MILK POISONING IN MALTA.*

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EVERY year in Malta we hear of whole families being suddenly attacked with severe gastro-intestinal disturbances, so severe, in fact, that occasionally there is a fatal issue. That which is characteristic in these outbreaks is the suddenness of their onset and their occurrence in different points of the island. When a case of this kind occurs in our department we always expect that other reports of a similar nature will follow. The seasons have, apparently, no etiological relation, as we have had attacks in winter as well as in summer, and no variation in the general health of the population has ever been observed.

It was but natural that these outbreaks should be ascribed to local causes. The lay mind, and very frequently the profession as well, have ascribed the symptoms to the effect of poisons, mineral or otherwise. The most superficial observers have always found that milk was constantly an article of food partaken by the persons affected; and it is, therefore, a general opinion that the outbreaks are actually due to unsound milk. I remember, however, a case with absolutely the same symptoms, occurring in a family which had partaken of a meat broth kept for a few hours. If the family attacked has had its food prepared in copper utensils the blame goes certainly to the verdigris presumably left unnoticed in the vessel. When copper is not suspected then the goat is held to be at fault. I mention the goat as the population makes use mostly of goat's milk, sheep's and cow's milk being used only exceptionally. In these cases the goat is generally accused of having eaten a poisonous plant. Euphorbiaceous plants, the spurge family, known in the vernacular as *Tenhout*, are believed by many to render milk poisonous. This opinion has been totally discarded by the profession, as a commission appointed for the purpose fed a number of goats exclusively on this spurge, and drank the milk for many days without any ill effect. The opinion of the profession in general leans to the belief that the milk may acquire poisonous properties when the goat is diseased. As a matter of fact, in a case of this nature which had proved fatal to two young children, the goat which was said to have supplied the milk died next day, and was found to be affected with extensive inflammation of the udders. In all the other cases, however, investigated by the officials of the Public Health Department or by a magistrate the goats concerned have always been declared to be healthy. Against this assumption we have also to note that the poisonous symptoms are not apparent immediately after the ingestion of the milk, but some hours after, and that the severity of the symptoms is by no means proportionate to the quantity of milk taken.

Since the researches of Dr. Klein on the relation of Asiatic cholera and cholera nostras, published in the Twenty-fifth Annual Report of the Local Government Board, and the report of the same distinguished bacteriologist on the morphology and biology of the bacillus enteritidis sporogenes, and on the relation of the same to milk, sewage, and manure, it was natural to assume that these sudden outbreaks of gastro-intestinal disturbances might possibly be connected with the micro-organism described by Klein. In order to investigate this possible relation, I soon had an opportunity. On December 25th, 1899, five families of twelve persons were taken ill at Casal Axiak with persistent vomiting, diarrhoea, cramps, and the other symptoms of cholera nostras. Two young children did not rally from the attack, and died a few hours after the ingestion of the milk. An investigation was conducted by a magistrate, and the *post-mortem* examination, made by two medical experts, showed nothing abnormal in the viscera but a slight congestion in patches of the intestinal tract and congestion of the venous system of the brain. In a *post-mortem* examination at which I assisted a few months ago, on a child dead under similar circumstances, nothing abnormal but congestion of the brain membranes could be detected.

About ten days after the occurrence of the cases at Casal Axiak, a report reached our department that a number of cases of

milk poisoning had occurred in the suburb of Sliema. In half an hour we were on the spot to investigate the conditions under which the outbreak had taken place, and found that seventeen persons residing in five different houses were suffering from the attack. The symptoms were, with varying intensity—severe diarrhoea and vomiting, acute pains in the bowels and stomach, shrunken face, cramps in the extremities and in the abdomen, the pulse weak and irregular, the skin cold and clammy. The attack had followed in all cases three hours after the ingestion of milk bought in the morning. Several persons in one of the families who had carefully boiled the milk before use did not suffer in the least. All the cases eventually got well. The milk was supplied by the milkman from one can, as it was a rainy day. Other families supplied by the same milkman but directly from the goats did not complain of any ill-effect. An inspection of the shed where the milkman kept his goats was immediately made. The forty-one goats forming the herd were carefully examined by a veterinary surgeon (a M.R.C.V.S. Edin.) and declared to be quite healthy. The shed itself was rather clean, and no obvious sanitary defects were detected.

I tried in vain to obtain a sample of the milk supplied and could only obtain a small quantity of the milk which had been carefully boiled. I caused the milk cans to be brought to my laboratory and a sample of water was also taken from the tank in the milkman's farmhouse. The cans had been already washed and dried, but a smell of sour milk was distinct in them all. The can in which the milk in question had been stored was rinsed with a small quantity of sterile distilled water, which was then examined bacteriologically. The sample of water drawn from the tank and the milk obtained were similarly examined. Sterile milk tubes respectively inoculated with ten drops of the three liquids were heated to 80° C. for fifteen minutes and incubated at 37° C. anaerobically in Buchner's cylinders. On the next day in two of the tubes the milk was found changed in the characteristic manner described by Klein, the frothy whey smelling distinctly of butyric acid. The tube inoculated with the boiled milk remained quite unchanged. In the tubes thus changed numerous bacilli were seen under the microscope corresponding in shape to the bacillus of Klein. Two guinea-pigs were injected subcutaneously with the whey, the one weighing 800 grams receiving 4 c.cm. of one of the tubes, and the other weighing 470 grams receiving 2 c.cm. of the other tube. The first guinea-pig was found dead in the morning with an extensive gaseous tumour in the groin and chest due to gangrene which dissolved the muscular tissue. The offensive sanguineous fluid contained the bacillus in pure culture and in enormous numbers. The bacillus stained easily with Gram's method and gave characteristic growths on gelatine, sugar agar, and blood serum agar. The *post-mortem* examination was made a very short time after death and free spores and spore-bearing bacilli were very scanty. The second guinea-pig, which through a faulty injection received a comparatively small quantity of whey, lived for a couple of days and then died with all the pathological alterations observed in the first one. The animal was opened several hours after its death and in all preparations made from the blood and the gangrenous fluid the spore-bearing bacillus was abundantly found along with numberless free spores. The inoculations of media from this guinea-pig were much more vigorous and characteristic.

These results, in my opinion, leave no doubt that the outbreak of gastro-enteric disturbance under examination was due to the contamination of the milk ingested by the bacillus enteritidis sporogenes. The fact that the micro-organism was detected in the washed and dried cans and in the tank water in the farmhouse point to the extreme importance of enforcing the systematic sterilisation of milk cans, and of keeping a constant supervision over the water supply of milkmen.

With regard to the outbreaks themselves the reason why they are not more frequent is obviously due to some general condition or conditions, which, happily, are detrimental to the virulence or the production of the micro-organism, and this is in a way shown by the observed repetition of these outbreaks at short intervals from one another, whilst isolated cases of poisoning are seldom, if ever, known to occur. To go a point further, I wish to point out that this outbreak affords another demonstration, if any be needed, of the golden rule that all milk should be boiled before use. We in Malta do not generally

lay great stress on the importance of boiling goat's milk, in part because we know that tuberculosis is a rare affection with the goat, and in part because we think that by having the goat milked at the door contamination of the milk is not possible. The milk is no doubt quite sterile in the udder, but the state of cleanliness of the skin of the animal and of the hands of the milker, combined with that of the tin measure in which the milk is collected, afford ample opportunity for pathogenic microbes to find their way into this important food.

BERI-BERI.*

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BERI-BERI may perhaps be best described as a disease characterised by difficulties of movement, often associated with atrophic paralysis, especially of the lower limbs, disorders of sensation, oedema of the skin and of the muscles of the lower extremities, and dropsy of the serous cavities.

It is a disease of many types, for while in one patient the evidences of paresis may predominate, in another the symptoms may appear to centre themselves in the respiratory system, and in a third we may have apparently only interfere with the circulatory organs; and it is not to be wondered at, therefore, that the disease has been described by various authors as two or more diseases, the paralytic type being taken as one disease, and the oedematous type as another. Closer researches, have, however, shown that disturbances of the nervous system generally if not always precede the oedema, and that the predominance of one or other of the various symptoms of the disease does not afford sufficient grounds for assuming a different etiology. A very usual concomitant of the disease is anaemia, but it is not by any means an invariable accompaniment.

One of the earliest symptoms is said to be a slight oedema along the crest of the tibia, while later symptoms are a puffy face, difficulty in walking rapidly or in going upstairs, palpitation of the heart on slight exertion, muscular and nervous electrical reactions of degeneration, isolated patches of slight anaesthesia in the calf of the legs, shooting pains in the limbs, and dilatation of the right heart. The muscular atrophy is not infrequently preceded by a spurious hypertrophy due to degeneration of the muscular fibres.

The disease is essentially a chronic one, the so-called acute variety being almost certainly an acute exacerbation of the disease, the initial stages of which have been unnoticed. Such cases usually succumb to acute paralysis of the heart. The most interesting and the most debated point, however, about beri-beri is its etiology. It is said that dirt, overcrowding, and dampness are predisposing causes of the disease, but that it can occur as a localised epidemic without any of these accompaniments is shown in the recent outbreak at the Berlin Foundling House. Manson also states that the disease is more prevalent during the hot than during the cold seasons of the year, but I find that the converse is the case in this colony.

The exciting cause is by Manson said to be a chemical poison generated by a bacterium which resides in the soil or in fomites, but does not gain access to the human body. By Pickeltharing and Winckler it is attributed to bacteria in the blood of the patients; but the researches of these savants do not appear to have been sufficiently verified to warrant us in accepting them at present. It is often said that patients with open wounds may contract the disease from a patient in a neighbouring bed, but otherwise the disease is not directly communicable from man to man.

Owing, perhaps, to the remote similarity in some respects of the symptoms of beri-beri to those of ergotism, there is a very powerful contingent of scientists in favour of a food origin of the disease, and this theory receives strong corroboration from the fact that until recently a very large percentage of the *personnel* of the Japanese navy—as much as 20 to 25 per cent., it is said—suffered from beri-beri, until

an improved dietary and better sanitary conditions abolished the disease. In connection with this theory the recent French publications point out the important part played by fat as an article of diet in connection with the causation of the disease. An extensive epidemic of the disease at Chautabun (Siam) was arrested by the addition of this important article of diet in the rations; while at the French penal settlement of Palo Condor (Cochin China) it was found that the cutting off of fat from the dietary led to an outbreak of beri-beri, and that the epidemic ceased when the fat-containing diet was resumed.

The following is the history of the recent outbreak of beri-beri at the Berlin Foundling House, West Point. It is stated that the Blind Home, a one-storey building, which maintains about 16 children, and is now closed, has had cases of beri-beri among the inmates since July of last year, the first case to occur being said to have been an infant who was admitted suffering from the disease. From the records I find, however, that only one death has occurred at the Blind Home during this period—namely, a female child 4 years old, whose death was registered as due to beri-beri.

The children from the Blind Home attended divine worship at the Berlin Foundling House on Sundays, and a European nurse employed at the latter visited the Blind Home daily, and the authorities of the Foundling House are of the opinion that the infection must have been introduced from the Blind Home in some manner or other. The first two children to be attacked were two who were being (surgically) dressed by the above-mentioned nurse, one for an affection of the eyes, and the other for some skin affection, although I cannot gather that either of them had open wounds. Within two days, however, of these two children showing symptoms of the disease, no fewer than 50 to 60 others were attacked.

Up to December 7th the House contained 102 Chinese children and girls up to 16 or 17 years of age, and on that date 69 school children, all of whom were said to be suffering from beri-beri, were sent to the neighbouring Portuguese colony of Macao with 6 big girls (who were free from the disease) to assist in looking after them, thus leaving 27 healthy children in the House. These latter have remained healthy, although no change has been made in the dietary or source of food supply. Two of the children sent to Macao died shortly after arrival there, but the remainder are reported to be improving in health.

The children who were attacked were all between the ages of 4 and 7 years, and all of them slept in a series of adjacent ground-floor rooms. These rooms are thoroughly well lit and ventilated and have close-boarded floors, which are painted but otherwise bare. Some children who slept in ground-floor rooms in another part of the building were not attacked, nor were any of the girls who slept upstairs. No European cases have occurred.

The children's dietary appears to be a most generous one, comprising rice, eggs, fish (fresh and salt on alternate days), meat (beef or pork) at every evening meal and thrice a week with the morning meal.

The special points about the outbreak seems to be the unusually early age of all the patients (from 4 to 7 years), the absence of overcrowding, and the abundant lighting and ventilation of the premises, the liberal dietary, the fact that all those attacked slept on the ground-floor, and the fact that after the removal of the sick the remaining 27 children have remained free from the disease, although no apparent change has been made in the dietary.

If we adopt Manson's theory we must assume, I suppose, that the infection was conveyed from the Blind Home to the Berlin Foundling House either in the clothing or in the earth adhering to the boots of the children or of the nurse who went from one establishment to the other, that it developed rapidly, and that the children sleeping in certain of the ground-floor rooms were rapidly poisoned by the toxin generated by the infective germ. The fact that the two children who required surgical dressings were the first to develop the disease suggests rather that they were thus more susceptible to the disease than that they communicated it to the others, for the interval between their attack and the outbreak among the rest of the children did not exceed two days at the most, and I am inclined to think, therefore, that all the children derived infection from the same source.

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