PUBLIC HEALTH REPORTS

VOL. 50 MARCH 8, 1935 NO. 10

THE OCCURRENCE OF INFESTATIONS WITH *E. HISTOLYTICA* ASSOCIATED WITH WATER-BORNE EPIDEMIC DISEASES [1]

By A. V. HARDY, M. D., *Consultant*, and BERTHA KAPLAN SPECTOR, Ph. D., *Associate Protozoologist, United States Public Health Service*

PURPOSE OF THE STUDY

In the study of the epidemic of amoebic dysentery which originated in Chicago in 1933, it became increasingly evident, as has been pointed out by Bundesen (*1*), that the infection was probably spread through water. The one obstacle in the way of accepting this conclusion with confidence was the absence of similar outbreaks in previous rather comparable circumstances. It is well known that in numerous instances heavy and direct sewage pollution of water has occurred. These have given rise to epidemics of acute enteritis and typhoid fever, but, so far as we have been able to learn, to no recognized amoebic dysentery. Carriers of *E. histolytica*, however, have been found to be widely distributed and relatively numerous. According to Craig (*2*), in 49,336 persons examined in 18 different surveys in the United States the average number found to be positive for this parasite was 11.6 percent. Other studies in foreign countries have revealed an even greater proportion of carriers. Hence, any feces-polluted water would be expected to contain cysts of *E. histolytica*. Furthermore, amoebic dysentery has a rather characteristic clinical picture, and it is reasonable to expect that a portion of the cases would be recognized, particularly if the disease were prevalent. Hitherto these considerations made it difficult to explain the absence of recognized amoebic dysentery in association with water-borne epidemic diseases. Therefore, a study of infestations with *E. histolytica* in such situations seemed to be needed.

[1] The observations on which this paper is based were made under the auspices of (1) the United States Public Health Service, (2) the board of health, the division of water purification, and the fire department of the city of Chicago, (3) the department of preventive medicine of the State University of Iowa, and (4) the department of medicine and the Douglas Smith Foundation of the University of Chicago.

An unfortunate series of accidents and combination of circumstances gave an unexpectedly early opportunity for such a study. Following an extensive fire in Chicago in May 1934, cases of acute diarrhea were soon reported. In due time typhoid fever made its appearance. Firemen and spectators were both affected. It proved the most extensive epidemic of typhoid fever from which Chicago has suffered in many years. Suspecting that amoebic dysentery might also be found, and appreciating the importance of its early and definite recognition, a survey of those exposed was undertaken, both as a practical public-health measure and to throw light on unanswered questions concerning amoebic infection.

For the major part of the study our attention was limited to members of the Chicago Fire Department. The active cooperation of the administrative officers, notably Dr. H. P. Sullivan, physician to the department, was generously given. The men were sent to us under official orders and were directed to follow our instructions. This situation greatly facilitated the study. Supplementary data were also collected from spectators who developed illness shortly after the fire.

CIRCUMSTANCES ACCOUNTING FOR THE EPIDEMIC

On May 19, 1934, at about 4:20 p. m., a fire started in the cattle pens of the Union Stockyards Co. Owing to the wooden structure of the pens, to the large amount of inflammable hay and straw, and to moderately strong winds, the flames spread rapidly. It was reported that the fire traveled through the pens nearly as fast as a man could run. During the following hours the fire spread through approximately two-thirds of the cattle pens and to surrounding business houses. The spectacular nature of the fire and the dramatic reports of it over the radio brought eyewitnesses to the scene by the thousands. These viewed the fire from the roofs of surrounding buildings and from the tops of freight cars, and large numbers flocked into the area of the burned stock pens and through the unburned pens to the windward of the fire. No accurate estimate of the number of spectators may be given, but all observers agree that for each fireman there were many idle viewers of the scene.

As the origin of the fire was wholly within the stock pens, the first fire companies reported for duty in that region. The majority of those which were called by later alarms worked on the adjoining business houses, which became involved quite early. The estimated number of firemen on duty was 1,600, of whom a substantial majority worked entirely outside of the stockyards.

Owing to illnesses which developed, a careful study of the water system in this area was later undertaken. It was found that the area of the Union Stockyards had a double water supply. For reasons of economy, a private supply was more generally available than the

city supply. The former was distributed to all the stock watering troughs. Each small pen had its individual trough, and this was supplied by a small pipe which emptied from a height of 4 to 5 feet. There were, therefore, scores of these accessible drinking places in the yards. For fire-fighting purposes there were also special high-pressure mains drawing from the private supply. This private system obtained its water from two sources. One was from an open reservoir, occupying approximately the area of a city block, and commonly known as "Haydens Lake." Water was being supplied to this at the time of the fire largely, or entirely, from city mains. Ordinarily it was pumped from a deep well, but a few days preceding the fire the pump had been removed for repairs. For emergencies, another source was available. Water could be drawn from the nearby large sewer, which in earlier years was an open stream known as "Bubbly Creek." Under normal circumstances this supply was filtered and chlorinated. On the day of the fire, however, chlorination was not carried out (for a portion of the time at least), and in the emergency, filtration could not be conducted in an efficient manner. The call was for water to fight an apparently uncontrollable fire, and at the time this was the one important consideration. Furthermore, the officials of the stockyards company believed that water from the sewer could be distributed only through the high pressure fire-fighting mains. However, open cross-connections between this and the stock-watering lines were later found. It was evident, therefore, that a substantial amount of this heavily polluted water from the sewer would pass from the high-pressure fire lines to the low-pressure pipes running to the stock-watering troughs.

We have questioned carefully the firemen who became ill and also several civilian spectators. All were in agreement that the water running to the stock troughs was used freely for drinking purposes. Several persons have mentioned that to get a drink it was necessary to stand in line, even though the open pipes were distributed every few yards. The firemen were rarely able to describe accurately the source of their drinking water. Those working in "the pens" area commonly used water from the above-described pipes emptying into the troughs. Many went directly to a hydrant, while others used a drinking pipe especially supplied on each of the fire engines. This delivered the same water as was then being used for fire-fighting purposes. Helpful civilians also carried water. The source of this was rarely known, but occasionally the men stated that the pails were filled from pipes emptying into the watering troughs.

With the exception of a few companies in the immediate vicinity of the yards, few firemen seemed to appreciate that there was this double water supply and that only one was safe for human consumption. Civilians appeared to believe that any water running out of a

pipe was city water and good to drink. Only regular employees of the stockyards company and a few firemen were sufficiently informed to take proper precautions relative to drinking water. After the conflagration was under control, appropriate warnings were posted cautioning against the drinking of this water, but by that time most of the damage had been done.

THE TYPHOID FEVER EPIDEMIC

During 1933 there were reported to the Chicago Board of Health 78 cases of typhoid fever with 12 deaths. A substantial proportion of these were contracted very definitely outside of Chicago. In 1934, in the epidemic related to the stockyards fire, there occurred 69 cases and 11 deaths. There were in addition, 2 cases of paratyphoid fever contracted apparently from the same source.

The epidemic was typical of its kind. The incubation periods were the expected 10 days to 3 weeks. Reports came to the board of health after the usual delay. The first official reports were received on June 8, but it was a full month after the fire before there was any definite evidence that an epidemic was in progress. In regard to the virulence of the infection the epidemic did seem exceptional in that the normal death expectancy was somewhat exceeded. Clinically, also, the severity of the symptoms appeared to be beyond the average. About one-half of these patients had an acute diarrhea which began shortly after the fire. In some cases this subsided before the onset of the typhoid fever, in others the two conditions blended. Except in the prodromal phase of the typhoid infections there was never any difficulty in differentiating clinically between the typhoid fever and the enteritis.

Three of the typhoid cases were among firemen and the remainder were among civilian spectators. We suspect this corresponds in general to the proportions of firemen and spectators at the fire.

THE DYSENTERY EPIDEMIC AND THE STUDY OF IT

On the third and fourth days after the fire the Chicago papers carried brief reports concerning acute enteritis occurring among firemen. This was the first suggestion that there might have been any serious health hazard at the time of the fire. The situation was investigated by a representative of the Chicago Board of Health, and the illnesses were first attributed to a simple sewage poisoning. During the second week, however, further reports were received by the board of health of quite severe and persisting illnesses. That amoebic dysentery might be occurring seemed a distinct possibility. Hence a special study of the situation was undertaken.

The fire marshal first called for reports of all illnesses which had occurred among firemen following the stockyards fire. When all

these had been received it was found that over 300 men in 76 different companies scattered widely throughout Chicago had been or were still affected. At various company stations and in the hospitals many of these men were interviewed. Later, others were directed to come at a specified time to the office of the physician to the fire department, or to the laboratory. During these interviews we (A. V. H., assisted by T. Schmid, of the division of water purification, city of Chicago) obtained both clinical and epidemiological data. Stool specimens were collected at that time, or arrangements were made for this examination at a later date. Thus almost all of the firemen who had been ill were examined. In a similar way an adequate number of controls were studied. Concurrently, also, all cases of dysentery officially reported to the board of health were individually examined with a view to determining whether they possibly had an identical origin.

CLINICAL FINDINGS IN FIREMEN

The histories obtained from the men revealed that the illnesses varied from transient ailments to relatively severe and prolonged sickness. It seemed essential, therefore, that the cases be grouped according to the severity of the illness. The division was made on the basis of the variety, severity, and duration of symptoms, and entirely independent of laboratory findings. In the borderline cases between the groups, decisions were somewhat uncertain, but in the majority of instances any given case clearly belonged in one of the three groups described below.

There were 35 mild cases. Onset occurred commonly between 24 and 48 hours after exposure. In 1 case it was later than 72 hours. Diarrhea was the outstanding symptom, and in many, the only one. A mild nausea and occasional vomiting occurred in a small number. Abdominal cramps or prolonged weakness were rarely mentioned. Stools were usually watery. In 5 instances mucus was reported, but in no instance was blood noted. The total duration of illness varied from a few hours to less than 3 days.

Forty-nine cases were classified as illnesses of moderate severity. Three reported that symptoms began on the day of the fire. The usual onset, however, was between 24 and 36 hours following exposure. In one instance the illness began after 6 days. The onset tended to be sudden, with rather severe symptoms. In this group also, diarrhea was the one constant complaint. It was accompanied by abdominal cramps in almost one-half of the cases. Nausea occurred in one-third and vomiting in somewhat less. Moderate weakness was troublesome to several of the patients. A definite loss of weight (averaging 6 pounds per man) was noted in 8. A short recurrence occurred in four. Three men believed that they had had fever, and 5 stated

that there had been "slime" in the stool. The usual duration of these cases was from 3 to 4 days, with limits of 2 and 7 days.

One hundred and fifty-eight (two-thirds) of the cases were regarded as severe infections. The time of onset was distributed from less than 24 hours (1 case) to more than 1 week after the fire (3 cases). Again, however, the common incubation period was 24 to 72 hours. In this group the symptoms tended to be more severe, more prolonged, and more varied. The diarrhea was often violent. Incontinence of feces was not uncommon. Nausea was experienced by one-half and vomiting by slightly less than one-third. Early in the illness defecation and vomiting were often simultaneous. Relatively severe cramps and marked weakness were noted by two-thirds. A known fever or feverishness was reported by 10 percent. A loss of weight, varying from 5 to 30 pounds and averaging 12, was reported by almost one-half. In this group the characteristic stool was again "nothing but water", but 38 (24 percent) reported mucus, and 18 (11 percent) reported blood.

The most striking feature, and the most puzzling, was the frequency of recurrences. The usual story was that diarrhea would occur "off and on," but with each recurring attack it would be less prolonged and less severe. In many instances the men voluntarily stated that while they were no longer troubled with acute diarrhea, still their stools "had not been normal since the fire." A softness of the movement and an abundance of gas were characteristic. Few were ill enough to be off duty for long periods, but complaints persisted for a disturbing length of time. In approximately one-third of this group the duration was 1 month or more. In many, the illness continued until specific treatment was undertaken. At the time of the last survey, 2 months after the fire, 12 untreated cases still had troublesome complaints.

The treatment of these infections at first was symptomatic and nonspecific. Marked improvement to complete cure often seemed to follow the early use of castor oil. Illnesses of 1 week or more in duration did not commonly yield to such medication. In view of the high percentage of positive findings for *E. histolytica*, as hereafter reported, it was deemed desirable to test the efficacy of some specific amoebicide, and carbarsone was selected. Ordinarily, 2 capsules of 0.25 gram each were given 3 times a day for 5 days. In earlier cases the dosage was smaller and more prolonged. Almost without exception there was prompt response to this therapy. We repeatedly heard of firemen who insisted upon obtaining this medication because of its beneficial effect on some companion.

Throughout the study we were looking for amoebic dysentery, but classical cases among the firemen were not encountered. In several, however, this seemed to be the best diagnosis which could be made.

An early case was reported to the board of health as amoebic dysentery and was counted as such. Similar infections encountered later were regarded as suspects only. The early onset and course was not that of amoebic dysentery, but later clinical and laboratory findings demanded its consideration. While recognizing that no final and certain judgment can be given, still we are inclined to believe that *E. histolytica* was the important etiological agent in the group with the severer infections. To support this there is the following:

1. *E. histolytica* were found in almost two-thirds, on one stool examination only.
2. Bacteriological studies failed to reveal other etiological agents.
3. Treatment with a specific amoebicide was remarkably effective.
4. The late symptoms and course of the illnesses were quite characteristic of amoebic infections.

For these reasons we suspect that the firemen suffered from two conditions. The early illness we would attribute to nonspecific organisms or toxic products in the heavily polluted water. In general, we believe that the late symptoms can be explained satisfactorily by the *E. histolytica* invasion.

LABORATORY FINDINGS IN FIREMEN

Throughout, the laboratory studies were made by one of us (B. K. S.). The diagnoses were usually made from the routine water and iodine preparations. If the nature of the organism seemed doubtful, cultures were also used. In a few cases decisions were made only after one, two, or more repeat samples were obtained. With these exceptions only one stool specimen was ordinarily examined from each man.

The findings are presented in table 1.

TABLE 1.—*Stool findings for E. histolytica in Chicago firemen*

Group	Totals					Laboratory findings							
	Examined	Negative		Positive		Small cysts		Large cysts		Precysts		Trophozoites	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Controls	161	136	84.5	25	15.5	22	13.7	5	31.1	4	2.5	0	0
Possibly exposed, illness denied	34	28	82.0	6	18.0	6	18.0	0	0	3	9.0	0	0
Mild illness	33	19	57.6	14	42.4	13	39.4	2	6.1	1	3.0	0	0
Moderate illness	43	21	48.8	22	51.2	20	46.5	6	14.0	4	9.3	1	2.3
Severe illness	140	53	37.9	87	62.1	65	46.4	34	24.3	24	17.2	4	2.9

To the three clinical groups previously described, two others were added. The controls were firemen who were not at the fire. None of those reporting for examination had had any recent intestinal

disorder. The "possibly exposed, illness denied" group were men who were at the fire, who had had some illness following it, but with symptoms not definitely related to the gastro-intestinal tract. Several of these men gave clear histories which made it certain that they had had no contact with the polluted water. In others, however, both the source of the water which they drank and the nature of their illnesses was somewhat uncertain.

The high percentage of positives among the normal controls warrants critical consideration. That the findings here given may represent a Chicago normal was suggested by an unreported survey of healthy family groups, which was conducted immediately following the study reported here. The percentage of positives was even somewhat higher than that among the control firemen. In other localities, however, the findings have been markedly different, as, for example, in a sampling of the residents of a small Iowa town from which several cases of amoebic dysentery had been reported. Probably the percentage of positives was higher than is normal for the State; but even so, it was less than one-third of that found in Chicago. Moreover, in that study only small cysts were observed. Any discussion of these findings would be beyond both the scope of this report and the bounds of present knowledge.

The number of positives among the controls may represent a high normal, but the number among the cases certainly indicates a very abnormal situation. This high proportion of positives speaks clearly for a wide-spread and probably recent exposure to infection. It cannot be explained on the assumption that a nonspecific infection occurred in previous carriers of *E. histolytica*.

The differences in the laboratory findings were definite in those cases classified as mild, moderately severe, and severe. It is particularly to be noted that the large cysts (generally regarded as those of a more highly pathogenic organism as compared with the small cyst races) were found in 24 percent of the severe illnesses, in contrast to the 6 percent in the mild infections. Furthermore, the precysts and motile forms were more commonly observed in the infections classified as severe.

In considering the types of organisms found, it is to be noted that from the same person all types and stages were occasionally identified. This tended to be true particularly in the severe infections. Of the 65 in this group which showed small cysts, 29 had these alone. In the others they were found in association with large cysts, precysts, or motile forms. In the mild cases, on the other hand, the small cysts only were commonly observed, as was true in 12 of the 13 cases with this positive finding.

Except for the positive protozoological findings, the stool examinations were essentially negative. A small but representative number

of fresh stools were studied bacteriologically. *B. typhosus* was isolated from an individual in whom the disease was not yet suspected. Other than this, pathogenic organisms were not identified. Cellular exudate was also usually lacking. Pus cells were rarely observed, and, with few exceptions, red blood cells were not present. Occasionally mucus was evident, but the characteristic bloody mucus of amoebic dysentery was very rarely encountered in the study of the stool specimens from firemen.

AMOEBIC DYSENTERY AMONG SPECTATORS

Coincident with the above investigation, careful observation was made of all cases of amoebic dysentery reported to the Chicago Board of Health. Routinely, inquiry was made as to possible exposure at the stockyards fire. Eleven cases apparently from this source have come to our attention. The diagnosis could not always be made without some reservation, but that of amoebic dysentery seemed warranted.

In two the clinical picture, with complicating liver abscess, was classical. In one of these, an acute diarrhea occurred 2 days following liberal drinking of the polluted water at the stockyards fire. From this ailment the patient recovered promptly and apparently completely. Ten days later, however, he again began to have abdominal pain and diarrhea. There was marked tenesmus and gross blood in the stool. Eight days later, right upper quadrant pain began and progressively became worse. The patient was admitted to the hospital, and a diagnosis of acute purulent cholecystitis was made. At operation, however, a large liver abscess was found. The second complicated case also began with a severe diarrhea 2 days after the fire. For almost 4 weeks the patient continued to have 10 to 15 stools daily. In these mucus and blood were noted repeatedly. The diarrhea abated, but the patient continued to be very weak and to lose weight. Fever was noted soon after, and midepigastric pain appeared. Though studied in a hospital, the ailment was not diagnosed. Anemia developed and became worse, and upper abdominal tenderness was found. After several weeks at home and a total 2½ months of illness, the patient entered a teaching and research hospital. For almost 3 weeks the working diagnosis of cholecystitis was retained. Unable to substantiate this, other possibilities, including amoebic dysentery, were explored. On the second examination trophozoites were found in the stool. There was some improvement under antiamoebic treatment, but the evidence of upper abdominal abscess continued. Late in the illness one abscess was drained surgically, but the patient did not improve and died after an illness of 4 months and 1 week. At autopsy, pus collections were found in the

right pleural cavity, in the subdiaphragmatic area, in the liver, in the upper peritoneal cavity, and in the pelvis.

In four other cases the clinical nature of the illness and the laboratory findings left no question as to the accuracy of a diagnosis of amoebic dysentery. In one of these the illness began as an early and acute diarrhea, which about 10 days later gradually assumed the characteristics of amoebic dysentery. Two of the other three cases began after an incubation period of 2 to 3 weeks and the third during the seventh week after the fire.

The remaining 5 cases were milder and less typical. Four began within 1 to 2 days after the fire and the other 10 days later. The laboratory findings pointed to a diagnosis of amoebic dysentery, but on clinical grounds the illnesses could not be differentiated from nonspecific enteritis.

EPIDEMIOLOGICAL DATA

The major points in the epidemiology of this outbreak of typhoid fever, enteritis, and amoebic dysentery have already been stated. The nature of the evidence was unusually clear. All the data pointed to one source and to one source only for these infections. The following information has been collected:

1. Those who later developed these illnesses had been at the stockyards fire.

2. Almost all were known to have used, while there, a supply of drinking water which was later shown to be heavily polluted.

3. Similar infections were rarely encountered among those who had not been at the fire. During the period of the epidemic, only three scattered cases of typhoid fever from other sources were reported. We did continue to see the usual number of sporadic cases of amoebic dysentery, but these did not have the early acute diarrhea. For a period the number of diagnosed and reported cases of this disease was approximately doubled by those originating apparently at the fire.

4. We found no firemen who had taken even one moderate drink of the polluted water who escaped illness. Company officers were questioned repeatedly, and all have said that all the firemen who drank this water developed symptoms. Such evidence as was obtained from the typhoid cases suggests that some did not have the early acute diarrhea, but men so ill and with mental faculties somewhat dulled might easily have forgotten a diarrhea which had occurred 2 to 3 weeks previously.

5. Firemen who drank only city water did not develop any of these illnesses. One company officer, knowing the nature of the stock yards supply, warned his men and arranged to have other water

provided for drinking purposes. None of this company developed symptoms, even though they worked in the heart of the area with the polluted water supply. Moreover, men who preferred beer or coffee and contrived to get them remained well.

6. The source of the water was such that the occurrence of the above-described infections would be expected. Furthermore, laboratory samples collected on the night of the fire showed the grossest sewage pollution in the private stockyards water system. The city water, however, though abnormally turbid, was bacteriologically satisfactory.

7. All who developed infection were males, and, among the spectators, were chiefly adolescents or young adults. This was the group which made up the more curious, venturesome, and troublesome spectators who swarmed the pens and explored the ruins. Women, younger children, and older males viewed the conflagration from greater distances, well beyond the private water supply of the yards.

8. The dates of onset and the explosive nature of the outbreak support the conclusion that infection was contracted at a common place on the day of the fire.

DISCUSSION

It is agreed by all authorities that amoebic infection is a disease spread only by human fecal contamination, as is true of typhoid fever, bacillary dysentery, and cholera. We believe that the study here reported has provided definite evidence that amoebic dysentery also may be water-borne. Apparently through this one exposure to polluted water, about 100 firemen must have acquired *E. histolytica*, as this represents the difference between the number of positives found in those exposed and the normal expectancy as indicated by the controls. It is safe to assume that the ratio of infection between firemen and spectators was approximately the same for amoebic infestation as for typhoid. There were 3 cases of the latter in firemen in a total of 69, giving a ratio of 1 to 22. Apparently, therefore, in the neighborhood of 2,200 civilians acquired *E. histolytica* at the time of the fire. Thus, we believe that this study also shows clearly that amoebic infestations may be spread in an epidemic manner.

Undoubtedly a very large number of amoebic infections did result from drinking the polluted water at the stockyards fire. However, there were few cases of classical amoebic dysentery. Are these observations compatible? Apparently it is true that the clinical entity, amoebic dysentery, occurs in only one of several who acquire *E. histolytica*. From the calculated 2,200 recently infested civilians there were reported but 6 undoubted cases of amoebic dysentery and 5 other mild infections which were also so diagnosed. Among the

firemen the early administration of a specific amoebicide to all with diarrheal disorders may perhaps have cut short some infections which otherwise would have developed into typical and severe amoebic dysentery.

In evaluating the above-reported findings it is to be borne in mind that the examination of one stool specimen is not sufficient to determine whether a person actually carries *E. histolytica*. The positives found among the firemen would certainly have been increased if as many as three or more tests had been made on each man. The relationship between controls and cases, however, would probably have been little affected. We can see no reason for believing otherwise than that more examinations would have served merely to strengthen our conclusions.

SUMMARY AND CONCLUSIONS

During the stockyards fire in Chicago in May 1934, water heavily polluted with fresh sewage was used for drinking purposes by many firemen and spectators. There followed a large but undetermined number of cases of acute diarrhea, 69 of typhoid fever, and 2 of paratyphoid fever. Laboratory studies revealed that a high percentage of those exposed had become infested with *E. histolytica;* and the more severe the symptoms, the higher the percentage.

Six cases of undoubted amoebic dysentery, two with complicating liver abscess, were recognized among those exposed. Six other mild cases (1 fireman and 5 spectators) were also diagnosed as amoebic dysentery and reported to the board of health. The evidence has led to the opinion that many of the other illnesses with intestinal symptoms were also the result of *E. histolytica* invasion.

Therefore, we conclude that infestations with *E. histolytica* may occur in association with water-borne epidemic diseases, and, furthermore, that the control of amoebic dysentery demands that water for human consumption be free from dangerous protozoal as well as bacterial contamination.

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VARIATIONS IN PHYSIQUE AND GROWTH OF CHILDREN IN DIFFERENT GEOGRAPHIC REGIONS OF THE UNITED STATES [1]

Physical Measurement Studies No. 2

By CARROLL E. PALMER, *Consultant*, and SELWYN D. COLLINS, *Senior Statistician*, *United States Public Health Service*

Measurements of men conscripted for service in the World War furnished data by means of which Davenport and Love (*1*) have shown significant differences in the physical characteristics of the young male population in different geographic sections of the United States. While these authors have indicated that the differences observed are due probably to differences in the racial stocks which predominate in the various geographic subdivisions of the country, it may be postulated that part of the observed variation might have been effected by variations in the *growth* of the individuals measured. It may be postulated, for example, that certain environmental factors conducive to increased growth may be present in one locality and absent or less effective in another. Indeed evidence that certain environmental factors influence human growth is increasing. Thus Malling-Hansen (*2*), Nylin (*3*), Palmer (*4*), and others have shown marked seasonal differences in certain measurements of growth. Palmer (*5*) has reported, with respect to body weight, that some calendar years are good and others are poor "growing years." Boas (*6*) has presented evidence that the growth of children of immigrants to the United States probably is affected by environmental differences between the United States and their native lands. Spier (*7*) has pointed out that the physical measurements of Japanese children reared in the United States are markedly different from those of Japanese children in Japan.

So far as the authors are aware, no studies have been made to ascertain whether or not children in various geographic regions in the United States are different with respect to their physical measurements, or to what extent children living in different regions show differences in growth rates. Obviously, a study merely of physical measurements and of growth increments of children living in different sections of the country will not furnish conclusive data from which to evaluate the relative roles of heredity and environment in growth processes. A satisfactory method for investigating this problem completely—obviously a method not readily applicable—would consist of simultaneous observations on children of similar heredity living in different regions. The difficulties of obtaining such a controlled situation are, at the present time, quite insurmountable.

[1] From the Offices of Field Investigations in Child Hygiene and of Statistical Investigations, U. S. Public Health Service, and the Department of Biostatistics (Paper No. 190), the Johns Hopkins University. For the first paper in the series, see reference (8) in the bibliography.

However, it is felt that some suggestive information may be obtained simply through the study of averages of physical measurements and of yearly increments of growth for children living in different geographic regions. It is to this end, therefore, that the present paper is presented.

MATERIAL AND METHODS

Data for the study of this problem were collected by medical officers of the United States Public Health Service in four fairly distinct geographic sections of the country: 1) A northeastern section comprising New England and Middle Atlantic States; 2) a north central section including measurements of children from the States bordering the western Great Lakes; 3) a south central section, including children from Missouri and Kentucky on the north and Louisiana and Texas on the south; and 4) a western section, which was limited to children from Utah and Nevada. In all, nearly 30,000 school children between the ages of 6 and 15 years were measured; about 9,000 were from each of the sections, northeast, north central, and south central; about 2,000 were from the western section. Table 1 shows in some detail the geographic distribution of the children, the number measured, the dates of measurement, and the names of the medical officers making the observations. It will be noted that the same examiner made all of the measurements in a given section and that the same officer worked in both the north and south central regions.

The anthropometric data collected include, among other things, measurements of body weight, standing height, sitting height, the anteroposterior and transverse chest diameters, chest circumference, and vital capacity. Scales, measuring rods, compasses, and spirometers were calibrated by the United States Bureau of Standards before being used. The three observers studied in collaboration the technique of taking the measurements, and, although no quantitative study of individual difference in technique was made, it may be assumed that the methods used were sufficiently similar to permit comparison of the measurements of the different workers. Details of these methods are given in the first of this series of papers (*8*).

These data, while subject to some notable defects, possess certain important advantages for a study of this kind. The principal advantages lie in the general homogeneity of the populations observed. First, the children, except for a relatively small number in the western section, are from large urban centers. Second, all of them are native-born of the third generation, that is, native-born of both native-born parents and grandparents. Third, all were attending school and therefore represent a group of fairly healthy children in each section; furthermore, no grossly defective or seriously crippled children were included. About one-half of the children had no significant physical defects whatsoever.

TABLE 1.—*Geographic distribution of the children measured (children of native white parents and grandparents)*

Locality	Dates measurements were made	Examiner	Number of children 6 to 15 years of age who were measured		
			Both sexes	Boys	Girls
All sections, total			28,674	14,318	14,356
Northeast, total		Dr. E. B. Sterling	9,377	4,630	4,747
Portland, Maine	Oct. 11 to Nov. 15, 1923	do	1,422	695	727
Manchester, N. H.	Nov. 20 to Dec. 5, 1923	do	534	259	275
Burlington, Vt.	Dec. 6–17, 1923	do	532	269	263
Fall River, Mass.	Jan. 2–9, 1924	do	321	149	172
Hartford, Conn.	Mar. 3–28, 1924	do	992	490	502
Syracuse, N. Y.	Jan. 22 to Feb. 21, 1924	do	1,751	883	868
Trenton, N. J.	Apr. 1–11, 21; May 6, 1924	do	1,661	801	860
Philadelphia, Pa.	May 9 to June 24, 1924	do	2,164	1,084	1,080
North central, total		Dr. M. V. Veldee	8,575	4,420	4,155
Minneapolis, Minn.	Sept. 17 to Oct. 5, 1923	do	1,838	949	889
Milwaukee, Wis.	Oct. 10–31, 1923	do	1,153	617	536
Detroit, Mich.	Nov. 27–28, 1923	do	1,798	912	886
South Bend, Ind.	Dec. 6–20, 1923; Jan. 7–9, 1924.	do	1,899	967	932
Muncie, Ind.	Jan. 15–28, 1924	do	1,079	550	529
Quincy, Ill.	Feb. 4–16, 1924	do	808	425	383
South central, total		do	8,779	4,305	4,474
Houston, Tex.	Feb. 25 to Mar. 18, 1924	do	1,680	821	859
New Orleans, La.	Mar. 24 to Apr. 9, 1924	do	1,718	847	871
Little Rock, Ark.	Apr. 15–24, 1924	do	1,265	619	646
Nashville, Tenn.	Apr. 29 to May 9, 1924	do	1,062	501	561
Louisville, Ky.	May 13 to June 5, 1924	do	1,770	869	901
St. Louis, Mo.	Apr. 9 to June 7, 1923	do	1,284	648	636
Western, total		Dr. V. R. Anderson	1,943	963	980
Provo, Utah	Dec. 6, 1922 to Mar. 1, 1923	do	855	418	437
Salt Lake City, Utah	Nov. 27–29, Dec. 4–8, 1922	do	211	109	102
Bountiful, Utah	Oct. 19 to Nov. 16, 1922	do	257	138	119
Kaysville, Utah	Oct. 10–18, 1922	do	44	26	18
Las Vegas, Nev.	May 28–31, 1923	do	93	39	54
Elko, Nev.	Nov. 20–25, 1923	do	133	62	71
Carson City, Nev.	Apr. 5–12, 1923	do	100	44	56
Unincorporated places in Nevada [1]		do	250	127	123

[1] St. Thomas, Nev., Apr. 23–27, 1923; Overton, Nev., May 1–10, 1923; Bunkerville, Nev., May 13–15, 1923; Mesquite, Nev., May 18, 1923; Minden, Nev., Sept. 25, 1923; Gardnerville, Nev., Sept. 26–27, 1923; Virginia City, Nev., Oct. 9, 1923; Gold Hill, Nev., Dec. 4, 1923; Silver City, Nev., Dec. 5, 1923; Comstock, Nev., Dec. 10, 1923.

The important imperfections in the data, so far as this study of differences in children from the various sections is concerned, are three.

First, the time of year in which the measurements were made was not exactly the same in each geographic section. Measurements made in the northeast section were distributed fairly evenly over the school year of 1923–24; those in the north central section were begun in the fall of 1923 and were completed by February; those in the south central section were made in the spring, either in 1923 or 1924; most of the measurements in the western section were begun and finished in the fall or early winter of 1922 and 1923. Thus, seasonal variation in growth may account for some difference in the various localities.

However, rough calculations based on observations of the seasonal and yearly fluctuations in growth (*3*, *4*) have indicated that no very large differences among the four sections will arise as a result of these factors. In growth increments, calculated as the differences between means of successive age groups, the error introduced by variation in the season of measurement will be negligible.

Second, the geographic grouping used introduces some error. Thus, despite the fact that the entire group measured is what may be designated "old American stock", it seems not altogether satisfactory, for example, to group together children of probably largely Dutch descent in Philadelphia with those of probably English descent in Hartford, or the children of probably largely Scandinavian descent in Minneapolis with those of English descent in Muncie, Ind. However, to obtain groups of sufficient size for reliable comparisons, and because it seemed desirable to make the study one of differences between broad geographic regions, the only method of grouping which seemed feasible or practicable was the one adopted.

Third, errors may arise as a result of possible differences in the technique of measuring of the three examiners, and although this technique was standardized, it is not impossible that even small variations in the methods of measuring might account for some of the differences between the geographic sections. Obviously, this source of error does not apply to differences between the north and south central regions, where the same person made the measurements; and, also, it does not apply to that part of the study which deals with yearly increments calculated as the differences between averages for successive age groups. Standing height and weight measurements, however, should be reasonably comparable in all areas, as the techniques for making these measurements probably are quite standardized and the errors due to variation in technique would be less than in chest measurements and sitting height.

RESULTS

Averages of measurements for the four sections.—Tables 2 and 3 and figures 1 and 2 give data for the comparison of the physical characteristics of children in the four geographic regions. The table shows the number of children in each subgroup and the averages of measurements of weight, standing and sitting heights, transverse and anteroposterior chest diameters, chest circumference and vital capacity, for each section and for all sections taken together. The averages in the tables are expressed in the units in which the measurements were made. Figure 1 shows, for boys and girls in yearly age classes, the differences between the four geographic sections in terms of the *deviations of the sectional averages from the averages for "all sections."* Figure 2 shows, similarly, geographic differences for three calculated

indexes of body form, the height-weight index, the relative trunk-length index, and the thoracic index. The height-weight index is expressed in terms of pounds per inch of height and is the quotient, $\frac{\text{average weight (in pounds)}}{\text{average height (in inches)}}$; the relative trunk-length index is expressed

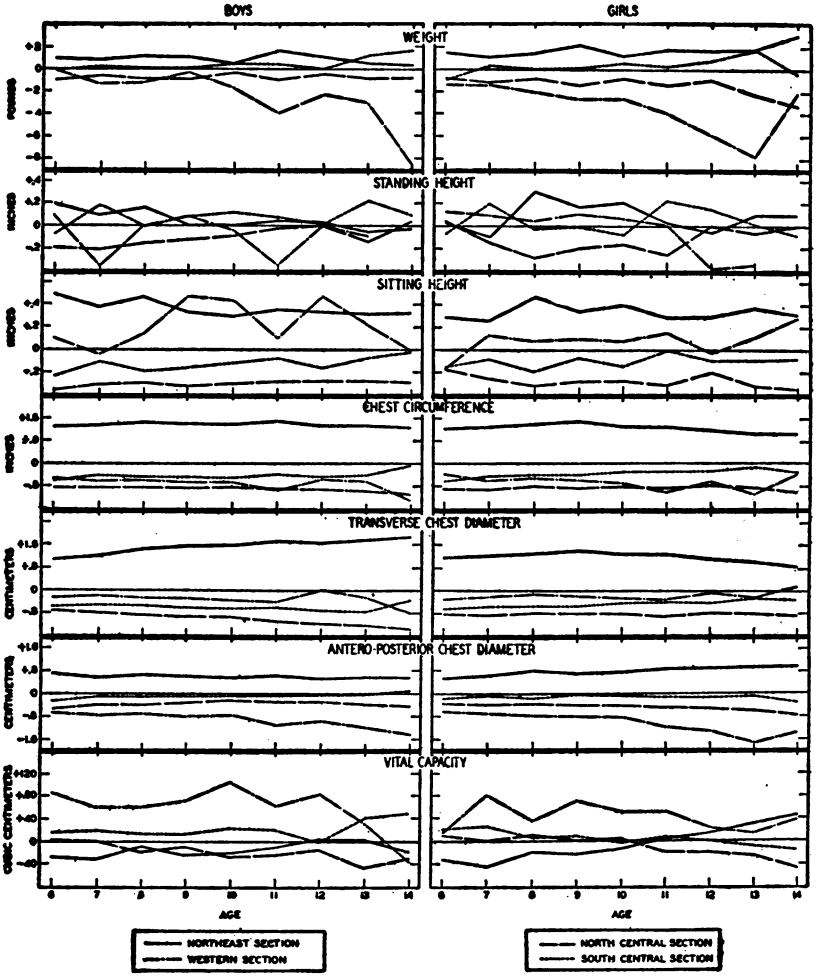

FIGURE 1.—Deviations of mean measurements of children in different geographic sections of the United States from mean measurements of children in "all sections" (children of native white parents and grandparents.)

as the percentage, $\frac{(100)\text{ average sitting height (in inches)}}{\text{average standing height (in inches)}}$; the thoracic index, as the percentage,

$$\frac{(100\text{ average tranverse chest diameter (in centimeters)}}{\text{average anteroposterior chest diameter (in centimeters)}}.$$

Three facts of general interest may be noted from the tables and graphs. *First*, it is clear that the deviations of the regional averages are, in most instances, sufficiently uniform and consistent to permit a definite ordering of the relative magnitude of the measurements and indexes for children in the different regions. *Second*, there is a close correspondence between the deviations of boys and girls; that is, if the average for boys in any section deviates from the average of boys in all sections, a similar deviation is found for the girls of that section. *Third*, the deviations of the sectional averages remain fairly constant, on an absolute scale, over the whole age range from 6 to 14 years.

Other facts of a more detailed nature may be noted. Thus it will be observed that children from the northeast section tend in a general

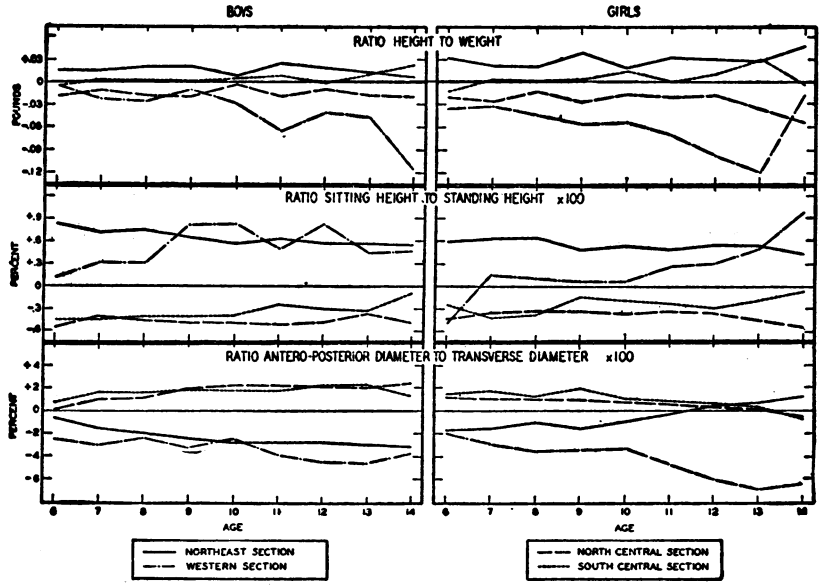

FIGURE 2.—Deviations of mean indexes of body build of children in different geographic sections of the United States from mean indexes of children in "all sections." (Children of native white parents and grandparents.)

way to be the largest, those from the north-central area the next largest, those from the south-central section the third largest, and children from the western region the smallest. With respect to weight, this order is maintained quite consistently. With respect to height, the differences between the areas fluctuate somewhat irregularly and it is possible only to state that boys and girls from the northeast and north-central regions tend to be slightly taller than those from the south-central and western sections. In sitting height the order of size is changed by the fact that western children take second place. The two diameters and circumference of the chest are markedly greater for children from the northeast section, while

the interregional differences between the other groups are small and somewhat irregular. The order of size in vital capacity, beginning with the largest, is as follows: Western, north central, northeast, and south central. This order is not followed by chest circumference or any of the other chest measurements, and is difficult to explain. In making the measurements of vital capacity, however, a Narragansett wet spirometer was used in the western section, while Sanborn wet spirometers were used in the other sections. Although the four instruments used were carefully calibrated and their readings were presumably comparable, the possibility that the regional varia-

TABLE 2.—*Mean measurements of children in four geographic regions in the United States (children of native white parents and grandparents)*

BOYS

Measurement and section	Age in years, nearest birthday								
	6	7	8	9	10	11	12	13	14
Weight (pounds):									
All sections	45.82	49.77	55.26	60.76	66.87	73.40	80.07	89.29	99.44
Northeast	46.79	50.56	56.46	61.85	67.27	74.87	81.13	89.83	99.73
North central	45.56	50.04	55.39	60.87	67.25	73.98	79.91	90.18	100.99
South central	44.75	48.98	54.22	59.59	66.52	72.23	79.57	88.23	98.45
Western	45.69	48.33	53.94	60.26	65.16	69.30	77.76	86.31	90.89
Standing height (inches):									
All sections	45.16	47.04	49.26	51.27	53.20	55.08	56.84	59.07	61.23
Northeast	45.36	47.14	49.43	51.29	53.19	55.12	56.85	59.00	61.20
North central	45.09	47.23	49.25	51.35	53.33	55.16	56.84	59.29	61.32
South central	44.97	46.83	49.11	51.15	53.11	55.05	56.83	58.92	61.27
Western	45.26	46.68	49.25	51.35	53.15	54.72	56.84	58.96	60.35
Sitting height [1] (inches):									
All sections	24.37	25.10	25.97	26.76	27.47	28.15	28.84	29.74	30.79
Northeast	24.85	25.49	26.43	27.10	27.78	28.50	29.17	30.05	31.12
North central	24.13	24.99	25.77	26.59	27.34	28.06	28.67	29.66	30.78
South central	24.01	24.79	25.66	26.43	27.17	27.85	28.56	29.46	30.51
Western	24.47	25.06	26.11	27.22	27.90	28.24	29.31	29.95	30.64
Chest circumference (inches):									
All sections	22.87	23.33	23.99	24.60	25.30	26.06	26.83	27.81	28.98
Northeast	24.15	24.63	25.43	26.02	26.68	27.57	28.23	29.20	30.28
North central	22.25	22.89	23.51	24.13	24.79	25.64	26.33	27.40	28.90
South central	22.02	22.48	23.14	23.72	24.49	25.13	25.95	26.85	27.94
Western	22.32	22.70	23.39	23.91	24.61	25.13	26.28	27.15	27.69
Transverse chest diameter (centimeters):									
All sections	19.03	19.49	20.07	20.67	21.24	21.89	22.54	23.33	24.25
Northeast	20.15	20.74	21.53	22.21	22.83	23.65	24.22	25.20	26.16
North central	18.44	18.94	19.53	20.03	20.58	21.27	21.82	22.60	23.93
South central	18.31	18.67	19.18	19.68	20.26	20.77	21.41	22.12	22.84
Western	18.75	19.28	19.81	20.42	20.91	21.48	22.56	23.10	23.43
Anteroposterior chest diameter (centimeters):									
All sections	14.29	14.51	14.75	15.09	15.45	15.89	16.29	16.89	17.64
Northeast	15.02	15.13	15.40	15.69	15.96	16.51	16.83	17.44	18.20
North central	14.00	14.42	14.67	15.02	15.35	15.82	16.26	16.89	17.74
South central	13.73	14.11	14.33	14.74	15.20	15.56	15.94	16.47	17.16
Western	13.62	13.78	14.08	14.27	14.68	14.76	15.31	15.66	16.16
Vital capacity (cubic centimeters):									
All sections	1,063	1,217	1,402	1,567	1,752	1,935	2,121	2,363	2,658
Northeast	1,036	1,183	1,393	1,543	1,732	1,925	2,123	2,365	2,637
North central	1,078	1,236	1,414	1,579	1,778	1,955	2,119	2,403	2,706
South central	1,065	1,217	1,383	1,559	1,725	1,912	2,104	2,317	2,628
Western	1,146	1,278	1,462	1,638	1,856	1,997	2,204	2,395	2,621
Number of children:									
All sections	922	1,600	1,679	1,813	1,698	1,735	1,714	1,646	1,317
Northeast	323	527	529	587	557	553	569	546	397
North central	367	492	509	546	477	515	494	517	468
South central	193	440	511	531	536	552	539	509	399
Western	39	141	130	149	128	115	112	74	53

[1] Sitting height measured by Dreyer method (see reference 9).

tion might be due to differences in the instruments used makes it advisable to accept only provisionally the observed interregional differences in vital capacity.

The index of general body build, expressed in terms of pounds per inch of height, shows regional differences similar to those observed for body weight. Thus the stockiest children come from the northeast section; those of intermediate build from the north-central and south-central regions, and the least stocky from the western area. Sectional deviations of relative trunk length, expressed as the percentage that sitting height is of standing height, show that children from the

TABLE 3.—*Mean measurements of children in four geographic regions in the United States (children of native white parents and grandparents)*

GIRLS

Measurement and section	Age in years, nearest birthday								
	6	7	8	9	10	11	12	13	14
Weight (pounds):									
All sections	44.91	48.56	53.41	59.59	65.71	74.27	83.31	94.63	102.99
Northeast	46.45	49.65	54.83	61.78	66.86	76.13	84.95	96.47	106.05
North central	44.14	48.93	53.48	59.77	66.34	74.66	84.07	96.39	102.62
South central	44.00	47.21	52.55	58.06	64.71	72.84	82.28	92.34	99.70
Western	43.48	47.14	51.27	56.84	63.01	70.40	77.32	86.86	100.82
Standing height (inches):									
All sections	44.81	46.66	48.93	50.94	52.95	55.17	57.48	59.85	61.22
Northeast	44.85	46.57	49.23	51.11	53.16	55.20	57.44	59.97	61.33
North central	44.73	46.85	48.90	50.95	52.87	55.41	57.63	59.87	61.14
South central	44.85	46.51	48.64	50.74	52.78	54.92	57.49	59.77	61.22
Western	44.95	46.76	48.97	51.06	53.02	55.19	57.09	59.50	60.61
Sitting height [1] (inches):									
All sections	24.18	24.91	25.79	26.56	27.35	28.31	29.30	30.54	31.33
Northeast	24.46	25.16	26.27	26.90	27.74	28.59	29.59	30.93	31.65
North central	24.03	24.82	25.60	26.48	27.20	28.31	29.21	30.45	31.24
South central	23.99	24.66	25.47	26.28	27.07	27.99	29.10	30.22	30.99
Western	24.02	25.03	25.86	26.65	27.42	28.47	29.29	30.67	31.62
Chest circumference (inches):									
All sections	22.32	22.86	23.38	24.14	24.88	25.92	26.87	28.01	28.85
Northeast	23.55	24.17	24.76	25.64	26.18	27.22	28.04	29.11	29.91
North central	21.68	22.41	22.95	23.72	24.56	25.66	26.54	27.88	28.56
South central	21.43	21.91	22.55	23.25	24.07	25.03	26.10	27.16	27.81
Western	21.93	22.27	22.82	23.51	24.15	24.92	26.15	26.99	28.47
Transverse chest diameter (centimeters):									
All sections	18.57	19.01	19.49	20.06	20.65	21.43	22.11	22.94	23.55
Northeast	19.77	20.25	20.83	21.49	21.92	22.69	23.20	23.98	24.41
North central	17.93	18.47	18.95	19.53	20.26	21.08	21.71	22.72	23.32
South central	17.73	18.13	18.68	19.21	19.83	20.53	21.34	22.13	22.68
Western	18.29	18.80	19.35	19.86	20.38	21.12	22.05	22.73	23.73
Anteroposterior chest diameter (centimeters):									
All sections	13.85	14.09	14.39	14.78	15.23	15.80	16.45	17.23	17.81
Northeast	14.38	14.69	15.17	15.46	15.97	16.66	17.36	18.18	18.77
North central	13.63	14.02	14.23	14.75	15.16	15.71	16.29	17.15	17.47
South central	13.46	13.64	14.00	14.33	14.77	15.25	15.93	16.61	17.05
Western	13.26	13.41	13.59	13.94	14.37	14.56	15.08	15.51	16.45
Vital capacity (cubic centimeters):									
All sections	993	1,120	1,282	1,431	1,590	1,782	2,010	2,257	2,468
Northeast	961	1,076	1,260	1,405	1,577	1,785	2,025	2,289	2,513
North central	1,017	1,147	1,286	1,440	1,586	1,788	2,011	2,248	2,454
South central	1,004	1,120	1,290	1,431	1,593	1,763	1,989	2,232	2,422
Western	1,006	1,200	1,318	1,504	1,640	1,832	2,037	2,267	2,505
Number of children:									
All sections	966	1,548	1,652	1,780	1,772	1,718	1,736	1,657	1,364
Northeast	348	524	513	551	559	563	580	550	526
North central	375	480	478	495	494	485	458	483	380
South central	193	418	508	593	580	554	579	546	420
Western	50	126	153	141	139	116	119	78	38

[1] Sitting height measured by Dreyer method (see reference 9).

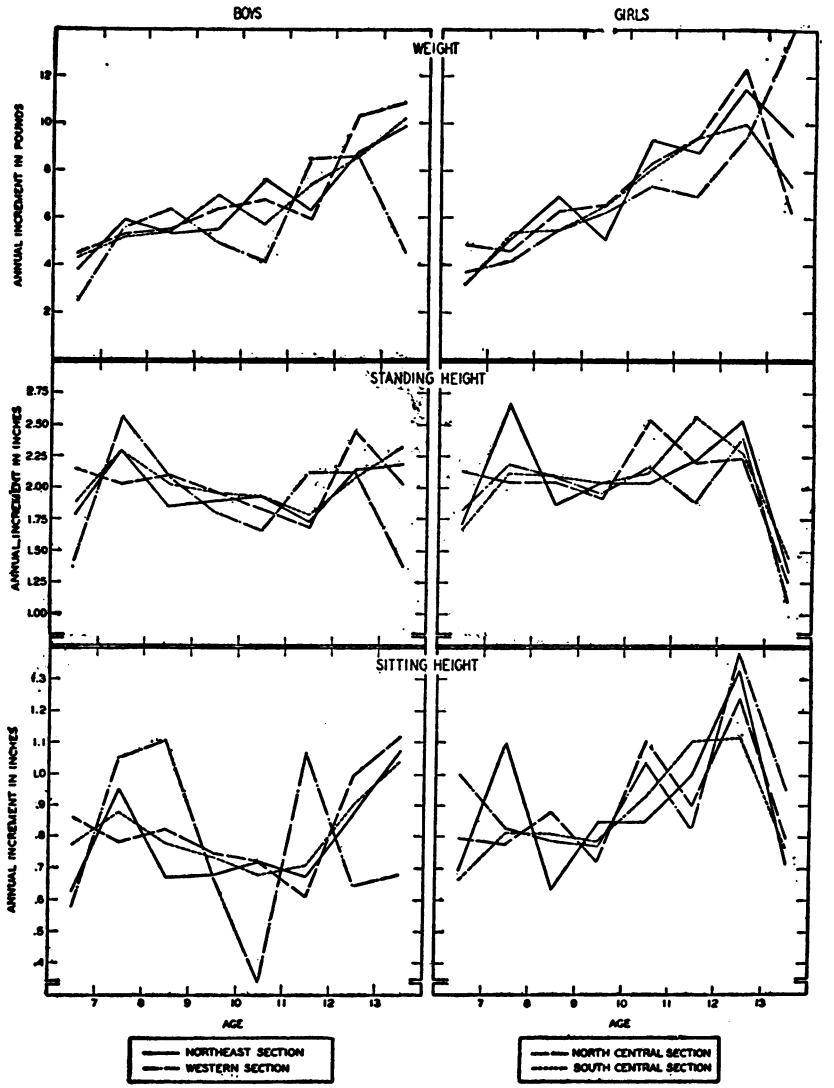

FIGURE 3.—Mean annual increments of growth of children in different geographic sections of the United States. (Children of native white parents and grandparents.)

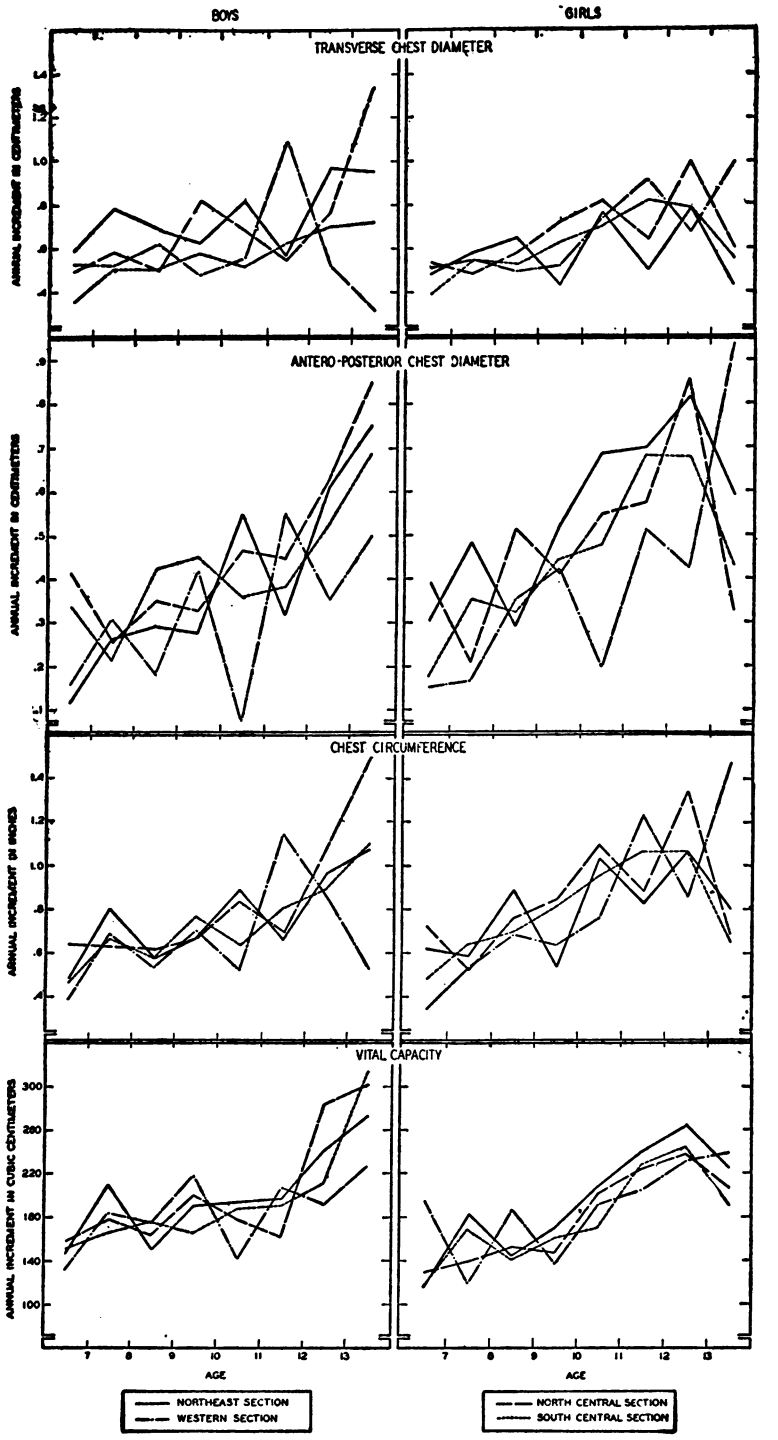

FIGURE 4.—Mean annual increments of growth of children in different geographic sections of the United States. (Children of native white parents and grandparents.)

northeast and western regions have relatively long trunks while those from the central sections have relatively long legs. The relative thickness of the chest, as measured by the ratio of anteroposterior diameter to transverse diameter, is greatest for children from the central areas and least for those from the western and northeastern sections. Thus children from the eastern and western sections have relatively shorter legs and flatter chests than those from the central districts.

Growth increments of children in different sections.—Tables 3, 4, and 5 and figures 3 and 4 give data for the comparison of yearly growth increments calculated as the differences between averages of measurements of successive age classes. These data show the characteristics of growth usually found from such analyses. The significant findings for this study, however, lie in the comparison of increments for the different geographic subdivisions. Study of the tables and graphs from this viewpoint indicates that no section shows a consistent difference from any other section. Thus the four lines representing the age changes in annual increments cross and recross each other very irregularly.

In this connection it must be noted, despite the rather large numbers of cases involved, that the data may not be extensive enough to bring out small differences in such highly variable measures as growth increments.

SUMMARY

This paper deals with physical measurements of children of native white parents and grandparents in four geographic sections of the United States: 1) a northeastern section of New England and Middle Atlantic States; 2) a north central section, States bordering the western Great Lakes; 3) a south central section, from Kentucky to Texas; 4) a western section, limited to Utah and Nevada. The data consist of measurements of weight, standing and sitting heights, anteroposterior and transverse diameters of the chest, chest circumference, and vital capacity of approximately 30,000 children between 6 and 15 years of age. Analysis of the data in age and sex specific classes for each section shows consistent differences between the mean measurements of children in the various geographic subdivisions. On the whole, children from the northeastern section tend to be the largest, those from the north central area the next largest, children from the south central region are third largest, and those from the western section are the smallest.

Study of growth increments, calculated as the differences between averages of successive age classes, shows no consistent differences in mean increments for children in the various sections.

TABLE 4.—*Mean annual increments in the measurements of children in four geographic regions in the United States (children of native white parents and grandparents)*

BOYS

Measurement and section	Age interval							
	6–7	7–8	8–9	9–10	10–11	11–12	12–13	13–14
Weight (pounds):								
All sections	3.95	5.49	5.50	6.11	6.53	6.67	9.22	10.15
Northeast	3.77	5.90	5.39	5.42	7.61	6.26	8.70	9.90
North central	4.48	5.35	5.48	6.38	6.72	5.94	10.27	10.81
South central	4.24	5.24	5.37	6.92	5.72	7.34	8.66	10.22
Western	2.64	5.61	6.32	4.90	4.13	8.46	8.55	4.58
Standing height (inches):								
All sections	1.88	2.22	2.01	1.93	1.88	1.76	2.23	2.17
Northeast	1.78	2.29	1.86	1.90	1.93	1.73	2.15	2.20
North central	2.14	2.02	2.11	1.97	1.83	1.68	2.46	2.03
South central	1.86	2.28	2.04	1.96	1.94	1.78	2.09	2.35
Western	1.43	2.57	2.10	1.80	1.57	2.12	2.12	1.39
Sitting height [1] (inches):								
All sections	.731	.870	.791	.708	.674	.698	.897	1.055
Northeast	.632	.947	.669	.678	.721	.674	.872	1.076
North central	.863	.781	.824	.744	.719	.609	.996	1.120
South central	.775	.875	.775	.732	.684	.709	.900	1.046
Western	.585	1.053	1.111	.675	.339	1.071	.647	.685
Chest circumference (inches):								
All sections	.463	.663	.608	.702	.754	.776	.980	1.162
Northeast	.474	.809	.583	.663	.887	.660	.976	1.078
North central	.642	.626	.616	.663	.843	.691	1.070	1.503
South central	.461	.662	.579	.777	.640	.810	.900	1.092
Western	.378	.684	.528	.694	.527	1.145	.872	.540
Transverse chest diameter (centimeters):								
All sections	.462	.587	.591	.577	.644	.651	.798	.919
Northeast	.587	.793	.682	.618	.823	.569	.978	.960
North central	.502	.589	.496	.823	.690	.552	.775	1.336
South central	.354	.512	.501	.582	.515	.632	.710	.726
Western	.531	.525	.619	.486	.567	1.087	.532	.330
Anteroposterior chest diameter (centimeters):								
All sections	.217	.238	.344	.356	.436	.403	.599	.750
Northeast	.114	.265	.293	.272	.548	.322	.610	.756
North central	.415	.258	.349	.321	.472	.445	.624	.850
South central	.334	.213	.417	.454	.363	.384	.530	.688
Western	.153	.308	.181	.418	.075	.556	.347	.503
Vital capacity (cubic centimeters):								
All sections	154	185	165	185	183	186	242	295
Northeast	147	210	150	189	193	198	242	272
North central	158	178	165	199	177	164	284	303
South central	152	166	176	166	187	192	213	311
Western	132	184	176	218	141	207	191	226

[1] Sitting height measured by the Dreyer method (see reference 9)

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TABLE 5.—*Mean annual increments in the measurements of children in four geographic regions in the United States (children of native white parents and grandparents)*

GIRLS

Measurement and section	Age interval							
	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14
Weight (pounds):								
All sections	3.66	4.85	6.18	6.12	8.56	9.04	11.33	8.36
Northeast	3.20	5.19	6.95	5.08	9.27	8.82	11.52	9.58
North central	4.80	4.54	6.30	6.57	8.32	9.41	12.33	6.22
South central	3.21	5.34	5.51	6.66	8.13	9.44	10.06	7.36
Western	3.66	4.13	5.57	6.16	7.39	6.92	9.54	13.96
Standing height (inches):								
All sections	1.85	2.27	2.01	2.01	2.22	2.31	2.37	1.37
Northeast	1.72	2.67	1.88	2.05	2.04	2.24	2.53	1.36
North central	2.12	2.05	2.05	1.93	2.54	2.22	2.25	1.26
South central	1.66	2.13	2.10	2.04	2.14	2.57	2.28	1.45
Western	1.82	2.20	2.10	1.96	2.17	1.90	2.41	1.11
Sitting height [1] (inches):								
All sections	.731	.883	.766	.789	.964	.995	1.239	.787
Northeast	.695	1.109	.631	.844	.849	1.004	1.336	.719
North central	.794	.777	.882	.721	1.106	.899	1.217	.790
South central	.663	.813	.811	.788	.925	1.103	1.121	.769
Western	1.011	.825	.790	.776	1.043	.821	1.384	.946
Chest circumference (inches):								
All sections	.545	.515	.766	.736	1.038	.951	1.143	.835
Northeast	.623	.589	.886	.538	1.037	.824	1.064	.804
North central	.729	.534	.769	.844	1.097	.883	1.343	.674
South central	.485	.640	.698	.815	.962	1.066	1.067	.643
Western	.345	.542	.689	.639	.771	1.234	.845	1.471
Transverse chest diameter (centimeters):								
All sections	.434	.482	.569	.598	.780	.675	.833	.611
Northeast	.480	.587	.656	.434	.768	.507	.783	.424
North central	.539	.479	.585	.729	.819	.635	1.001	.600
South central	.393	.548	.532	.624	.698	.811	.735	.557
Western	.513	.554	.504	.524	.743	.928	.675	1.002
Anteroposterior chest diameter (centimeters):								
All sections	.249	.299	.382	.451	.569	.649	.790	.573
Northeast	.309	.485	.290	.514	.689	.698	.817	.578
North central	.394	.209	.516	.410	.552	.576	.860	.390
South central	.180	.361	.327	.441	.475	.685	.680	.423
Western	.158	.172	.357	.425	.196	.517	.427	.933
Vital capacity (cubic centimeters):								
All sections	127	162	149	159	192	228	247	211
Northeast	115	184	145	172	208	240	264	224
North central	130	139	154	146	202	223	237	206
South central	116	170	141	162	170	226	243	190
Western	194	118	186	136	192	205	230	238

[1] Sitting height measured by the Dreyer method (see reference 9).

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DEATHS DURING WEEK ENDED FEB. 16, 1935

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

	Week ended Feb. 16, 1935	Corresponding week, 1934
Data from 86 large cities of the United States:		
Total deaths	9,040	9,775
Deaths per 1,000 population, annual basis	12.6	13.6
Deaths under 1 year of age	561	625
Deaths under 1 year of age per 1,000 estimated live births	52	58
Deaths per 1,000 population, annual basis, first 7 weeks of year	13.1	12.6
Data from industrial insurance companies:		
Policies in force	67,265,885	67,519,644
Number of death claims	12,696	11,810
Death claims per 1,000 policies in force, annual rate	9.8	9.1
Death claims per 1,000 policies, first 7 weeks of year, annual rate	10.8	10.7

PREVALENCE OF DISEASE

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

UNITED STATES

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 Feb. 23, 1935, and Feb. 24, 1934

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Feb. 23, 1935, and Feb. 24, 1934

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Feb. 23, 1935	Week ended Feb. 24, 1934	Week ended Feb. 23, 1935	Week ended Feb. 24, 1934	Week ended Feb. 23, 1935	Week ended Feb. 24, 1934	Week ended Feb. 23, 1935	Week ended Feb. 24, 1934
New England States:								
Maine	----	----	3	2	386	2	0	0
New Hampshire	----	----	----	1	17	222	0	0
Vermont	----	----	----	----	4	27	0	0
Massachusetts	8	5	----	----	400	1,807	1	0
Rhode Island	2	1	----	----	55	6	1	0
Connecticut	3	2	12	6	689	30	1	0
Middle Atlantic States:								
New York	41	40	[1] 27	[1] 16	1,905	1,047	5	6
New Jersey	18	11	21	23	574	408	0	0
Pennsylvania	51	58	----	----	3,006	2,082	7	3
East North Central States:								
Ohio	74	33	53	119	760	449	17	3
Indiana	36	38	71	108	584	691	4	3
Illinois	54	34	46	33	2,341	968	13	7
Michigan	7	4	31	8	1,219	67	0	2
Wisconsin	4	16	134	78	1,598	1,024	3	2
West North Central States:								
Minnesota	4	13	----	2	2,272	207	1	1
Iowa	2	----	34	14	1,575	86	5	0
Missouri	46	52	393	206	607	1,408	4	8
North Dakota	10	8	75	10	61	36	0	1
South Dakota	----	----	4	----	36	624	0	0
Nebraska	9	4	----	27	538	22	9	0
Kansas	12	9	25	2	1,507	125	4	3
South Atlantic States:								
Delaware	----	2	7	----	----	167	0	0
Maryland	10	11	69	24	46	318	7	0
District of Columbia	8	4	7	2	11	473	11	0
Virginia	17	22	----	----	1,253	1,131	6	5
West Virginia	13	16	211	80	678	26	0	1
North Carolina [2]	17	25	216	77	765	3,230	5	0
South Carolina	6	6	580	880	27	529	0	0
Georgia [2]	9	14	356	206	----	1,880	0	1
Florida [2]	8	8	43	2	40	114	3	0
East South Central States:								
Kentucky	24	32	419	108	905	374	14	3
Tennessee	14	9	366	112	38	975	7	3
Alabama [2]	21	41	1,839	253	568	836	3	1
Mississippi [2]	7	10	----	----	----	----	4	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Feb. 23, 1935, and Feb. 24, 1934—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Feb. 23, 1935	Week ended Feb. 24, 1934	Week ended Feb. 23, 1935	Week ended Feb. 24, 1934	Week ended Feb. 23, 1935	Week ended Feb. 24, 1934	Week ended Feb. 23, 1935	Week ended Feb. 24, 1934
West South Central States:								
Arkansas	23	10	103	89	60	473	2	3
Louisiana	32	22	46	11	105	128	2	0
Oklahoma [4]	17	14	273	169	50	432	1	2
Texas [2]	44	129	661	825	267	2,028	7	2
Mountain States:								
Montana	3	2	455	64	237	32	0	1
Idaho	1		7		53	28	0	0
Wyoming		1			132	65	0	0
Colorado	8	2			593	78	4	0
New Mexico	8	5	45		23	135	2	1
Arizona	2	1	67	26	23	22	1	0
Utah [3]					15	725	0	0
Pacific States:								
Washington	4	2	18		130	200	1	2
Oregon		6	143	62	87	55	0	0
California	51	38	158	38	601	1,154	5	2
Total	728	760	7,018	3,683	26,841	26,946	160	66

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Feb. 23, 1935	Week ended Feb. 24, 1934	Week ended Feb. 23, 1935	Week ended Feb. 24, 1934	Week ended Feb. 23, 1935	Week ended Feb. 24, 1934	Week ended Feb. 23, 1935	Week ended Feb. 24, 1934
New England States:								
Maine	0	0	22	18	0	0	3	1
New Hampshire	0	0	5	17	0	1	0	0
Vermont	0	1	16	11	0	0	0	0
Massachusetts	0	0	190	237	0	0	0	0
Rhode Island	0	0	17	11	0	0	0	0
Connecticut	0	0	53	44	0	0	2	0
Middle Atlantic States:								
New York	1	0	793	789	0	0	5	7
New Jersey	1	0	149	179	0	0	1	6
Pennsylvania	0	0	508	779	0	0	13	8
East North Central States:								
Ohio	1	0	940	689	0	1	4	11
Indiana	0	0	223	248	0	1	1	2
Illinois	0	1	944	632	1	8	3	3
Michigan	0	0	371	486	0	1	3	3
Wisconsin	0	0	600	230	22	50	0	1
West North Central States:								
Minnesota	0	0	150	74	9	5	0	3
Iowa	1	0	101	71	2	2	2	2
Missouri	0	0	113	143	1	2	0	6
North Dakota	0	0	46	54	5	0	0	0
South Dakota	0	0	17	10	12	0	0	0
Nebraska	0	0	38	17	21	2	0	0
Kansas	0	0	108	80	6	0	0	2
South Atlantic States:								
Delaware	0	0	12	13	1	0	0	0
Maryland	0	0	107	73	0	0	5	1
District of Columbia	1	0	44	25	0	0	2	0
Virginia	0	0	49	44	0	1	8	6
West Virginia	0	0	153	79	0	0	4	6
North Carolina [2]	0	1	29	46	0	0	2	0
South Carolina	0	0	3	7	0	3	0	3
Georgia [2]	0	0	6	12	0	0	2	10
Florida [2]	0	0	2	2	0	0	0	2
East South Central States:								
Kentucky	0	1	87	96	0	0	8	6
Tennessee	0	0	42	40	0	2	2	4
Alabama [2]	1	0	18	21	2	0	7	3
Mississippi [2]	0	0	15	14	1	0	1	2

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Feb. 23, 1935, and Feb. 24, 1934—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Feb. 23, 1935	Week ended Feb. 24, 1934	Week ended Feb. 23, 1935	Week ended Feb. 24, 1934	Week ended Feb. 23, 1935	Week ended Feb. 24, 1934	Week ended Feb. 23, 1935	Week ended Feb. 24, 1934
West South Central States:								
Arkansas	0	0	8	8	1	0	2	2
Louisiana	0	0	14	42	1	2	7	6
Oklahoma [4]	0	0	21	20	4	7	7	4
Texas [2]	2	2	86	142	0	44	11	18
Mountain States:								
Montana	0	0	24	10	0	0	1	2
Idaho	0	0	15	18	0	1	0	0
Wyoming	0	0	5	6	7	1	0	0
Colorado	0	0	317	39	2	4	0	0
New Mexico	0	1	21	24	8	0	2	6
Arizona	0	0	19	17	0	0	0	2
Utah [3]	0	0	96	9	0	1	0	0
Pacific States:								
Washington	0	0	-------	62	23	2	1	2
Oregon	0	0	62	40	4	5	0	2
California	10	5	242	271	9	5	4	4
Total	18	12	6,901	5,999	142	151	113	140

[1] New York City only.
[2] Typhus fever, week ended Feb. 23, 1935, 11 cases, as follows: North Carolina, 1; Georgia, 3; Florida, 2; Alabama, 1; Texas, 4.
[3] Week ended earlier than Saturday.
[4] Exclusive of Oklahoma City and Tulsa.

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
Idaho	4	-------	330	-------	172	-------	0	45	51	2
Illinois	25	198	703	9	7,910	-------	0	3,475	8	33
Iowa	4	46	337	-------	4,580	-------	0	296	6	8
Kansas	3	48	141	-------	2,844	-------	1	482	25	5
Louisiana	3	185	105	41	496	4	5	158	9	37
Michigan	4	58	219	1	1,264	-------	0	1,392	2	14
Montana	2	17	1,926	-------	588	-------	1	89	12	3
North Dakota	3	10	176	-------	400	-------	-------	212	-------	0
Ohio	49	281	1,231	-------	2,398	-------	4	3,187	2	14
Oklahoma [1]	10	56	848	18	-------	4	1	191	13	30
Oregon	1	11	571	-------	199	-------	2	308	10	3
Pennsylvania	16	263	-------	-------	7,344	-------	5	2,602	0	29
Rhode Island	-------	20	13	-------	118	-------	1	77	0	0
South Dakota	2	11	47	-------	336	-------	2	176	42	2
Tennessee	19	89	1,906	36	181	5	0	194	1	10
West Virginia	18	130	1,333	-------	1,960	-------	3	701	2	17
Wyoming	-------	1	-------	-------	166	-------	0	70	55	0

[1] Exclusive of Oklahoma City and Tulsa.

January 1935	Cases
Actinomycosis:	
Pennsylvania	1
Anthrax:	
Kansas	1
Michigan	1
Pennsylvania	1
Chickenpox:	
Idaho	44
Illinois	2,207
Iowa	301
Kansas	707
Louisiana	92
Michigan	2,180
Montana	136
North Dakota	91
Ohio	3,208
Oklahoma [1]	100
Oregon	375
Pennsylvania	5,019
Rhode Island	136
South Dakota	108
Tennessee	204
West Virginia	319
Wyoming	71
Conjunctivitis:	
Illinois	3
Kansas	5
Diarrhea and enteritis:	
Ohio (under 2 years)	11
Dysentery:	
Illinois (amoebic)	8
Illinois (bacillary)	2
Illinois (amoebic carriers)	67
Louisiana (amoebic)	1
Michigan (amoebic)	3
Ohio	1
Oklahoma [1]	1
Pennsylvania	3
Tennessee	7
West Virginia	1
Epidemic encephalitis:	
Illinois	18
Iowa	1
Kansas	3
Louisiana	2
Ohio	4
Pennsylvania	3
Tennessee	6
Favus:	
Montana	1
Food poisoning:	
Ohio	15
German measles:	
Illinois	1,830
Iowa	13
Kansas	838
Montana	2,110
Ohio	509
Pennsylvania	492
Tennessee	6
Wyoming	49
Hookworm disease:	
Louisiana	10
Impetigo contagiosa:	
Iowa	2
Kansas	1

January 1935	Cases
Impetigo contagiosa—Con.	
Montana	12
Oklahoma [1]	1
Oregon	43
Tennessee	2
Lead poisoning:	
Illinois	1
Ohio	8
Mumps:	
Idaho	7
Illinois	392
Iowa	602
Kansas	419
Louisiana	2
Michigan	447
Montana	169
North Dakota	23
Ohio	1,031
Oklahoma [1]	42
Oregon	386
Pennsylvania	2,090
Rhode Island	19
South Dakota	357
Tennessee	76
West Virginia	194
Wyoming	18
Ophthalmia neonatorum:	
Idaho	1
Illinois	6
Louisiana	1
Ohio	79
Oklahoma [1]	2
Pennsylvania	5
Tennessee	1
Paratyphoid fever:	
Ohio	1
Oregon	1
Puerperal septicemia:	
Illinois	6
Ohio	2
Rabies in animals:	
Illinois	25
Kansas	4
Louisiana	32
Rabies in man:	
Pennsylvania	1
Scabies:	
Kansas	2
Montana	11
Oregon	24
Tennessee	13
Septic sore throat:	
Idaho (reports incomplete)	1
Illinois	15
Kansas	3
Louisiana	14
Michigan	50
Montana	15
Ohio	300
Oklahoma [1]	22
Oregon	11
Rhode Island	2
South Dakota	2
Tennessee	1
Wyoming	3

January 1935	Cases
Tetanus:	
Illinois	2
Louisiana	3
Trachoma:	
Illinois	3
Louisiana	1
North Dakota	1
Ohio	1
Oklahoma [1]	5
Oregon	1
Pennsylvania	2
Tennessee	9
Trichinosis:	
Illinois	3
Iowa	10
Michigan	3
Ohio	12
Pennsylvania	4
Rhode Island	6
South Dakota	2
Tularaemia:	
Illinois	30
Kansas	2
Louisiana	3
Michigan	6
Ohio	14
Pennsylvania	4
Tennessee	2
Typhus fever:	
Louisiana	1
Tennessee	2
Undulant fever:	
Illinois	4
Iowa	14
Kansas	2
Michigan	6
Montana	1
Ohio	2
Pennsylvania	8
South Dakota	1
Wyoming	1
Vincent's infection:	
Illinois	27
Iowa	1
Kansas	2
Michigan	20
North Dakota	4
Oklahoma [1]	2
Oregon	8
Tennessee	3
Whooping cough:	
Idaho	22
Illinois	880
Iowa	55
Kansas	222
Louisiana	3
Michigan	788
Montana	143
North Dakota	55
Ohio	894
Oklahoma [1]	32
Oregon	40
Pennsylvania	1,855
Rhode Island	41
South Dakota	58
Tennessee	131
West Virginia	325
Wyoming	16

[1] Exclusive of Oklahoma City and Tulsa.

WEEKLY REPORTS FROM CITIES

City reports for week ended Feb. 16, 1935

[This table summarizes the reports received regularly from a selected list of 121 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table. Weekly reports are received from about 700 cities, from which the data are tabulated and filed for reference]

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								
Maine:											
Portland	0	1	0	0	5	0	0	0	0	4	29
New Hampshire:											
Concord	0	------	1	0	1	1	0	0	0	0	21
Nashua	0	------	--------	1	-------	0	0	-------	0	0	--------
Vermont:											
Barre	0	------	0	0	0	0	0	0	0	9	7
Burlington	0	------	0	12	0	5	0	0	0	0	5
Massachusetts:											
Boston	7	------	2	9	42	35	0	10	0	21	239
Fall River	0	------	0	276	1	1	0	4	0	13	34
Springfield	0	------	0	100	0	5	0	0	0	9	31
Worcester	0	------	0	2	8	20	0	2	0	6	--------
Rhode Island:											
Pawtucket	0	------	0	2	0	0	0	0	0	0	17
Providence	1	1	0	4	5	11	0	0	0	0	56
Connecticut:											
Bridgeport	0	8	2	2	4	8	0	1	0	2	43
Hartford	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
New Haven	0	2	1	27	8	3	0	1	0	0	59
New York:											
Buffalo	3	------	1	195	25	53	0	9	0	29	159
New York	35	24	21	341	163	396	0	69	2	187	1,550
Rochester	0	------	0	220	6	17	0	1	0	10	70
Syracuse	0	------	2	25	3	4	0	1	1	3	60
New Jersey:											
Camden	2	------	2	0	4	4	0	3	0	0	45
Newark	0	------	5	100	12	14	0	12	0	38	129
Trenton	0	------	0	13	5	12	0	1	0	1	37
Pennsylvania:											
Philadelphia	7	7	3	8	49	88	0	28	0	113	583
Pittsburgh	6	9	6	311	38	37	0	11	0	18	219
Reading	0	------	1	7	0	6	0	0	0	8	23
Scranton	0	------	--------	244	-------	1	0	-------	0	5	--------
Ohio:											
Cincinnati	5	------	5	0	8	29	0	4	0	11	109
Cleveland	10	77	2	136	20	36	0	14	1	55	199
Columbus	13	3	3	60	6	46	0	3	0	0	116
Toledo	4	3	2	35	6	14	0	4	0	4	71
Indiana:											
Fort Wayne	2	------	0	5	1	4	0	0	0	0	32
Indianapolis	7	------	0	16	21	32	0	5	1	10	--------
South Bend	0	------	0	26	5	5	0	0	0	0	20
Terre Haute	0	------	0	1	0	2	0	0	0	0	10
Illinois:											
Chicago	17	13	7	597	69	536	0	44	0	71	706
Springfield	0	------	0	1	1	10	0	0	0	8	25
Michigan:											
Detroit	5	14	3	360	35	147	0	27	0	85	294
Flint	0	------	0	278	4	17	0	2	0	6	37
Grand Rapids	0	------	3	26	4	11	0	0	0	14	39
Wisconsin:											
Kenosha	0	------	0	196	1	16	0	1	0	19	11
Milwaukee	1	2	2	332	10	282	0	5	0	25	100
Racine	0	1	0	22	2	6	0	1	0	6	18
Superior	0	------	0	126	0	0	0	1	0	0	10
Minnesota:											
Duluth	0	------	0	386	4	4	0	0	0	0	22
Minneapolis	1	------	2	1,555	11	40	0	1	0	7	98
St. Paul	0	------	0	4	8	21	0	4	0	12	66
Iowa:											
Davenport	0	------	--------	2	-------	3	0	-------	0	0	--------
Des Moines	0	------	--------	35	-------	4	0	-------	1	0	31
Sioux City	0	------	--------	6	-------	1	0	-------	0	1	--------
Waterloo	0	------	--------	2	-------	9	0	-------	0	0	--------
Missouri:											
Kansas City	2	------	5	144	12	26	0	6	0	1	99
St. Joseph	1	------	1	2	1	3	0	1	0	0	14
St. Louis	18	------	2	15	12	25	0	14	1	9	198

City reports for week ended Feb. 16, 1935—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 Dakota:											
Fargo	0		0		1	3	0	1	0	2	12
Grand Forks	0					1	0		0	0	
South Dakota:											
Aberdeen	0			1		1	0		0	1	
Sioux Falls	0			0		2	0		0	0	7
Nebraska:											
Omaha	3		2	11	12	13	5	0	0	3	68
Kansas:											
Topeka	0		1	8	2	7	0	0	0	1	14
Wichita	2		0	112	6	3	0	0	0	0	22
Delaware:											
Wilmington	1		0	1	0	7	0	0	0	0	30
Maryland:											
Baltimore	2	16	5	8	26	49	0	12	1	24	240
Cumberland	0		0	2	1	0	0	1	0	0	
Frederick	0	1	0	0	1	0	0	0	0	0	4
District of Columbia:											
Washington	9		2	7	17	36	0	12	0	2	192
Virginia:											
Lynchburg	2		0	319	3	2	0	1	0	9	18
Norfolk	0		0	7	11	4	0	2	0	3	40
Richmond	1		1	73	9	4	0	3	1	1	75
Roanoke	0		0	5	1	9	0	0	0	0	9
West Virginia:											
Charleston	1	3	2	34	3	4	0	0	0	6	18
Huntington	0			11		1	0		0	0	
Wheeling	1		0	42	6	19	0	0	1	13	27
North Carolina:											
Raleigh	0		0	6	2	3	0	1	0	0	18
Wilmington	0	10	2	0	2	0	0	0	0	0	17
Winston-Salem	1	2	1	0	2	4	0	1	0	38	15
South Carolina:											
Charleston	1	68	1	0	5	2	0	1	0	0	26
Columbia											
Greenville	0		0	0	6	1	0	1	0	0	25
Georgia:											
Atlanta	0	73	6	1	6	0	0	5	0	1	79
Brunswick	0		0	0	1	0	0	0	0	0	2
Savannah	0	41	3	2	3	1	0	3	0	1	48
Florida:											
Miami	1	9	0	0	0	1	0	2	0	0	38
Tampa	1	12	7	0	2	4	0	2	0	0	39
Kentucky:											
Ashland	1	18		0		0	0		1	2	
Lexington	0		0	20	5	1	0	0	0	2	20
Louisville	4	8	0	285	19	11	0	5	0	10	81
Tennessee:											
Memphis	2		2	0	16	11	0	7	0	7	96
Nashville	2		1	0	6	4	0	0	0	7	52
Alabama:											
Birmingham	1	67	5	16	6	6	0	1	1	1	72
Mobile	0	6	3	2	3	0	0	2	4	0	28
Montgomery	2	23		9		0	0		0	0	
Arkansas:											
Fort Smith											
Little Rock	0		1	12	7	7	0	1	0	0	10
Louisiana:											
New Orleans	31	8	3	15	28	12	0	16	6	1	184
Shreveport	2		0	35	1	0	0	2	0	4	29
Oklahoma:											
Oklahoma City	1		1	0	15	4	0	1	1	2	56
Tulsa	2			8		1	0		0	0	
Texas:											
Dallas	4	10	8	0	15	8	0	6	3	6	72
Fort Worth	2		4		8	4	0	2	0	0	62
Galveston	0		0	0	4	0	0	0	0	0	19
Houston	4		1	2	11	6	0	2	1	0	69
San Antonio	1			2		5	0		0	0	
Montana:											
Billings	2		0	18	0	2	0	0	0	0	10
Great Falls	0		0		0	0	0	0	0	1	12
Helena	0		0	76	1	0	0	0	0	0	7
Missoula	0		0		1	3	0	0	0	10	4

City reports for week ended Feb. 16, 1935—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	hs all causes
		Cases	Deaths								
Idaho:											
Boise	0	------	0	0	1	1	0	0	0	0	9
Colorado:											
Denver	5	41	2	367	6	167	1	6	0	2	95
Pueblo	1	------	0	29	2	1	0	0	0	1	10
New Mexico:											
Albuquerque	2	------	0	2	5	0	0	3	0	2	17
Utah:											
Salt Lake City	0	------	0	4	4	60	0	1	0	23	32
Nevada:											
Reno	0	------	0	0	0	3	0	0	0	0	6
Washington:											
Seattle	------	------	------	------	------	------	------	------	------	------	------
Spokane	0	1	1	84	5	4	1	0	1	0	40
Tacoma	0	------	0	2	2	0	13	0	0	0	27
Oregon:											
Portland	0	3	0	25	7	13	0	2	0	0	81
Salem	0	8	------	0	------	2	0	------	0	0	------
California:											
Los Angeles	20	119	4	16	12	65	8	13	1	8	313
Sacramento	6	------	2	27	2	4	0	3	0	0	35
San Francisco	4	12	1	1	15	11	0	13	1	5	188

State and city	Meningococcus meningitis		Poliomyelitis cases	State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				Nebraska:			
Worcester	0	1	0	Omaha	0	1	0
New York:				Kansas:			
New York	1	0	0	Wichita	2	2	0
Syracuse	1	0	0	Maryland:			
New Jersey:				Baltimore	3	2	0
Camden	0	0	1	District of Columbia:			
Pennsylvania:				Washington	0	0	1
Philadelphia	2	0	0	Florida:			
Pittsburgh	0	1	0	Tampa	2	2	0
Ohio:				Tennessee:	1	1	0
Cincinnati	9	4	0	Memphis			
Columbus	0	1	0	Nashville	0	1	0
Indiana:				Alabama:			
Indianapolis	1	1	0	Birmingham	1	1	0
Illinois:				Arkansas:			
Chicago	6	2	0	Little Rock	2	0	0
Springfield	1	1	0	Oklahoma:			
Wisconsin:				Oklahoma City	1	0	0
Milwaukee	2	1	0	Texas:	1	3	0
Minnesota:				Dallas			
Minneapolis	1	0	0	Fort Worth	1	0	0
St. Paul	0	0	1	Colorado:			
Iowa:				Denver	1	0	0
Sioux City	2	0	0	New Mexico:			
Missouri:				Albuquerque	0	0	2
Kansas City	0	2	0	California:			
St. Joseph	1	0	0	Los Angeles			
St. Louis	4	0	0				

Epidemic encephalitis.—Cases: New York, 1; Toledo, 1; Chicago, 1; Kansas City, Mo., 1.
Pellagra.—Cases: Los Angeles, 1.
Rabies in man.—Memphis, 1 case and 1 death.
Typhus fever.—Cases: New York, 2; Charleston, S. C., 2; Savannah, 2; Houston, 1; San Antonio, 1.

FOREIGN AND INSULAR

CEYLON

Malaria.—The following telegram regarding malaria on the island of Ceylon, dated January 7, 1935, from the Governor of Ceylon to the Secretary of State for Colonies, at London, has been transmitted to the Public Health Service:

The northwest Province continues to be seriously affected, but the number of cases has decreased appreciably during the last 2 weeks.

In the district of Kegalla the situation is improving slightly and assistance is well organized. Malaria is now rather wide-spread in the district of Ratnapura, but the epidemic is not serious.

The number of cases remains high at Kelani, and in the valley of Maha Oya, and in a zone between two rivers, but is not increasing at the present time. The other sections of the eastern Province are affected, but not seriously.

The central Province is not greatly affected except in some regions bordering the northwest Province and the district of Kegalla, and the situation is improving.

There is very little risk for travelers remaining in the large cities and the usual tourist centers, and malaria is not observed at altitudes above 2,400 feet.

In general, the disease is not of virulent form, and the mortality is low. The deaths which occur are usually caused by cerebral malaria, convulsions in children, and weakness in persons suffering from dysentery.

CZECHOSLOVAKIA

Communicable diseases—December 1934.—During the month of December 1934 certain communicable diseases were reported in Czechoslovakia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	3	1	Malaria	10	----
Cerebrospinal meningitis	4	----	Paratyphoid fever	15	----
Chicken pox	645	----	Puerperal fever	40	22
Diphtheria	5,369	351	Scarlet fever	2,780	30
Dysentery	27	3	Trachoma	68	----
Influenza	49	7	Typhoid fever	531	46
Lethargic encephalitis	4	3	Typhus fever	8	----

JAMAICA

Communicable diseases—4 weeks ended December 29, 1934.—During the 4 weeks ended December 29, 1934, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chicken pox		13	Poliomyelitis		2
Dysentery	8	11	Puerperal fever		1
Erysipelas		3	Tuberculosis	41	103
Leprosy		1	Typhoid fever	18	82

JAPAN

Kawasaki—Dysentery.—A report dated January 24, 1935, states that an outbreak of epidemic dysentery was reported on January 7, 1935, in the city of Kawasaki, near Yokohama, Japan. The number of new cases increased to 887 by January 12. Elementary schools and public nurseries were closed on January 11 for a period of 7 days and other preventive measures taken. The number of new cases gradually decreased by January 15. The total number of deaths resulting was estimated at 383.

YUGOSLAVIA

Communicable diseases—January 1935.—During the month of January 1935, certain communicable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	18	3	Paratyphoid fever	11	1
Cerebrospinal meningitis	8	3	Scarlet fever	354	38
Diphtheria and croup	916	130	Sepsis	14	8
Dysentery	22	3	Tetanus	12	5
Erysipelas	182	10	Typhoid fever	469	89
Measles	1,233	80	Typhus fever	55	6

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 Feb. 22, 1935, pp. 267-279. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued Mar. 29, 1935, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

Ceylon—Peliyagoda.—During the week ended February 16, 1935, 10 cases of cholera with 6 deaths were reported at Peliyagoda, near Colombo, Ceylon.

Plague

Ecuador.—A report dated February 19, 1935, states that bubonic plague has been reported in Ecuador, as follows: 16 cases at Celica, Loja Province, and 14 cases near Pungala and Tixan, Chimborazo Province, Ecuador.

Siam—Nagara Rajsima.—During the week ended February 16, 1935, 1 case of plague with 1 death was reported at Nagara Rajsima, Siam.