

The system of handling milk at the dairy appeared to me to be excellent. The only human contact with the milk is at the point where the receiver smells (not tastes) it for acidity and pours it into a pipe connecting with the mixing tank which is in an enclosed room. The bacterial results obtained by Professor Prescott for the month of May were placed at my disposal and indicate exceptionally good conditions from the standpoint of cleanliness. The mixed milk showed once 300,000 bacteria and once 200,000 with all the rest below the latter figure. Two thirds of the farm samples examined were below 50,000 and half below 10,000.

I am at a loss to suggest any other precautions that could have been taken to guard against infection with human germs of disease that were not taken in this instance. Excellent regulations were drawn up for the exclusion of contagion, the farms and cattle were carefully inspected, the dairy was admirably arranged and the whole process controlled by laboratory examinations under the direction of a bacteriologist and sanitarian of the highest standing. If, in spite of such precautions, the Deerfoot milk became infected, any raw milk supply may at any time become infected; and this I believe to be the lesson not only of this outbreak, but of many that have preceded it in all parts of the world. It is practically impossible to exclude mild and unrecognized cases of disease from contact with the process of milk production. The larger a supply, the greater, of course, is the danger, but even a small supply must meet it at some time. Then a cough over the pail, a finger inside the can as it is lifted, and the danger is imminent.

There is in my judgment but one certain safeguard against such outbreaks, — proper pasteurization; but two things must be understood in recommending pasteurization as a general practice. Pasteurization has been too often used in the past by unscrupulous dealers to cover up milk so dirty as to be unsaleable without it. Regulations as to sanitary inspection and bacterial counts are just as imperative for milk to be pasteurized as if it were to be sold raw, and the standards should be set just as high as economic conditions permit. In the second place, many processes of pasteurization do not pasteurize. No process should be accepted unless the milk is held at a temperature of at least 145° F. for twenty minutes. The systems of "flash" pasteurization are often worse than useless. Finally, the milk must be properly protected from secondary contamination after pasteurization. The treated milk should either be conducted in closed pipes to an automatic bottling machine; or, best of all, the pasteurization should be conducted in the final package ready for delivery.

#### X. SIMILAR OUTBREAKS OF MILK-BORNE SORE THROAT IN OTHER COUNTRIES.

So far as I am aware, no milk epidemic of tonsillitis or similar throat disease has been hitherto reported in this country. In Great Britain, however, the phenomenon has been a

common one. Swithinbank and Newman (1903) even go so far as to say "it is safe to assume that a year never goes by in which there are not outbreaks of sore throat or tonsillitis due to milk or cream." In some instances the throat disease has resembled an atypical scarlet fever and has often been associated with definite scarlet fever cases. In other instances, 12 of which are reviewed in my full report, tonsillar and peritonsillar infection followed by septic invasion have been the chief symptoms. In many of them the character of the disease, called by the English sanitarians "septic sore throat," was exactly as noted in Boston. The appearance of the throat, the relapses, the cervical glands and the occurrence of rheumatism, erysipelas and septic complications are all described. Septic sore throat is evidently by no means rare as a milk-borne infection in England, and sanitarians in this country must now add this to the list of dangers that surround a raw milk supply.

#### CLINICAL ASPECTS OF THE EPIDEMIC OF SEPTIC SORE THROAT IN CAMBRIDGE, MAY, 1911.

BY EUGENE A. DARLING, M.D., CAMBRIDGE, MASS.

DURING the month of May, 1911, there appeared in Cambridge a widespread epidemic of septic sore throat which was remarkable for its severity and for the variety and gravity of its complications. Its consequences were so serious and its cause was the occasion of so much controversy that it has seemed worth while to collect some of the clinical facts relating to it. With this object in view, a circular letter was prepared and sent to all the physicians in Cambridge asking them for reports of the cases seen by them. Replies were received from 54. Of this number 19, mostly living in East Cambridge or Cambridgeport, reported that they had seen no cases. Thirty reported with more or less detail a total of 555 cases. Five other physicians stated that they had treated a total of about 175 cases but had kept no record of them. In addition to these 730 known cases, there must have been a considerable number occurring in the practice of those physicians who did not answer the circular letter. There must also have been a number of Cambridge cases attended by physicians from Boston and other surrounding towns. Moreover, there were in all probability a large number of mild cases who did not consult a physician. Estimating the cases in these three groups as 300, we have a total of more than 1,000 cases in Cambridge alone. As most of the cases were in Old Cambridge and North Cambridge, the least populous of the four sections of the city, this would mean a high rate of morbidity. This report is based on the 555 cases of which fairly complete records were obtained.

#### DURATION OF EPIDEMIC.

Occasional cases of severe throat trouble began to appear during the first part of May, but the

real epidemic started on May 10, and by far the largest number of cases were first seen by physicians during the following week. The distribution by days of 540 cases in which the date of the physician's first visit was recorded was as follows:

Before May	9,	27
"	10,	18
"	11,	47
"	12,	73
"	13,	74
"	14,	80
"	15,	61
"	16,	40
"	17-23,	88
After	23,	32

Practically all of the patients who were first seen by physicians after May 16 dated the beginning of their illness in the week of May 10 to 16. In many cases the early symptoms were mild and the physician was summoned for a relapse or for some complication or sequel. It seems probable, therefore, that the spread of the infection, whatever its source, took place in the first two weeks of May and that it ceased suddenly at the end of that period.

#### ENVIRONMENT OF CASES.

Nearly all of the cases occurred in well-to-do families living in the best residential parts of the city and in the most favorable hygienic surroundings. The affected families differed in no essential respect from their neighbors in environmental conditions, such as dust, water-supply, etc. The simultaneous appearance of several cases in the same household, which occurred in many instances, precluded direct contagion and pointed to some common infecting agent. The fact, which was early noted, that the vast majority of the cases occurred in families using a certain milk supply suggested the probability that this milk was in some way the carrier of the infection. However, it is not my purpose to discuss this aspect of the epidemic, so I shall confine my remarks to its clinical features.

#### BACTERIOLOGY.

Many cultures were taken from throats and from secondary foci of infection. The organisms usually found were streptococci, often associated with staphylococci or pneumococci.

#### SEX.

Among 527 patients whose sex was recorded, there were 160 males and 367 females — males, 30%; females, 70%. This would indicate a greater susceptibility on the part of females, but may be accounted for in other ways, such as differences in the use of milk as food. There were many cases among domestic servants, nearly all of whom were females, and this fact might affect the totals. There was no apparent difference in the severity of the disease in the two sexes.

#### AGE.

The age of 465 patients was as follows:

Under 10 years,	54
11-20 "	55
21-40 "	207
41-60 "	107
Over 60 "	42
	<hr/> 465

The cases occurring in children were as a rule mild in character and the complications were comparatively rare and unimportant. The most serious cases occurred in persons above the age of forty. As might be expected, elderly patients, particularly those already debilitated by chronic disease of the heart, kidneys or blood vessels, were affected most profoundly and the mortality was largely, though not wholly, in this class.

#### PERIOD OF INCUBATION.

This was apparently short, not more than thirty-six to seventy-two hours. In one case a maid came to a new place from another town, arriving on the evening of May 10. Her first meal at this place was breakfast the following morning, May 11. She was taken ill simultaneously with two other persons in the same household on the evening of May 13. Assuming that all three received their infection at the same time, it could not have been earlier than the morning of May 11, and the incubation period was, therefore, not more than sixty hours. Another patient, Mrs. X., was taken ill May 13 and was the only case in her household. She did not take the suspected milk herself, but had spent the night of May 11 and eaten breakfast on the 12th with Mrs. Y., who did take the milk. Both Mrs. X. and Mrs. Y. were taken sick at the same time on May 13. Assuming that they received their infection at the same time, i. e., at breakfast on the 12th, the period of incubation was about thirty-six hours. There were several other cases confirming these inferences.

#### CLINICAL HISTORY.

The onset was in most cases sudden, with sore throat, painful deglutition, moderate fever, often preceded by chills, headache and prostration. The tonsils and pharynx, in cases of moderate severity, were red and swollen at first and usually on the second day follicular patches appeared on the tonsils. Nausea and vomiting, with foul breath and repugnance to food, were common early symptoms. In children, gastro-intestinal symptoms were often more pronounced than the throat symptoms. Mild cases began to show improvement in two or three days and were convalescent in a week.

In cases of a more severe type, the throat symptoms were more intense. The follicular spots coalesced and formed large grayish patches of pseudo-membrane, which strongly resembled that of diphtheria, so much so that in many cases anti-toxin was administered as a precautionary measure before the culture reports were received. The

uvula, soft palate and base of the tongue became edematous, and the swelling and pain made swallowing difficult or impossible. These cases showed marked constitutional disturbances, high temperature, 104° F. or thereabouts, rapid pulse, severe headache, pains in the back and extremities and great prostration. Insomnia and mild delirium were not uncommon.

Practically all except the mildest cases had more or less involvement of the cervical lymph nodes, sometimes on one side only, but usually on both sides. These nodes became enlarged and intensely painful, forming in many cases large tumors. Sometimes a deep phlegmonous inflammation of the tissues of the neck resulted. It was noteworthy that lymphatic involvement was not marked in many cases having secondary infections in remote parts of the body. In these cases the nodes failed to arrest the spread of the infection along the lymph channels.

The duration of severe uncomplicated cases varied widely, but as a rule recovery was slow. There was a marked tendency to relapse and many patients suffered for weeks from impaired appetite and digestion, excessive sweating, dyspnea on exertion, loss of weight and other symptoms of general debility.

#### COMPLICATIONS AND SEQUELÆ.

About one quarter of all the cases reported had complications of one kind or another. It would be impossible in a short paper to give a detailed account of so many cases, so I shall merely summarize them, with brief reference to a few of the more unusual ones.

#### ABSCESS FORMATION.

The most frequent complication was abscess formation in or near the throat. Twenty-four patients developed peritonsillar or pharyngeal suppuration, and in twenty-four cases the cervical lymph nodes suppurred. This latter event was not so common as might have been expected. In many cases the nodes remained hard and swollen for several weeks, appearing to be on the verge of breaking down and then gradually subsided without suppurating. Some of these were operated upon and no pus found. There were four cases of otitis media and one of mastoid abscess. Besides these local abscesses there were a few cases of abscess in other parts of the body: the axilla, the supra-sternal region, the lumbar and gluteal regions and the legs. In all 62 cases, or about 12%, had abscess formation.

#### INFLAMMATION OF THE SEROUS MEMBRANES.

The next commonest complications were those involving the serous membranes. There were 38 cases of acute arthritis, varying in severity from a mild and transitory inflammation of a few joints, usually the knees and ankles, to a general inflammatory rheumatism affecting all the joints in succession and causing the most intense suffering. There were no instances of joint suppuration. Many of these severe joint cases developed endocarditis or pneumonia; in

other words, they were really cases of general septicemia.

There were eight cases of peritonitis, all fatal. In four of them laparotomy was done and all showed the same condition, namely, free pus in the peritoneal cavity with extensive deposits of inflammatory lymph, but no local cause. They were typically cases of "idiopathic peritonitis," the occurrence of which has at times been questioned. It is a noteworthy fact that all the deaths reported in persons under twenty were due to this complication. There were five other cases showing abdominal symptoms suggesting peritonitis, but these recovered and a positive diagnosis was not made.

Pleurisy was observed in eight cases. Three of these were pleurisy with effusion, and three were empyemata. Two of the latter also had peritonitis. There were two cases of pericarditis, both in patients with general arthritis, and one fatal case of meningitis.

#### RESPIRATORY SYSTEM.

*Pneumonia.*—This complication was seen in eleven cases, of whom eight died. Several of these were of the acute fulminating type, with high fever, delirium, rapidly spreading consolidation, and death in from two to seven days. Others developed rather late in the course of a general sepsis and the patients succumbed to the toxemia without very marked local symptoms. The cases which recovered had long and tedious periods of convalescence. In one case which came under my own observation the area of consolidation persisted for six weeks, giving rise to apprehension as to a possible tuberculous process.

Laryngitis of a severe type was noted in five cases, all older than seventy. None died, though all had alarming symptoms of stenosis.

#### DIGESTIVE SYSTEM.

Beyond the functional disturbances noted in the early stages, complications involving the digestive tract were not numerous. There was one fatal case of hemorrhage from the stomach, suggesting an acute ulceration. There were two fatal cases of entero-colitis, one occurring in a woman of fifty-five who was already suffering from a chronic colitis, the other in a woman of seventy-two with a weak, dilated heart.

#### CIRCULATORY SYSTEM.

Acute endocarditis was reported in seven cases and myocarditis in one. These were without exception cases with other signs of a general septicemia. Phlebitis was noted in two cases, one of whom died suddenly of pulmonary embolism. One case of thrombosis of the popliteal artery came as a sequel to pneumonia in a woman of eighty-two. Gangrene of the leg resulted and the leg was amputated. The patient survived the operation but died later of exhaustion after an illness of sixteen weeks.

## URINARY SYSTEM.

There were six cases of acute nephritis, one fatal. The latter was an acute exacerbation of a chronic nephritis in a man of sixty-five.

## SKIN.

Five patients showed erythema of the skin not unlike a scarlet fever eruption, and six developed erysipelas of a severe type. One case of the latter in a woman of fifty-seven was followed by an extensive abscess which undermined nearly the whole scalp and resulted in complete alopecia.

## NERVOUS SYSTEM.

The usual nervous phenomena of headache, delirium and mental excitement common in all severe infections were marked in many cases.

One woman of fifty-five had a period of intense mental excitement followed by manic depression, from which she has not recovered. One case showed a temporary hemiplegia. There were several cases of neuritis in the extremities.

In general, the complications were metastatic processes occurring in practically all parts of the body. There was a remarkable tendency to a general septic condition, and the complications in individual organs were apt to be determined by pre-existing disease. There were many patients who had a succession of complications. One of the commonest sequences was as follows: First, the sore throat, then the cervical adenitis, then arthritis involving many joints in turn, then endocarditis or pericarditis and finally pneumonia.

## MORTALITY.

There were twenty-seven deaths, distributed by age and sex as follows:

	Male.	Female.	
Under 10 years,	1	1	
11-20 "	0	1	
21-40 "	1	0	
41-60 "	1	9	$\frac{10}{100} = 9.4\%$ of cases at this age.]
Over 60 "	3	10	$\frac{13}{42} = 31\%$ of cases at this age.]
Total,	6	21	

The causes of death were as follows:

Pneumonia,	7
Peritonitis,	6
Peritonitis and empyema,	2
General septicemia,	4
Enterocolitis,	2
Acute nephritis,	1
Meningitis,	1
Rheumatic fever,	1
Pulmonary embolism,	1
Hemorrhage from stomach,	1
Exhaustion, following operation,	1
	27

## SUMMARY.

In conclusion, we may summarize the unusual features of this epidemic as follows:

1. The extraordinary virulence of the infecting agent, as shown by the severity of the initial sore throat, by the tendency to relapse and by the number and variety of the complications observed.
2. The comparative immunity of children.
3. The high mortality among the aged and infirm.

## AN EPIDEMIC OF TONSILLITIS DUE TO INFECTED MILK.

BY MARK W. RICHARDSON, M.D.,

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ON Sunday, May 14, 1911, I received in the evening a telephone message from Dr. E. A. Darling, of Cambridge, stating that tonsillitis was unusually prevalent in the city of Cambridge and that it seemed to have an intimate relation to the Deerfoot milk supply. The matter was referred immediately for investigation to Dr. W. W. Walcott, state inspector of health for District No. 10 in which Southboro, the home of Deerfoot milk, is situated, and also to Dr. Frank L. Morse, of Somerville, state inspector of health for District No. 5, in which district lies the city of Cambridge.

The preliminary reports concerning the situation began to come in to the office of the State Board of Health within a few days and were very conflicting. Dr. Walcott stated that in his district no relation to the Deerfoot Farm milk could be made out, whereas in Dr. Morse's district such a relation was apparently very marked. For instance, in the city of Marlboro an investigation of 57 cases of tonsillitis taken at random showed that Deerfoot milk constituted about 50% of the city's supply and was used either alone or combined with other milk supplies in 47% of the cases, and that the other nine milk dealers were implicated in proportions that would naturally be expected from the amount of milk supplied by them. In Cambridge, on the other hand, of a total of 223 cases, it was found that, with but 5 exceptions, all of them had obtained milk from the Deerfoot Farm supply. The greater number of cases appeared to occur on the 13th, 14th and 15th of the month, after which time there was a steady diminution. At an early stage of the investigation it was rumored, moreover, that tonsillitis was epidemic in other cities of the commonwealth and also in more distant cities, such as New York, New Haven and Washington. In fact, it was thought that in connection with the cases of tonsillitis in Southboro a source of infection had been found in a party of tourists who, some two weeks previously, had visited Washington, where the disease was said to be prevalent. Letters of inquiry, however, sent to all the state inspectors of health in Massachusetts, and also to the above-mentioned cities and other states, soon showed that the rumors as to prevalence of tonsillitis in those cities were unfounded. The necessity for seeking the source of this epidemic near home became more and more apparent.

Fortunately, the town of Brookline planned almost immediately a house-to-house investigation of the disease, but the preliminary reports from this investigation also discredited quite emphatically the idea that the disease was due to any special milk supply. It was with great interest, however, that the final figures secured by this board were awaited. Through the kindness of Dr. Frederick H. Osgood, milk inspector of the Brookline Board of Health, I was enabled some