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REVIEW OF DR. CUNINGHAM'S REPORT OF THE
EPIDEMIC CHOLERA OF 1872 *

By JOHN MURRAY, M.D.,
Inspector-General of Hospitals.

As I have had much experience of cholera during the last forty years, and have devoted especial attention to its study in India, I have been requested to review the Report of the Cholera Epidemic in Northern India of 1872, which has been presented to the Society by the Sanitary Commissioner with the Government of India, Dr. Cunningham. I am glad to see him present this evening, and I trust he will favour us by replying to any objections I may raise to his views. I also hope that the interest of this meeting may be increased by our being favoured with the views of those of our members who have given their attention to this subject.

This Report gives an useful topographical account of the chief military cantonments, with tables showing the previous severe attacks since 1826; also tables showing the daily course of the disease among different classes, during its presence; and very valuable monthly returns of the mortality from cholera during this epidemic, amounting to 165,458 over the whole of our possessions in India and Burmah. This report contributes a valuable addition to the History of Cholera, from a knowledge of which, alone, the true nature of the disease can be established. We look in vain for similar reports from the Governments of those countries in Europe, where the disease appears now to have taken up its abode as firmly as in India. These statistical tables are an important supplement to the series which appear in the Annual Reports of the Sanitary Commissioner, and reflect great credit on the ability and zeal with which they are collected by Dr. Bryden.

Dr. Cunningham gives many valuable opinions and suggestions regarding the sanitary condition of the various stations and the improvements required, especially regarding the water-supply, which in many instances is not only bad in quality, but deficient in quantity. This scarcity of water renders the system of flushing drains, employed in Europe, inapplicable to India, where, in many parts, there are intervals of months without a shower. The report before us is a history of one of the severest epidemics that have attacked India since 1817. In judging of the nature of the disease from this history, Dr. Cunningham appears to have arrived at conclusions on certain points from imperfect and insufficient data. He deviates from the ordinary canons of criticism in considering negative evidence as important as positive; and he attaches no value to the opinions of others who have devoted much attention to the subject.

There is a marked coincidence in the period and progress of all epidemics. The disease progresses chiefly in a north-westerly direction, and appears in the same months. The only exception is in the epi-

* Read before the Epidemiological Society.

demic of 1845, when the disease attacked Umballa in the months of July and August, and progressing eastward reached Meerut in August and September; the disease had raged severely in Lahore in 1844, in Peshawur in 1843, and in Cabool in 1842. The present epidemic bears the closest analogy to the Hurdwar epidemic of 1867, of which we have most minute details. In giving its history, Dr. Cunningham appears to have missed a most important link in reference to the dissemination of the disease in the north-west Provinces and the Punjaub. He asserts that no cases of cholera occurred during the annual fair at Hurdwar in this year; but he states that cases of the disease were reported among the pilgrims on their return from it, at the neighbouring stations of Roorkee, Saharunpore, Juggadra, and Roopur, and in the Sealkote district, and in the native states of Jummoo and Cashmere. Dr. Cunningham does not connect the dissemination of the epidemic of 1872 with these pilgrims, as he was led to do in 1867, the accuracy of which opinion he is now inclined to question.

I beg to state that I was at Meerut, in the vicinity of Hurdwar, in 1867, when the cholera appeared among the pilgrims there, and by an official circular memorandum I called the attention of all the medical officers in the north-west Provinces and the Punjaub to this fact, and requested minute details of the appearance of the disease in their districts, jails, or regiments. The assistance of the civil authorities was also obtained, and by these means the correct dates of the appearance of the disease were secured. I received returns from 597 districts and towns on the lines of the returning pilgrims, the details of which will be found in the report I now submit for your inspection. It contains some of the facts on which I have formed my opinion that cholera is communicable by human intercourse, on the ordinary lines of commerce. I have many others collected from trustworthy reports of the disease in India, Europe, and America; but these alone appear conclusive. It is much to be regretted that a similar plan for collecting accurate information was not pursued in the present instance. Here, as on several other occasions of epidemics originating at Hurdwar, and other sacred fairs in India, the disease was not noticed during the assembly, but showed itself immediately after the pilgrims separated, and accompanied them to their homes, thus spreading over the country. It might be excusable to fail to trace the progress of the disease, in either year, from the records in the military and civil hospitals, as these are under exceptional circumstances of quarantine and conservancy. But the progress of the disease, as shown amongst the civil population, furnishes facts which clearly indicate the connection. The coincidence in the course of the disease in 1867 and in 1872 is too remarkable to be accidental, especially when the course of the disease in the intervening years is considered. This is shown in the accompanying table to apply to nearly all the districts, but I have selected ten of the neighbouring and most marked instances, and illustrated them by diagrams, as more easily seen in a casual inspection, such as you can now afford to give.

There is another coincidence in the two epidemics of 1867 and 1872, of which I can give no satisfactory explanation, viz., the exceptional exemption of the central provinces. This was complete in 1867, and the only exceptions in 1872 were Nimar and two neighbouring districts in the south-west part of the province. In 1868-69 the mortality reached 110,671, but it had almost disappeared in 1870-71. There are no reports of the disease in 1866.

1867	74	1870	107
1868	59,284	1871	19
1869	51,387	1872	1592

The above facts are, in my opinion, of great importance in determining the question of the communicability of the disease by human intercourse, and it indicates the little value of negative evidence to find Dr. Cuninghame asserting that there is no proof of communication through human intercourse in this epidemic, on the authority of one hundred out of one hundred and five carefully selected answers from medical officers to his inquiries, who reported that they could trace no evidence of importation. The remaining five who illustrate their opinion by facts are disposed of as the minority. There is a material difference between facts that are not observed and facts that do not exist. If fifty men were to handle a small-pox patient in one of the London hospitals to-morrow, it is not probable that one of them would be attacked by the disease; and yet I believe there is not one here present who does not consider small-pox to be contagious, if I except Dr. Cuninghame, who stated in a subsequent part of this report that it is only contagious under certain aerial influences. It may be said that the individual is protected from small-pox by having been vaccinated, or by having had the disease previously; and the same explanation in my opinion applies to those who escape cholera after contact with a cholera patient; they are protected, not certainly by having had the disease, for that does not prevent a second attack; still, they are protected, and it forms one of the most important branches of the study of cholera to find out what constitutes this source of protection. Perhaps Dr. Cuninghame means that cholera and small-pox are alike contagious, and that both are influenced by season. This is more in accordance with my views; the spread of both is influenced by season in India, but not the same season. Small-pox increases in the hot, cholera in the rainy season. We can with certainty communicate small-pox by inoculation. We can only develop cholera by purgatives, etc. We know various channels through which it may be communicated, but not how to conduct the operation with certainty; and I class small-pox higher in the scale of contagious diseases than cholera.

Besides the individual cases which Dr. Cuninghame has mentioned, on which the five medical officers formed their opinion that cholera is contagious, there were others during this epidemic which he has omitted to notice; and in the report of the Officiating Sanitary Commissioner of the Central Provinces there are facts that would have been interesting. There were 158 outbreaks of the disease in Nimar and the surrounding villages, almost all of which he personally inspected, and found that in 41 instances the first case had occurred in a man who had just returned from an infected place. In 29 instances the second case occurred in the family or among the friends who attended on the first case, and in 17 in neighbouring houses.

There are several objections to the inference that cholera is not contagious being drawn from the inability to trace the first case during an epidemic, independent of the possibility of defective inquiry. We know, from the history of the disease, that it reappears in endemic countries at certain seasons of the year, and it is doubtful how long the disease may remain dormant till recalled to life by favourable circumstances. This endemic influence will generally be allowed to prevail in Bengal and on the coasts of India, and in my opinion it also exists in many other parts where the disease has prevailed in previous years. I have noticed this reproduction in the hospitals at Agra, and I have received many reports of a similar reappearance in other localities, where the disease halted during the cold season, and continued its course when the hot and rainy season set in, in the following year. In my opinion, season has a decided influence on the dissemination of the disease in

India. The accompanying table gives the facts on which that opinion is founded. It shows the monthly admissions and deaths from cholera in different stations of the Bengal Presidency amongst the European troops from 1817 to 1871, amongst the native troops from 1826, and amongst the native prisoners from 1854. The returns from the European hospitals up to 1856 were compiled by me from the records in the office of the Medical Department in Calcutta. The rest are from Dr. Bryden's valuable returns.

Dr. Cuninghame considers, from the evidence of the epidemic of 1872, that the difference in the prevalence of the disease among the European troops and the native troops depends on difference of race and habits. These tables show there are other and more powerful influences in force in so far as the difference between the native troops and native prisoners is as marked as the relative exemption of the native troops and native population. The European troops and native prisoners, who suffer severely, reside in large barracks, and use common latrines; the native troops and civil population reside in separate buildings, and do not use common latrines.*

Dr. Cuninghame devotes much care to the subject, and displays sound judgment in proving that water cannot be the only channel of transmission; but I am not aware that above an infinitesimal number of the medical officers of India, or any other part of the world, are of this opinion. That water is one of the channels of communication is a separate question; and here those who have paid most attention to the subject are equally in accord in the opinion that it may be so transmitted. I do not understand Dr. Cuninghame's statement that no illustration of this mode of transmission can be found in the Bengal Presidency; perhaps, he means during the present year, as no such illustration appears in his report. He surely cannot have forgotten the illustrations of this channel in the Hurdwar epidemic; or the hundreds of other illustrations to be met with in India.

The instances of patients in hospital for other diseases being attacked with cholera, and also of attendants being affected, are numerous in this, as in former Indian reports, whilst there are, as usual, still more numerous instances of exemption. The reports of the civil hospitals in Paris show that, during the late epidemic there, out of 291 cases treated for cholera, 101 occurred in patients in hospital. These facts coincide with the history of the disease, and will have much more weight in enabling us to form an estimate of the nature of cholera, than the escape of hundreds of attendants of which illustrations are given, who are, in my opinion, protected from the attack of the disease by an influence not now definitely determined.

Observations on the subsoil water are now being carried out in the principal stations of the Bengal Presidency, where its distance from the surface of the ground varies, in all the intermediate degrees, from three hundred feet at the edge of the desert at Sirsa and Hissar, to a few feet in Calcutta and Lower Bengal. I have been disappointed not to find in this report the returns on this point which have been made for the last three years. Dr. Cuninghame merely says "that the data procured have not been so accurate as to warrant any conclusion being drawn from them." I have only had the opportunity of seeing the returns from the central provinces; those of 1871 tended to show that

* The native troops in Lahore, Peshawur, and Kokal live in large barracks and use common latrines. The mortality from cholera in these stations amounted this year to 100, while that in the other stations in the Punjaub only amounted to eight.

there was in that part of India no connection between the level of the subsoil water and the progress of cholera. This is more clearly indicated in the report of this year from Nimar, where there was a sharp attack of cholera, commencing at Dhangaou in March, and attaining its maximum in April, and then gradually subsiding ; whilst at Kundwa, in the same district, it attained its maximum in July. The subsoil level varied very little during March and April ; the great change in it took place in the middle of June. Had there been any connection between the disease and the subsoil water, it should have appeared in this widespread epidemic. There is not any difficulty in comparing two simultaneously recorded returns of the water-level and of the existence of cholera in the same locality, and several years of such returns would add much to the valuable reports of the Sanitary Commissioner, and would furnish a mass of facts on which a sound opinion could be formed as to the value of Professor Pettenkofer's subsoil theories regarding the spread of cholera, fever, and other diseases.

The microscopic reports of Dr. Lewis and Dr. D. Cunningham, which have appeared in former reports, are of the greatest value, and the nature of the changes in atmospheric objects which Dr. D. Cunningham is investigating will be very interesting, and I am informed the result will appear in the complete annual report.

One of the greatest objections to inculcating the doctrine of non-contagion in an official Government publication is, that it may be used as an excuse for neglecting those precautions which are essential to the preservation of life, should the disease really be contagious. These are often irksome and expensive, so much so, that many people would rather incur the danger of attack than submit to the inconvenience. In so far as the individual is concerned, he may be allowed to please himself, if thereby he does not endanger others ; but when this proceeding involves danger to the lives of thousands who entrust their protection to Government, individual convenience should be held subordinate to the general safety.

During this severe epidemic, the removal of the troops into camp has, in most instances, been promptly and efficiently conducted, with the most satisfactory results. There has been no increase of other sickness, caused by this measure ; on the contrary, the health of the men was, in several instances improved ; as it has been on former occasions where the removal was well managed. In some instances the disease clung to the party, but in general it was shaken off. In twenty-eight instances of removal there was not a single fresh case after leaving cantonments. In six removals, cases appeared on the first day, and in two on the second ; but out of thirty-six instances of removal given in this report, there were in all only nineteen cases of cholera among the men after they had left cantonments. Out of these thirty-six instances, in fourteen the distance moved did not exceed one mile ; in thirteen it was from one to five miles ; in five, from five to eleven miles ; more extended moves were only made in four cases. Dr. Cuninghame states that in his opinion the chances are against any such slight change being successful. This opinion is not supported by these facts : and it is also opposed by numerous instances given in this report, where simply moving the inmates to another barrack, when a first case appeared, arrested the spread of the disease. Removal of troops from an infected locality is one of the most important measures adopted by any government, in the treatment of cholera. It was instituted on the principle that the disease is contagious, and communicable from the place which has been vitiated by the presence of the disease. The result, for years, has been most successful in saving life, and I regret to see the correct-

ness of the views, on which this measure is founded, now called in question. So doing, must influence those who have to carry out measures that are disagreeable, and to which they themselves object. Promptitude is essential to the success of removal, and inability to detect the early presence of the disease must lead to dangerous delay. The reports of medical officers ought to be above suspicion, but, in some instances here noted, every case reported proved fatal ; in others, cases of congee-vomiting and purging, with collapse, were not recognised as cholera. It was to obviate local influences, or ignorance like this, that the responsibility of determining the period of removal was placed on the Deputy Inspector-General, or the senior medical officer at the station. A delay of two or three days may allow a whole regiment to become impregnated with the disease, which might be avoided by promptly evacuating the infected locality. In one of the stations, it is noticed in this report that there were fifty cases and forty-eight deaths, of which only two took place after the troops left cantonments ; and, in another instance, there had been twenty-nine cases in cantonments, and with the removal the disease entirely disappeared. Again, at Meerut, there were sixty cases in the artillery, of which only four occurred out of cantonments. Doubtless, these cases of neglect to obey the orders of Government have been brought prominently to the notice of the authorities. In severe epidemics, Dr. Cuninghame recommends extended movements to places less under, what he calls, "the prevailing influence." I may be mistaken in supposing that by this prevailing influence he means Dr. Bryden's aerial theory, but I cannot be wrong in thinking that the result of slight changes, in this, as in former epidemics, has been very successful ; for it is shown by the facts given in this report. In my opinion, the vitiated building, which the men occupy, is the greatest source of immediate danger, and Dr. Bryden's aerial prevailing influence is a chimera, with no more solid foundation than the "baseless fabric of a vision." In four instances here mentioned, the troops were moved from thirty to a hundred and sixty miles by rail with equal advantage as in the shorter moves. There were only three subsequent cases ; one on the first day ; one on the second, and the third some days later. Where available, this mode of removal was strongly recommended in my earlier reports, as it is attended with little fatigue to the men, and they can be conveyed, without danger, to any eligible site within a hundred miles. This is a special advantage during the rainy season, in several of the stations in the Doab and the Punjaub, where the surrounding country is much under water. Removal of troops is a delicate operation, troublesome at all times, and dangerous when ignorantly conducted ; but, nevertheless, a powerful precautionary measure in India ; and it may, with equal advantage, be adopted for troops affected by the disease either in Europe or America.

There is much truth in many of the observations of Dr. Cuninghame, on the great inconvenience of the quarantine regulations which have lately been introduced into India. They are strongly objected to by the people, and very generally evaded. They create a desire for the concealment of the disease, and this feeling will probably account for the omission to report its existence, and the absence of any notice of the deaths of Hurdwar pilgrims from cholera in 1872, except in three or four towns on the line towards the Punjaub, though the disease subsequently appeared over the whole country, in the same manner as in 1867, when it was strictly connected with their advent. Such omissions are beyond control, but they are much to be regretted. It is true the present quarantine regulations have proved inefficient, but that does not

prove that in all circumstances they have been useless, or that they may not be improved so as to render their benefit more than commensurate with the trouble and expense they entail, though they may not always ensure a perfect protection.

Quarantine is essentially a medical question, dependent on our knowledge of the nature of cholera, its method of diffusion over the world, and dissemination in the vicinity of the affected, and the nature of the surrounding objects which promote or impede its multiplication. But it has an important mercantile influence, as its measures cause delay in transmission of goods, and it costs much money. It has also a political aspect, as it affects the intercourse between different countries. It likewise involves a social element of which we hear very much, viz., the personal inconvenience of travellers, and the domestic misery which it may entail on families. Here is a powerful array of opponents; and our only defence is philanthropy and the desire to save life, and sometimes lives, where it would be economy to provide coffins. The inconveniences of quarantine regulations are palpable, and naturally render them distasteful to the unthinking public, who have much influence in directing the measures of their government. I fully concur with Dr. Milroy that those now in force, in all countries, require revision, based on a true knowledge of the nature of the disease. If the disease be not contagious (I revert to the old term as implying both direct and indirect transmission), all quarantine restrictions would be not only expensive and vexatious, as they undoubtedly are, but also useless, as is the opinion of some high continental authorities, and which appears to be sanctioned by the two eminent British authorities, now present, whose views I have the honour of criticising. The basis of my argument in favour of quarantine is, that cholera is contagious (under the meaning I have defined), and I feel a difficulty in understanding the constitution of a mind that can resist the overwhelming evidence which the observation of the course of the disease all over the world, since 1817, has produced. With such a mind, facts can have no value; but as there are some of this opinion still, I would wish to convince them by referring them to the practical results that have arisen from the imperfect measures adopted, under the impression that the disease is contagious. I shall chiefly direct your attention to the results in India, where my experience extends, leaving out the facts accumulated in Europe, and at Staten Island in America, as you have had better means of judging of them than I have.

The medical returns in the present report of 1872 amply confirm the returns of former years, since quarantine was introduced into India in 1862. I would repeat that the system is confessedly imperfect, and supposed to be frequently evaded, but it never claimed to give perfect protection, and its action may be improved. The accompanying table shows the effect of quarantine on the dissemination of the disease amongst three classes who were subject to its control, compared with its prevalence among the civil population, to whom its regulations could not be extended. This table only gives the returns of 1872, which may be called an epidemic year, and of 1871, which was a non-epidemic year. If I find time I shall add the five previous years. Each class is subdivided under four heads, showing, first, where no death occurred from cholera; second, where one death occurred; third, where two deaths occurred; fourth, where more than two deaths occurred in protected localities. It thus appears that in these, 78.49 per cent. escaped entirely; 6.89 per cent. had one death; 3.94 per cent. two deaths, and only 10.57 per cent. had more than two; whilst, in the unprotected class, there were only 7.55 per cent., with less than fifty deaths;

3.77 per cent. with from fifty to one hundred deaths; 5.66 per cent. with from one hundred to two hundred deaths, and 83.03 per cent. with over two hundred deaths.

When I was in India, I received reports in numerous instances from the Deputy Inspectors-General of Hospitals that the disease was raging severely in the district, whilst there were no cases in cantonments. In all the protected localities, the sanitary arrangements were as perfect as practicable—certainly much better than in the towns and villages of the district; and I consider that it was owing to these most valuable arrangements that the dissemination of the disease was limited in those instances where it found access, and was followed by only one or two cases. At the same time, it must be remarked that the relative mortality in these protected places was much higher, especially among the European troops and native prisoners, than in the unprotected places; and also that it varied materially between the native troops and native prisoners, with whom the sanitary arrangements were in full and equal force. This proves that sanitary laws alone will not regulate the mortality of cholera, and furnishes one of the facts on which my opinion is formed of the contagious nature of the disease. The relative number of the inhabitants in the unprotected and protected classes differs very materially; but this would not account for the difference in the ratio of attacks in the localities—*i. e.*, 78.49 per cent. exempted in the one case, and only 11.51 per cent. in the other. The importance of exclusion cannot be over-estimated, when it is considered that the presence of one case may originate a wide-spread attack.

There would be little difficulty in selecting a large number of cases from the present epidemic, where there was a very high mortality in the district, whilst there was total exemption in the jails. In twenty of the jails, in twenty of the districts most severely affected, there was not a single death from cholera, while the mortality in the districts amounted to 56,914. This is positive evidence, which is incompatible with the aerial theory, and forms but a fraction of similar instances to be found in Bryden's tables of the present and former years. The returns in this report clearly indicate that the present quarantine regulations are inefficient in protecting open towns in a commercial country, and that they ought to be abandoned there; but they also show that these regulations are valuable as far as they can be efficiently applied; the exemption being most complete in the jails, where, among the native prisoners, it amounts to 84.38 per cent., whilst that of the European troops is only 68.12 per cent., and that of the native troops is intermediate, *viz.*, 73.46 per cent.; clearly proving that quarantine, under certain circumstances, may be employed with advantage. An island is under favourable circumstances for an efficient quarantine, as the only entrance of the disease from a foreign country must be by ships at a port. When the disease is already raging in the interior, external quarantine can be of little value; but cases suffering from the disease should not be allowed to land in any healthy port, and, in all cases, floating accommodation should be provided for them.

I most fully concur with Dr. Milroy in the necessity of a revision of the present quarantine regulations, and agree that it would lead to more definite results if conducted by a small body of well-selected men, than by a numerous and foreign congress. But it must be instituted by Government to give its opinion weight, and also to give it the means to render that opinion valuable.



