

AN OUTBREAK OF DIPHTHERIA TRACEABLE TO ULCERS ON COWS' TEATS.*

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IN the September issue of PUBLIC HEALTH, Dr. Chalmers, of Glasgow, dealt with an outbreak of "septic" sore throat which had coincided with an eruption on cows' teats. Having recently passed through a somewhat similar experience I am able in the present contribution to add interest to a subject that calls for close study and research.

The Leith outbreak differs from that which occurred at Glasgow in that the great majority of the cases notified in Leith were true diphtheria, the Loeffler bacillus having been found by microscopic and bacteriological examination. On that point there is no possible doubt. Also the outbreak was a long drawn out one, the first case having been reported to me at the latter end of June and the last two cases on October 16th. The outbreak was not a serious one from the point of view of numbers, but affecting as it did a residential district it created a great deal of alarm and uneasiness.

When the third case was notified, in each of the three cases the same milk supply being involved, suspicion was aroused. The farm was visited, but I could not detect any suspicion or evidence of sore throat among any of those employed at the farm. Both outbreaks simulated one another in that when the greatest number of cows were affected the largest number of diphtheria cases were notified. Also in Leith, as in Glasgow, the hands of some of the milkers were infected, in one case by small punched-out sores (ruptured pustules of cow-pox no doubt) on the inner aspects of the fingers; in the other with onychia of the small finger of the right hand. I had one of these hands photographed, but the lesions were very imperfectly demonstrated. Lastly, just as occurred in Glasgow, with the stoppage of the milk supply from the affected cows the spread of diphtheria immediately ceased. While then the two outbreaks are in several respects much alike, they differ as to the resulting infection from the teat condition.

I know that many cases of what were looked upon as "septic" throats did occur while diphtheria was being spread by the infected milk. The many swabs submitted to us proved the existence of cases from which the true Loeffler could not be isolated. These cases were very properly looked upon as "septic," though one or two of them

* A minor outbreak of this kind was reported in the *Journal of Hygiene*, April 10, 1902.

showed, clinically at least, that they had been actually instances of diphtheria. I speak of post-diphtheritic paresis.

After the occurrence of the first few cases the succeeding notifications pointed to houses drawing their milk supply from other sources. This detracted attention from the farm already mentioned, but with the renewed cropping up of the farm as a source of possible spread of infection, inquiries elicited the fact that the four other implicated dairies derived their supply in whole or in part from the farm. Not the least peculiar feature, too, was the periodical interruption in the sequence of notifications. A glance at the dates of notifications will make that point more clear. It is very difficult to account for this feature of the spread of infection. Perhaps, however, had all the cases that undoubtedly did occur been notified to me the sequence might not after all have been so broken. Since, however, we are dealing with actual cases that came to my knowledge, I can only refer to them.

Having now satisfied myself that the source of infection was at the farm, a visit was paid to it, and another examination of throats made. Again the results were negative, and in response to my suggestion that some of the cows must be suffering from ulcers or sores on their teats (it was in truth a random guess), the farmer replied that one cow did have a "chapped" (fissured) teat. An examination of this cow revealed not "chaps," but sores that had been recently bled as a result of milking operations. That afternoon the Veterinary Inspector visited the cowsheds in which there were forty-five cows, and reported to me that five cows were suffering from ulcers on their teats. The existence of drying pustules on some of the udders convinced the Veterinary Inspector that the condition was one of cow-pox.

Having ascertained these facts, I wrote to the farmer, asking him to isolate the affected cows, to boil their milk before selling it, and lastly to delegate one person to milk these animals and no others. A week passed and much to my disappointment cases of diphtheria and "septic sore throat" were still notified or reported. A second visit to the farm revealed the extraordinary fact that not a single one of my recommendations had been put into force. The farmer had never heard of cow-pox producing diphtheria, and my instructions went unheeded. A detailed examination showed that there were now 15 cows suffering from ulcerated teats, some in a worse condition than others. A dairymaid was laid aside owing to the outbreak of pustules on her hands, and the son's fingers were swathed in bandages. Again, and this time accompanied by threats, the farmer was instructed to do what he was told. But to make certain that he would obey me, I sent out three inspectors, one at each milking, to watch the operations.

The farmer had promised to boil or pasteurise the milk from the diseased cows. The unexpected presence of an inspector at 4 a.m. proved that had the watch not been established the milk would have been sold as usual. There were no preparations made for boiling or pasteurising. Faced with an awkward development of his obstinacy the farmer preferred to pour the milk down the drains. Incredible as it may appear, when I visited the farm on the day following the son was still milking the cows.



Having now exhausted the powers of persuasion and diplomacy, I determined upon extreme measures. The facts were reported to the Local Authority, and I was empowered to insist upon and see to the carrying out by the farmer of any precautions that I might see fit to suggest. Confronted with this mandate the farmer gave way. It was about this time that most of the cases of diphtheria were notified, the cows suffering from ulcerated teats numbering nineteen. When on the 16th October two more cases occurred, I feared one of two things: First, that some of the cows had been returned to the healthy

stock too soon, or, that the vigilance of my inspectors had slackened. There may have been a combination of these circumstances, but it is significant that an examination revealed the presence of another cow among the healthy stock with ulcers on her teats. With her isolation there was no more trouble from the farm. The number of cows now suffering from sore teats had been reduced to five, and having come to recognize the error of his ways, his financial loss having been very heavy, the farmer agreed to sell these five cows to the butcher. Thus ended the "fearful epidemic" which had disturbed the citizens of the aristocratic district mainly involved.

BACTERIOLOGY.—Over and over again swabs were taken from the ulcers on the teats, but never once was the Loeffler bacillus found. On every occasion streptococci and staphylococci were discovered. Now and again an organism possessing the microscopical and cultural characteristics of the Klebs-Loeffler was detected. This organism was also found in swabs taken from the throats of several of our patients. In the Glasgow outbreak it is remarked by Dr. Chalmers that an organism was recovered which, to use his own words, "had some of the morphological and cultural characters of the diphtheria bacillus. It lacked, however, the feature of pathogenicity, *i.e.* it was not fatal to animals." At first blush this might appear to be conclusive proof regarding the want of connection between the teat eruption and the diphtheria at Leith. One must, however, temper that statement with one made by such eminent authorities as Muir and Ritchie who say: "A positive result on inoculating a guinea pig (say with 1 c.c. of a 24 hours' broth culture) will be conclusive, but we consider that for all practical purposes an organism having all the microscopical and cultural characters of the diphtheria bacillus, may be accepted as such. *Even if it is non-virulent it is probably only an attenuated diphtheria bacillus.*" One might spend much time in speculating as to how an attenuated form of the bacillus reached the ulcers. Many conjectures could be advanced. But if be the case, as has been proved, that attenuated and true forms of the Loeffler bacillus exist in the throats of healthy persons, the infection of the cows' ulcers may be thus accounted for.

Concluding Remarks.—All through this past summer milch cows in large numbers have been coming from the North of England, and a great many of these cows have been affected by cow-pox. The dairyman in this part of the country does not look upon cow-pox as a serious malady; indeed, he continues to sell the milk from the affected cows. His only trouble in the past has been that he lost the services of several of his employees as the result of the infection of their hands by the cow-pox. This is in itself a hint full of suggestion to the Health

Official and one that must be kept in mind. It was because the farmer never had heard that cow-pox could produce diphtheria that he placed so many obstacles in my way.

The very fact that danger lies in the existence of ulcers on cows' teats proves the necessity for periodical and methodical inspection of milch cows. The onus of notifying such a condition ought to be placed upon the shoulders of the dairyman who has cows with ulcerated teats in his keeping.

The Leith outbreak has been of great value to me since the Local Authority has passed a unanimous resolution to the effect that grooming of cows, washing of teats and udders, and washing of hands will in future be enforced. Also that the salary of the Veterinary Inspector be increased so as to enable him to report monthly to me regarding the condition of the cows in the Burgh. There are no fewer than 1760 milch cows in Leith alone. The dairymen some time ago formed themselves into a strong association to resist my fault-findings; fortunately they have been very unsuccessful in their baulking efforts. This resolution of the Local Authority has staggered them. It takes a great deal to stagger an East of Scotland dairy keeper.

Dates on which cases of Diphtheria due to infected milk supply were notified.—1904: June 24th and 27th; July 11th and 18th; Aug. 1st, 5th, 9th, 19th and 23rd; Sept. 10th, 13th, 14th, 16th, 20th, 24th, 26th and 27th; Oct. 16th.

THE FACTORY AND WORKSHOP ACT.—An order of the Secretary of State, dated November 15th, directs that the special exception by which the period of employment of women may on certain days and subject to certain conditions be between 6 a.m. and 8 p.m., or between 7 a.m. and 9 p.m., or between 8 a.m. and 10 p.m. shall be extended to the non-textile factories and workshops in which the making-up of any article of table linen, bed linen, or other household linen is carried on; provided that (1) There shall be in each room in which overtime is being worked at least 400 cubic feet of space for each person employed therein; (2) A woman shall not be employed overtime on any other process other than a process named in this order. The order came into force on December 1st.

As much of the work in workshops and factories is in the hands of women, it is most important that the sanitary surroundings should receive special consideration. The health and well-being of the next generation is immediately dependent on the good physique of the present race of young women and girls, and this requires that they should work in healthy surroundings and be fed on nutritious food. You cannot expect grapes from thorns nor figs from thistles, and a strong, vigorous race of men and women cannot be reared from women whose life is spent in a close, vitiated atmosphere, and whose staple articles of diet are strong tea, bread and butter, potatoes, and sweet stuff.—J. Hedley Marsh, *Annual Report*, Macclesfield.