

tion, as in all other advancements that appeal to the reason of the people, will gradually be assimilated and meet with their sympathy and co-operation. All Local Governments in India have taken up vigorously the question of imbuing the children of the present generation with the rudiments of hygiene, and we are glad to see that their good example is not neglected in these dominions.

As we have already stated one of the alternative appellations for hygiene is *preventive medicine*, which implies that disease is not an absolute necessity in the phenomena of life. For the most part this is true—in one sense the majority of diseases are preventible. It is more or less in the power of every individual to keep remote from all known predisposing and exciting causes of diseases. In particular, however, each person has the power of avoiding violations of physiological laws, which laws cannot with impunity, be disregarded. We cannot expect to antagonise nature successfully. The phrase, preventive medicine, however, is generally limited in its signification. It refers specially to those diseases, the prevention of which is more in the hands of the State than in those of the individual. The unit of the community is in many instances a victim to external circumstances over which he has no control. State or legal medicine attempts to guard him against these possible contingencies.

Let us now take a brief retrospective glance at the history of sanitation in the civilised world. The late Professor de Chaumont in summarising the hygienic history through which a people passed, divided their progress into three stages,—the first being that in which man is in a condition of absolute savagery, and not much removed from the brute creation; this gradually passing into the *supernatural period*, when disease is looked upon as the direct act of an offended Deity. In this second stage there are many degrees, varying in accordance with the ideas held regarding the influence of the *supreme power*. The higher gradations of this phase gradually blend with the *rational period*, in which disease is correctly attributed to physical agencies, capable of investigation and of being dealt with scientifically. This the third, or final, period may be sub-divided into three further stages,—the first a period of development, during which the principles of rationalism struggle for expression and recognition. This is succeeded by the *legislative epoch*, which brings to light, the necessity of some controlling power ending in the introduction of sanitary legislation, where-in the wisdom of a few is applied to frame laws for the good of the multitude. The first sign of this stage are distinguishable in the

severely repressive nature of the enactments *for emergencies*, and the absence of comprehensive legislation. The ultimate period is that which may at present be designated the *ideal stage*—in which the principles of hygiene, and conditions necessary for its uninterrupted advancement, will be clearly understood, and the adoption of these principles be so customary as to render restrictive legislation obsolete and supererogatory. In the brief summary of the history of sanitation which we are about to enter upon we can readily assign each period of sanitation in England, to its legitimate place in this classification.

Although sanitation has engaged attention either empiric or scientific, from remote antiquity to the present date, it may be stated, that at no previous period has its importance become more manifest or more recognised than during the last fifty years. In all ages of mankind the blessings of health have been fully appreciated, and its preservation has always had a certain share of consideration. From time immemorial, men have duly comprehended the value of pure water, pure air, good and unadulterated food, proper clothing, and all those conditions that combine to bring about cleanliness and a healthy state of the body. In most ancient histories, concerning nations in which any degree of civilisation obtained, we find allusions to the existence of sanitary works and measures. Works of water-supply and sewage existed in many ancient towns and cities.

(To be continued.)

A LOCAL AND CIRCUMSCRIBED OUT-BREAK OF CHOLERA BEARING A SPECIAL RELATION TO FOOD.

REPORTED BY SURGN. L. A. WADDELL, M. B.,
Depty. Sanitary Commissioner, Bengal.

A localized outbreak of cholera, especially when occurring outside 'the endemic area,'* as in the outbreak now reported, should afford more favorable opportunities for profitable enquiry than the ordinary epidemics occurring in the plains—in that the conditions presented are of a somewhat simpler character. And as the circumstances of this particular outbreak were rather rigorously enquired into, the report is published.

Locality of Outbreak.—Kursiong, the site of this outbreak is a straggling hill-side village

* That is the area in Lower Bengal as defined by BRYDEN, —it is a convenient term for distinguishing the somewhat ill-defined area in which cholera occurs perennially, and more or less all the year round.

about two miles long, in the South-Eastern Himalayas (within the Darjiling District) at an altitude of about 5,000 feet above the sea-level, and overlooking the *Terai* and Gangetic Plains, from which it is only about 5 or 6 miles distant, in a direct line.

Peculiar relation to endemic area.—Kursiong occupies a peculiar position in regard to 'the endemic area'; for although within five or six miles of that area, it is by virtue of its elevation and climate well removed beyond. And cholera which is perennial in the *Terai* and the plains-districts continuous with the *Terai* to the south, seldom reaches up the mountain ranges here beyond 2,000 feet, and then only gradually and usually in epidemic form. This, in spite of a considerable stream of traffic from the plains flowing along the steep Hill-road as well as the Cart-road and Railway, and converging at Kursiong; and the sides of these roads being extensively polluted by the urine and fæces of travellers and baggage-animals. The individual houses too, of the hill-people are generally very filthy as regards their immediate surroundings; cattle and pigs are usually housed in the understorey of the dwelling. The danger from this state of affairs is somewhat mitigated however by the houses being usually isolated, and seldom clustered into compact villages.

History of the Outbreak.—The history of the outbreak is as follows:—The disease appeared on the 13th May and the epidemic had practically ceased by the 15th May.

Disease undoubtedly Cholera.—The disease was undoubtedly cholera. Surgeon-Major Cobb (Civil Surgeon of Hughli) who attended the patients in the earlier stages of the illness, testifies to this; and the symptoms exhibited by the Bhutiya woman and her child, seen by me on the 29th ultimo, were choleraic. The mode of propagation also, of the disease, was that of cholera.

Remarkably circumscribed nature of the epidemic.—The epidemic was strictly circumscribed: it was confined to certain of the inmates of Dr. S—'s bungalow, and of the house of his *dhai*, half a mile distant on the further and upper side of the *bazar*.

Nowhere else in the Kursiong town, or in the neighbouring villages, can any trace be found of recent cholera or choleraic diarrhœa. Had any cholera occurred within the *bazar* or its neighbourhood, the fact could scarcely have escaped notice, as the Municipality is a very small one, and the police and the conservancy overseer, as well as the registrar-clerk, are charged with reporting cholera as well as ordinary deaths. No cholera is reported as having occurred within this Municipality since the spring of 1881, when there was a severe epidemic with over 12 deaths.

As to the occurrence of cholera in the neigh-

bouring villages belonging to tea-gardens, repeated inquiry fails to elicit any news of cholera or choleraic diarrhœa as having occurred this year. In particular, no such disease appears to have occurred since several years—the villagers say 12 years—in the *Jitman-dura* ('*dura*'—*Nepali* for residence or village) adjoining Dr. S—'s house. It is ascertained, however, that within recent years cholera has occurred several times in the Singel Tea Estate, of which this *dura* forms a part, without being reported to the authorities. But special inquiry fails to show that there has been any cholera in Singel this year or last year.

In the *Terai*, however, within five or six miles from Kursiong, in a direct line, but 3,000 to 4,000 feet lower lying, cholera had been known to be prevalent during the past two months, and these affected localities (which are quite within the 'endemic area' of cholera) were in free communication with Kursiong by road and rail. Yet, with the exception of the cases of cholera now under report, no other cases of cholera are known to have occurred this year at Kursiong nor in the hills above Kursiong. Dr. S. it is stated, had not visited any cholera case since 9th April, when he had been to Nij Tea Garden in the *Terai*; and subsequent to this he is reported not to have been near the *Terai* except on or about the 4th May.

Outbreak divisible into (1) Primary, and (2) Secondary.—The outbreak is divisible into two portions, viz., (1) the *primary* explosive outbreak affecting certain of the inmates of Dr. S—'s bungalow, and (2) the *secondary* outbreak in the house of Dr. S—'s *dhai* in the *bazar*.

Dimensions of epidemic and mortality.—The persons attacked in the primary outbreak were—

- (1) Dr. S.—Fatally. (Death in seven days by pneumonia).
- (2) Mrs. S. ... Slightly.
- (3) Mrs. S—'s brother (a visitor with two weeks' stay) ... Severely.
- (4) Bhutiya *dhai* ... Fatally. (Death in two-and-a-half days).
- (5) European nurse ... Moderately severe.
- (6) Dr. S—'s child ... Very mildly (or doubtful).

In the *secondary* epidemic the persons attacked were—

- (7) Husband of the Bhutiya *dhai* ... Fatally. (Death in one day).
- (8) Bhutiya inmate of *dhai*'s house ... Severely.
- (9) Child of above ... Fatally. (Death in two days).

The mortality, therefore, excluding the case of Dr. S—'s child, whose attack is doubtful, is 50 per cent.—an usual death-rate in cholera.

Proportion attacked among Dr. S—'s family and servants.—The number attacked among

Dr. S.—'s family and servants was six (or excluding the child, five), four being members of the family and two being servants. Of Dr. S.—'s own family, the infant aged four months (and doubtfully the child aged 16 months) alone escaped; but the number of Dr. S.—'s servants (*viz.*, bearer, cook, melter, water-carrier, mali, three saises, two pattawalas, and two ayahs) and their families who escaped attack is 19.

Water—although of bad quality—apparently not the medium of infection.—That water was apparently not the medium of infection is evident from the fact that the suspected water-supply from a filthy *jhora* (= *Nepali* for hill-stream) has all along been, and continues to be, the ordinary source of drinking and potable water for the house servants, and for the adjoining villages of Jitman and Kharbia, and among none of these villagers and servants, to the number of over 80 individuals, has diarrhoea been prevalent.

Water from two sources was in use in Dr. S.—'s house, *viz.* (1) from the municipal hydrant about a quarter of a mile off (by the road), and (2) from the *jhora* just mentioned, a few yards below the bungalow.

The hydrant water seems of fairly good quality, and is in general use throughout the municipality. Dr. S.—'s *pahari* water-carrier used a kerosine-oil tin to fetch the water; and it was understood that hydrant water alone was used for cooking purposes and for the filter.

I find, however, that a tin of *jhora* water always stood in the cook-house for washing plates, &c., and that the same tin which was used for bringing hydrant water was also used at times to bring *jhora* water; and Dr. Cobb and Mrs. W—(a visitor), during Dr. S.—'s illness, saw the water-carrier bringing *jhora* water for culinary purposes.

This *jhora* itself is highly defiled: a few yards above the point where the water was taken, I found its bed and sides contained human excreta, being used as a latrine by some of the servants. The surface drainage from below the north-end of the railway lines, from the "New Bazar," and a portion of Kharbia village and a stretch of the Pankhabari road—the jungly sides of which are open to pollution by passers-by—all discharges into this *jhora*. And until three years ago clothes used to be washed in it at the village, as its name "Dhobi Kola" ('Kola' = *Nepali* for *jhora*) implies. Its water must be unsafe for domestic use. I despatched a sample on the 30th May to the Chemical Examiner, and his report will be found in Appendix No. IV. Heavy showers, however, had fallen during the previous fortnight, and had cleansed the *jhora* of part of its impurities. The *jhora* is a perennial stream only for about 30 to 50 yards above Dr. S.—'s house. Its course above this contains water

only in the rainy season, and then only after showers.

Dr. S. was not a "water drinker," neither was his brother-in-law during his stay here. Mrs. W—, a visitor, immediately after the outbreak, drank some of the water from the small carbon filter without bad effect. The *ayah* who drank the house-water escaped, also the infant whose milk-bottle was washed out with house-water.

Insanitary condition and site of house 'per se' do not explain outbreak.—The insanitary condition and site of house, although favourable to the development of a pythogenic disease, cannot explain the cholera outbreak; for the servants, whose quarters were within 30 yards of the bungalow, were living under generally similar conditions, and the villagers in the adjoining Kharbia and Jitman villages, who were living under more aggravated insanitary conditions, escaped attack although hill-men are especially susceptible to cholera; and the *ayah* and infant, both of whom stayed in the bungalow night and day, were unaffected, while the *dhai* who was affected did not remain in the house over-nights.

The house is situated low down on the steep, north slope of the spur which connects Kursiong with Pankhabari and the plains, at an elevation of about 4,500 feet above the sea-level, and about one-fifth mile below the ridge. The Pankhabari road traverses the hillside above the bungalow. Directly above the house, about 150 yards distant, is another bungalow with its servants' houses, and the small Kharbia village, with its private privies, &c., a portion of the municipality. The house itself is on the bank of the Dhobi Kola; and within a stone-throw, on the other (east) side of the *jhora*, and on a slightly lower-level, is the thick-set village of Jitman. The house is thus between two native villages.

The soil forms a deepish layer of a lateritic nature, rather stiff and retentive of moisture, with a rocky (gneissic) bottom.

The bungalow is an old one; its floor appears damp and rotten; the water-runs from the bath-rooms are foul and slimy, and part of the refuse water lies in shallow pools outside. The cook-house is about one yard from the south-end of the house: it has a damp earthen floor, and no provision is made to drain away its refuse water.

Altogether, in view of the state of the bungalow, its low-lying site within the funnel of the filthy Dhobi Kola ravine, and its proximity to the two villages, it is not surprising that it should have a most unhealthy history. In 1876, a Sub-Manager of the Singel Tea Company, died in the house from cholera (which was then epidemic in the neighbourhood, but

he was the only European who died in Kursiong of the disease in that epidemic); and subsequent tenants have there contracted typhoid fever, dysentery, severe diarrhœa and diphtheria, so that the house acquired the reputation of being most unhealthy. Dr. S.—and his wife have tenanted the house for the past 18 months without apparent ailment. Dr. S.—’s brother-in-law on coming as a visitor two weeks previously suffered for a few days from diarrhœa.

Improbability of dhai having introduced the disease into Dr. S.—’s house—It seems highly improbable that the *dhai* introduced the disease into Dr. S.—’s house for the following reasons:—

(1) Although suffering from diarrhœa for one or two days previously, her cholera symptoms commenced only about two hours before those of Dr. S. and his brother-in-law.

(2) No traces can be found of antecedent cholera in Kursiong and in the Bhutiya *basti*, where she lived, in particular.

(3) She had no access to the cook-house for the previous two months—so the cook says—not even for bringing hot water.

(4) She had no handling of the house food, except the milk for the child and infant.

Simultaneous onset of symptoms among the attacked.—The several individuals were attacked almost simultaneously—

Dr. S.—on the 13th morning was apparently in good health and, so far as his brother-in-law and others know, had not diarrhœa. He played tennis from 4 P.M. to 6 P.M. on 13th. At 8 P.M. on the 13th he called the Civil Hospital Assistant and told him he had passed several watery stools. During the night vomiting and collapse set in.

Dr. S.—’s brother-in-law, who had not been suffering from diarrhœa, left Dr. S.—’s house on morning of 13th feeling well. At 2 P.M. he felt sick, and at 9 P.M. purged several times. Full symptoms of cholera developed next morning (14th).

The *dhai* obtained leave about noon of 13th to return to her house in the bazar on account of diarrhœa. At 7-30 P.M. she was seen by the Civil Hospital Assistant in active cholera and semi-collapse. She was in the seventh month of pregnancy.

Mrs. S. had violent purging on the morning of the 14th.

The *European nurse*, who had not been suffering from diarrhœa, developed choleraic symptoms on the 15th.

The *child* had several rice-watery motions on the 14th, but no serious collapse.

Peculiar inter-relations of persons attacked.—The persons attacked bore a peculiar relation to one another. In the primary outbreak only those were attacked who were in the habit of partaking of food from the master’s table; and of

those who were in the habit of partaking of such food, not one escaped attack. The European nurse had her share of food sent from the table to her in the nursery, and the Bhutiyan *dhai* was occasionally in the habit of taking any remains of table-food she wished, as *none of the other servants accepted such food*. The sweeper, ayah, the cook, &c., partook only of the food specially cooked for themselves in their own huts.

Table-food indicated as medium of infection.—The circumstances of the outbreak therefore point strongly to an item of the table-food as being the medium through which the cholera poison was ingested.

Probable time of ingestion of the cholera poison.—The simultaneous attack of the several individuals on the 13th or morning of 14th, implying that the poison was ingested at one and the same time; and the explosive suddenness of the attacks without (except in apparently one case) any premonitory diarrhœa, implying that the poison was in a very active form, tend to fix the time of ingesting the poison; as do also the following facts, viz., (1) that Dr. S. was absent from Kursiong on Saturday and returned on Sunday, the 12th, to dinner; (2) that Dr. S.—’s brother-in-law left Kursiong for Selim Tea Estate (where no cholera is reported) on Monday morning, the 13th, before breakfast, and it was at Selim where his attack developed at the same hour as that of Dr. S.; (3) the *dhai* left the bungalow after dinner on the 12th and did not return till 10 A.M. on the 13th.

The dinner of Sunday, the 12th May, indicated.—The dinner of Sunday, the 12th May, is therefore indicated as being very probably the time of infection.

The dinner of the 12th consisted of white soup, fowl cutlets, roast beef (the beef got from the club), potatoes (no other vegetables), and baked custard pudding. No salad was used. There was no vegetable garden and salad was very seldom eaten. There was no fish from the bazar, nor tinned fish or provisions of any sort. No raw milk or cream was used, and the milk used in the house came from a tea-planter’s house above Kursiong where no cholera existed. The food was cooked in iron-enamelled and tin vessels; no copper or brass vessels were in use.

A large over-ripe papaya eaten as dessert.—But at dessert was eaten a very large over-ripe papaya (*carica papaya*) which, when received five days previously, was in an over-ripe state, and had subsequently been locked up in the sideboard.

The papaya eaten only by those attacked and by no one else.—At the time, Dr. S. expressed doubts as to the wholesomeness of so decomposed a fruit, but after cutting off a portion for the nurse, *the remainder was consumed at the table* between Dr. S., Mrs. S., and her brother.

The brother testifies to the fact that none of this was left over from their table.

Of the portion sent to the nursery, the nurse states that she divided it, giving one portion to the *dhai*, and that they both ate of it. The nurse cannot positively say whether the *dhai* carried away any of it to her house in the bazar, but thinks this unlikely as no portion seemed to remain over. *But the dhai ate none of the other house food that day or for some days previously*; as she (the nurse) was with the *dhai* all day, she must have known this. The child was present while the fruit was being eaten, but she cannot recollect whether the child was allowed to taste the fruit. That it was allowed to taste a morsel of so sweet and juicy a fruit is, I consider, extremely probable. (The child's attack, it will be remembered, was of the most mild form, without marked collapse.)

The table servants also certify that none of this fruit remained over.

All who ate the papaya became attacked.—The evidence therefore that Dr. S. Mrs. S., Mrs. S.'s brother, the nurse, and the *dhai* all ate of this fruit is certain, and that Dr. S.'s child ate of the fruit is probable; and that none remained over to be eaten by any other person is practically certain; and the cholera outbreak was strictly limited to the above individuals who had eaten the papaya, and all who had eaten it became attacked.

Disorder not irritant poisoning but real cholera.—An over-ripe papaya might readily produce diarrhoea and even symptoms of irritant poisoning; but that the outbreak presently under report was undoubtedly Asiatic cholera is evident not only from its symptoms in the sufferers, but also from its mode of propagation in the secondary attack.

Essay to investigate the history of this papaya.—On realizing the strong suspicion which attached to this papaya of being the medium through which the cholera-poison had been conveyed, I proceeded to the Tea Estate (L), on the margin of the Terai, from whence the papaya had come. [The sideboard in Dr. S.'s house in which the papaya had been stored was a new one, brought to the house by Dr. S. 1½ years previously, and it had been used constantly for storing plates. The khidmatgar declares, and Dr. S.'s brother-in-law is also of opinion, the papaya had not been washed since its arrival at Dr. S.'s house].

Obstacles however were put in the way of my receiving information.

Collateral information obtained.—This much I did ascertain, *viz.*, that cholera had been more or less prevalent during the months of April and May (although not reported at the thana.) Since the 1st of March only one death even is reported, and that from 'fever' in the adjoining tea estate of P., which is in the endemic area, its water-supply is extremely bad, and that the

coolies of L., daily frequented the P. bazar; and that persons panic-struck through cholera occurring in their neighbour's house occasionally fled from P. 'lines' to friends in L villages. Such an incident had occurred the day previous to my visit, the refugees being found near the Manager's house.

That some cases of cholera did occur this season in the L Garden I consider probable, but except that a *sais's* wife had choleraic diarrhoea I can obtain no direct information on the subject. It is unlikely that there has been any considerable epidemic there, or this would doubtless have become known to the thana (police outpost) officials and other residents of P. village.

I could not discover from which tree the papaya had been taken: some papayas were growing below the bungalow; others lower down in the Terai.

It was thus ascertained that the papaya was brought from a locality, which, if not actually the theatre of cholera at the time—which is doubtful—was in constant and close communication with a locality a mile or so distant in which cholera was prevalent: and the bearer (carrier) of the fruit was ostensibly a frequenter of this locality where cholera existed. He may even, at the time, have been harbouring in his house panic-struck refugees from P., as some of his class are known to have done. But information on this head was withheld from me.

Details of the secondary outbreak—the dhai's house a focus.—As to the Secondary outbreak. The *dhai* obtained permission at noon of the 13th May to return to her house in the bazaar on account of diarrhoea. In the afternoon she developed choleraic symptoms, and when seen by the Civil Hospital Assistant at 7-30 P.M. (on the 13th), she was in incipient collapse. She died in her house on the early morning of the 15th.

The *dhai's* husband, aged about 35, and an exceptionally robust man even for a Bhutiya, attended on his wife during her illness. He, on the evening of the 14th, was questioned by the Civil Hospital Assistant as to whether he had diarrhoea and answered in the negative. He was attacked with cholera on the morning of the 15th and removed at 9 A. M., to the cholera-shed where he died the same night.

A Bhutiya neighbour, aged 28, who lived in the bazaar (for the past two years) in the same row of houses as the *dhai*, but three houses distant, and *who did not visit the dhai* during the illness of the latter, finding on the 15th that the *dhai's* house was vacant, she went and occupied it. She tenanted that house until the morning of the 17th, when, by the order of the Magistrate, the house was burned down. She then returned to her own house; and on the morning of the 22nd she was found suffering from cholera and removed to the cholera-shed.

She says she had not been suffering from diarrhoea previously. There were no more cases in the bazaar after this. During her first night of occupying the *dhai's* house, she was accompanied by a neighbour, and during the second night by her husband; but only she and her child tenanted the house for the full two nights. She says she found no fruit nor any provisions in the house, and that the *dhai's* soiled clothes had been removed and been burned before she occupied the house.

The next and last case of cholera occurred in the person of the child (aged 4 years) of the above. This child, who was strong and healthy and ate the same food as his parents, accompanied his mother on the 22nd of the cholera-shed, and remaining there was, on the 28th May, attacked by cholera and died on the 30th. The mother recovered.

Site and condition of the dhai's house.—The *dhai's* house was situated on the upper border of the bazaar in a row of houses occupied by Bhutiyas. It had houses on either side of it, and immediately below it; but in none of these did cholera show itself (except in that—three houses off—of the Bhutiyani above mentioned who had tenanted the house of the deceased *dhai*). The floor was coarsely planked, and a considerable portion of the material vomited and purged must necessarily have adhered to the planks and passed through to the rocky stratum a foot or more underneath the floor. The cooking place was about four feet from the bed on which the *dhai* died, and the Bhutiyani's food was cooked upon this floor. The uncleanly condition of a Bhutiyani's house is well known.

While it would seem that the cholera-infection became attached to the *dhai's* house, making that house a focus for the secondary outbreak, it is to be noted that neither the neighbour who stayed with the Bhutiyani during the first night of her occupancy of the house, nor her husband who accompanied her the second night, and who attended on her in the cholera-shed, were attacked. It is also to be noted that at the funeral ceremonies of the *dhai*, on the 15th, the above Bhutiyani, together with some of her neighbours, cooked rice and tea, partly within the house and partly outside, and this food was partaken of by over 25 persons without ill effects.

Atmospheric condition.—The atmospheric conditions at the time, as regards the rainfall and temperature, are shown in the tables appended as *Appendices Nos. I and II*. Only the rainfall is registered officially at Kursiong. The note of temperatures (which is of a very vague character) was obtained from the adjoining tea-garden which has a slightly lower elevation. Hot showery weather seems to have preceded the

outbreak, but the rainfall appears to have been neither remarkably scanty nor heavy.

That the atmospheric and telluric conditions were evidently unfavourable to the establishment of the disease would appear from the epidemic not having become more general.

Premonitory diarrhoea.—Amongst the attacked no premonitory diarrhoea is traced, except in the case of the *dhai*. Among the other servants and villagers in the immediate neighbourhood and in the Bhutiya section of the bazar, I failed, after extensive inquiry, to find that any diarrhoeal tendency existed either at that time or subsequently. In the eastern section of the bazar at present (29th May), I have ascertained by an inspection of the principal latrine and inquiry from the sweepers that a considerable amount of diarrhoea exists and has existed for three weeks, but it is not of a choleraic character, and is not so general as to be epidemic. The latrine sweepers say that the usual season for (hill) diarrhoea is July and August, but that this year it seems to have commenced earlier than usual. It seems questionable, however, whether the existing amount of diarrhoea is unusual at this season.

RÉSUMÉ.

Résumé of leading results of inquiry into the causation of outbreak.—To recapitulate the leading results of this inquiry into the causation of the outbreak:—

1. *The disease was undoubtedly Asiatic cholera.*
2. *Its origin is not to be explained by Locality (including telluric emanations) per se; as the ayah and the infant who inhabited the bungalow, and the servants who lived in the immediate vicinity, altogether escaped; while the dhai who only remained during the day time in the bungalow was attacked. Moreover, Kursiong being, by virtue of its elevation and climate, decidedly beyond the endemic area of cholera, and there being no cholera in the neighbourhood suggests that the cholera-poison had been introduced from without.*

3. *That Water was not the medium of infection may be considered almost absolutely certain.*—The *jhora* water seems excluded, as this water was, and has continued to be, the sole source of water-supply for the house-servants and neighbouring villagers to the number of over 80 individuals, none of whom were attacked, nor have they been suffering from diarrhoea; and the strictest inquiry fails to find any trace of cholera within the drainage area of the *jhora* or in Kursiong or its neighbourhood. There was no rainfall on the day of the 12th (to scour down impurities from above). The ayah drank house-water and escaped, also the infant whose milk-bottle was washed with this water. The

Chemical Examiner's Analysis (Appendix No. IV) shows that this water from a chemical point of view is of 'good potable quality.' The other source of water-supply, viz., the hydrant water, is in general use in the municipality and is above suspicion.

4. That the poison or infective material was not 'Air-borne' or the outbreak due to an 'epidemic wave' is evidenced by the fact that the other inhabitants of Kursiong and its neighbourhood did not suffer, the disease being confined to Dr. S's house, and the house of his *dhai*, half a mile off on the upper and further side of the bazar.

5. Having practically excluded the earth, air, and water as media of infection, the food is indicated as a probable medium, and an examination of the details of the outbreak shows that the disease actually bore a very close relation to the Food.

6. The outbreak (primary) was strictly confined to those persons who ate the table-food; and every person, without exception, who ate the table-food, was attacked.

7. Passing in review the articles of food, including milk, consumed during the week previous to the outbreak, the only suspicious article discovered was a large over-ripe papaya.

8. This papaya had been received in an over-ripe state, and it was further kept for five days until the 12th May when it was eaten as dessert at dinner.

9. And collateral evidence tends to fix the dinner of the 12th May as the time of ingesting the poison. The evidence is (1) the known fact that cholera has usually a short incubation-period; (2) the fact that Dr. S. was absent on the 11th and returned to dinner on the 12th, and (3) that Dr. S's brother-in-law left Kursiong (for a place where there was no cholera) on the morning of the 13th, yet he developed cholera precisely at the same hour as Dr. S.

10. And the explosive character of the outbreak and simultaneous onset of the symptoms among the attacked indicated that the cholera poison had been ingested by the several individuals at one and the same time.

11. That the papaya was eaten by all of the individuals attacked is certain (as to the child only, the evidence of eating is uncertain, but

its attack was somewhat doubtful); and that none remained over to be eaten by anyone else is practically certain; and that those of the family and servants who did not eat the papaya escaped attack is certain: further, the papaya seems to have been the only house-food eaten by the *dhai* on that day (the 12th) or subsequently.

12. This papaya was brought five days previously from a village (L) on the margin of the endemic cholera area, which village, if not the theatre of active cholera, which is doubtful (choleraic diarrhoea had certainly occurred), was in constant and close communication with a locality (P) a mile or so distant, in which cholera was prevalent; and panic-struck refugees from this latter place were being harboured in the particular village from whence the papaya came.

13. The carrier of this papaya was a resident of the above village (L), and one of a class who were daily frequenting the bazar of the locality (P) where cholera was active; but as the identity of the man was withheld from me, his special relations to a concrete case of cholera could not be investigated.

14. A large over-ripe papaya would appear especially well suited for the transmission of cholera. It presents a large surface, and is so soft and pulpy that handling it entails the application of both hands to avoid penetrating or lacerating its soft rind and flesh; and even in careful handling, the epidermis must get ruptured and the fruit more or less deeply pitted at the parts grasped by the hand. The large amount of water in its composition (over 95 per cent.) would supply the necessary moisture for the preservation or development of the infective material. It is a non-acid, starchy and saccharine fruit. And the unwholesome decomposed condition of the fruit, as in that now under report (even in an undecomposed state this fruit is generally considered somewhat irritant), would tend of itself to establish diarrhoea, and thus facilitate the action of any cholera-poison which might be present.

15. That the papaya conveyed the cholera-poison seems more than probable, but that it certainly did so must remain undetermined owing to the want of the last link in the chain of evidence against it.

APPENDIX I.

Statement showing the RAINFALL registered at the Kursiong Charitable Dispensary during the year 1889.

N. B.—These are the previous day and night's rainfall in inches up till 8 A. M., and the point of observation was about 200 yards from Dr. Smith's bungalow and at a nearly equal elevation.

Month and date.	Rainfall.	Month and date.	Rainfall.
24th January 1889	4	11th February 1889	8
25th Ditto	26	12th Ditto	11
30th Ditto	1.42	18th Ditto	90
31st Ditto	1.60	20th Ditto	55
		22nd Ditto	18
		25th Ditto	4
Total for January	3.68	Total for February	2.94

APPENDIX I.—Continued.

Statement showing the RAINFALL registered at the Kursiong Charitable Dispensary during the year 1889.

N. B.—These are the previous day and night's rainfall in inches up till 8 A. M., and the point of observation was about 200 yards from Dr. Smith's bungalow and at a nearly equal elevation.

Month and date.	Rainfall.	Month and date.	Rainfall.
17th March 1889 ... ..	.. '15	4th May 1889 ... ..	.. '20
18th Ditto ... ..	.. '28	8th Ditto ... ..	.. '24
Total for March ... ..	.. '43	11th Ditto ... ..	.. '2
14th April 1889... ..	.. '46	12th Ditto ... ..	.. '8
16th Ditto ... ..	.. '69	15th Ditto ... ..	.. '7
18th Ditto ... ..	.. '31	16th Ditto ... ..	.. '5
19th April 1889... ..	.. 1.2	18th Ditto ... ..	.. '20
20th Ditto ... ..	.. '34	19th Ditto ... ..	.. '1
23rd Ditto ... ..	.. '5	21st Ditto ... ..	.. '91
24th Ditto ... ..	.. '15	23rd Ditto ... ..	.. '28
27th Ditto ... ..	.. '57	26th Ditto ... ..	.. '18
29th Ditto ... ..	.. 1.58	27th Ditto ... ..	.. '84
30th Ditto ... ..	.. '4	28th Ditto ... ..	.. '18
Total for April ... ..	.. 6.20	29th Ditto ... ..	.. 1.90

APPENDIX II.

Note of TEMPERATURE (atmospheric) at Castleton Tea Estate adjoining Kursiong, but about 800 feet lower.

1st to 7th April 1889 ... ..	.. 65° Fah.	1st to 7th May 1889 ... ..	.. 67° Fah
8th to 14th Ditto ... ..	.. 66° "	8th to 14th Ditto ... ..	.. 68° "
15th to 21st Ditto ... ..	.. 66° "	15th to 21st Ditto ... ..	.. 67° "
22nd to 30th Ditto ... ..	.. 68° "	22nd to 31st Ditto ... ..	.. 67° "

THE statement is very vague. I suppose it represents mean temperature in the shade. No temperature (atmospheric) observations are taken officially at Kursiong, and the above note is the only record I could obtain in the neighbourhood. It is of comparative value.

APPENDIX III.

List of DEATHS in Kursiong Municipality from January to 30th May 1889.

DATE OF REGISTRATION.	SEX.		Age.	Cholera.	Fever.	Bowel-complaint (all dysentery).	All other causes.	REMARKS.
	Male.	Female.						
24th January 1889 ... ..	.....	1	15 to 20	.....	1	.....	.....
7th February " ... ..	.....	1	20 to 30	.....	.....	.....	1	
7th " "	1	.....	10 to 15	.....	.....	.....	1	
7th " " ... ..	.....	1	10 to 15	.....	1	.....	.....
25th " "	1	.....	Under 1	.....	.....	.....	1	
3rd March "	1	.....	30 to 40	.....	.....	.....	1	
11th " "	1	.....	50 to 60	.....	1	.....	.....
20th " "	1	.....	Under 1	.....	1	.....	.....
30th " "	1	.....	20 to 30	.....	.....	1	.....
30th " "	1	.....	20 to 30	.....	.....	1	.....
2nd April " ... ..	.....	1	1 to 5	.....	.....	.....	1	
6th May "	1	.....	Under 1	.....	1	.....	.....
14th " "	1	.....	30 to 40	.....	1	.....	.....
14th " "	1	.....	1 to 5	.....	1	.....	.....
15th " " ... ..	.....	1	50 to 60	.....	.....	.....	1	
20th " "	1	.....	20 to 30	1	.....	.....	.....
20th " " ... ..	.....	1	20 to 30	1	.....	.....	.....
20th " "	1	.....	30 to 40	1	.....	.....	.....
20th " "	1	.....	5 to 10	(1*)	.....	.....	(1)	
26th " "	1	.....	40 to 50	.....	1	.....	.....
26th " " ... ..	.....	1	20 to 30	.....	.....	1	.....
26th " "	1	.....	1 to 5	.....	.....	.....	1	
26th " " ... ..	.....	1	30 to 40	.....	1	.....	.....
29th " " ... ..	.....	1	1 to 5	.....	.....	.....	1	
Total	15	9	.....	4	9	3	8	

* Investigated by me: had no bowel-complaint; only enlarged spleen and debility; had been ill for several weeks.
L. A. W.

APPENDIX IV.

CHEMICAL EXAMINER'S REPORT on Sample of Dhobi Kola Water from Kharbia, Kursiong.

Physical appearances—

Colour and transparency viewed through two-foot tube Yellowish—hazy.
Smell None.

Results of Analysis expressed in parts per 100,000.

Total solid matter.	Chlorine.	Free ammonia.	Albuminoid ammonia.	Nitrogen as nitrates and nitrites.	HARDNESS—CLARK'S SCALE.			Nitrates.	Behaviour of total solid residue on ignition.	Sulphates.
					Total hardness	Temporary.	Permanent.			
5.0	.56	.004	.0088	.08	4.0	1.0	3.0	Trace.	Slight blackening	Trace.

[N. B.—From a chemical point of view, this water would be classed as unpolluted and of good, potable quality.]

A Mirror of Hospital Practice.

EDEN HOSPITAL, CALCUTTA.

CASE OF CONCEALMENT OF SEX.

BY SURGEON-MAJOR C. H. JOUBERT, M.B., F.R.C.S.,
LONDON.

JUMEERUN, Mahomedan ayah, age twenty-six years, was sent to the Eden Hospital on the 10th July 1889, for an opinion as to sex, having applied at the out-patient department for relief of a difficulty of micturition. The history given was that the genital organ had been in their existing condition from birth, the patient repeatedly stating "junnum si hua." She or he had been for years in European service as an ayah, and had been taken to Europe by one family. The patient was tall for a woman, but the type of features was distinctly masculine. The voice was high pitched, but appeared constrained. There were distinct traces of free growth of hair on the cheeks and upper lip. The patient stated that hairs had frequently to be pulled out. The breasts were masculine. The shape of the thorax, hips, and thighs was distinctly masculine.

On examining the genitals, a smooth unbroken surface, somewhat rounded from subcutaneous fat extended from the pubes in front to the anus behind, with the normal amount of hair. But in the median line there was a very distinct linear cicatrix, branching off in front into a small γ shaped fork. The angular flap within the arms of the γ was somewhat puckered, and in the left arm was a minute opening admitting a small probe only, through which micturition was effected. The cicatrix was undoubtedly that of an old incised wound, by which the genital organs had been removed. Through the skin the remains of a penis, the corpora cavernosa, could be distinctly felt. The anus was loose and rather infundibuliform. Bimanual examination per anum and over pubes revealed only the existence of a bladder. No prostate

gland could be made out and certainly no female organ.

The patient was subsequently put under chloroform and the orifice of the urethra enlarged by a free incision, the mucous membrane being everted and stitched to the skin, but it was found impossible to pass a catheter or a sound or even a probe any distance at all. While under chloroform the voice became quite masculine in tone.

The individual evidently was of male sex and had been mutilated possibly so early in life as to have no recollection of the fact. Chevers speaks of this practice of making "Higrabs" as they are called, as formerly of frequent occurrence. The patient had to be discharged from hospital for indecent conduct and was evidently of vile morals.

A CASE OF ENTERIC FEVER.

BY SURGEON-MAJOR H. K. MCKAY, CIVIL SURGEON
Seoni, Chapparah, Central Provinces.

No. 587, male, aged 30, caste Panwar, Hindoo, was admitted into Hospital on the 17th July suffering from fever, which commenced in the middle of the night. His temperature in the evening was found to be 103.2.—He was given a purge.

18th Morning temperature. 100 Evening 102.2
19th " " 99.4 " 102
20th " " 101 " 103

21st. Had two loose yellow motions during the night, and complains of pain in the right iliac region, which is painful on pressure.

Morning temperature. 101 Evening. 103.4
22nd " " 101.8 " 104
23rd " " 101.6 " 104

Complains of pain and tenderness all over the abdomen.

24th Morning temperature. 100.6 Evening 103.4
25th. Had four motions during the night and vomited several times.

Morning. 102.8 Evening 99
Abdomen very painful.