

AN OUTBREAK OF CHOLERA IN AN OFFICERS' MESS.

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(From the Government Laboratory, Agra, India.)

ONE of the most unpleasant concomitants of the life of Europeans in India is presented by the sudden and isolated outbreaks that occasionally follow a large dinner party or it may be a ball supper, and which in old times, without more ado or much evidence would have been put down as being due to "degchie poisoning." Recent cases which have aroused the widest sympathy and regret in India and elsewhere show that whatever may be the cause of these outbreaks, there is much need of further investigation. I have recently assisted at such an inquiry, and the results obtained appear to be of sufficient interest to merit description.

On July 13th, 1896, thirteen persons sat down to dinner on a guest night at an officers' mess in Saugor, a station in the Central Provinces. Two days later no fewer than nine of the partakers of the dinner were attacked with severe diarrhoea, vomiting, and prostration, which in three cases developed into typical cholera. Of these three cases, only one recovered. The outbreak in its sanitary aspects was investigated by Brigade-Surgeon-Lieutenant-Colonel Hutcheson, Sanitary Commissioner to the Central Provinces, assisted by Surgeon-Captain Marks. At the time no other cases of cholera were occurring elsewhere in cantonments, and but little cholera was present in the neighbouring town. This isolation of the outbreak might be regarded as adding to the difficulty of supposing that it was ordinary cholera, and it might be suggested that it was an example of ptomaine poisoning. The high percentage of those exposed to the infection who were attacked, and the presence of tinned prawns in aspic as an item in the *menu* of the fatal dinner party lent colour to the idea. But, on the one hand, the existence of a regular incubation period of about two days in every case, the typical choleraic aspect of the symptoms in the severer cases, and the fact that at least one of those attacked had not eaten the tinned prawns, made the conclusion inevitable that the disorder was due in part at least to the cholera microbe.

A clue to the proximate cause of the outbreak was furnished by the only other case of cholera that occurred in the cantonments at the time. The patient was a servant of one of the guests, and had been employed in the mess on the occasion of the dinner party in question. Owing to his being a Madrassi he could eat European food. Such food could not be eaten by the other servants owing to their caste customs. The Madrassi servant was attacked on July 15th—that is to say, at the same time as the other victims, and died on the same day. It was discovered that he had eaten the remains of a chocolate pudding that had been left over from the dinner. He had not eaten any of the tinned prawns or any other food so far as could be ascertained. That the outbreak was not due to the more ordinary channel of drinking water was proved by the fact that all the servants in the mess drank from the single well that was in the mess compound, and that with the above exception they all remained in good health; further, the mess was provided with a Pasteur filter, and but few of the members ever drank water. Consequently the investigation threw a strong suspicion on the chocolate pudding. At this stage of the investigation I was called in to see whether the bacteriological test could throw any light on the mode of access of cholera microbes to the chocolate pudding, and on the reason why in this position these microbes exhibited such exceptional virulence.

A bacteriological examination of everything in the mess house and mess house kitchen that was wet resulted in the discovery of the cholera microbe in a fully virulent condition in a sufficiently unexpected position. Such care was being taken, and had been taken, in the sanitation of this kitchen, that all drinking water was not only boiled but passed through a Pasteur filter. The cholera microbe was found in a degchie of recently boiled water that was standing near the Pasteur

filter ready to be poured into it. The water coming from the Pasteur filter naturally was free of cholera. The original water supply whether taken direct from the well or from the bhisti's mussack was found to be free of infection. The same water, whether stored in earthen vessels or in tins or glasses in the mess house, was in every case found to be free of infection. There is every probability that the water in the degchie had really been boiled, a process which obviously would remove any cholera microbes that might be present, since after a severe outbreak such obvious precautions are not usually neglected. No one had in all probability introduced the infection by taking water out of the degchie by means of an infected vessel, because the degchie was still quite full of water at the time of my visit. It was not likely that the infection had been introduced by means of flies into the water, because the lid was on the degchie, and probably had been there since the degchie had been removed from the fire. Only one channel remains that I can think of by which the water in the degchie is likely to have become infected, namely, from the dishcloth used in carrying it. A degchie, it may be explained, is a cooking pot without a handle, whose mouth is provided with a projecting rim. The servants usually take hold of this rim on both sides by means of a dishcloth when carrying the degchie about. The lid is merely a concave sheet of metal fitting loosely, and while the degchie was being carried from the kitchen to the pantry the water it contained was almost certain to be splashed up against the dishcloth, and if the dishcloth was infected with cholera microbes, the latter might be introduced into the water. Investigation showed that the clean dishcloths on their return from the wash arrived impregnated with cholera microbes. The mess dhoobie was in the habit of washing the dishcloths in a running stream two miles and a-half from cantonments, in whose water no cholera microbes could be detected. Surgeon-Captain Marks, who investigated the matter, found that it was highly improbable that the dishcloths had become infected owing to their having been washed in the same vessel as cholera-infected clothing, both because the dhoobie did not use any vessel, but only the running water, and because, so far as could be learnt, he only worked for the mess and for a few Europeans who had remained in good health. For some time the source of infection of the dishcloths entirely escaped our search, but at length Surgeon-Captain Marks found that during May and June, that is to say, during the few weeks before the outbreak in the mess, five or six cases of cholera had occurred in some huts situated about 30 yards from the place where the dhoobie washed. The drainage from these huts went in the direction of the river, and at length the cholera microbe was detected in sand from near the bank of the river at the place where the dishcloths were usually laid out to dry.

Though other sources of infection are by no means excluded, the above is the only way by which virulent cholera microbes may have been introduced into the mess at the time of the outbreak in favour of which any positive evidence can be brought forward.

Assuming that at the time of the outbreak cholera microbes were present on the dishcloths, it is obvious that the chocolate pudding or its constituents may have been infected by any of the vessels used in its preparation having been cleaned by these dishcloths. There is another more direct way in which the infection may have been introduced, depending on the habits of the native cooks. Every cook possesses a piece of muslin through which he strains all sauces, custard, blanc manges, etc. This muslin, owing to its frequent use, is apt to acquire a bad smell. If this becomes too pronounced, the food acquires a disagreeable flavour, and the cook is likely to be fined. In order to avoid this the muslin is occasionally sent to the wash, I suspect, even in cases in which the dishcloths are never thus exposed to the risks of infection with the microbes of waterborne diseases. As will be shown below, the constituents of the chocolate pudding had been strained through such a piece of muslin.¹

The question now arises, Why should chocolate pudding be such a dangerous nidus for cholera microbes? An answer to this question may be obtained from a consideration of the method of making it, and of the properties of its constituents. Roughly speaking, it is made as follows:

First, the contents of a packet of gelatine are dissolved

in warm water. The cook then adds to it milk, sugar, and the whites of several eggs. The constituents are well beaten up together, and then strained through a piece of muslin. The mixture is next divided into three portions. To one powdered chocolate is added to produce a brown colour; cochineal is added to the next portion, and the third portion is flavoured with essence of vanilla, possibly in order to remove the taste of the cook's fingers. A mould is placed in ice. A part of the still warm chocolate-coloured portion is poured into the mould. When it has set, some of another coloured portion is added. When this has set, more is added, and so on until the mould is full. Thus a pudding of opaque jelly in different coloured layers is produced. This is obviously a long process, during which the portions that are not yet in the mould are kept at a warm temperature, such as tends to aid the growth of microbes, for several hours.

From the above enumeration of the constituents, it is obviously likely that the chocolate pudding will be a good breeding place for cholera microbes, and it is possible that the large percentage of attacks in the present instance was due to cholera microbes having been swallowed in enormous quantities. In order to test this possibility, it was obviously necessary to obtain the constituents in a sterile condition, and then to add a measured quantity of cholera microbes, and estimate their rate of reproduction.

So far as the milk and eggs were concerned, it was necessary to obtain them in a sterile condition without the aid of heat, as boiling might possibly affect their nutritive value. In order to do this some milk was obtained from a disinfected cow, by means of a disinfected milkman with every aseptic precaution. Some of the white of a fresh egg was removed through a hole in a portion of the shell that had been calcined in a blow-pipe flame. These two liquids were added to some previously sterilised and dissolved gelatine in a test tube. The mixture was inoculated with a trace of cholera microbes, and it was then found that about 20,000 of these microbes per c.cm. were present. I imitated the cook in keeping the mixture in a warm place, by putting the test tube in an incubator.

On the following day the cholera microbes had reproduced at such a rate that 9 millions were present in every cubic centimetre. This rate of reproduction was not quite so much as I had expected for chocolate pudding, so I suspected that I had made some mistake in the culinary part of the experiment. This I was fortunate enough to detect. I had used the ordinary laboratory gelatine that is used for cultivating microbes. The cook had used the specially purified gelatine that is sold for making jellies and similar nutritious food for invalids. I thereupon repeated my experiment, but using the shop gelatine instead of the other. The mixture was again inoculated, and this time the cholera microbes reproduced with such amazing rapidity that eighteen hours later no less than 400,000,000 cholera microbes were present per cubic centimetre. The explanation of the difference in the results of the two experiments is extremely simple. The ordinary coarse gelatine that I used in the first experiment is acid in reaction. The other constituents of the chocolate pudding are alkaline or neutral. The mixture has a faint acid reaction. Cholera microbes are hindered in their growth by the presence of even minute quantities of acid. Refined gelatine and isinglass that are used in making jellies and puddings, on the other hand, are alkaline, and hence, with the other constituents, make an alkaline and excellent food medium for the cholera microbe. Fortunately for us, by far the greater portion of our food has a faint acid reaction. The above-mentioned constituents of chocolate pudding are the only things commonly used by cooks that I can think of that have an alkaline reaction.

Consequently this little research suggests an explanation of the excessive virulence shown by the cholera microbes in the chocolate pudding. The unfortunate partakers at the dinner party were swallowing cholera microbes that were actively reproducing, and that were present in enormous quantities. The investigation also gives us a valuable hint as to how to avoid such accidents in future. In the present condition of cooks and cookhouses in India I believe it is almost impossible to prevent the microbes of enteric fever or cholera from being introduced occasionally. What I believe can be done is to avoid pampering these un-

welcome visitors. Cold puddings made in the above described way with gelatine or isinglass should obviously be avoided. In Indian cantonments, if cholera microbes are not about, the enteric microbe is usually not far off, and these cold puddings are as likely to be able to nourish one microbe as the other. Ordinary transparent jellies are probably less dangerous than opaque jellies, not because they are not capable of supporting the life of dangerous microbes, but because while being made they have to be boiled after the addition of white of egg, in order to clarify them. The boiling will destroy any cholera or enteric microbes present, and as these jellies are likely to be strained while hot, they are the less likely to be infected from the flannel bag or cook's loincloth that is used for the purpose.

During the present summer, what I believe to be an exceptional number of European officials and military officers have succumbed to cholera and enteric fever in India. Within a few weeks of the above related outbreak in Saugor, cases were reported in the papers from Aligarh, Jhansi, Naini Tal, Kathgodam, Murree, Dehra Dun, Agra, and other places. In one of these cases the cholera microbe was detected by me in the finger bowls; in another case the enteric microbe occupied this position. In another case the cholera microbe was found in a virulent condition in each of the vessels of water kept in the kitchen for culinary purposes. In most of the cases, however, to the best of my knowledge, the investigation had to be carried out without bacteriological help. During the same time, as far as cholera is concerned, British soldiers have been remarkably free from infection. To the best of my knowledge, in the whole of the Bengal Command during the present rainy season, cases of cholera among soldiers have only been reported from two stations, and in one at least of these places the infection appears to have been contracted while the men were on the march. I believe this remarkable immunity of the British soldier, as contrasted with the relative liability of the British officer and civilian official, is due to the strenuous efforts now being made by officers of the Army Medical Staff to sanitise the soldiers' cookhouses.

The kitchens in India most in need of reform are those attached to the officers' messes of British regiments. These are private institutions not subject to official control. It is high time that officers of the Army Medical Staff should be invited to undertake the task of sanitising these kitchens. It will, I think, be clear from the facts described in this paper, that the complete prevention of cholera is rapidly becoming a matter for specialists. The ordinary mess president is no more a specialist than the average subaltern is an epicure. Together they produce and consume horrible delicacies that are often a severe strain on the digestion of their guests.

This is not an isolated opinion. I find it is a matter of common remark in all parts of India that I have visited. It is as unusual as it is to me unpleasant to go out to dinner and then to criticise the *menu* in this way; but I hope it will be admitted that the occasion is one for plain speaking rather than for ceremony. When dining at an officers' mess the other day, I noticed that the soup was putrid; but my hosts, with sturdy appetites bred of healthy exercise, consumed it with perfect content. The whipped cream poured over the apple pie had the abominable taste of dirty dishcloth, noticed, I believe, by no one but myself. My host had heard vaguely of my recent researches, with the result that the next item on the *menu* had the title "*crème à la microbe*." It was chocolate pudding. After dinner I inspected the mess kitchen. To all appearance it was perfectly clean, and the mess president pointed out to me with pride a long row of enamelled iron saucepans with which he had replaced the more usual degchies, apparently under the idea that they would be less suitable than the latter for the breeding of microbes.

Nine or ten subalterns in this regiment have had enteric within my recollection, so the need of some precautions was obvious; but I very much doubt whether the mess president had chosen the precaution most necessary. Though in many cases, so far as he himself is concerned, the British officer can only be stimulated into sanitary zeal by attendance at a long series of funeral parties, his care of the private soldiers under his charge is altogether admirable. As an example I may quote the following incident:

A few cases of enteric occurred among the privates of an artillery detachment. Every possible precaution was at once adopted. A vigorous investigation was at once begun to find the source of the infection.

All sorts of things were sent to me for examination. At length I discovered the enteric microbe in water taken from the tap of an iron cistern in the Battery Aerated Water Factory. Observations made at the time tended to show that the water coming from the piped supply that was daily poured into the cistern was free of enteric. Apparently a temporary infection of the water in the cistern had occurred. But why had it persisted? The help of the medical officer in charge of the battery was invoked. On failing to find any obvious reason for the persistence of the infection by questioning the attendants in the factory, he had the cistern emptied. At the bottom and attached to the exit pipe he found a small filter. It was one made by a well-known firm of aerated water machine manufacturers, the use of which is now strictly forbidden, and the existence of which had been overlooked when these filters had been abolished. It was found afterwards that the public water supply had been temporarily infected with the enteric microbe. The medical officer who investigated the matter is of opinion that the presence of this filter is a probable reason why the consumers of aerated waters from this factory suffered relatively more severely than did other bodies of troops in the station.² This case appears to be an apt illustration of the capacity of ordinary filters to act as breeding places for microbes.

If the ordinary mess president attempts to improve his kitchen, he is likely to do more harm than good. For instance, he will issue orders that the floor is to be washed every day, instead of once a week. Under existing conditions, cleaning kitchens in Upper India is a dangerous process. Cooking the sahib's dinner is regarded as a somewhat unclean occupation by most natives. Mohammedans do not like it because we eat bacon, and Hindus look askance at the business because we eat beef. For these reasons native cooks in general are of rather low caste and low standing; hence they are apt to stand on what little dignity they have, and consider it beneath them to clean the floors of the kitchens in which they work; consequently the sweeper has to be called in to do the business. In Upper India there are no sewers. The sweeper is a man who fulfils the functions of a sewer; he is apt to carry about outside him what sewers in other countries carry about inside them—namely, dangerous microbes. I have elsewhere published an account of a very clear case in which I proved that the sweeper was introducing cholera microbes into the cookhouse because of his methodical habit of reserving one broom for clean work, such as sweeping out barracks, and another broom for dirty work, such as cleaning out latrines and cookhouses.³ Those who know India will agree with me that stopping this abominable custom may not be so easy as it appears on the surface. It is possible that the mess president would most readily achieve this object by insisting that the cook should sleep on the kitchen floor, if possible with his head in a degchie. The mess president would then have an assurance that he at present lacks that neither the one or the other would be cleaned with the broom that is used for the servants' latrines.

Both in the present paper and elsewhere I have given examples of the dangers attending the washing of dishcloths in India.⁴ I doubt whether in the whole of India there is a mess president or club secretary who has a reasonable certainty that his kitchen dishcloths are not washed in water infected with either cholera or enteric microbes. Unless the mess president can arrange for the sterilisation of washed dishcloths, it might be wiser to leave them dirty.

REFERENCES.

¹ I was unable to obtain this particular piece of muslin for examination, because on the occurrence of the outbreak the cook had been dismissed. He had then gone to Naini Tal, taking with him his muslin. A few days after his arrival in Naini Tal there was another dinner party cholera outbreak, but no connection between this and the newly-arrived cook and his muslin could be traced. ² My having been suddenly sent to Bombay in connection with the bubonic fever outbreak is the reason why I have been unable to obtain definite figures with regard to this case. The above is the opinion of the medical officer who carried out the investigation. ³ See *Cholera in Indian Cantonments*, Pioneer Press, Allahabad, India (Deighton, Bell, and Co., Cambridge). ⁴ See the Annual Report of the Chemical Examiner and Bacteriologist to the North-West Provinces and Oudh for 1895, Government Press, Allahabad.

A CASE OF DECIDUOMA MALIGNUM, WITH AN ACCOUNT OF THE POST-MORTEM EXAMINATION AND MICROSCOPIC APPEARANCES.

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CONSIDERABLE attention is being given at the present time to the study of the clinical characters and pathology of that form of new growth known as deciduoma malignum, and it is therefore desirable that all recognised cases should be put on record. The literature of the subject is chiefly to be found in Germany and America, though scattered notices have appeared from time to time in English medical periodicals. The recent important discussion at the Obstetrical Society of London will bring the disease more prominently to the notice of English practitioners, and as few cases have hitherto been reported in this country, the following particulars may be of interest:

Mrs. S., aged 30, was admitted to the New Hospital for Women on June 19th, 1896.

History of Present Illness.—The patient had been delivered of her fourth child three weeks previously. The labour was normal, and the placenta was examined, and considered to be complete. The loss at the time of labour was slight, and she was up on the fourteenth day. She then had slight hæmorrhage, and was ordered back to bed. On June 17th she got up again, profuse hæmorrhage occurred, and she was admitted to the hospital.

On admission she was blanched and exhausted; the temperature was 102°, and the pulse 120. She was lethargic, and it was difficult to rouse her to take food or answer questions. The uterus on vaginal examination was felt to be high, the os closed. Hæmorrhage was slight. The urine dribbled away; a specimen ($\frac{3}{4}$ xl), withdrawn by the catheter, was acid, of specific gravity 1020, contained no albumen or sugar. Nothing abnormal was detected in chest or abdomen.

On June 20th the patient was anaesthetised and the cervix dilated. A mass was felt adherent to the posterior wall of the uterus, the feel and appearance being that of placental tissue. It was removed by the finger and curette, and the uterus douched and lightly packed with iodoform gauze.

On June 23rd she was still lethargic. No bleeding had occurred since curetting, and the temperature was normal.

On June 24th she was delirious at night and tried to get out of bed, but she had no delusions. She slept at 3 A.M. after a draught of potassium bromide.

On July 7th her condition was good. Slight bleeding occurred, which was thought to be probably a normal period.

On July 12th it had ceased, and she was doing well.

On July 13th she had headache, the temperature was 101°, and she vomited three times. At 2.30 A.M. (July 14th) the house-surgeon was sent for, and found the patient had passed two large clots, and the bed was drenched by the discharge of a great quantity of blood-stained serum. She was blanched and faint, the pulse was 130.

On July 15th another large clot was passed. The uterus was felt to be high. The os was patulous, and admitted the tip of the finger; a roughish mass was felt presenting through it. There was no foetus. The temperature was 98° and the pulse 120. Examined under an anaesthetic, on July 16th, the os was found to be patulous, and no dilators were needed for the exploration of the uterine cavity, which measured 3 inches, and was occupied by a mass of pale organised material growing from the posterior wall. This was removed, and over its site the uterine wall was felt to be extremely thin. There was little hæmorrhage during the curetting. The uterus was douched, and lightly packed as before.

In the afternoon the temperature ran up to 103.4°. At 4.45 P.M. antistreptococcus serum (Pasteur Institute), 5 c.cm., was injected into the abdominal wall. At 6.30 P.M. the temperature was 102°, and the pulse 146. At 10 P.M. antistreptococcus serum, 10 c.cm., was injected. At 11 P.M. the temperature was 101°, and the pulse 132.

On July 17th the general condition was improved. The temperature was normal, and there was no hæmorrhage.

On July 22nd a clot the size of a walnut was passed. The general condition was good.