	67 41 16 11
W. SO. CEN.												
Arkansas Louisiana Oklahoma Teras ⁴	25 24 0 8] 1 0 4	1 4 2 8	1 0 2 8	0 7 0 1.7	0 3 0 2	1 1 0 3	0 1 0 1	45 39 109 94	18 16 54 114	9 16 49 136	9 81 48 110
MOUNTAIN												
Montana Idaho Wyoming Colorado New Mexico Arizona Utah 4	0 0 5 0 12 0	0 0 1 0 1	0 1 0 0 0	0 0 0 0 0	90000000	1 0 0 0 0	000000000000000000000000000000000000000	0 0 0 0 0	225 92 240 197 457 25 228	24 9 11 41 37 2 23	43 29 14 83 12 11 83	85 29 12 88 23 20 72
PACIFIC												
Washington Oregon California	0 0 1.6	0 0 2	0 1 1	1 1 8	0 0 0	000	2 0 4	1 0 4	225 848 207	73 70 252	99 70 221	74 70 292
Total	2 2	55	104	104	0.7	17	26	26	213	5, 343	6, 359	6, 859
4 weeks	21	212	877	474	0.7	67	85	94	205	20, 581	23, 787	23, 892

Cases of certain diseases reported by telegraph by State health officers for the week ended January 28, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

		Sma	llpox		Тур	hoid and fe	d paraty ver	phoid	Whooping cough			
Division and State	Jan. 28, 1939, rate	Jan. 28, 1939, cases	Jan. 29, 1938, cases	1934– 38, me- dian	Jan. 28. 1939, rate	Jan. 28, 1939, cases	Jan. 29, 1938, cases	1934- 38, me- dian	Jan. 28, 1939, rate	Jan. 28, 1939, cases	Jan. 29, 1938, cases	
NEW ENG. Maine. New Hampshire Vermont Massachusetts Rhode Island Connecticut.	0 0 0 0 0 0	000000	0000000	00000000	6 20 0 4 0	1 2 0 3 0 0	5 0 2 0 0	0 0 1 0 0	109 0 1. 059 222 458 424	18 0 79 189 60 143	55 3 31 141 59 39	
New York New Jersey Pennsylvania	0 0 0	0 0 0	000	0 0 0	2 0 5	6 0 10	7 0 6	5 3 6	261 502 224	653 422 441	462 187 284	
E. NO. CEN. Ohio Indiana Illinois Michigan ³ Wisconsin	15 83 7 2 26	19 56 10 2 15	8 42 84 4 12	· 3 2 17 0 13	5 0 2 1 0	7 0 3 1 0	2 1 2 1 0	1 0 7 3 2	204 7 255 242 685	265 5 359 229 390	149 33 112 195 198	
W. NO. CEN. Minnesota Iowa Missouri North Dakota South Dakota Nebraska Kansas	33 93 13 73 68 11 59	17 46 10 10 9 3 21	35 46 48 23 3 2 25	5 20 17 7 4 2 9	8 0 3 0 15 17	4 0 2 0 4 6	0 2 8 0 0 0	1 2 2 0 1 1	101 43 30 7 23 0 20	52 21 23 1 3 0 7	53 47 49 80 23 8 99	
SO. ATL. Delaware	000000000000000000000000000000000000000	00000020	0 0 0 0 1 0 0 1	000001000	0 12 0 4 16 6 8 5 3	0 4 0 2 6 4 3 3 1	0 20 21 6 1 31	0 2 0 7 3 5 2 3 1	98 96 203 139 78 441 180 45 33	5 81 25 74 29 302 66 27 11	10 44 5 109 143 419 44 66 22	
E. SO. CEN. Kentucky Tennessee 4 Alabama 4 Mississippi 34	5 2 2 3	8 1 1 1	84 2 0 4	0 0 0 0	0 4 5 3	0 2 3 1	2 3 1 2	8 3 2 1 -	28 39 100	16 22 57	49 30 81	
W. SO. CEN. Arkansas. Louisiana Oklahoma. Texas 4	2 0 97 24	1 0 48 29	12 0 29 30	2 0 2 2	5 51 14 9	2 21 7 11	3 4 8 13	8 4 2 11	32 2 10 106	13 1 5 128	41 6 88 136	
MOUNTAIN										·		
Montana Idaho wyoming Colorado New Mexico Arizona Utah ¹	37 153 22 39 62 294 0	4 15 1 8 5 24 0	7 30 2 4 0 0 1	7302000	19 0 5 12 0 10	2 0 1 1 1 0	0 1 0 3 8 0	1 0 0 3 0	131 20 0 356 321 98 248	14 2 0 74 26 8 25	24 50 14 12 86 55 46	

Cases of certain diseases repor	ed by telegraph	by State health	officers for the	week
ended January 28, 1939, ra	es per 100,000	population (ann	ual basis), and	com-
parison with corresponding	week of 1938 and	d 5-year median	Continued	

		Sma	llpox		Тур	hoid and fe	l paraty ver	phoid	Whooping cough			
Division and State	Jan. 28, 1939, rate	Jan. 28, 1939, cases	Jan. 29, 1938, cases	1934- 38, me- dian	Jan. 28, 1939, rate	Jan. 28, 1939, cases	Jan. 29, 1938, cases	1934- 38, me- dian	Jan. 28, 1939, rate	Jan. 28, 1939, Cases	Jan. 29, 1938, cases	
PACIFIC												
Washington Oregon California 4	6 75 8	2 15 10	45 11 30	15 5 4	0 0 4	0 0 5	1 0 4	1 0 7	56 75 92	18 15 112	124 28 405	
Total	15	388	575	185	5	129	95	101	182	4, 496	4, 294	
4 weeks	15	1, 548	2, 409	864	5	458	464	493	176	17, 459	15, 918	

New York City only.
 Period ended earlier than Saturday.
 Rocky Mountain spotted fever, week ended Jan. 28, 1939, 2 cases as follows: Virginia, 1; North Caro-

Ina, 1.
 Typhus fever, week ended Jan. 28, 1939, 33 cases as follows: North Carolina, 4; South Carolina, 5; Georgia, 8; Tennessee, 3; Alabama, 5; Mississippi, 1; Texas, 5; California, 2.

SUMMARY OF MONTHLY REPORTS FROM STATES

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

State	Menin- gitis, menin- gococ- cus	Diph- theria	Influ- enza	Ma- laria	Mea- sles	Pel- lagra	Polio- mye- litis	Scarlet fever	Small- pox	Ty- phoid and paraty- phoid fever
October 1938 Puerto Rico November 1938	3	46	182	3, 322	2	1	0	0	0	24
Wisconsin December 1938	1				439		1		27	6
Hawaii Territory Illinois Massachusetts Montana North Dakota Ohio Oklahoma Oregon South Carolina Washington	0 2 5 0 0 1 8 2 0 0 2	13 192 23 5 0 14 206 98 6 110 16	233 69 61 5 70 80 515 104 1,749 11		3 112 902 1,002 60 1,309 89 131 	1 1 12 	0 4 0 0 1 2 2 2 10 2	0 1, 566 506 101 9 89 1, 630 249 237 55 269	0 15 0 17 0 10 25 74 30 0 11	3 26 9 4 0 3 23 24 3 10 8

February 10, 1939

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23 12

Puerto Rico: Cases Encephalitis, epidemic or Septie sore i litinois	rost: Cases
Dynamiary 4 Ohio	usetts 13
Legender 2 Oregon 1 Mentar	
Mumps 2 South Carolina	akota 1
Orbitinalizza neonato- German measles: Ohio	
rum 5 Illinois 29 Oklahor	
Puerperal septicemia 2 Massachusetts 45 Oregon.	
Tetanus 6 Montana 21 South C	reline
Whoeving cough 186 North Dakota	ton 5
Manus 1049 Ohio 15 Tetanus:	.
Bouth Carolins	l'erritory 1
Wisconsin: Wesbington 18 Illinois	2
Chickenpox	rouna 1
Mumps	Romiton 11
Septic sore throat	90
Tuesdame	00
Unomiant prof. 1 710 Hawaii 1 Griffory	airota K
W neoping cougination 1, (19 All All All All All All All All All Al	
December 1999 Oregon 53 Their stores	8 V
Anthease International International	neotta ?
	436449
Chickenpay:	950
Hawaii Territory 101 Obio 31 Obio	600
Things 1.778 Leonsy:	130
Massachusetts	21
Montana 199 Ohio	
Nevada	li Namelitaanaa 9
North Dakota	
Ohio 2649 Bilinois 275 Banth C	nine 14
Oklahoma	
Oregon	er:
South Carolina	AU
Washington	190663 U
Conjunctivitis, epidemic: Onio	akota 1
Hawaii Terrifery 1 Originia	9
Diarrhea: Oregon Oblahor	a 107
Ohio (under 2 years; en-	nitina i
Veritis included)	ion1
House Carolina	etion.
La viel Boundance of Managements 92 Illipois	26
Things (encebie) 6 Obio 81 North L	akota 8
Illinois (amoshic car. South Carolina 3 Oklahot	8 23
riers) 23 Pherneral senticemia: Oregon.	
Illippis (bacillary) 19 Obio	on 1
Massachusetts (bacil- Washington 1 Whoeping e	ozh:
lary) 14 Rables in animals: Hawaii	erritory 41
Montana (amoebic) 1 Illinois 28 Illinois	
Ohio 28 Massachusetts 1 Massach	19etts
Oklahoma (hacillary)	
Washington (bacillary). 8 South Carolina	20
Encephalitis, epidemic or Washington	kota
iethargie: Rabies in man: Ohio	
lethargic: Rabies in man: Ohio Illinois	a 35
Itabies in man: Othornow Illinois 5 Washington 1 Oktabon Massachusetts 7 Scables Oregon 1	8 35 76
iethargic: Hables in man; Ohio Illinois 5 Washington	a

¹Later information shows only 9 cases of tetanus in Michigan in December 1988, instead of 22 as published in the Public Health Reports of Feb. 3, 1939, p. 197.

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WEEKLY REPORTS FROM CITIES

City reports for week ended Jan. 21, 1939

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	Diph- theria cases	Infl Cases	uenza Deaths	Mea- sles cases	Pneu- monia deaths	Scar- let fever cases	Small- pox cases	Tuber- culosis deaths	Ty- phoid fever cases	Whoop- ing cough cases	Deaths, all causes
<u></u>	·										
Data for 90 cities: 5-year average Current week ¹ _	210 166	1, 320 312	160 71	3, 025 3, 051	1, 056 702	1, 805 1, 543	32 68	386 338	20 25	1, 186 1, 513	
Maine: Portland	0		0	0	4	0	0	0	0	5	21
Manchester	0		0	0	1 4	1 7	0	1 1	0	0	10 22
Vermont: Barre	0		0	0 0	1	1	0	0	0	1	4
Burlington Rutland Massachusetts:	0		0	0	0	1 0	0	0	10	4 0	9 6
Boston Fall River	0 ō		2 	172	24 i	61 3	0	14 9	1	57 5	212 34
Worcester Rhode Island:	Ŏ		Ŏ	10 0	7	9 0	Ŏ	ĩ	Ŏ	19	54
Pawtucket Providence Connecticut:	0	3	0	11	4	12	0 0	1	Ö	56	53
Bridgeport Hartford New Haven	0 0 1	1 	1 0 0	2 111 10	2 4 2	2 8 4	000	1 2 0	000	13 11 9	32 32 40
New York: Buffalo New York Rochester Syracuse	1 34 1 0	 87 1	0 6 0 0	104 58 45 11	15 146 8 6	58 173 27 9	0 0 0 0	9 88 1 0	1 3 0 1	22 169 13 30	148 1, 680 76 68
New Jersey: Camden Newark Trenton	1	1	1 0 0	0 6 0	374	4 24 2	0	1 3 2	0 0 0	8 54 7	87 102 35
Pennsylvania: Philadelphia Pittsburgh Reading Scranton	6 3 7 0	94	4 3 0	12 0 1 0	31 13 1	52 49 2 12	0 0 0 0	17 7 0	1 2 0 0	145 41 0 9	463 168 20
Ohio: Cincinnati Cleveland Columbus Toledo	7 2 0 0	2 19 2	1 1 0 2	0 3 2 2	16 21 8 5	17 62 7 33	0 0 0 0	5 14 1 4	0 0 0 0	1 49 2 26	145 213 113 86
Indiana: Anderson Fort Wayne Indianapolis Muncie South Bend Torre Heute	0 1 3 0 0		0 2 1 1	0 0 3 1 0	1 3 19 0 2 2	3 3 49 1 4 4	0 0 31 2 1 1	0 1 2 0 0 1	0 0 1 0 0	5 0 1 0 0 0	16 37 105 13 17
Illinois:	0		0	0	2		0	0	0	1	9
Chicago Elgin Moline	25 0 0		000	0	11 4 0 8	199 11 2		001	Ö Ö	0000	11 12 24
Michigan: Detroit Flint	7	2	200	23 199	19 7	130 36 31	0	15 0	1 0 0	125 1 3	303 29 32
Wisconsin: Kenosha	0 0		0 0	, i	0	5	o o	0	0	24 11	3 20
Madison Milwaukee Racine		8	8 0 0		900	112 6 2		3 3 0	Ŭ 0 0	115 2 0	95 15 5

¹ Figures for Fall River and Salt Lake City estimated; reports not received.

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State and altr	Diph-	Inf	luenza	Mea	Pneu-	Scar-	Small	Tuber-	Ty-	Whoop-	Deaths,
	-	Cases	Deaths	Cables	deaths	Cases	Cases	deaths	Jever cases	cases	CEUSES
Minnesota:											
Duluth			i	133	10	3			0	11 85	20 112
St. Paul	Ō	1	1	441	4	18	0	5	0	13	62
Cedar Rapids	0			0		0	0		0	0	
Des Moines	1 1		0	ŏ	0	24	ő	0	0	0	85
Biour City	Ĩ			17		8	Ő		Õ	6	
Missouri:									U		
St. Joseph	Ö		1	Õ	8	50 2	2	2	0	2	85 23
St. Louis	, ŝ		1	2	12	39	4	8	Ō	8	197
Fargo	0		0	0	0	2	0	0	0	0	6
Grand Forks Minot	2		<u>ö</u> -	26	<u>0</u> -		0		0	0	4
South Dakota:			-	,	-						-
Nebraska:						1	U		v		
Umana Kansas:	0		0	4	8	1	C	0	0	0	57
Lawrence	0	2	0	· 1	1	ę	0	0	0	0	6
Wichita	3		ŏ	ĭ	ĭ	ž	ŏ	ĕ	ŏ	ő	30
Delaware:											
Wilmington	3		0	0	3	- 4	0	1	0	1	28
Baltimore	1	10	0	613	25	21	.0	18	1	27	244
Frederick	1			8		5	0	1	1	5	13
Dist. of Col.:											140
Virginia:		Ů	1				v				148
Norjolk	8	ī	8	i	7	2	0	0	8	8	11 42
Richmond	1		3	1	4	8	Ó	2	2	õ	55
West Virginia:								4			17
Huntington	ð	1	1	8	. 8			0	8	8	21
Wheeling	ĺ		0	2	6	i	Ō	0	i	. 2	30
Gastonia	0		0	0	0	1	0	1	0	0	
Wilmington	0		8	8			8	1	8	1	17
Winston-Salem.	Ō		ŏ	36	ō	i	÷Ŏ.	ĭ	ŏ	Ó,	9
Charleston	0	76	4	0	4	2	0	1	1	0	85
Greenville	1		0		0		<u></u>		8	2	8
Georgia:		10								. [
Brunswick	ŏ		ő	2	ě	ő	ŏ	õ	ö	1	1
Savannah	•	23	1	•	2	3	0	2	0	3	21
Miami	2		2	2	1	2	0	0	0	1	36
* ans har	•	1	1	•	- 1	"	۳	1	"	2	
Ashland	1	I			1	1	0				. 4
Covington	Õ		ě	<u>ě</u>	4	16	ğ	ě	ě	ĕ	17
Tennessee:			-	•		10	v	T I	V	1	69
Memphis	2	6	1	8	1	4	0		<u>e</u>	0	23 79
Nashville	ē		ī	ē	6	6	ŏ	ŏ	ŏ	õ	57
Birmingham	0	5	2	1	10	1	0	4	:0	i j	84
Montgomery		z]	3		5	8			8	8	25

City reports for week ended Jan. 21, 1989-Continued

Chate and alter	Diph-	Inf	luenza	Mea-	Pneu-	Scar- let	Small-	Tuber	Ty-	Whoop-	Deaths
State and city	cases	Cases	Deaths	Cases	deaths	fever cases	cases	deaths	fever cases	cough cases	causes
Arkansas: Fort Smith Little Rock	0	5	0	1	4	0 7	0	0	0	0	
Louisiana: Lake Charles New Orleans Shreveport	0 9 1		0 3 1	12 21 6	0 14 6	1 11 0	0	0 9 0	032	0 2 0	177 24
Oklahoma: Oklahoma City. Tuisa	0		0	0	7	7	0	1	0	0	45
Texas: Dallas. Fort Worth Galveston Houston San Antonio	0 0 4 1	23	2 1 0 1 2	1 0 0 0 0	7 3 5 6 8	10 8 1 3 0	9 0 0 1 0	3 1 0 4 8	0 0 0 0	0 1 0 0	71 30 15 73 65
Montana: Billings. Great Falls Helena. Missoula	0		0 0 0	128 0 4 2	2 1 0 0	2 1 0 3	0 1 0 2	0 G 0 0	0 0 0 0	0 1 0	11 5 2
Idaho: Beise Colorado:	0		0	1	4	0	0	0	o	2	8
Bprings Denver Pueblo	0400		0 1 0	2 6 0	0 9 3	4 10 4	0 0 1	3 5 0	000	6 27 0	
New Mexico: Albuquerque Utah:	0		0	0	2	3	0	2	1	3	10
Washington: Senttie Spokane Oregon:	0 0 0		0	2 11 6	6 1 2	8 1 5	0 0 0	2 0 1	0 0 0	1 0 1	96 33 30
Portland Salem California:	0	1		10	5 79	8 4 55	2		0	0	426
Los Angeles Sacramento San Francisco	0 0	2	0 1	12 736	1 13	3 14	12 0	27	0	0 9	34 200
Btate and city		Mening	egitis, ococcus	Polio- mye-		State	and city		Meni mening	ngitis, cococcus	Poho- mye-
State and day	T	Cases	Deaths	utis cases		State and city			Cases	Deaths	cases
New Yerk: Buffalo New York		12	03		0 Sou D Lou	th Caro Cherles isiana:	li na: :ton		0	0	1
Pennsylvana: Philadelphia Illinois: Chicago		2	0 0	1) Tex	as: Housto	n		1	0	1
North Carolina: Wilmington		1	•								

City :	reports j	for	weck	ended	l Jan	. 21,	. 19 39 —	Continued
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Encophelitis, spidemic or hthereic. - Cases: Albuquerque, 1. Pellegra.-Cases: Toledo, 1; Wilmington, N. C., 1; Charleston, B. C., 2; Savannah, 3; Fort Smith, 1; San Francisco, 1. Rebie: in man.- Deaths: Detroit, 1. Typhus fever.-Cases: Charleston, S. C., 6; San Antonio, 1; Los Angeles, 2.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—2 weeks ended January 14, 1939.—During the 2 weeks ended January 14, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia 1	New Bruns- wick	Que- bec	Onta- rio	Mani- toba	Sas- katch- ewan	Alber- ta	British Colum- bia	Total
Cerebrospinal meningitis. Chickenpox Diphtheria Dysentery.		 7 11	· 2 5 5	1 406 95	2 942 11 1	1 47 14	 77 8	 48 1	322	6 1, 854 145 1
Erysipelas Influenza Measles Mumps		12 13		13 466	10 29 1, 555 148	4 5 69 81	1 	3 12 13	2 13 52 5	33 59 2, 181 248
Poliomyelitis Scarlet fever 8 mallpox		2 1 19	20	1 140	64 	2 53 6	 53 9	2 1 66	27 	95 5 770 15
Trachoma. Tuberculosis. Typhoid fever. Undulant fever. Whooning cough	1	40	9 5 4	73 24 263	128 1 8 642	1 3 3	1	31	22 2 3 64	1 279 37 6 1 112
		Ů	-				**	Ů	vi	-, 114

¹ For 2 weeks ended Jan. 18, 1939.

CUBA

Habana—Communicable diseases—4 weeks ended January 14, 1939.—During the 4 weeks ended January 14, 1939, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	11	1	Tuberculosis	13	7
Malaria	23	1	Typhoid fever	65	

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

NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for January 27, 1939, pages 137-148. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Plague

Brazil.—During the month of October 1938, 1 case of plague was reported in Alagoas State, and 20 cases of plague with 10 deaths were reported in Pernambuco State, Brazil. *Peru.*—During the month of November 1938, plague was reported in Peru as follows: Cajamarca Department, 1 case, 1 death; Libertad Department, 3 cases, 1 death; Lima Department, 2 cases, 2 deaths.

Smallpox

Mexico.—During the month of November 1938, smallpox was reported in Mexico as follows: Mexico, D. F., 2 cases; Pachuca, Hidalgo State, 7 cases; San Luis Potosi, San Luis Potosi State, 7 cases; Tampico, Tamaulipas State, 1 case.

Typhus Fever

Mexico.—During the month of November 1938, typhus fever was reported in Mexico as follows: Mexico, D. F., 13 cases, 4 deaths; Oaxaca, Oaxaca State, 3 cases; Pachuca, Hidalgo State, 1 case; Puebla, Puebla State, 3 cases, 1 death; Queretaro, Queretaro State, 2 cases; San Luis Potosi, San Luis Potosi State, 1 case; Tepic, Nayarit State, 1 case; Toluca, Mexico State, 7 cases.

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