ON SOME RECENT CASES OF DISEASED MILK.

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I HAVE recently had some samples of diseased milk brought to me officially by the inspectors of one of my districts, and they present such features of interest, not only chemically and microscopically, but in view of the fact that for the third time the magistrate has convicted where diseased milk has been sold, that for the general information of others I give the characteristics of the milk in question.

The immediate cause which led to their being brought to me was that an outbreak of fever had occurred almost simultaneously through a considerable portion of Lee, Kidbrook, and Blackheath, and consequently, as the outbreak was supposed to be due to the milk, I directed the inspectors to bring me samples from every milkman supplying those districts. The first of the diseased samples was received by me on the 19th March; its colour had a decided tinge of blood, which was visible even through the tinted glass of the common medicine bottle in which it was contained. The portion I poured into the cream tube had a blood or orange wine tint, and the cream which rose in the tube showed this peculiar colour still more markedly. As soon as the inspector brought the sample I called his attention to its peculiar tint, but he had received no information from the vendor which threw any light on the matter.

I commenced the microscopical examination almost immediately, and found that the

sample showed a very large number of pus corpuscles very different in their appearance from the true fat corpuscles of milk, and the addition of a minute drop of ether to the milk on the slide brought up the tristellate nucleus very distinctly in many of them. In some parts of the slide there was a distinct reddish colouration, which, however, was not uniformly spread over the whole field. Nearly every field contained a considerable number of pieces of epithelial matter and other animal debris, mostly tinged at the edges with a blood colour. The micro-spectroscope showed blood bands plainly when any of these blood tinged pieces of epithelial matter were in focus, but when the field was shut down by a diaphragm so as not to include any of the streaked pieces it was not possible to detect the blood bands. Blood discs could be seen in some few places, sometimes singly but mostly arranged in groups like clotted blood. In other parts of the slides, but irregularly distributed, were a considerable number of the peculiar bodies described by Mr. Wynter Blyth, in *The proceedings of the Society of Public Analysts*,* as being found in milk yielded by cows suffering from foot and mouth disease; some of these bodies were scimitar shaped, and others more closely resembled the appearance which would be produced by the coalescence of five or six fat globules in an almost straight line, the division between the globules being almost entirely obliterated.

On the second day the physical characteristics of the milk as distinguished from the microscopical were still more indicative of peculiarity. The residue of the sample remaining in the bottle had not curdled in the ordinary way in which milk curdles when it turns sour, but had partially solidified much in the same way as ordinary colostrum milk solidifies when it is boiled—viz., to a consistency closely resembling that of ordinary blancmange in hot weather. This blancmange adhered with some little force to the sides of the bottle, and when the latter was shaken so as to detach the blancmange the glass was left quite clean, while the milk itself moved about in the bottle, still retaining its semi-fluid condition. The cream had, of course, to some extent risen to the top of the bottle, and was of an orange colour, while the colour of the lower part of the milk was very little changed. In the cream tube the top surface of the cream had by this time (i.e., after 24 hours) assumed an unusual appearance, being mottled in colour and corrugated, resembling more closely the crust of a Stilton cheese than any other common object with which I can compare it. The microscope still showed many of Blyth's bodies although not so many as on the previous day; many colourless blood corpuscles were visible, and by using a $\frac{1}{4}$ -inch objective and B eyepiece it was easy to count a considerable number of coloured ones. The pieces of skin, which were stained with blood, were as visible as before, and the colour did not appear to have altered in intensity. When a small portion of the cream alone was taken out on the point of a stirring rod it was found that the abnormal characteristics of the milk were exaggerated in the cream—i.e., there was a larger proportion of the foreign bodies than was present in the whole milk sample, evidently showing that there was a tendency in the cream on rising to entangle with it the pus and blood corpuscles.

On the third day there was a still further change in the appearance of the cream tube, for the top of the cream was covered with a peculiar and (to me) unknown fungus, although the tube had been standing side by side with seven other samples of the same date, none of which presented that appearance. The lower part of the milk in the tube was breaking up in a manner which as far as I can judge at present is perfectly characteristic

* See Vol. 1, page 239.

of diseased milk. Instead of curdling to an irregular mass, or instead of the separation of the whey taking place up to a certain level in the tube, the whey had separated in peculiar streaks, running in a vertical or almost vertical direction up and down the tube, these streaks being from $\frac{1}{8}$ to $\frac{1}{4}$ inch wide, and in some cases as much as 3 inches long. The whey viewed in these streaks against the background of curd in the tube had a tint resembling Irish whisky. On this day I examined 10 or 12 slides but I could not succeed in detecting more than 3 or 4 of Blyth's bodies. Here then we have a tolerably convincing proof that whatever these bodies may be they disappear either by becoming transparent or by breaking up as the milk decomposes. Some of the pus and blood corpuscles were still visible, but the number of the former was decidedly less, and some of them seemed to be bursting or else gradually becoming so transparent as to be invisible.

On the sixth day the sample was so much decomposed that if I had then examined it for the first time, although I should certainly have said that it presented some abnormal characteristics, I should have been unable to identify them in the way I have already described. In other words, for practical work the examination on this day would have been useless.

Having obtained such results as these I had no hesitation, notwithstanding that the chemical results were perfectly consistent with genuine milk, in certifying that the sample came wholly or in part from a diseased cow, and was therefore unfit for human food. I did not state that it was much more likely to be an admixture of the milk of a diseased cow with the milk of healthy cows, but still from the streaky condition of the milk and by the slides which I examined, I am inclined to that opinion.

The above results being so unsatisfactory I directed the Inspector on the 20th March—*i.e.*, one day after receiving the first sample—to procure another sample from the same vendor. I examined this sample in precisely the same way and with the same precautions, but the difference between the microscopical appearance of the two samples was very slight, the second one contained rather fewer pus and blood corpuscles, and I think there were also fewer of Blyth's bodies present, but in other respects the general characteristics of the samples were as nearly as possible the same. The milk in the cream tube had a little higher colour, perhaps more correctly described as a brighter colour. The chemical results of the second sample were slightly better, showing solids not fat 9.7 instead of 9.3.

Mr. Heisch examined both samples at my request within a very short time of their reception by me, in fact the second sample he examined as soon as I did, and his results fully confirmed my own.

Here, therefore, we have a clear case of diseased milk sold for ordinary consumption. The question now comes what was the character of the disease, and the evidence which was given on the hearing of the case threw some light on this, although unfortunately it did not fully identify the source from which the milk came; that is, although it was proved that it came from a dairy one cow in which was diseased, it was not proved whether the actual churn from which the sample was taken contained any of this diseased cow's milk. I, however, think the inference is clear that it did, and for these reasons—My first sample was purchased by the inspector on the morning of the 19th March; on the evening of the 20th, finding that the milk was abnormal, I wrote to the inspector for a second sample. On the same day—the 20th—one of the defendant's cows

presented signs of illness, and his attention was drawn to it. On the 21st the Inspector received my letter requesting a second sample, but he had not time to procure it that day. On that day (the 21st) the defendant came to the conclusion that the cow was suffering from lung disease, and sent for a veterinary surgeon. On the morning of the 22nd, according to the evidence, the cow had very nearly "gone off" milk. The Inspector bought another sample that day which was characterised by the defendant's wife as being streaky, and after the bottle was filled the defendant's wife said it "must have had blood in it"; consequently the Inspector emptied the bottle and took another sample from the same churn. Later on the same day (the 22nd) the veterinary surgeon came and saw the cow, which he said was suffering from pleuro-pneumonia, and it was consequently killed.

The evidence, therefore, that the milk which I pronounced diseased came from this cow is purely circumstantial, but the chain of circumstances is so complete that I think there is no fair reason to doubt that it was so.

In considering, however, the results I obtained, and my reasons for saying that I thought the sample injurious to health, two or three other points must be borne in mind. My reason for classing it as an injurious sample was that I believe the presence of pus or blood corpuscles, or of any abnormal ingredients of this kind in milk must, to some extent, be liable to produce gastric irritation, and therefore to prove injurious to health; but, on the other hand, it must be pointed out that the outbreak of fever which led to the examinations of these milks was not due to the milk from this particular diseased cow, as the fever had occurred some two or three weeks before the sale of this diseased milk, and I cannot find any evidence to prove, or to lead me to think, that the cow had been ill more than a few days. There were, however, clear proofs that there had been other cases of pleuro-pneumonia in cows in the same district, just about the time when the fever broke out. As there was no *post mortem* examination of the cow, it is not possible to say whether the pleuro-pneumonia was complicated by any disease of the udder or not, but the defendant did not produce any evidence of disease or injury to any other cow, or of injury to the diseased cow.

One of the most important lessons to be derived from this case is the absolute necessity of making a microscopical examination of every sample of milk, and of doing so immediately the sample is received. The case should also serve as a hint to those who still believe that the determinations of the solids not fat and fat are all that is requisite, and that the use of the microscope is unnecessary. In this case, although fever had been spreading through the district in which this milk was being distributed, and although the milk was conclusively proved to have been diseased, yet the samples were of such a character as to satisfactorily pass an ordinary chemical analysis.