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DISTRIBUTION OF MOTTLED ENAMEL IN THE UNITED STATES

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INTRODUCTION

This paper reports the results of a survey to determine the distribution of mottled enamel in the United States, a preliminary report (1) of this study having previously been made. No reference will be made to a description of the lesion, its histology, or work of recent investigators respecting its etiology. For these phases of the problem the reader is referred to the work of Black (2) and McKay (3), Williams (4), Churchill (5), Smith, Lantz, and Smith (6), Smith and Lantz (7), and Sebrell, Dean, Elvove, and Breaux (8). In 1930 McKay (9), in an article on geographical distribution, listed a number of areas where mottled enamel had been definitely demonstrated. In addition to those listed by McKay, Ackeroyd (10) and Kehr (11) report certain endemic areas in New Mexico and Kansas, respectively. A recent publication by Smith and Smith (12) reports about 45 towns or rural districts where mottled enamel is endemic in Arizona. For the furtherance of future study on this problem, McKay (9) also compiled a complete bibliography on the literature of mottled enamel.

METHOD OF SURVEY

This survey was made in the following manner: Letters were addressed to the secretaries of each of the State dental societies, stating the purpose of the investigation and requesting the names and addresses of the secretaries of the various component, district, or local societies within the State. A questionnaire was then sent to the secretary of each of the component or district societies. The only exception was that no questionnaire was sent to those societies with almost exclusive urban membership, such as New York City, Chicago, or Philadelphia. Of the 415 questionnaires sent to the various component or local societies asking for a report on mottled enamel within the geographical boundaries of their society, 207 replied.

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QUESTIONNAIRE SENT TO SECRETARIES OF DENTAL SOCIETIES

Dear Doctor:

There exists in about 55 areas in the United States the enamel dystrophy known as "mottled enamel." The permanent teeth erupt presenting a dead white or opaque appearance, sometimes being pitted. In a high percentage of cases these teeth later take on the characteristic "brown stain." This developmental dystrophy is peculiar to the native-born children of an endemic area, or those taken in the area very early in childhood.

We are desirous of knowing whether this condition exists within the geographical boundaries of your dental society, and would appreciate any data which you might furnish us. If your society is meeting in the near future, would you discuss this matter with the members? If NO cases exist, will you return this questionnaire so that we may likewise have that information?

1. Does mottled enamel occur locally?_____
2. If present, approximate number of cases?_____
3. If present, what percentage of native-born children and other susceptibles would you roughly estimate, have it?_____
4. Are cases from any particular area?_____
   If so, what city, town, or county?_____
5. If any particular area is affected, what type of drinking water is used? (River, artesian, shallow wells, spring, etc.)_____

A self-addressed envelope which does not require postage is enclosed for your answer. Any other information which you might be in position to furnish us concerning this problem would be gratefully appreciated.

Respectfully,

H. T. Dean,
Dental Surgeon, U.S. Public Health Service.

INDIVIDUAL QUESTIONNAIRE SENT TO DENTISTS, HEALTH OFFICERS, AND PHYSICIANS

Dear Doctor:

There exists in about 75 areas in the United States the enamel dystrophy known as "mottled enamel." The permanent teeth erupt, presenting a dead white or opaque appearance, sometimes being pitted. In a high percentage of cases, and in certain areas, these teeth later take on the characteristic "brown stain." This developmental dystrophy is peculiar to the native-born children of an endemic area, or those taken in the area very early in childhood.

We desire to know whether this condition exists within the geographical boundaries of your county and would appreciate any data which you might furnish. If no cases exist, will you kindly return this questionnaire stating that the county is negative for mottled enamel?

1. Does mottled enamel occur in your county?_____
2. If present, approximate number of cases?_____
3. If present, what percentage of native-born children and other susceptibles, would you roughly estimate, have it?_____
4. Are cases from any particular area?_____
   If so, what city, town, or part of the county?_____
5. If any particular area is affected, what type of drinking water is used? (River, artesian, shallow wells, spring, etc.)_____

(In the light of recent research on this problem, the drinking water used from birth to about 12 years of age, or during the period of calcification of the permanent teeth, is apparently an important etiological factor).

Any other information which you might be able to furnish us, either with respect to your own county or some endemic area that you know of, would be gratefully appreciated. A self-addressed envelope which does not require postage is enclosed for your answer.

Respectfully,

H. T. DEAN,
Dental Surgeon, U.S. Public Health Service.

In certain States where organization of district societies does not completely cover the State, or in States where for geological reasons we desired a more complete report than is ordinarily included in a society report, a questionnaire [1] was sent to one or more individual dentists in each county. These States included Mississippi, New Mexico, Nevada, Utah, and Wyoming. Areas partially covered by these county questionnaires were certain parts of north central Illinois, where the water obtained from deep wells and used for domestic purposes showed a high sodium bicarbonate content, the Panhandle and west Texas, and rock phosphate areas in Kentucky, Idaho, South Carolina, and Tennessee. This same type of county questionnaire was also sent into certain limited areas in Alabama, Florida, Indiana, North Carolina, North Dakota, Oklahoma, Oregon, South Carolina, South Dakota, and Virginia. In cases where Polk's Dental Register (1928) failed to show a dentist practicing in a county, the questionnaire was sent to the county health officer, and in a few cases to local physicians. In all, 1,197 of these individual questionnaires were sent, and from these, 632 replies were received, while 47 more were returned marked "unclaimed", "deceased," etc. (table 1). The distribution of individual questionnaires is shown in figure 1.

Opportunity is taken here to thank the many general practitioners who cooperated so freely in this survey. Many, in addition to answering the questionnaire as completely as possible, included long reports of local conditions, analyses of water supplies, and summaries of school surveys, revealing the presence or absence of mottled enamel. But for the whole-hearted interest of these individual dentists, physicians, county health officers, and dental society officers who gave so freely of their time and effort, much of this report could not have been written.

[1] The apparent discrepancy between the number of areas stated in the two questionnaires is due to the fact that the later questionnaire included areas made known subsequent to the date of the first questionnaire.

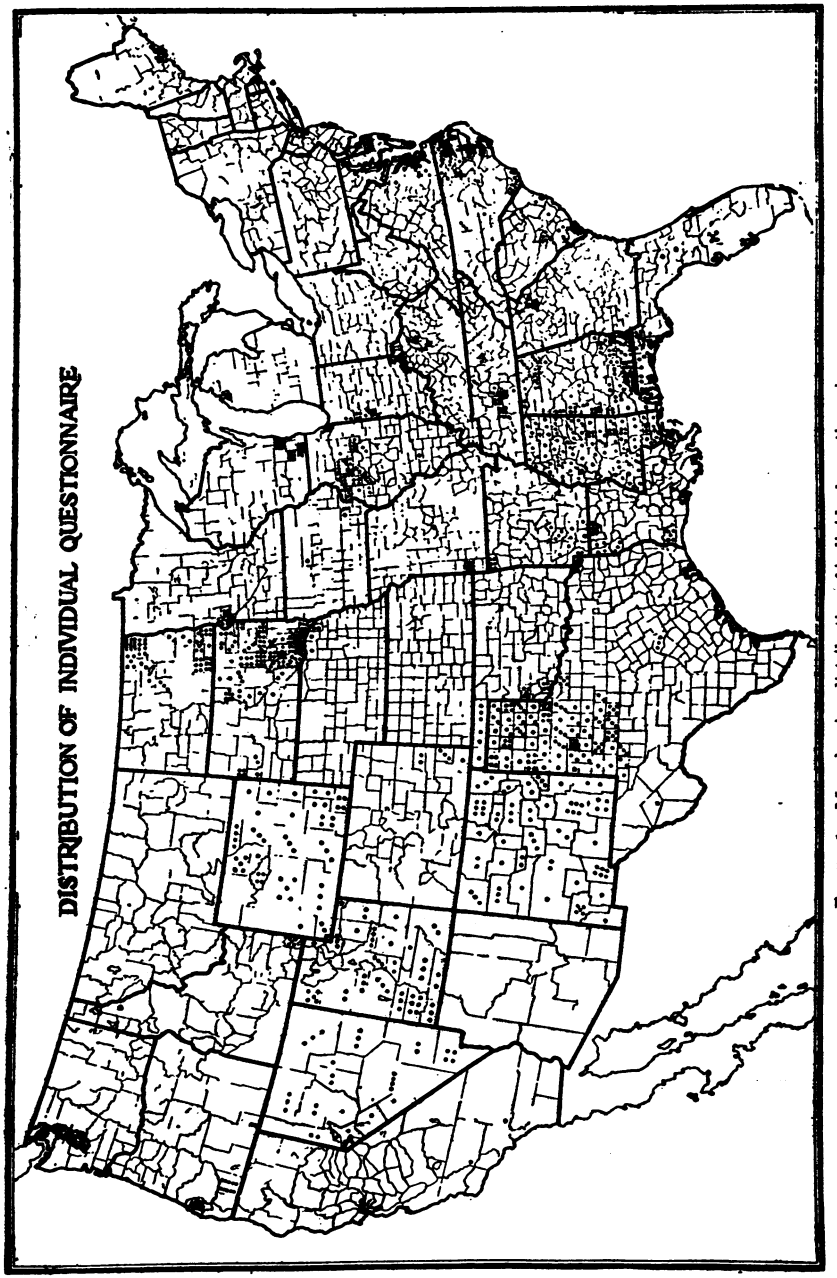

FIGURE 1.—Map showing distribution of individual questionnaire.

TABLE 1.—*Distribution of questionnaires*

State	To component dental societies			To individuals		
	Number sent	Number of replies	Number returned "unclaimed," "wrong address," etc.	Number sent	Number of replies	Number returned "unclaimed," "deceased," etc.
Alabama	3	1	0	109	45	2
Arizona	2	1	0	0	----	----
Arkansas	5	4	0	18	11	0
California (northern)	15	8	1	0	----	----
California (southern)	11	8	0	2	2	----
Colorado	10	5	0	6	2	2
Connecticut	6	5	0	0	----	----
Delaware	1	1	----	14	8	0
Florida	5	4	0	26	12	1
Georgia	12	8	0	11	7	2
Idaho	3	2	1	6	2	0
Illinois	24	12	0	68	38	4
Indiana	14	9	0	31	16	0
Iowa	10	4	0	2	1	0
Kansas	9	3	0	0	----	----
Kentucky	9	4	0	9	7	0
Louisiana	7	3	0	18	6	0
Maine	6	2	0	0	----	----
Maryland	5	2	0	0	----	----
Massachusetts	4	0	0	0	----	----
Michigan	14	2	0	0	----	----
Minnesota	7	3	0	16	11	0
Mississippi	4	2	0	109	54	1
Missouri	11	5	0	10	5	0
Montana	10	6	0	0	----	----
Nebraska	8	5	0	4	0	0
Nevada	0	----	----	35	15	2
New Hampshire	3	1	0	0	----	----
New Jersey	12	4	1	0	----	----
New Mexico	0	----	----	74	49	3
New York	7	3	0	0	----	----
North Carolina	5	2	0	38	16	1
North Dakota	6	4	0	56	27	3
Ohio	24	13	0	0	----	----
Oklahoma	6	4	0	15	12	0
Oregon	9	5	0	23	10	3
Pennsylvania	19	12	1	0	----	----
Rhode Island	0	----	----	0	----	----
South Carolina	4	2	0	20	8	1
South Dakota	5	1	0	142	78	4
Tennessee	10	1	0	32	15	1
Texas	19	11	0	146	93	8
Utah	4	3	0	52	26	3
Vermont	3	2	0	0	----	----
Virginia	10	6	0	17	10	0
Washington	13	6	0	0	----	----
West Virginia	12	6	0	0	----	----
Wisconsin	27	11	0	36	21	----
Wyoming	2	1	0	52	25	6
Total	415	207	4	1,197	632	47

Evaluating a survey of this type is fraught with difficulties. First, all reports which were in the least doubtful were eliminated. Often the answer indicated that the individual was unfamiliar with mottled enamel and was confusing it with the hypoplasias concomitant with the erythematous or febrific diseases of childhood. These were of course eliminated from further consideration. Second, those reporting a very low incidence were likewise set aside as unimportant. On the other hand, when several men in different parts of a county call attention to a particular area where mottled enamel is probably

endemic, or when local dentists or societies submit extensive reports of local conditions, the evidence becomes of value pending confirmation. It has been impossible to confirm all of these reported areas by personal surveys, but they are included in this paper as "reported areas" so that others interested in mottled enamel may confirm or disprove them by surveys (fig. 2).

Detailed surveys made by the writer included Courtland, Va.; Minonk and Fairbury, Ill.; Windsor, N.C.; Conway, S.C.; rural districts in Berkeley and Charleston Counties, S.C.; and two rural areas in Hickman and Maury Counties, Tenn. In detailed surveys the clinical findings are first recorded, and then the individual water history is noted on a card (fig. 3) provided for that purpose. Of the areas just referred to, Courtland (3) (13) and Minonk (14) have been previously reported in the literature. In addition to the foregoing, endemic mottled enamel has been observed by the author at Harrold, Miller, St. Lawrence, and Vayland, S.Dak. Time did not permit, however, the taking of a detailed history of each affected individual in order to determine the local incidence. A moderately severe type of mottled enamel with brown stain quite common was observed at Harrold and St. Lawrence.

SPECIAL POINTS OF INTEREST BY STATES

ARIZONA

Some of the earliest reports in the literature, Rodriguez (15) and McKay (3), refer to mottled enamel areas in this State. A recent publication by Smith and Smith (12) covers in detail the distribution of mottled enamel in Arizona and lists the affected communities. In this report they state: "The survey disclosed about 45 towns or rural districts in Arizona in which mottled enamel is endemic", in degrees varying from "very mild" to "severe." Most of these communities lie along two rivers, namely, the Gila and the San Pedro, the latter flowing into the Gila.

In addition to these areas, Dr. Leslie W. Foster, field dentist of the Indian Service, writing from Keams Canyon, calls attention to the presence of mottled enamel among the Indian children at the Polacca Day School located at Polacca, in Navajo County. Dr. Fred B. Bass, also a field dentist of the Indian Service, writes from San Carlos that the "condition is very prevalent among all the Indians of southern Arizona, San Carlos Apaches, Pimas, Papagos, and Mohaves. The Apaches live in Gila and Graham Counties, the Pimas in Pinal and Maricopa Counties, the Papagos in Pima County, and the Mohaves in Yuma County." Dr. Bass states that, with the exception of the Papagos, the drinking water is obtained, in the main, from shallow wells, 20 to 40 feet deep. He also adds that

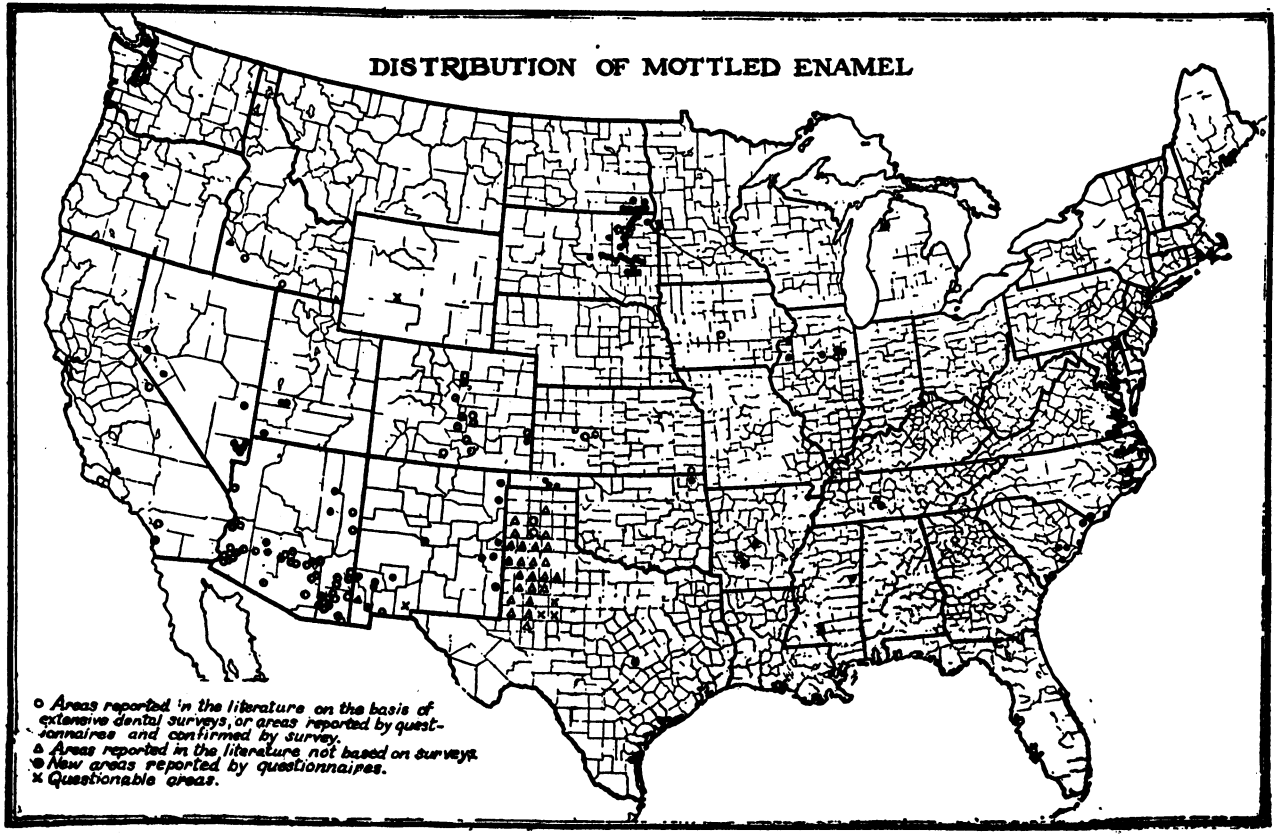

FIGURE 2.—Map showing distribution of mottled enamel in the United States.

mottled enamel is prevalent among white people living on the Gila and San Pedro watersheds.

ARKANSAS

In 1930 Kempf and McKay (16) reported the results of a study made at Bauxite, where mottled enamel was endemic. In addition

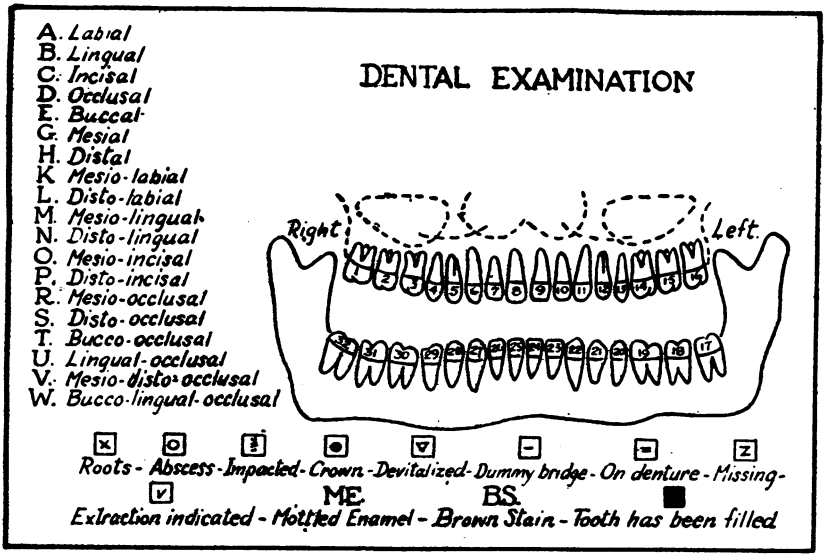

FIGURE 3.—Record of dental examination and individual drinking water history.

to this well-known area at Bauxite, Saline County, Gurdon and Okolona in Clark County have been reported to us in questionnaires as endemic areas. Three different dentists call attention to the Gurdon area, two of the reports containing much supplemental data.

CALIFORNIA

McKay (9) reports mottled enamel at Benton Hot Springs, in the upper Owens River Valley, Montecito, and Las Vegas, suburbs of Santa Barbara; Elsinor Hot Springs, Warner's Ranch, north of San Diego; and Maricopa. With the exception of Maricopa, the use of water from a hot spring is reported as the associated factor. The number of people affected is apparently negligible. With respect to Maricopa, McKay states: "No definite information available either as to extent of the affliction or water conditions." Dr. Clayton W. Akers, formerly of Maricopa, but now practicing at Taft, states that the majority of the children who were born in Maricopa or who moved there at an early age have mottled enamel, some cases being very severe. He adds that the population in the affected area uses a spring for its drinking water.

COLORADO

Colorado Springs is the first area in the United States where mottled enamel was reported as endemic. In 1910 Fynn (17), referring to the enamel defects of the children of Colorado Springs, stated that "87½ percent of the children born and raised in this city have defects of the enamel." He referred to the condition which we now term mottled enamel as "enamel defects of local origin." This mottled enamel area at Colorado Springs had been the subject of study even before this. There is a reference in the literature by McKay (3) that a "systematic endeavor to investigate this lesion was undertaken by the Colorado Springs Dental Society soon after its organization in 1902." McKay adds that the work of investigation began in an organized way in 1908. Black became interested in the problem about this time and visited the area for field study in 1909. This investigation of Colorado Springs and the Pikes Peak watershed by Black (2) and McKay (3) culminated in a thorough and extensive report on the histopathology and epidemiology of mottled enamel. Williams (4) has somewhat modified Black's original conception of the histology of mottled enamel, but subsequent surveys have tended to add further evidence to McKay's original hypothesis that some rare element in the drinking water was the etiological factor. Later McKay (18) reported mottled enamel endemic at Towner, a small community in Kiowa County near the Kansas State line.

No new areas were reported in the questionnaires sent the several component societies in the State. Dr. Oren V. Shaw writes that in the examinations made at the Colorado Springs Public School Dental Clinic during the years 1930–31, there were 160 children examined who were born in Colorado Springs. Of this group, 97, or slightly over 60 percent, showed mottled enamel.

Six questionnaires were sent to dentists in Cheyenne, Prowers, and Baca Counties, in the southeastern portion of the State. Dr. Alfred W. Leonard, of Holly, calls attention to a mottled enamel area at Hartman, in Prowers County, where he states that approximately 75 percent of the children are affected. He further adds that the drinking water is obtained from wells, 100 to 300 feet in depth.

IDAHO

McKay has reported two endemic areas in Idaho, one (19) at Oakley in Cassia County, and one (18) at Bruneau in Owyhee County. A questionnaire from Dr. Vaughan D. Lyons, secretary of the Upper Snake River Dental Society, indicates that mottled enamel is probably endemic at Wilson, in the northwest section of Owyhee County, and apparently associated with the use of artesian water. Previous reference has been made to this area at Wilson by Smith and Smith (12).

ILLINOIS

Minonk, located in the northeastern portion of Woodford County, was reported as an endemic area in 1928 by Bunting (14). McKay (18) also refers to this area and notes a deep-well association. During February 1932 the writer examined 39 children at the Minonk school, of which number 21, or 53 percent, showed mottled enamel. There were 9 children who had used the Minonk municipal water exclusively from birth, 5 of whom showed mottled enamel. The city water at Minonk is obtained from two deep wells. The "old" well is 1,850 feet deep, while the "new" well is reported to reach a depth of 2,005 feet.

Fairbury, a community with a population of 2,310, and located in the southern part of Livingston County, was reported as an endemic area by the McLean County Dental Society. The author visited this area shortly before the examination at Minonk and examined 68 children at the North School. These children were principally from the sixth and seventh grades. Of this group, 21 had used Fairbury city water exclusively from birth; 14 of these, or 66 percent, showed mottled enamel. Fairbury obtains its municipal water supply from three wells, 2,100, 2,000, and 1,600 feet in depth, respectively.

Dr. L. W. Neber, former superintendent of mouth hygiene of the Illinois State Department of Health, who assisted in the examination at Minonk, and the Rock Island Dental Society report mottled enamel at Milan, a small community with a population of 888 located in Rock Island County. Dr. Neber stated that he found a number of children showing the white opaque type of mottled enamel with little or no brown stain. The drinking water is obtained from a 1,100-

foot drilled well. The Warren Dental Society reports a low incidence of mottled enamel at Monmouth and adds that the municipal water supply is obtained from two wells 2,445 feet deep and cased 1,200 feet. Later communications from Dr. E. B. Knight, the secretary of the society, indicate that mottled enamel is probably more prevalent than when first reported.

Dr. P. A. Pyper, of Pontiac, reports mottled enamel cases in the surrounding rural districts where deep-well water is used. Both he and Dr. L. B. Muzzy, of Odell, call attention to mottled enamel in Odell. Dr. Pyper also directs attention to several farms around Emington, about 25 miles northeast of Pontiac, where the inhabitants use deep wells and the children born and reared there show badly marked teeth. Dr. W. G. Ross, of Kempton, Ford County, writes that there are many cases in Kempton. It is interesting to note that Kempton is not far from the area referred to by Dr. Pyper around Emington, in Livingston County.

IOWA

Mottled enamel is reported as endemic at Ankeny, in Polk County, by Ostrem, Nelson, Greenwood, and Wilhelm (20). The water supply, according to these investigators, is obtained from deep wells.

KANSAS

Mottled enamel in Kansas has been extensively studied by Kehr (11). This investigator reported areas of mottled enamel at Chetopa, La Crosse, Utica, and Bazine, which were confirmed by survey.

MINNESOTA

McKay (19) reports an area at Graceville, Big Stone County, and definitely associates it with the use of deep well water. Dr. W. H. Strong, of Graceville, states that the wells from which the municipal water supply is obtained are from 500 to 600 feet deep. Dr. Strong also estimates that about 90 percent of the native-born children are affected.

Sixteen questionnaires were sent to dentists in Traverse, Stevens, and Big Stone Counties, of whom 11 replied. Dr. Alf T. Watzke, of Brown Valley, Traverse County, writes that, formerly, when the people of Brown Valley obtained their drinking water from artesian wells, mottled enamel was endemic among the children. The community installed a city water supply which is obtained from a spring, and children calcifying their permanent teeth under the new water supply are free from the dystrophy. Dr. Harold N. Weickert, of Wheaton, Traverse County, notes in his report that mottled enamel is endemic in a small section of the southern part of this county where the children use a "soft" water obtained from deep wells.

MISSISSIPPI

Seven areas endemic for mottled enamel are located in that part of Virginia, North Carolina, and South Carolina lying in the Atlantic coastal plain. Mississippi is one of the few States lying wholly in the Atlantic coastal plain. There are no reports in the literature of mottled enamel areas located in this State. The component or district dental societies are limited to four, located principally around the larger centers of population.

A survey by counties was decided upon and one or more questionnaires were sent to practicing dentists of each county. There are 84 counties in this State. Polk's Dental Register (1928) listed no practicing dentist in 5 counties, viz, Benton, Forrest, Issaquene, Sharky, and Warren. Questionnaires were sent to one or more individuals in each of the remaining 79 counties. These questionnaires totaled 109, and 54 replies from 46 different counties have been received.

Dr. D. N. Garner, President of the Mississippi Dental Association, writing from West Point, Mississippi, states: "West Point is located about on the dividing line between the sandy, or hilly section, and the black-lime, or prairie belt of the State. Going west from this town into the hills, where the people use water from shallow, or pump, wells, we find no mottled enamel of any consequence. Going east and south into the black land, the condition is very prevalent, some cases having but little enamel on their permanent teeth. In this section people use water from artesian wells. There are two strata of this water. The first seems to be free from minerals, and will overflow only in low lands. The second seems to have quantities of some mineral, largely iron, and overflows on higher land. This last-mentioned section is where we find so much mottled enamel."

Those counties in which the reports indicate mottled enamel are as follows:

Noxubee County: Doctor Garner writes that he examined about 200 school children at Brookville and found about 40 cases of mottled enamel. Dr. D. W. Reilly, of Okolona, also notes in his report that mottled enamel occurs at Brookville and states that the water supply is obtained from a deep well. Dr. M. M. Brown, of Macon, estimates that there are about 200 cases in the county principally from the eastern and southern sections. He also notes an artesian well association.

Lawrence County: Dr. B. A. Batson, of Monticello, states that a large percentage of the population is affected with mottled enamel. It is interesting to note that Dr. Noel R. Thompson, of Brookhaven, also calls attention to a mottled enamel area in Lawrence County, located at Nola.

NEVADA

This State is very sparsely populated and there are no district dental societies. It became necessary, therefore, to send one or more questionnaires to dentists in each county. In counties where there were no dentists, information was requested from the county health officer or local physician. Points of interest disclosed in the replies were as follows:

Clark County: This is probably the most extensive area in Nevada. Dr. J. Dayton Smith of Las Vegas writes: "In the Moapa and Virgin valleys, about 80 miles from Las Vegas, the native children have mottled enamel almost 100 percent." Doctor Smith states that the communities affected are Moapa, St. Thomas, Bunkerville, and Overton. He adds that the water supply is obtained from river and shallow wells. Dr. Charles H. Masterson, formerly of Tonapah, now of Las Vegas, also calls attention to the high incidence of mottled enamel in this area and states that most of the cases he has seen were associated with the use of water from shallow wells. Dr. E. H. Conger, of St. George, Utah, makes some interesting comments respecting this area. He has an office in Overton, and one at Mesquite, which he visits bimonthly. He writes that the people of Overton get their drinking water from a small stream known as the Muddy Valley River, the source of which is a large nearby spring. In Mesquite, the people obtain water from the Rio Virgin, into which a number of hot sulphur springs empty a few miles from the community. Doctor Conger states that a large percentage of children in both communities are affected. Dr. Wilford C. Cox, also of St. George, Utah, likewise reports a high incidence of mottled enamel in the Moapa Valley of Nevada.

Lincoln County: From Caliente, Dr. Willard W. Stockham, a physician, writes that about 25 percent of the children at Panaca are affected. He states that they obtain their drinking water from a spring, the water of which is carried in open ditches.

Lyon County: Both Dr. E. B. Dawson, of Yerington, and Dr. C. H. Masterson, formerly of Yerington, but now practicing at Las Vegas, report mottled enamel in this country. The latter noted that a large number of cases came from the "Wabuska district" where the drinking water is apparently obtained from shallow wells.

Mineral County: Dr. Wm. J. Lanahan, field dentist of the Indian Service, while making examinations at Schurz, Nevada, observed typical cases of mottled enamel among Indians who had resided at Sodaville from birth until adult life.

NEW MEXICO

The only area of mottled enamel endemicity definitely described in the literature is that at Columbus in Luna County, which was

reported by Ackeroyd (10) in 1923. McKay (9), in an article on geographical distribution, states, in referring to New Mexico, that it is found in "various small communities over the State, principally adjacent to the eastern boundary (Texas). No reliable data as to water supply and no definite knowledge of the particular towns afflicted."

There are no component or district dental societies in the State. Seventy-four questionnaires were sent to individual dentists and replies have been received from 49. Of the 31 counties in the State, one or more replies have been received from 29 counties.

Areas reported are as follows:

Chaves County: Dr. J. E. Rose of Roswell, reports a small area in the extreme northeastern section of the county near Kenna.

Dona Ana County: From the reports of Dr. S. T. Barnhill and Dr. O. H. Brown of Las Cruces, it would appear that mottled enamel is being produced in certain sections of the county where the drinking water is being obtained from shallow wells. The data with respect to this county is indefinite; but Las Cruces, the county seat, where the drinking water is obtained from wells approximately 200 feet deep, is apparently nonendemic for mottled enamel. This county is listed as questionable.

Grant County: Mottled enamel is seemingly widespread throughout this county. Dr. L. A. Jessen, of Santa Rita, states that a high percentage of individuals using certain water supplies along the Membres River are affected. He specifically refers to the Sherman School on the Membres River where a very high percentage of children are affected. Dr. Frank E. Morton, of Hurley, writes that approximately 95 percent of the native-born children are affected. From another section of the county, Dr. W. H. Chapin, of Silver City, reports mottled enamel in the Gila River district in the western portion of the county. Again, from another section of this county, the extreme southern tip, comes a report from Acting Assistant Surgeon E. J. Thornberry, of the Public Health Service, that practically all the children of Hachita develop mottled enamel. Several of these observers supplemented their reports with extensive descriptions of local conditions.

Hidalgo County: Dr. R. E. Buvens, of Lordsburg, states that about 50 percent of the children are affected and adds that this is also true of some of the nearby communities. This area has also been referred to by Smith and Smith (12).

Lea County: Dr. H. J. Coburn, of Tatum, states that mottled enamel is general throughout the county and estimates that 90 percent are affected. He states that drinking water is obtained from shallow wells.

Luna County: From Deming, Dr. M. J. Moran, writes that mottled enamel occurs in all the district south of the Florida and Tresher-manas Mountains but not in the immediate vicinity of Deming. He estimates that at least 90 percent of all children in this endemic district are affected. He also adds that mottled enamel is still endemic at Columbus.

Roosevelt County: Dr. Raymond W. Means, of Portales, states that a severe type of mottled enamel is widely distributed in this county.

Sierra County: Dr. A. C. White, the county health officer, writes that 40 to 50 percent of the children of this county are affected. There is no dentist listed as practicing in the county.

Torrance County: Dr. E. S. Hamel, who formerly practiced at Mountainair, estimated that about 25 percent of the children are affected and noted that water from deep wells was used for drinking purposes.

Union County: From Clayton, Dr. C. E. Keller, writes that about 50 percent of the children are affected in the town of Amistad, where water for domestic purposes is obtained from shallow wells. Dr. C. M. Hurley, also of Clayton, reports that he finds mottled enamel in those individuals coming from the southern part of the county around Bueyeros and in the northern part around Cuates. Capulin in the extreme northwestern part of the county is considered questionable.

No reports were recieved from De Baca or Mora Counties; all others were reported as negative.

NORTH CAROLINA

This survey disclosed two areas in North Carolina where mottled enamel is endemic. One reported by Dr. W. R. Davis, of Whiteville, is a narrow strip, 5 to 10 miles wide, a thinly populated area in Columbus and Brunswick Counties, where these two counties border Horry County, S. C. The mottled enamel here, as in Horry County, is apparently associated with the use of flowing artesian well water. The other area is in Bertie County, located in the northeastern section of the State. The county seat of Bertie County is Windsor, a community with a population of 1,425. The writer made a detailed examination of 132 children of the sixth, seventh, and eighth grades in the Windsor school. Twenty-two of these pupils had used the Windsor municipal water exclusively from birth, and 19, or 86 percent, showed mottled enamel. The Windsor municipal water supply is obtained from deep wells.

Many of the pupils at the Windsor school come from distances as great as 10 or 12 miles. Consequently the examination gave us a picture of mottled enamel as it existed not only in Windsor but in parts of Bertie County as well. In the group examined, there were

70 children who stated that at no time did they live in Windsor. Among these 70 from the rural districts, there were 43 who gave a history of having lived in the same place and used the same water since birth. Sixteen of the 43 showed mottled enamel, 4 moderately severe, while the remainder ranged from mild to very mild. All gave a history of using shallow well water at home. The dug or driven wells in this area vary in depth from 12 to 25 feet. The only deep-well water (artesian) used by these children was that consumed at the Windsor school. The children from the rural districts who show mottled enamel are, in the main, from that section of Bertie County east and northeast of Windsor.

NORTH DAKOTA

In addition to the town of Lidgerwood, referred to by McKay (9), reports from various dentists indicate that mottled enamel occurs in the following counties:

Dickey County: Dr. H. E. Thomas, of Ellendale, calls attention to mottled enamel in this county among the users of artesian water. Dr. H. F. O'Connor, of Oakes, states that probably 90 percent of the children in the eastern part of Dickey County and the western part of Sargent County using artesian water are affected.

Ransom County: Dr. George A. Nelson, of Enderlin, and Dr. Arthur B. Ostrander, of Lisbon, state that mottled enamel is quite prevalent among children on farms where artesian water is used.

Richland County: Dr. R. M. Johnson, of Wyndmere, writes that the majority of the inhabitants of Wyndmere use surface wells and are free from mottled enamel, but on the farms near Wyndmere, where artesian water is used, mottled enamel is being produced in the children. Dr. A. R. Thomason, of Hankinson, reports cases in the western part of the county toward Geneseo.

Sargent County: Dr. K. J. Cole, of Milnor, estimates that 75 to 80 percent of the children are affected, and he associates the condition with the use of artesian water. Dr. E. G. Movius, formerly of Lidgerwood but now of Mohall, also calls attention to this district and states that mottled enamel is endemic at Cayuga and Geneseo.

OKLAHOMA

Six dentists and a physician report mottled enamel in Guymon, Hooker, and certain sections of the southeastern section of Texas County and the southwestern part of Beaver County. The report of Dr. Carl Puckett, managing director of the Oklahoma Tuberculosis and Health Association and submitted by Dr. T. W. Sorrels, chairman of the oral hygiene and educational committee of the Oklahoma State Dental Society, contains much relevant data respecting mottled enamel

in this region. Dr. Puckett also notes an observation made by McKay (18). His tabulations indicate a slightly lower incidence of dental caries among those with mottled enamel than is present in a similar school group in another part of the State where mottled enamel is not endemic.

Dr. Hugh Jeter, of Oklahoma City, calls attention to an area at Bluejacket in the northeastern section of the State, where mottled enamel is reported as endemic. Mr. H. J. Darcey, State sanitary engineer, writes that the inhabitants of Bluejacket obtain their domestic water supply from individual wells.

OREGON

Dr. E. E. Gray, secretary of the Central Oregon District Society, reports a small area 32 miles north of Bend, Oreg. Dr. Gray states that the affected area is a small community near Opal City in Jefferson County, known as Opal Springs. In 5 white families there were 3, 3, 2, 1, and 2 cases, respectively, while in 1 Japanese family there were 3 cases of mottled enamel, or a total of 14 cases. All of these 14 were in children who were born there, their ages ranging from 8 to 19 years. Dr. Gray states that the water supply was obtained from a 2,000-foot "railroad" artesian well which was sunk in 1910. This well was used until about 3 years ago. In addition, Smith and Smith (12) report an endemic area at Talent.

SOUTH CAROLINA

As in North Carolina and Virginia, mottled enamel in South Carolina is apparently limited to communities lying in the Atlantic coastal plain.

Horry County: Dr. Carl Busbee, president of the Pee Dee Dental Society, reports the city of Conway and Horry County as endemic areas. There is likewise a reference to the presence of mottled enamel in Conway in a recent publication by Smith and Smith (12). The writer surveyed this area during April 1932. Conway has a population of 3,011, and its municipal water is obtained from three artesian wells, a 3½-inch well put down in 1896 to a depth of 450 feet, a 10-inch well drilled in 1918 and 400 feet deep, and a 3-inch well drilled in 1924 to a depth of 305 feet. All wells are cased down to the first rock. In addition to the municipal water supply, there are about 30 flowing wells within the city limits. There are likewise many flowing wells in the smaller communities and surrounding rural districts of the county.

One hundred and four children were examined at Conway and 15 at Myrtle Beach. Detailed examination of each tooth, with chron-

ological water history of each individual, was made and recorded as follows:

Group A	Entire sixth grade, Conway white school	59
Group B	Selected cases from the eighth grade of the Conway Junior High School (individuals who had never lived in Conway)	28
Group C	Special cases	17
Group D	Myrtle Beach grade school	15
		119

In group A there were 14 children who stated that they had used Conway water exclusively from birth. All showed mottled enamel, the majority in a moderate to severe degree. An analysis of cases listed under groups B and C indicates that the same factor which is apparently causing mottled enamel among the children in the city of Conway is likewise operative among those individuals from the rural districts who use artesian water during the period of calcification of their permanent teeth.[2] A shifting population with consequent broken water histories obviated drawing any inferences from the examinations listed in group D.

Berkeley County: Dr. J. K. Fishburne, county health officer at Moncks Corner, reports that an examination of 11 schools in the county disclosed 297 cases of mottled enamel varying in degree from very mild to moderate. In March 1933 the writer visited this county and observed mottled enamel in two widely separated sections. At the Chicora school, near Cross and the Orangeburg County line, a few mild to moderate cases of white opaque type of mottled enamel were observed. All cases were associated with the use of deep-well water. One family on Route No. 31 near the Orangeburg County line showed a typical mottled enamel involvement. There were eight children in the family and only the oldest, aged 18, was free from the defect.

[2] Although statements of previous investigators (16) (6) indicate that lesions corresponding to human mottled enamel have not been observed in domestic animals of endemic areas, the writer in studying the literature on this subject found that a lesion of the permanent teeth of ruminants, horses, and other animals had been observed in North Africa, where it is known as "Le Darmous" (1). In this connection it may be interesting to mention that the writer has succeeded in finding instances of "Le Darmous", or animal mottled enamel, in the United States. An examination of a score or more of cows in Horry County, S.C., indicated that these developmental imperfections may show in the permanent teeth of cows which drink continuously of artesian waters showing a high fluoride content. It was possible to find three cows, about 4 years of age, whose consumption of artesian water from birth had been quite constant. Although the centrals and first laterals showed little other than an abnormal dullness, the second laterals and corner teeth showed definite developmental imperfections which we would be justified in considering the analogue of human mottled enamel. The second laterals and corner teeth, according to Chauveau (The Comparative Anatomy of the Domesticated Animals, by A. Chauveau, revised by S. Arloing; Second English Edition translated and edited by George Fleming. D. Appleton & Co., New York, 1905) erupt at about 3 and 4 years of age, respectively. In 2 of the 3 cases, children of the household using the same water as did the cows showed a moderately severe mottled enamel. In the third case, there were no children in the house, but the well water on analysis showed considerable amounts of fluorides. Cows imported from other counties (nonendemic areas) did not show this developmental dystrophy. This study is being continued and it is hoped other instances of its occurrence in the United States may be found.

The youngest, aged 6, showed questionable signs on the few permanent teeth present, while the remaining six children showed definite signs of mottled enamel ranging from very mild to a moderate degree of involvement. The water apparently causing the dystrophy was from a well 93 feet deep but cased down only 36 feet.

In the northeastern section of the county there is a logging community known as Witherbee. About a dozen families are supplied with water piped to their individual homes from a storage tank. The water is obtained from a well 289 feet deep which was put down in 1926. This water is apparently affecting all the children using it, some showing a moderate degree of involvement. The older children show the lesion only on the cuspids, bicuspids, and second molars, the teeth calcified earlier being normal. The younger children show the characteristic manifestations of mottled enamel on the first molars and incisors.

Charleston County: The possible relationship between rock phosphate deposits and mottled enamel will be referred to more completely in that portion of this paper relating to Tennessee. The phosphate deposits of Charleston County have been described in detail by Rogers (21), and a survey of certain of these areas in the northern part of the county was made with the assistance of Dr. Leon Bonov, the county health officer. Seven cases of very mild to mild, white, opaque mottled enamel were observed among colored children using water from two shallow wells in these phosphate areas. These two wells are located between Johns Island and Lambs. The evidence relative to mottled enamel among users of shallow wells in this particular rock phosphate area is indefinite, and conclusions are apparently not justified by the evidence available at the present time.

Mottled enamel associated with the use of water from deep wells is, however, not uncommon in this county. At the Red Top colored school near the Johns Island railroad station, 13 cases among the 54 children examined were noted. Many of these were moderate to severe in degree of involvement, a few showing brown stain on the incisors. Eight gave a history of drinking water from the artesian well at the Johns Island railroad station. The others were found to be associated with water from two other nearby deep wells. Other examinations in various schools indicated that other deep wells in the rural districts of the northern part of this county were likewise producing mottled enamel, but none as severe as noted around Johns Island.

SOUTH DAKOTA

Areas of mottled enamel in South Dakota were reported as early as 1918 by McKay (22), who demonstrated its presence by a survey at Britton, Kidder, Langford, Pierpont, Andover, Groton, and Aberdeen,

all apparently associated with the use of artesian water during the period of calcification of the permanent teeth. Five questionnaires were sent to the district dental societies in the State. One reply, from the Second District Dental Society, has been received. In addition, questionnaires were mailed to 142 individual dentists in 29 different counties. Seventy-eight replies have been received from these individual dentists, many of them supplying much supplemental data. Many of these questionnaires were sent to dentists solely on the basis of the type of water used in their communities, which, in turn, were based on the geological reports of Darton (23).

A report by counties follows:

Beadle County: Dr. George A. Youel, of Huron, writes that mottled enamel is not endemic among the children of Huron, which uses a filtered river water for its municipal supply. Dr. Youel calls attention, however, to mottled enamel in areas using artesian water and particularly refers to Cavour, Yale, Iroquois, and nearby farms. Several other dentists of Huron call attention to mottled enamel in the northern half of the county bordering on Spink County. Dr. A. A. Wollman particularly calls attention to the neighborhood around Hitchcock.

The writer examined 63 children in the school at Wessington. There was one mild case of mottled enamel and four cases very mild to questionable. The one mild case was in a child from a nearby country district who had used artesian water exclusively from birth. At Wolsey, the school was not in session and the writer examined 14 children on the street. There were four moderate to severe cases of mottled enamel generally associated with the use of the artesian city water.

Bon Homme County: Six replies indicate that this county is apparently negative.

Brookings County: Six replies from dentists indicate that this county is negative.

Charles Mix County: Four replies from this county fail to point to any outstanding area. One dentist reports mottled enamel around Wagner, but the information at present is indefinite. This county is being listed as negative pending further information.

Davison County: Replies from seven dentists in Mitchell indicate that this county is nonendemic for mottled enamel.

Faulk County: Dr. Max H. Moore, of Faulkton, is of the opinion that the mottled enamel cases being produced in this county are, in the main, from around Chelsea, in the northeastern part of the county.

Hand County: The writer examined the pupils of four schools along U.S. Route No. 14 in this county. At Ree Heights 50 children in the fifth, sixth, seventh, and eighth grades were examined. Only one

case of mild mottled enamel was observed, and in this case there was a mixed water history. At the Spears school, midway between Ree Heights and Miller, 14 children were examined. Eight of the 14 showed a mild degree of white, opaque mottled enamel associated with the use of artesian water. At Miller, 102 children in the sixth, seventh, and eighth grades were examined. Thirty-eight cases of mottled enamel were observed, practically all of which were of a mild type. At St. Lawrence, 46 children in the fifth and sixth grades were examined, of whom 19 showed mottled enamel. Seven of the nineteen, principally from the country districts, showed mottled enamel in a moderate to severe form. Two other individuals in the high school who had used water from artesian wells on the outskirts of the community showed a severe form of mottled enamel. The characteristic brown stain was present in many of these moderately severe cases. At Vayland 11 cases of mottled enamel were observed among the 25 persons examined. These were all of a mild type, and no brown stain was observed.

Hughes County: The children in five schools, 76 children, from Pierre to Harrold were examined. In the one mild case observed in this entire group the affected teeth had apparently calcified while the child was living in Lyman County, where mottled enamel is occasionally observed in children living on ranches where deep well water is used. At Harrold, however, an examination of 58 children showed 9 cases of mottled enamel, varying from moderate to severe, several showing marked brown stain. The mottled enamel and brown stain observed at Harrold was similar to that observed at St. Lawrence and more severe than any noted in the various schools along Route No. 14 between Pierre and Wolsey.

Kingsbury County: Dr. P. L. Scofield of De Smet reports a high incidence of mottled enamel in the western third of the county associated with artesian water. Dr. W. C. Gross reports a high percentage of children affected in Iroquois, with many showing the characteristic brown stain. Dr. M. G. Jensen of Lake Preston reports a high incidence of mottled enamel in Lake Preston associated with the use of artesian water. Bancroft, in this county, has also been reported as an endemic area.

Miner County: Dr. Leo V. Schueller of Howard states that mottled enamel is very prevalent in the western half of the county and particularly refers to Fedora, Roswell, and Vilas. Dr. Albert S. Bensend, of Carthage, reports that a high percentage of children in Carthage are affected and adds that the condition is also present in Esmond and the western part of the county.

Roberts County: Dr. A. R. Sorbel and Dr. J. A. Robertson, both of Sisseton, write that there are areas where mottled enamel is endemic in this county. Dr. Robertson further calls attention to the fact that

Roberts County is composed of hills to the west which rise to a height of 2,000 feet and the Whetstone Valley to the east. Many artesian wells have been sunk in the Whetstone Valley during the past 20 years and water is obtained at depths of from 700 to 900 feet. Doctor Robertson notes that children drinking artesian water in the valley invariably show mottled enamel, while those from the hill country, although separated by only a few miles, are not affected.

Sanborn County: Dr. D. St. I. Davies, of Woonsocket, makes some interesting comments relative to Woonsocket and neighboring communities going back over a period of 50 years. He states that when the county was first settled and the inhabitants depended on creeks or shallow wells, near sloughs, there was no mottled enamel. Then in the early 90's deep artesian wells (around 700 feet deep) were put down. Water from these wells produced mottled enamel. He further adds that within recent years, so-called "soft water" wells (about 200 feet deep) have been used more and more and children calcifying their permanent teeth while using this water are free from the defect. Doctor Davies has offices both in Woonsocket and Artesian and states that mottled enamel is more frequently observed in Artesian than in Woonsocket, where the gradual change in the water supply has almost eliminated it. Dr. Leo V. Schueller, of Howard, also refers to Forestburg, between Woonsocket and Artesian, as an endemic area.

Spink County: Dr. Clyde A. Peterson, of Doland, writes that approximately 50 per cent of the children show mottled enamel, associates it with the use of artesian water, and localizes it in the eastern part of the county. From Dr. V. P. Poulson, of Conde, comes another interesting report. He states that a high percentage of individuals are affected wherever artesian water is used and especially reports its presence in the northern section of the county where Conde is located. From Redfield, in the western part of the county, and a little to the south, Dr. Earl F. Harrington writes that he sees only a few cases and these apparently from the northern section of the county. Dr. W. G. Gross, of Iroquois, states that mottled enamel is endemic at Frankfort.

TENNESSEE

No reply was received from the query sent to the secretary of the Tennessee State Dental Association, and questionnaires were sent to the secretaries of the 10 component societies as listed in Polk's Dental Register (1928). In answer to these 10 requests for information, one reply was received. This was negative.

In view of the extensive deposits of natural phosphates in the State, further study was deemed advisable. Certain rock phosphates, according to Marshall, Jacob, and Reynolds (24), show a fluorine content as high as 3 or 4 percent. These investigators found that a number of samples from Tennessee contained more than 3 percent.

A report by Waggaman (25) gives a detailed description of the location of the Tennessee natural phosphates, while other work of interest in connection with this study is that of Carter (26) relative to the solubilities of inorganic fluorides in water.

Two counties in Tennessee, Maury and Hickman, were visited. At Mount Pleasant the two dentists stated that they see mottled enamel at times and that the cases are apparently from the rural sections. The municipal water supply of Mount Pleasant is brought a distance of about 10 miles, and its source is in a limestone region. About a quarter of a mile, however, from Mount Pleasant there is a small settlement of a dozen or more colored people who obtain their drinking water from a spring which comes out through a phosphate formation. Six children who had used water from the spring during the period of calcification of their permanent teeth were examined. Four showed a "mild" degree of involvement of the white opaque type of mottled enamel. One negro girl, age 11, who had used this spring for the past 3 years only, showed definite markings of mottled enamel on all of the bicuspid teeth, while the remaining teeth were normal. A mining community about 5 miles from Mount Pleasant was next visited. The water supply of this community is obtained from a well 65 feet deep and reported as cased its entire depth. The natural phosphate deposits in this particular area are about 20 feet deep and the community water supply is apparently obtained from a source considerably below the phosphate deposit. No mottled enamel was observed in about a dozen children examined.

In Hickman County, a small mining settlement at Twomey was visited. The water supply there is obtained from a spring known as "Twomey Springs" which issues from a phosphate deposit. The mining superintendent stated that this particular phosphate was high in fluorine. In one family there were three children who had used this spring exclusively from birth. Their ages were 8, 10, and 13, respectively. All showed a mild type of white, opaque mottled enamel, one in addition showing the characteristic brown stain on the superior incisors. Another family with a child aged 10 had moved into the community 3 years previously. The second bicuspids of this child showed mottled enamel while all other teeth were normal. A fifth child, aged 13, gave a mixed history of drinking water, having used water from both Twomey Springs and a surface well. This child showed questionable markings on the central incisors and one bicuspid while all the remaining teeth were apparently normal.

The finding of mottled enamel in children who had used water passing over or through rock phosphate deposits is of interest. Velu (27) reports a similar condition in North Africa known as "le darmous." In the opinion of Velu, "le darmous" is caused by the ingestion of small amounts of fluorine present in the drinking water as a fluoride,

due to its passage over or contact with the beds of natural phosphates. "Le darmous" has been studied during the past 10 years at the Institute of Pasteur in Algiers, and their animal experiments and investigations become of value in connection with the study of mottled enamel. From Velu's description, illustration, epidemiological data, and apparent causative factor, we infer that "le darmous" and mottled enamel are identical.

TEXAS

In 1916, McKay (3) called attention to certain mottled enamel areas in Texas. Pierle (28) later states, from data obtained from students at a college at Canyon, that "the area in Texas alone, mapped from data collected from the student body of the West Texas State Teachers' College, includes 86 of the 252 counties of Texas." The counties in the State affected were not stated. In a recent article on the geographical distribution of mottled enamel, McKay (9) states with respect to Texas: "The distribution over Texas is so widespread that no detailed cataloging of the communities is here possible, but reports indicate that the northwest portion known as the Panhandle constitutes by far the most extensive afflicted area in the country, and involves more people. A definite deep-well association has been reliably established. There are afflicted localities in other parts of the State."

In view of the widespread distribution of mottled enamel in Texas, two forms of survey were followed. As was the custom in each State, a questionnaire was sent to each component or district society in the State. In addition, 59 counties of the Panhandle and west Texas were made the object of a more intensive and complete survey.

Excluding the counties in the Panhandle and west Texas, the only area reported in the replies received from the various component societies is one at Taylor, in Williamson County, where it is estimated that there are 1,000 cases, and where the Austin Dental Society states that the condition is associated with the use of drinking water obtained from artesian wells. This report has likewise been confirmed by individual reports from dentists practicing in Taylor.

THE PANHANDLE AND WEST TEXAS

In order to obtain as much information as possible regarding mottled enamel in the Panhandle, a survey by counties was undertaken. Fifty-nine counties are included in this area. In counties where, according to Polk's Dental Register, there was no dentist practicing or where after a reasonable time no reply was received from the dentist practicing there, a questionnaire was sent to the county health officer. Often there were counties where no dentist was listed, and in these cases the sole report was from the county health officer. There were 13 such counties. In three counties,

Borden, Yoakum, and Loving, it was impossible to find either a physician or a dentist to whom an inquiry could be addressed.

One hundred and twenty-nine questionnaires were sent into this area, 127 to individuals and 1 each to the Amarillo and Panhandle Dental Societies, respectively. Replies were received from 86 individuals and 2 societies, while 4 more were returned marked "unclaimed", "deceased", etc. The majority of the answers included valuable supplemental data. Excluding the three counties previously referred to where it was impossible to address an inquiry, we find that there are only four counties to which questionnaires were addressed and from which we have no report, or, in other words, we have one or more reports from 52 of the 59 counties being studied. These 52 counties are covered by 86 individual reports and 2 reports from societies.

Information in detail from counties of the Panhandle and west Texas follows:

Andrews County: No record of a dentist practicing in this county. The county health officer states that about 50 percent of the population is affected and that it is localized in the extreme western part of the county associated with deep-well water.

Armstrong County: The only report from this county is that from the county health officer. He reports mottled enamel locally but states that the incidence is only about 5 to 10 percent. He further adds that the water supply is obtained from deep wells 140 to 240 feet in depth.

Bailey County: A report from the county health officer, A. R. Matthews, and jointly signed by A. E. Lewis, D.D.S., states that practically all native-born children are affected. They state that the water is obtained from shallow wells.

Borden County: It was not possible to obtain the name of either a physician or dentist practicing in this county.

Briscoe County: Dr. Ben R. Ezzell, a practicing dentist of Quitague, sends a complete report concerning mottled enamel in this county. He calls attention to the fact that Quitague is located just below the Cap Rock, at an altitude of 2,600 feet. About 10 miles to the west is the top of Cap Rock, where the Great Plains begin at an altitude of 3,100 feet. Dr. Ezzell states that mottled enamel occurs with much greater frequency on the Plains than in the valley. He also states that 3 years ago he examined over 900 school children in this county and found mottled enamel in the mouths of 10 percent of the children living in the valley and 25 percent of the children on the Plains. He states that the South Plains is underlaid with what is known as "the South Plains sheet water", which is tapped at from 20 to 40 feet anywhere. This South Plains water is soft, while the water in the valley is hard. Dr. Ezzell adds that most of the

mottled enamel occurs in the western part of the county around Silverton.

Carson County: Dr. O. York, the county health officer, reports only a few cases in this county and thinks they are confined to the shallow-water belt. The incidence is so low that the county is considered negative.

Castro County: Dr. Mayes Miller, county health officer, states that 85 percent of the native-born children of this county are affected. He also notes that mottled enamel is apparently evenly distributed throughout the county and that the water is obtained from wells 100 to 150 feet deep.

Childress County: Although occasional cases are sometimes seen, replies from three different dentists all indicate that this county is essentially negative.

Cochran County: There is neither a dentist nor a county health officer listed in this county. A questionnaire was addressed to the one physician practicing here but no reply has been received.

Collingsworth County: The report from Dr. W. R. Orr, a dentist who has practiced there for 21 years, indicates that the county is negative.

Cottle County: Dr. W. T. Payne reports that he recently examined the mouths of 300 school children between the ages of 6 and 12. No native-born children of this county showed mottled enamel. The county is listed as negative.

Crosby County: Reports have been received from Dr. F. A. Greene of Crosbyton, and Dr. H. F. Schwab of Ralls. They estimate an incidence of 60 and 50 percent, respectively, and state that the condition is general throughout the county. They add further that the drinking water is obtained from wells 100 to 300 feet deep.

Dallam County: Four replies have been received from this county, 3 from Dalhart and 1 from Texline. They indicate that what cases they see are from other areas, namely, Amarillo, Plainview, Lamesa, and the range country to the south. The county is listed as negative.

Dawson County: Five questionnaires were sent to dentists in this county and five replies were received. All reports indicate that mottled enamel is endemic. Dr. R. F. Nix, of Lamesa, for instance, stated that 95 percent of native-born children are affected. All five agree that shallow wells are associated with the dystrophy.

Deaf Smith County: Six questionnaires were sent into this county. Dr. G. W. Heard, a dentist, reports a low incidence, with considerable brown stain. Dr. G. F. Le Grand, a physician, of Hereford, roughly estimates an incidence of 5 percent but states that, due to the shifting population, it is difficult to estimate. He states that the drinking water is obtained from wells which vary in depth from 50 to 300 feet. Although the data with respect to this county is not as complete as

might be desired, it is being listed as an endemic area, since all surrounding counties are endemic areas and the "spot mapping" of the Panhandle as a whole marks it as being in the mottled enamel zone.

Dickens County: Two replies have been received, which indicate a low incidence of mottled enamel. It is apparently more marked in that part of the county around McAdoo, according to a reported survey of school children.

Donley County: This county is apparently negative for mottled enamel.

Ector County: The county health officer, Dr. Emmet V. Headlee, reports this county as negative. No reply was received from the only dentist practicing in the county.

Floyd County: Three replies from this county all indicate that mottled enamel is endemic among the native-born children. Water from wells 100 to 200 feet deep is apparently associated with the dystrophy.

Fisher County: This county is reported as negative.

Gaines County: The county health officer, Dr. A. L. Bradford, reports an incidence of about 75 percent and notes an association with wells about 100 feet in depth.

Garza County: The county health officer, Dr. D. C. Williams, conservatively estimates that 50 percent are affected and notes an association with deep-well water.

Gray County: This county is reported as negative.

Hale County: Three replies were received from this county. Dr. P. E. Berndt estimates that 40 to 50 percent are affected, while both Dr. C. D. Wofford and Dr. W. J. Lloyd estimate that at least 90 percent are affected. They report both shallow and deep wells, principally shallow wells.

Hall County: Two replies indicate that this county is apparently negative.

Hansford County: A joint report from Dr. G. P. Gibner, county health officer, and Dr. F. J. Daily, a dentist, indicates that this county is negative.

Hartley County: No replies received; two questionnaires sent.

Hemphill County: Dr. E. H. Snyder, county health officer, reports this county negative for mottled enamel with respect to native-born children.

Hockley County: Dr. Ray Ross states that the condition is general throughout the county, and adds that his investigations have shown that mottled enamel is always associated in this county with the use of shallow wells. Those using deep wells or artesians are apparently immune.

Howard County: Four replies from dentists at Big Spring mark this county as questionable. A few cases are reported, but from the

country districts. These cases are apparently a mild, white, opaque type, with little or no brown stain such as is seen farther to the northwest. Dr. E. O. Ellington and Dr. W. B. Hardy report a few cases in the northeast section of the county. This checks up with the fact that a few cases are reported in the southwestern section of Scurry County. Shallow wells are apparently used for drinking water.

Hutchinson County: Dr. W. H. Beckley, of Borger, states that 50 percent of the native-born children are affected in this county.

Jones County: Dr. F. C. Prichard of Anson, reports this county as negative for mottled enamel.

Kent County: Dr. J. H. Fowler, the county health officer, reports this county negative.

King County: No report.

Lamb County: Dr. C. C. Clements reports that nearly every child born at Littlefield has mottled enamel.

Lipscomb County: The county health officer reports the county negative.

Loving County: It was impossible to obtain the name of either a physician or dentist practicing in this county.

Lubbock County: Five replies were received from the city of Lubbock and two from Slaton. The consensus of opinion as conservatively expressed is that at least 50 percent of the native-born children are affected. Most of the cases are apparently associated with the use of shallow wells, but there are some deep wells in the county.

Lynn County: Dr. J. R. Singleton estimates that approximately 60 percent are affected and associates it with the use of shallow wells, which he states are about 110 feet deep.

Martin County: The county health officer reports a very low incidence of mottled enamel in this county. There is no dentist listed as practicing in this county. In as much as dentists in Dawson County to the north and Howard county to the east have both called attention to mottled enamel in Martin County, it is listed as an endemic area.

Midland County: Drs. L. B. Pemberton, K. P. Campbell, and D. K. Ratliff, all of Midland, report a fairly high incidence of mottled enamel in Midland County.

Mitchell County: This county is considered questionable. Dr. B. J. Dunlaney, of Colorado, reports an area about 12 miles to the northeast, but does not know the degree of involvement or the number affected. He states that shallow wells are used.

Moore County: Reports from 2 physicians and 1 dentist indicate that this county is negative for mottled enamel among the native-born children.

Motley County: Dr. E. W. McKenzie reports this county negative although he states that the condition is quite common in the counties to the west in the Plains country.

Nolan County: Three replies indicate that this county is negative for mottled enamel.

Ochiltree County: This county is apparently negative.

Oldham County: Dr. F. A. Collins, the county health officer, reports mottled enamel in this county. There are no dentists listed as practicing in the county.

Parmer County: Dr. J. M. McCuan, the county health officer, reports mottled enamel in this county. There are no dentists listed as practicing in the county.

Potter County: The secretaries of the Amarillo and the Panhandle Dental Societies, reporting from Amarillo, state that a high incidence of mottled enamel exists locally. Apparently deep wells are the sources of water supply here.

Randall County: A report from Dr. S. L. Ingham, a dentist, and Dr. C. A. Pierle, head of the department of chemistry, West Texas State Teachers' College, indicates a high incidence, approximately 75 percent, in this county. They state that both artesian and shallow wells are used.

Roberts County: The county health officer reports the county negative for mottled enamel.

Scurry County: Dr. Sed A. Harris reports only a few cases, those in the southwestern part of the county. It is interesting that a few cases were also reported in the northeastern part of Howard County. Scurry County is listed as questionable.

Sherman County: Apparently negative.

Stonewall County: Apparently negative.

Swisher County: Dr. R. L. Massey reports mottled enamel in this county and states that water is obtained from shallow wells.

Terry County: The county health officer, Dr. T. L. Treadway, reports mottled enamel in this county. No further data.

Wheeler County: Apparently negative.

Winkler County: No reply was received from the inquiry addressed to the county health officer. There is no dentist listed as practicing in the county.

Yoakum County: It was not possible to obtain the name of either a physician or a dentist practicing in this county.

UTAH

Beaver County: Dr. Edgar A. Petty, of Beaver, calls attention to the near-by communities of Greenville and Adamsville, where, he states, 700 to 1,000 are affected. He estimates the incidence at 90

percent for both towns and notes that drinking water is obtained from artesian wells and deep springs.

Washington County: Both Dr. E. H. Conger and Dr. W. C. Cox, of St. George, report mottled enamel in St. George, but note that it is not nearly as severe as formerly. They state that about 20 years ago the water supply was changed. Formerly the entire municipal water supply was obtained from springs and mottled enamel in St. George was very severe. It is not very clear in either report whether the new water supply from Pine Valley mountains is now used exclusively in the municipal supply for domestic purposes, or whether this mountain water has been merely added to the local spring supply. One report states that the St. George spring water is still being used for irrigation of truck gardens and vegetable plots. Both agree that there has been a marked decrease in the incidence of mottled enamel since the change in the water supply.

VIRGINIA

Areas of mottled enamel at Franklin and Courtland, Southhampton County, were reported by McKay (3) in 1916. In 1919, he (13) reported the results of a survey at Franklin. In 1931, the writer examined 222 school children at the Courtland school. These children were from Courtland and the surrounding rural districts within a radius of 6 or 7 miles. In this group were 29 children who had lived in Courtland and used artesian water exclusively from birth. Twenty-eight, or 96 percent, showed definite signs of mottled enamel. The one remaining case, listed as negative, was in a 6-year old child whose erupted permanent teeth were limited to the lower central incisors. The water supply in Courtland is obtained from individual flowing artesian wells. Reports from the State department of health indicate that mottled enamel is present at Smithfield (confirmed by Dr. W. C. Ames, a dentist of Smithfield), Rescue, Battery Park, and Carrollton in Isle of Wight County and Chuchatuck in Nansemond County. Dr. W. L. Smoot, of Williamsburg, writes that practically all native-born children of Jamestown Island are affected. He states that artesian water is used for drinking purposes.

QUESTIONABLE AREAS

Questionable areas include parts of Howard, Mitchell, and Scurry Counties, Texas; Dona Ana County, New Mexico; and the "South Pass and Atlantic City" district in the southern part of Fremont County, Wyoming.

SUMMARY

There are 97 localities which have either been referred to in the literature as areas where mottled enamel is definitely demonstrable

or areas reported by questionnaires and subsequently confirmed by survey of the locality.

There are, in addition, 28 areas referred to in the literature as mottled-enamel areas. No confirmatory surveys are reported, but little doubt exists as to the production of mottled enamel in these regions. They are, in the main, in the Panhandle and west Texas.

There are 70 areas which have been reported by questionnaires but which have not as yet been confirmed by extensive surveys.

There are 5 areas reported by questionnaires which are held as questionable pending receipt of further data.

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THE HYDROLYSIS OF THE PHENYL AND CRESYL PHOSPHORIC AND PHOSPHOROUS ACID ESTERS IN ALCOHOLIC AND AQUEOUS SYSTEMS

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In previous communications from this laboratory experiments were reported to show the rate of hydrolysis of the phosphoric and phosphorous acid esters of phenol and of the three cresols in absolute

alcohol with varying concentrations of KOH (1) (2). The rate of hydrolysis in these experiments was measured in terms of the respective phenols set free under the experimental conditions. Briefly, the experiments showed that in the presence of KOH the more stable phosphoric esters decomposed in absolute ethyl alcohol at a rate proportional to the concentration of the alkali, while the less stable phosphorous acid esters decomposed also in absolute alcohol alone, provided sufficient time was allowed. It appeared probable that the decomposition reaction of these esters in alcohol might be different from that in an aqueous system. A series of experiments was therefore undertaken to compare the products of hydrolysis, i.e., the phenols and the phosphorus, at different stages of decomposition of these esters in aqueous and alcoholic systems. The results of these experiments demonstrate that in aqueous systems the esters decompose into the corresponding phenols and inorganic phosphorus, while in alcohol inorganic phosphorus does not accompany the liberation of the phenols. Moreover, these experiments also show that there is a disproportionate liberation of inorganic phosphorus and phenols in the case of aqueous hydrolysis of some of the phosphoric esters, indicating the formation of intermediary compounds. Lastly, these experiments suggest that the role of KOH in the decomposition of the esters in alcohol may be in the nature of a catalyst.

EXPERIMENTAL

Hydrolysis in alcohol.—The hydrolysis of the esters in ethyl alcohol and the estimation of phenols in the hydrolysate at various stages have been previously described (1). Stated in terms of time required to effect 75 to 85 percent hydrolysis of a 1 percent solution of triorthocresyl phosphate as determined by the orthocresol set free at 25° C. under different concentrations of KOH, the results may be summed up as follows:

2.5 N KOH	20 minutes.
0.5 N KOH	2 hours.
0.1 N KOH	3 days.

The phosphoric esters of phenol and meta and para cresol were not studied in as great detail, but in general they did not differ materially from the orthocresyl compound.

The phosphorous acid esters of the phenols also presented relatively little difference among themselves. They were much less stable, however, than the phosphoric esters. The hydrolysis of 1 percent triorthocresyl phosphite in absolute ethyl alcohol with and without KOH at 25° C., as expressed in terms of time required to split off 90 to 100 percent of the available orthocresol, may be given as follows.

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0.1 N KOH	10 minutes.
0.01 N KOH	2 hours.
No KOH	2 days.

No inorganic phosphorus could be demonstrated in any of the above alcoholic hydrolysates.

Aqueous hydrolysis of the phosphoric esters.—These experiments were carried out by refluxing 1 percent of the respective esters in half-saturated aqueous solution of NaOH for a definite length of time, at the end of which analyses were made for the corresponding phenols and for inorganic phosphorus. The method for phenol estimation was the same as that previously described. The inorganic phosphorus was estimated colorimetrically by the method of Fiske and Subbarow (3). In order to insure freedom from silica, the inorganic phosphate was precipitated in a definite volume of hydrolysate with 10 percent $CaCl_2$ in saturated solution of $Ca(OH)_2$ after the reaction of the hydrolysate had been adjusted to just alkaline to phenolphthalein. The combined precipitate was washed by centrifugation and the phosphate separated by solution in dilute H_2SO_4 and centrifugation. The quantity of phosphorus so estimated at any one time varied from about 0.08 to 0.3 mg. Control experiments showed that the methods employed herein for estimation of the phenols and of inorganic phosphorus were accurate within ± 5 percent.

TABLE 1.—*Aqueous hydrolysis of the phenolic phosphoric esters on refluxing with half saturated NaOH*

Compound	Percent hydrolysis on basis of phenols (A) and phosphorus (B)							
	1 hour		2 hours		5 to 6 hours		9 to 15 hours	
	A	B	A	B	A	B	A	B
Triphenyl phosphate	82	37	94	80	100	102		
Triorthocresyl phosphate			60	9	89	46	102	97
Trimetacresyl phosphate			73	71	80	87	96	99
Triparacresyl phosphate			62	20	89	58	91	82

On comparing the inorganic phosphorus estimated in parallel with the respective phenols at different stages of hydrolysis of the several phosphoric esters, it appears that there is a lag of the former in all the esters examined except the metacresyl, as shown in table 1. Triphenyl phosphate appears to be the least stable of the four compounds. The disproportionate phenol and phosphorus findings in the instance of the phenyl, orthocresyl, and paracresyl esters suggested the formation of intermediary compounds. This finds support in the fact that similar hydrolysis experiments carried out upon the

phosphoric diester and monoester of orthocresol [1] showed disproportionate orthocresol and phosphorus in the former only, as follows:

Hydrolysis period	Dicresyl ester		Monocresyl ester	
	o-cresol	Phosphorus	o-cresol	Phosphorus
2 hours	40	10	27	27
5 to 9 hours	70	53	48	47
14 hours			71	69

It is significant that these two compounds do not hydrolyse in absolute ethyl alcohol at 25° C. in any concentration of KOH up to 2.5 N. One such experiment in 2.5 N KOH extended over a period of 9 days, with no evidence of any orthocresol having been split off.

Aqueous hydrolysis of the phosphorous acid esters.—These experiments were made with 1 percent suspensions of each of the four esters in water for a definite length of time and at a constant temperature. At the end of the hydrolysis period the suspension was filtered through hard filter paper and the phenols and the inorganic phosphite-phosphorus determined in the filtrate. Since phosphite-phosphorus must first be converted to phosphate-phosphorus before it can be estimated by the method of Fiske and Subbarow, it was necessary to work out a procedure of oxidation of phosphite to phosphate-phosphorus without interfering with its estimation. The procedure which proved satisfactory consisted of treating a quantity of hydrolysate representing 0.1 to 0.3 mg phosphite-phosphorus with 1 cc N $KMnO_4$ and about 0.5 cc 10 N H_2SO_4 on the water bath at 50° C. for half an hour. The mixture is then *cooled* and the estimation of inorganic phosphorus is continued in the usual manner.

The results of these experiments showed that all of the four phenolic phosphites can be decomposed nearly completely in water in 1 to 3 hours at 80° to 100° C. and partial decomposition may be effected in 15 to 60 minutes at 60° to 80° C. Determination of inorganic phosphite-phosphorus at various stages of hydrolysis usually showed an approximately close parallelism with the respective phenols, indicating the simple decomposition of the phenolic phosphites in water into the phenols on the one hand, and phosphorous acid on the other.[2]

[1] The preparation and pharmacologic action of these compounds will be described in a separate publication.

[2] In several of the hydrolysates in which some 30 to 80 percent of the esters had decomposed, the inorganic phosphite-phosphorus values were somewhat higher than the corresponding values for the phenols. This discrepancy we believe is probably due to increasing solubility of the esters in their products of hydrolysis as compared with that in water. Consequently, as hydrolysis progresses, a small amount of the undecomposed ester may go through the filter, and this would be decomposed in the course of oxidation of the phosphite prior to its determination as phosphate. No discrepancy, beyond the limits of experimental error, was noted in the phosphorus and phenol or cresol values in the early stages of hydrolysis nor at the end when decomposition was complete.

DISCUSSION

The foregoing experiments demonstrate that the phosphoric and phosphorous acid esters of phenol and of the three cresols may undergo two distinctly different types of cleavage according to the medium in which hydrolysis takes place. In aqueous systems the phenols are set free, and along with them inorganic phosphorus is split off. In absolute ethyl alcohol the phenols are also set free, but no inorganic phosphorus can be demonstrated as a product of hydrolysis. Since no inorganic phosphate can be demonstrated at any time in ester-alcohol-KOH systems even after all the available phenols have been set free, and no free phenols can be demonstrated in the phosphoric ester-alcohol system unless some KOH is present, it would seem that the alkali must play an indirect, though essential, part in this reaction.

An experiment with 1 percent solution of triorthocresyl phosphate in absolute alcohol and 0.1 N KOH at 38° C. showed a rapidly progressing rate of hydrolysis with respect to the liberated orthocresol, so that by the fifth day nearly all the available orthocresol was split off. No inorganic phosphorus could be detected in the hydrolysate. The titrable alkali (titrated against N/50 H_2SO_4) did not change in the entire course from the first day, when the hydrolysate contained a mere trace of free orthocresol, to the fifth day, when it contained 86 percent of it, indicating 98 percent decomposition. To account for these facts the following would seem to be the probable reaction.

$$(C_6H_4CH_3O)_3PO + 3C_2H_5OH \text{ and } KOH \rightarrow 3C_6H_4CH_3OH + (C_2H_5O)_3PO$$
$$\text{or } (C_6H_4CH_3O)_3PO + 3C_2H_5OK \rightarrow 3C_6H_4CH_3OK + (C_2H_5O)_4PO.$$

A similar experiment with 1 percent ester and 0.01 N KOH in absolute alcohol at 38° C. likewise showed a progressive, though slow, rate of hydrolysis, attaining approximately 28 percent orthocresol by the seventh day and 38 percent by the twenty-eighth day. The pH of this solution, being about 8, showed no appreciable change throughout the experimental period. Since the degradation of the tricresyl ester to the dicresyl ester is accompanied by liberation of 29.3 percent orthocresol, it would appear that the state of decomposition of the foregoing 1 percent solution by the seventh day might be expressed by the following equation:

$$(C_6H_4CH_3O)_3PO + C_2H_5OH \text{ and } KOH \rightarrow C_6H_4CH_3OH + C_6H_4CH_3O\!\!\begin{array}{l}\diagup C_2H_5O\\ \diagdown C_6H_4CH_3O\end{array}\!\!PO.$$

And since, with an excess of ester such as we have in a 1 percent solution 0.01 N KOH could not possibly yield more than 10.8 percent orthocresol if its liberation were conditioned upon the direct chemical interaction of ester and alkali, the conclusion that the role of the KOH must be indirect seems justified.

We believe that this difference in hydrolysis of the phosphoric and phosphorous esters of the phenols in aqueous and alcoholic systems may prove important in elucidating the mechanism of their pharmacologic action. We had previously suggested hydrolysis *in situ* of the nervous system as a probable explanation for the specific neurotoxic action of some of these esters. The probable mechanism for such assumed hydrolysis *in situ* was not apparent. In line with the experimental evidence described herein, it seems probable that phenolic esters may undergo two distinct types of hydrolysis in the animal body as *in vitro*—extraneural hydrolysis, possibly similar to aqueous hydrolysis *in vitro*, and intraneural hydrolysis similar to that in alcohol *in vitro*. For the latter it is necessary only to assume that certain normally occurring chemical constituents of the nervous system may be capable of exerting an influence similar to that of KOH on the decomposition of the neurotoxic esters in an alcohol-like medium, such as the cholesterol of the nervous system. The products of extraneural hydrolysis may be supposed to be readily detoxified, while those of intraneural hydrolysis, being subject to a different fate, might very well exert a lasting influence resulting in degeneration of the neuron.

CONCLUSIONS

Studies on the products of hydrolysis of the phenolic phosphoric and phosphorous acid esters in aqueous and alcoholic systems showed that in the former, inorganic phosphorus occurs along with the phenols, while in the latter the phenols may be split off quantitatively with no inorganic phosphorus accompanying them.

Parallel determinations of the inorganic phosphorus and the phenols in the aqueous hydrolysates of the phosphoric esters indicate the formation of intermediate esters, probably of the di- and mono-ester type, in all except the trimetacresyl phosphate.

No such intermediary products appear to form in the course of aqueous hydrolysis of the phosphorous acid esters of the phenols.

It is suggested that the two distinctly different types of hydrolysis of the phosphoric and phosphorous esters of the phenols in aqueous and alcoholic systems may be significant in accounting for their peculiarly specific pharmacologic properties.

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COURT DECISION RELATING TO PUBLIC HEALTH

Statute relating to labeling of packages used in shipment and transportation of clams construed.—(Maine Supreme Judicial Court; *State* v. *Chadbourne*, 164 A. 630; decided Feb. 18, 1933.) A 1931 statute provided, in part, as follows:

> All packages used in the shipment and transportation of clams from town to town and from a place within the State to a place without the State shall bear a label which, in plain and distinct letters and figures, shall state the name and license number of the consignor and the name of the consignee, the word "clams", the date of shipment, and the name of the town in which the clams were dug.

The defendant, who was duly licensed to buy and sell clams and to transport them from place to place in the State, delivered by truck to a customer in a neighboring town 6 bushels of clams in open bags. No labels were affixed to the bags, but inside of each bag there was a tag upon which was written all of the information called for by the above-quoted statute. The defendant was convicted of a violation of the statute, and the case came before the supreme court on exceptions to the refusal of the presiding justice to direct a verdict of not guilty.

The supreme court said that reference to the law disclosed its purpose to be the prevention of the sale of clams taken from contaminated areas, and that the label was especially important as from it could be ascertained the place where the clams were dug, which was the vital fact to be determined if the law was to be of benefit to the public. "Taken literally," said the court, "section 7 would not apply to the case at bar. It apparently refers to closed packages. The word 'clams' was to appear on the label. Quite obviously this would be superfluous if the package were open." The court then went on to say that it was also clear that the language was not strictly applicable to personal deliveries by vendor to vendee. Said the court:

> * * * We do not speak of a direct delivery by a seller of goods to a buyer as a "shipment", nor do we designate the parties to such a transaction as "consignor" and "consignee." These terms imply something quite different than appears in the case before us.

After considering definitions of the terms "shipment", "consignor", and "consignee", the court held that there was no "shipment" in the instant case, saying:

> * * * There may be "transportation" but not "shipment and transportation." The words appear conjunctively in the statute, and, taken together, carry a much broader implication than does the word "transportation" alone. There is no consignment, no consignor, no consignee. There is no closed package. There is a delivery of an open receptacle by a seller to a purchaser.

This, however, according to the court, would not excuse failure to label, but it took the view that there had been no such failure, stating as follows:

* * * The real object of the law must be kept in mind; namely, to convey to purchasers and wardens information from which could be determined whether or not the clams came from contaminated areas.

Under the circumstances shown here, the method of labeling adopted by respondent was sufficient. The label was filled out in accordance with law. It contained all of the information required. The only complaint is that it was inside instead of outside the open bags in which the clams were carried.

The purpose and intent of the statute were carried out. * * *

The defendant's exceptions were sustained.

DEATHS DURING WEEK ENDED JUNE 3, 1933

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

	Week ended June 3, 1933	Corresponding week, 1932
Data from 85 large cities of the United States:		
Total deaths	7,148	7,491
Deaths per 1,000 population, annual basis	10.0	10.7
Deaths under 1 year of age	489	618
Deaths under 1 year of age per 1,000 estimated live births [1]	41	50
Deaths per 1,000 population, annual basis, first 22 weeks of year	11.7	12.3
Data from industrial insurance companies:		
Policies in force	67,920,937	72,901,860
Number of death claims	10,313	11,261
Death claims per 1,000 policies in force, annual rate	7.9	8.1
Death claims per 1,000 policies, first 22 weeks of year, annual rate	10.6	10.3

[1] 81 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

Reports for Weeks Ended June 10, 1933, and June 11, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 10, 1933, and June 11, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932
New England States:								
Maine	2	4	3	1	2	91	1	0
New Hampshire		2			15	51	0	0
Vermont					63	185	0	0
Massachusetts	24	37		3	613	1,044	0	3
Rhode Island	5	8			3	33	0	0
Connecticut	2	4	1	1	191	255	0	0
Middle Atlantic States:								
New York [1]	44	69	[2]4	[2]9	1,785	2,469	4	7
New Jersey	20	32	1	2	984	972	0	1
Pennsylvania	39	52			1,165	1,015	5	5
East North Central States:								
Ohio	22	23		14	417	2,327	1	5
Indiana	7	15	12	3	141	181	3	2
Illinois	19	75	19	9	545	861	8	4
Michigan	31	14	2	4	670	3,101	1	2
Wisconsin	5	16	16	5	153	1,484	2	1
West North Central States:								
Minnesota	6	11	2	1	190	114	1	1
Iowa	6	5			66	4	1	0
Missouri	18	22		2	164	57	2	3
North Dakota	3	3			69	27	0	1
South Dakota	1	13			19	6	0	0
Nebraska	6	5			194	4	1	0
Kansas	11	5			171	251	0	1
South Atlantic States:								
Delaware		1			11	2	0	0
Maryland [1 3 4]	9	11	3	5	33	35	1	1
District of Columbia	1	3	1	1	22	18	1	1
Virginia [1]	9				224		0	
West Virginia	3	2	3	16	110	335	1	2
North Carolina [3]	12	11	10	5	419	614	0	2
South Carolina [3]	7	6	98	243	278	173	0	0
Georgia [3]	4	10		33	352	68	1	2
Florida	2	5	1	1	28	1	0	0
East South Central States:								
Kentucky	1	4	9	18	32	27	1	0
Tennessee	3	11	15	27	48	5	2	1
Alabama [3]	12	12	3	45	34	16	2	0
Mississippi	10	3					0	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 10, 1933, and June 11, 1932—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended Jnue 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932
West South Central States:								
Arkansas	3	1	1	----	83	----	0	0
Louisiana [3]	8	23	10	4	22	3	0	0
Oklahoma [3]	5	10	8	7	73	135	0	0
Texas [3]	45	18	144	25	550	76	4	0
Mountain States:								
Montana [1]	1	1	1	----	18	110	0	0
Idaho [1]	----	1	2	1	6	3	0	0
Wyoming [1]	----	----	----	----	9	70	0	0
Colorado	2	14	----	----	6	60	0	1
New Mexico	6	4	----	----	14	25	0	0
Arizona	1	3	----	1	77	7	0	1
Utah [4]	1	----	----	----	49	1	0	1
Pacific States:								
Washington	3	16	----	----	----	254	0	1
Oregon [1]	1	2	26	9	41	151	0	1
California [1]	29	61	26	42	1,274	452	5	2
Total	449	648	421	537	11,433	17,173	48	52

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932
New England States:								
Maine	0	0	10	35	0	0	4	1
New Hampshire	0	0	13	7	0	0	0	0
Vermont	0	0	6	8	0	2	0	0
Massachusetts	1	0	255	352	0	0	4	4
Rhode Island	0	0	24	53	0	0	0	0
Connecticut	0	0	62	77	0	0	1	0
Middle Atlantic States:								
New York [1]	0	2	485	922	0	1	20	17
New Jersey	0	0	133	209	0	0	5	2
Pennsylvania	2	1	458	472	0	0	25	10
East North Central States:								
Ohio	1	2	448	331	0	8	9	11
Indiana	1	0	45	62	1	12	7	10
Illinois	1	3	288	255	7	7	10	16
Michigan	3	3	361	356	0	9	4	8
Wisconsin	0	0	86	76	16	0	1	1
West North Central States:								
Minnesota	1	0	42	53	0	5	0	1
Iowa	0	0	15	33	14	22	4	1
Missouri	0	0	31	21	0	1	5	1
North Dakota	0	0	7	6	0	3	0	0
South Dakota	0	0	3	3	0	0	0	0
Nebraska	1	1	12	9	1	8	0	0
Kansas	0	0	26	16	0	6	5	5
South Atlantic States:								
Delaware	0	0	5	4	0	0	0	1
Maryland [1 3 4]	0	0	58	59	0	0	9	18
District of Columbia	0	1	8	12	0	0	1	2
Virginia [1]	0	----	27	----	0	----	9	----
West Virginia	0	0	18	11	2	1	4	5
North Carolina [3]	0	2	28	29	1	5	12	17
South Carolina [3]	0	0	6	0	0	0	30	30
Georgia [3]	0	0	4	6	0	0	36	21
Florida	0	0	1	1	0	0	3	5
East South Central States:								
Kentucky	0	1	9	49	0	6	13	26
Tennessee	1	1	16	16	1	3	14	40
Alabama [3]	0	0	17	9	0	7	16	18
Mississippi	1	0	4	3	0	5	8	36

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 10, 1933, and June 11, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932	Week ended June 10, 1933	Week ended June 11, 1932
West South Central States:								
Arkansas	0	1	0	1	8	2	9	7
Louisiana [5]	0	0	5	6	0	4	29	21
Oklahoma [5]	0	0	7	18	3	15	12	10
Texas [5]	0	6	45	17	7	22	36	10
Mountain States:								
Montana [1]	0	0	17	8	0	7	0	3
Idaho [1]	0	0	3	0	1	0	0	0
Wyoming [1]	0	0	6	4	0	0	1	0
Colorado	0	0	23	25	6	3	1	2
New Mexico	0	0	1	2	0	0	2	1
Arizona	0	0	9	5	0	0	1	3
Utah [4]	0	0	6	7	0	0	0	2
Pacific States:								
Washington	1	2	27	11	13	14	2	13
Oregon [1]	0	1	19	3	16	2	3	3
California [1]	2	1	125	141	17	12	7	10
	16	28	3,304	3,803	114	192	362	392

[1] Rocky Mountain spotted fever, week ended June 10, 1933, 38 cases: 1 case in New York, 8 cases in Maryland, 2 cases in Virginia, 6 cases in Montana, 7 cases in Idaho, 11 cases in Wyoming, 2 cases in Oregon, and 1 case in California.
[2] New York City only.
[3] Typhus fever, week ended June 10, 1933, 41 cases: 1 case in Maryland, 2 cases in North Carolina, 2 cases in South Carolina, 13 cases in Georgia, 10 cases in Alabama, 1 case in Louisiana, and 12 cases in Texas.
[4] Week ended Friday.
[5] Figures for 1933 are exclusive of Oklahoma City and Tulsa, and for 1932 are exclusive of Tulsa only.

SUMMARY OF MONTHLY REPORTS FROM STATES

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

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
April 1933										
Hawaii Territory	2	9	8		10		0	1	0	7
South Carolina		96	1,703	676	1,337	300	5	23	6	26
May 1933										
Maine	2	5	75		15		2	83	0	6
Massachusetts	5	92		1	2,467		5	1,522	0	15
New York	22	297		3	12,097		5	3,055	3	39
Pennsylvania	12	202			6,097		6	3,426	0	37
Tennessee	9	19	110	94	391	42	2	150	6	25
Vermont		14			115		1	51	0	0

April 1933

Chicken pox:	Cases
Hawaii Territory	125
South Carolina	129
Conjunctivitis, follicular:	
Hawaii Territory	11
Conjunctivitis, epidemic:	
Hawaii Territory	4
Dengue:	
South Carolina	7
Diarrhea:	
South Carolina	570
Hookworm disease:	
Hawaii Territory	64
South Carolina	250
Impetigo contagiosa:	
Hawaii Territory	9
Leprosy:	
Hawaii Territory	7
Lethargic encephalitis:	
South Carolina	2
Mumps:	
Hawaii Territory	37
South Carolina	128
Ophthalmia neonatorum:	
South Carolina	34
Paratyphoid fever:	
Hawaii Territory	2
South Carolina	3
Rabies in animals:	
South Carolina	18

	Cases
Tetanus:	
South Carolina	3
Trachoma:	
Hawaii Territory	3
South Carolina	1
Typhus fever:	
South Carolina	1
Whooping cough:	
Hawaii Territory	342
South Carolina	255

May 1933

Anthrax:	
Massachusetts	1
Chicken pox:	
Maine	143
Massachusetts	1,090
New York	3,291
Pennsylvania	3,849
Tennessee	135
Vermont	89
Dysentery:	
Massachusetts	1
New York	7
Pennsylvania	1
Tennessee	15
German measles:	
Maine	65
Massachusetts	107
New York	214
Pennsylvania	111
Tennessee	150
Impetigo contagiosa:	
Tennessee	1
Lead poisoning:	
Massachusetts	3
Pennsylvania	1
Lethargic encephalitis:	
Massachusetts	3
New York	7
Pennsylvania	9
Mumps:	
Maine	59
Massachusetts	779
Pennsylvania	1,654
Tennessee	78
Vermont	147
Ophthalmia neonatorum:	
Massachusetts	105
New York	1
Pennsylvania	1
Tennessee	2
Paratyphoid fever:	
Maine	2
Massachusetts	2
New York	1
Tennessee	2
Puerperal septicemia:	
Pennsylvania	10
Rabies in animals:	
Maine	11
New York [1]	1
Scabies:	
Tennessee	13
Septic sore throat:	
Maine	3
Massachusetts	18
Septic sore throat—Con.	
New York	20
Tennessee	4
Tetanus:	
Massachusetts	1
New York	5
Tennessee	1
Trachoma:	
Massachusetts	1
Tennessee	19
Trichinosis:	
New York	10
Tularaemia:	
Tennessee	1
Typhus fever:	
New York	1
Undulant fever:	
Maine	6
Massachusetts	1
New York	25
Pennsylvania	8
Vermont	2
Vincent's angina:	
Maine	5
New York [1]	100
Tennessee	8
Whooping cough:	
Maine	61
Massachusetts	710
New York	1,991
Pennsylvania	1,026
Tennessee	304
Vermont	56

[1] Exclusive of New York City.

WEEKLY REPORTS FROM CITIES

City reports for week ended June 3, 1933

State and city	Diphtheria cases	Influenza cases	Influenza deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Maine:											
Portland	0	------	0	4	2	1	0	0	0	2	25
New Hampshire:											
Concord	0	------	0	0	1	2	0	0	0	0	9
Manchester	0	------	0	0	0	0	0	1	0	0	25
Nashua	0	------	0	0	0	0	0	0	0	0	------
Vermont:											
Barre	0	------	1	0	0	0	0	1	0	2	5
Burlington	1	------	0	0	0	0	0	0	0	0	8
Massachusetts:											
Boston	11	------	1	201	10	63	0	7	1	40	191
Fall River	------	------	------	------	------	------	------	------	------	------	------
Springfield	0	------	0	0	1	6	0	0	0	1	25
Worcester	0	------	0	77	4	18	0	0	0	1	33
Rhode Island:											
Pawtucket	0	------	0	0	0	3	0	0	0	0	11
Providence	1	------	0	0	1	18	0	4	0	10	56
Connecticut:											
Bridgeport	0	------	0	28	2	11	0	0	1	5	22
Hartford	0	------	0	4	4	6	0	0	0	3	43
New Haven	0	------	0	8	2	2	0	1	0	26	49
New York:											
Buffalo	1	------	0	54	14	42	0	5	0	27	122
New York	26	10	0	6	1,022	126	131	0	101	1	106	1,374
Rochester	0	------	0	3	5	12	0	2	0	1	67
Syracuse	0	------	0	3	6	6	0	1	0	3	41

City reports for week ended June 3, 1933—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								
New Jersey:											
Camden	1		0	16	1	9	0	0	0	0	25
Newark	1	2	0	113	6	9	0	3	0	42	80
Trenton	0		0	24	0	3	0	0	1	7	28
Pennsylvania:											
Philadelphia	3	1	1	489	20	63	0	32	1	12	427
Pittsburgh	6	1	0	5	12	58	0	5	0	51	130
Reading	1		0	8	2	3	0	0	0	2	27
Scranton	0			2		7	0		0	0	
Ohio:											
Cincinnati	2		1	6	0	21	0	6	0	1	92
Cleveland	9	25	0	4	7	104	0	9	1	39	140
Columbus	2	1	1	10	4	34	0	3	0	0	66
Toledo	3		0	146	6	109	0	4	1	9	76
Indiana:											
Fort Wayne	7		0	0	0	5	0	4	1	1	18
Indianapolis	0		0	127	5	7	0	1	0	4	
South Bend	0		0	0	2	0	0	0	0	0	17
Terre Haute	0		0	26	1	6	0	1	0	0	14
Illinois:											
Chicago	5		2	368	28	223	0	54	1	18	591
Cicero	0			1		3	0		0	0	
Springfield	2		0	0	0	2	0	0	1	0	17
Michigan:											
Detroit	16		1	184	10	69	0	16	0	82	226
Flint	1	13	0	1	4	6	0	1	1	3	26
Grand Rapids	0		0	6	0	6	0	0	0	8	28
Wisconsin:											
Kenosha	0		0	2	0	2	0	0	0	23	5
Madison	[1] 2			47		2	0		0	4	
Milwaukee	0	1	1	5	5	26	0	4	1	66	88
Racine	1		0	1	0	12	0	0	0	16	8
Superior	0		0	0	2	0	0	0	0	9	8
Minnesota:											
Duluth	0		1	15	2	0	0	2	0	34	24
Minneapolis	1		0	29	2	34	0	1	0	37	109
St. Paul	1	1	1	86	4	19	0	2	0	59	50
Iowa:											
Des Moines	2			0		3	2		0	0	23
Sioux City	0			0		1	0		0	1	
Waterloo	0			0		1	2		0	0	
Missouri:											
Kansas City	1		0	17	11	24	0	4	1	3	85
St. Joseph	1		0	15	2	1	0	2	0	0	14
St. Louis											
North Dakota:											
Fargo	0		0	0	1	0	0	0	0	0	4
Grand Forks	0		0	0	0	0	0	0	0	0	
South Dakota:											
Aberdeen	0		0	0	0	0	0	0	0	0	
Nebraska:											
Omaha	2		0	73	2	2	0	1	0	6	35
Kansas:											
Topeka	0		0	52	2	0	0	0	0	0	13
Wichita	1		0	0	1	2	0	1	0	5	27
Delaware:											
Wilmington	0		0	11	2	2	0	0	0	2	22
Maryland:											
Baltimore	3	2	0	4	11	63	0	15	1	43	207
Cumberland	0		0	2	1	1	0	0	0	0	6
Frederick	0		0	0	0	0	0	0	0	12	1
District of Columbia:											
Washington	2	1	1	19	5	10	0	4	0	4	118
Virginia:											
Lynchburg	0		0	17	1	0	0	1	0	36	7
Norfolk	0		0	40	2	3	0	1	0	3	
Richmond	1		0	2	3	0	0	1	2	6	49
Roanoke	0		0	6	0	1	0	0	0	2	13
West Virginia:											
Charleston	1	3	0	0	1	0	0	0	0	6	17
Huntington	0		0	0	0	3	0	0	0	1	
Wheeling	0		0	73	0	2	0	2	0	3	10

[1] Nonresident.

City reports for week ended June 3, 1933—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								
North Carolina:											
Raleigh	0		0	0	2	0	0	1	0	1	19
Wilmington	0		0	11	1	0	0	1	0	5	10
Winston-Salem											
South Carolina:											
Charleston	1	8	0	0	1	0	0	2	0	3	18
Columbia											
Greenville	0		0	3	1	0	0	0	1	1	10
Georgia:											
Atlanta	1	6	1	14	0	0	0	5	3	39	73
Brunswick	0		0	0	0	0	0	0	1	0	5
Savannah	0	6	0	1	0	0	0	2	2	1	23
Florida:											
Miami	2	1	0	0	0	0	0	1	0	3	16
Tampa	0	1	1	0	1	0	0	1	0	2	24
Kentucky:											
Ashland	0		0	1	0	1	0	0	0	1	
Lexington	0		0	4	0	0	0	1	0	4	14
Louisville	0		0	12	5	9	0	1	0	7	64
Tennessee:											
Memphis	0		1	124	8	2	1	6	0	26	78
Nashville	1		0	7	0	2	0	4	0	0	38
Alabama:											
Birmingham	2		2	0	1	2	0	0	2	3	35
Mobile	2		0	1	0	0	0	0	0	0	22
Montgomery	1	1		1		0	0		0	3	
Arkansas:											
Fort Smith	0			0		0	0		0	0	
Little Rock	0		0	75	1	0	0	3	5	0	
Louisiana:											
New Orleans	3	1	2	4	7	1	0	12	0	4	119
Shreveport	0		0	2	3	1	0	1	0	3	30
Oklahoma:											
Tulsa	0			36		0	5		0	15	
Texas:											
Dallas	3	1	1	36	1	4	0	3	1	0	49
Fort Worth	0		0	0	3	2	0	4	0	2	33
Galveston	0		0	1	2	2	0	0	0	0	19
Houston	3		0	0	2	1	0	4	1	0	56
San Antonio	2		1	9	6	1	0	8	0	1	61
Montana:											
Billings	0		0	0	0	0	0	0	0	0	6
Great Falls	0		0	0	1	0	0	0	1	1	12
Helena	0		0	0	0	0	0	0	0	0	5
Missoula	0		0	0	1	1	0	0	0	0	7
Idaho:											
Boise											
Colorado:											
Denver	0	23	1	1	5	9	0	8	0	6	76
Pueblo	0		0	0	0	2	0	0	0	2	6
New Mexico:											
Albuquerque	0		0	0	0	2	0	8	1	9	12
Utah:											
Salt Lake City	0		0	29	1	4	0	0	0	11	28
Nevada:											
Reno	0		0	0	0	0	0	0	0	0	1
Washington:											
Seattle	0			2		23	0		0	5	
Spokane	0			6		1	0		0	0	
Tacoma	0		0	0	0	1	0	0	0	0	28
Oregon:											
Portland	1		1	1	3	10	2	2	1	0	68
Salem	0		0	3	0	1	0	0	0	0	
California:											
Los Angeles	20	11	1	348	5	48	18	24	2	55	265
Sacramento	0	1	1	2	1	0	0	6	0	39	28
San Francisco	4	2	0	2	11	5	0	10	0	33	142

City reports for week ended June 3, 1933—Continued

State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths	
New York:			
New York	3	1	1
Rochester	0	0	1
Pennsylvania:			
Philadelphia	1	0	0
Pittsburgh	0	0	1
Indiana:			
Indianapolis	3	0	0
Illinois:			
Chicago	19	5	0
Michigan:			
Detroit	1	0	2
Flint	0	0	1
Wisconsin:			
Madison	0	0	1
Minnesota:			
Minneapolis	1	0	0
Nebraska:			
Omaha	1	0	0
Maryland:			
Baltimore	1	0	0
District of Columbia:			
Washington	0	1	0
West Virginia:			
Charleston	1	1	0
Tennessee:			
Memphis	1	0	0
Oregon:			
Portland	1	0	0

Lethargic encephalitis.—Cases: Pittsburgh, 1; Baltimore, 1.
Pellagra.—Cases: Charleston, S.C., 3; Savannah, 2; Mobile, 1; New Orleans, 2; Dallas, 1.
Typhus fever.—Cases: New York, 1; Charleston, S.C., 2; Savannah, 1.

FOREIGN AND INSULAR

CANADA

Ontario Province—Communicable diseases—5 weeks ended April 29, 1933.—The Department of Health of the Province of Ontario, Canada, reports certain communicable diseases for the 5 weeks ended April 29, 1933, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	6	7	Pneumonia		146
Chicken pox	1,296		Poliomyelitis	1	
Diphtheria	59	1	Puerperal septicemia		1
Dysentery	1	1	Scarlet fever	384	2
Erysipelas	23		Septic sore throat	14	2
German measles	76		Smallpox	3	
Gonorrhea	295		Syphilis	255	
Influenza	32	9	Tuberculosis	212	51
Lethargic encephalitis	1	1	Typhoid fever	36	
Measles	945	6	Undulant fever	21	
Mumps	1,116		Whooping cough	480	7
Paratyphoid fever	9				

GREAT BRITAIN

Scotland—Vital statistics—Quarter ended March 31, 1933.—The Registrar General of Scotland has published the following statistics for the first quarter of the year 1933:

Population (estimated)	4,916,000	Deaths from—Continued	
Births	21,787	Influenza	1,689
Birth rate per 1,000 population	18.0	Lethargic encephalitis	38
Deaths	20,750	Measles	17
Death rate per 1,000 population	17.1	Nephritis, acute	52
Marriages	7,054	Nephritis, chronic	314
Deaths under 1 year	2,358	Nephritis, unspecified	122
Deaths under 1 year per 1,000 births	108	Paratyphoid fever	1
Deaths from—		Pneumonia, lobar	425
Bronchitis	1,595	Pneumonia	280
Broncho-pneumonia	1,998	Poliomyelitis	3
Cancer	1,804	Puerperal sepsis	51
Cerebrospinal fever	95	Scarlet fever	85
Diabetes	212	Syphilis	21
Diphtheria	89	Tetanus	4
Dysentery	2	Tuberculosis	1,173
Erysipelas	54	Typhoid fever	3
Heart disease	3,155	Whooping cough	356

ITALY

Communicable diseases—4 weeks ended February 5, 1933.—During the 4 weeks ended February 5, 1933, cases of certain communicable diseases were reported in Italy as follows:

Disease	Jan. 9–15		Jan. 16–22		Jan. 23–29		Jan. 30–Feb. 5	
	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected
Anthrax	13	12	12	12	16	13	14	14
Cerebrospinal meningitis	13	11	10	9	7	7	7	7
Chicken pox	369	126	289	127	284	102	299	104
Diphtheria and croup	748	356	794	393	696	353	592	321
Dysentery	4	4	6	5	5	5	4	4
Lethargic encephalitis	2	2	3	3	3	3	4	4
Measles	1,436	226	1,555	253	1,282	226	1,367	212
Poliomyelitis	5	4	12	11	3	2	4	4
Scarlet fever	452	148	439	159	487	161	407	149
Smallpox	2	1						
Typhoid fever	403	238	357	220	296	171	228	154

MEXICO

Tampico—Communicable diseases—May 1933.—During the month of May 1933 certain communicable diseases were reported in Tampico, Mexico, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	1	1	Paratyphoid fever	2	1
Enteritis, various		37	Tuberculosis		31
Influenza	38		Typhoid fever	1	1
Measles	1		Whooping cough	22	2
Malaria	278	9			

PUERTO RICO

Communicable diseases—4 weeks ended March 25, 1933.—During the 4 weeks ended March 25, 1933, cases of certain communicable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chicken pox	116	Ophthalmia neonatorum	9
Colibacillosis	1	Pellagra	6
Diphtheria	43	Puerperal fever	3
Dysentery	630	Syphilis	7
Erysipelas	5	Tetanus	4
Filariasis	3	Tetanus, infantile	8
Framboesia	1	Trachoma	14
Influenza	146	Tuberculosis	403
Malaria	2,217	Typhoid fever	11
Measles	251	Whooping cough	96
Mumps	29		

SWITZERLAND

Vital statistics—Years 1931 and 1932—Correction.—On page 675 of the PUBLIC HEALTH REPORTS for June 9, 1933, an error appears in the table reporting vital statistics in Switzerland. The figures in the last two columns of the table should each be moved down one line, making the figures for influenza, 1,855 and 1,924, etc.

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 May 26, 1933, pp. 586-596. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued June 30, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

Philippine Islands.—During the week ended June 10, 1933, cholera was reported in the Philippine Islands as follows: Province of Bohol, 14 cases, 9 deaths; Province of Leyte, 2 cases, 2 deaths.

Plague

Argentina.—During the month of May 1933, 8 cases of plague with 4 deaths were reported at Serrezuela, Cordoba Province, Argentina.

Smallpox

Guatemala.—During April 1933, three cases of smallpox were reported in Guatemala.

British Honduras.—Under date of June 13, 1933, a case of smallpox (alastrim) was reported at Belize, British Honduras.

Typhus Fever

Guatemala.—During April 1933, 14 cases of typhus fever with 2 deaths were reported in Guatemala.

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