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Dated 15-8-1870.

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MEMORANDUM by the ARMY SANITARY COMMISSION on DR. BRYDEN'S Report on the Cholera of 1866-68, and its relations to the Cholera of previous epidemics in India.

This Report is a valuable contribution to the epidemiology of India. It contains a large amount of extremely interesting detail on the subject of cholera, extending over many years, including the first connected view of epidemics of cholera in Bengal, with detailed statistics, for British and Native troops and for jails.

The statistical data are deficient in some necessary particulars. For instance, there are no statistics of cholera among the Native population, such information not having been in existence, and there are in the Report no detailed statistics of cholera for Bombay and Madras Presidencies capable of being usefully compared with these for Bengal. Without full statistical information, such as we have asked for in our Instructions for the Indian Cholera Enquiry, the law of movement of cholera cannot be accurately arrived at, and the absence of these data renders it necessary for us to suspend our judgment on Dr. Bryden's views for the present.

The general statistical arrangement adopted by Dr. Bryden includes the following data for British and Native troops.

1. Years of epidemics.
2. Stations attacked in each year.
3. Strength of troops at each station.
4. Monthly admissions and deaths at each station.

The jail statistics include corresponding data, and are partly placed in the text.

Besides these general tables, there are numerous summary and analytical tables giving the details day by day of specific outbreaks of cholera in regiments and jails, and showing the death rates to strength and to cases.

A few tables showing the influence of rainfall are introduced, but the meteorological data are generally deficient.

There is little or no information on the sanitary condition of stations.

The influence of meteorology on the progress of cholera is fully acknowledged, and the probable effect of bad sanitary condition and locality in augmenting the severity of attacks is admitted, as is also the influence of personal communication. But all such influences are considered by Dr. Bryden as subsidiary and subordinate to other laws of epidemic movement.

The view generally held by the author on this point resembles that held in Europe, viz., that there is a movement of epidemic cholera independent of all conditions, but the existing state of sanitary improvement in India does not yet appear to have shown to what extent the fatality of epidemics among a population depends on the conditions under which the people live, and hence Dr. Bryden subordinates the conditions to the general law of movement, which his report is intended to illustrate.

The law of movement is arrived at through the statistical data.

From what has been already said respecting the nature of these data for regiments and jails, it will be seen that the dates at which cholera has appeared at any station or jail over the North of India can be obtained, and in this way the movement of cholera in time and space from its beginning to its termination, so far as regards stations at least, can be shown. But without the evidence which would be afforded by statistics from other Presidencies and Governments, including statistics of the Native population, it is evident that the data from regiments and prisoners cannot by themselves be accepted as affording all the information required on the movement of an epidemic. The military or jail statistician may be able, in his own estimation, to fix the precise date of the arrival of an epidemic, from his hospital books, while cholera may have passed the locality long before, and be many miles ahead in its course among the Native population. A similar remark applies to the termination and resuscitation of an outbreak. Again, while the statistician in the North of India may be dealing with one group of facts, there may be phenomena in progress in the South which would materially influence his conclusions.

We have stated in our "Instructions" what appears to us to be the only true principle on which such an investigation can be carried out, as follows:—"Epidemics seize on all classes of the population, and no trustworthy information can be obtained regarding the movement of epidemic cholera except by including all classes in the same general statistical inquiry."

Taking Dr. Bryden's data as they are, we shall next proceed to state generally the principles at which the reporter has arrived. But in doing so, it is necessary to premise that, from certain obscurities in style in parts of the report, it is not always easy to follow the author's reasoning.

A line drawn along the 86th meridian of east longitude, from the mouths of the Mahanuddy to the roots of the Himalaya, and another line parallel to this, drawn from the north-east

11921.

*Referred to in Sanitary Letter to
Madras, No 7, dated 14th July 1870.*

angle of the Bay of Bengal to the Himalaya, will form the western and eastern boundaries of a great tract of country, with an area of about 122,500 square miles, having the Himalaya for its northern, and the sea for its southern limit. It is the country of the great waters, and contains within it the deltas of the Mahanuddy, Ganges, and Bramahpootra.

This great district is, in Dr. Bryden's view, the perennial home of Indian cholera. It was first recognised as a mortal disease within this area. It always exists in its endemic condition within this endemic country. It never dies out, it appears and disappears at different points, and at different seasons, and sometimes even within this area, it becomes epidemic, without necessarily passing over the ordinary endemic limit. Its climatology is peculiar. The whole region is under the influence of the sea board. It is a region of perennial moisture, from drainage of its own hills and from river outlets. Its rainfall is double that of any other province in Bengal Presidency. It receives the full force of the monsoon. Ground moisture is always within a few feet or inches of the surface. Vast tracts are under water every year until the cessation of the monsoon and the fall of the rivers permits the ground to rise above the water. "It is with the inundation of these tracts that cholera disappears; it is with their re-appearance that cholera re-appears upon the diluvial soil and districts adjacent, immediately invaded by it."

Besides cholera, the population of this endemic area suffers intensely from the whole group of miasmatic diseases and their consequences.

It may be stated here, that Colonel Henderson showed, that of the third of the Bengal Native Army serving in Bengal proper, the mortality was greater than of the two-thirds occupying the plains to the north-west.

It is the weak point, so to speak, of India, and from among its teeming population spring up those "bodies of cholera," as Dr. Bryden defines them, which overflow the boundary from time to time, and commence their destructive march towards the north-west, or west, or south-west, east, or north-east, overflowing at last the boundaries of India and invading the regions of Asia, Africa, and Europe which happen to be in their course.

Much cholera within the endemic area bodes danger to the districts beyond it.

Little cholera within the area is unfavourable to epidemic advance.

Dr. Bryden appears to hold the view that all cholera occurring outside the endemic area is invading cholera. It is a cholera which originally came from the endemic area. It may have apparently disappeared and died out, and its re-appearance, if this takes place, is simply a revival of the original body of the invading cholera. Such a revival outside the endemic area may itself become the starting point for further progress of cholera into the regions beyond.

India is thus to be considered as divided into an endemic area and epidemic areas. The phenomena may differ in the epidemic areas, but they are to be considered as epidemic phenomena nevertheless.

In the present state of knowledge, Dr. Bryden considers that the ultimate cause or *materies* of cholera, whatever this may be, comports itself more like an organized vitalized body than anything else. That it has a period of growth, existence, decay, re-vitalization, and death, and that these states are under the influence of time, place, and atmospheric conditions.

Hence he holds that when any station or district, outside the endemic area, is attacked with cholera, with intervals or seasons of entire cessation, the fact is not to be interpreted as showing that cholera is endemic in the station or locality, and has broken out afresh at each increase. He holds that these variations in intensity are influenced by season or by monsoon influences, or by rainfall or winds, but that they are all part of the original epidemic invasion of the country.

The epidemic itself is made up of these periodical appearances and disappearances, and the *materies* of which it consists may be augmented from time to time by fresh invasions from the endemic area.

The direction which any epidemic may take depends on the point at which cholera overflows the endemic boundary. If this is towards the north-west it would follow the Ganges valley upwards. If towards the west, it would seize the Hazareebagh plateau, and proceed westwards. If towards the south and west, it would cross the country towards Bombay.

Cholera epidemics proceeding westward would continue their course until met by the south-west monsoon, and would then be turned northward by the atmospheric influences.

The arrest of cholera at any part of the Indian frontier will depend on the strength of the body moving, and on conditions favourable or unfavourable to its onward progress. It might stop anywhere when exhausted.

A westward moving cholera is the one which under favouring conditions would pass into Arabia, Africa, and Southern Europe; while a cholera moving to the northward would invade Persia and Russia.

Dr. Bryden considers that the whole bearing of the cholera miasm has a remarkable resemblance to that of the miasm producing malarial fevers, only that it has its own specific character. He holds that cholera miasm may exist without population. That the existence of population is only the condition under which its presence is manifested; that it will cross unpeopled deserts and attack the districts beyond, if lying in the direction in which it is progressing, and hence that all attempts to arrest its course by quarantine must necessarily be futile; that once started on its course it must fulfil its life period, which, for Northern India, appears to be four years.

There is a most interesting series of maps in the Report, illustrating the laws of progress of cholera as deduced from the available statistics over the north-west and west of India.

These maps show cholera always present within the endemic area already described. In the first year of its epidemic progress it is shown as overstepping the endemic boundary, and occupying a certain region of country to westward. Next year, as occupying more ground; the third year, as still progressing, but occupying some of the older ground with less intensity, and during the fourth year reaching its most distant limit from the endemic boundary, while the district immediately outside the boundary which was first attacked is free or nearly so.

The next epidemic shows a fresh outbreak on this exempted district, and then a progressive course west and north-west as before for the next four years.

Dr. Bryden appears to consider that the force which moves an epidemic of cholera is the wind. He doubts altogether the alleged fact that an epidemic has ever progressed in a direction contrary to the wind; a resuscitation of cholera in any direction contrary to that of the wind would, in his view depend on some other cause, possibly a re-vitalization of part of an epidemic which at the very time is moving with the wind.

The course taken by the epidemic in any particular district or province will be modified by local geographical or topographical conditions or by meteorological causes of a temporary nature, but all will be subordinate to the great onward primary movement and the force which guides it.

Among subordinate conditions influencing the local course and local severity of an epidemic progressing in obedience to the great primary movement, Dr. Bryden ranks all those causes included under local sanitary condition, local topographical causes, such as wet or marsh land, local rainfall, changes of temperature, great stillness of atmosphere, personal communication, bad personal habits on the part of troops, intemperance, general want of cleanliness, fatigue, terror, alcoholic poisoning, and the like. He adduces cases which appear to him to prove communication from persons to persons of cholera; but communication would not, in his view, influence the movement of the epidemic itself, which is subject to other laws altogether.

On the other hand, he brings forward long experience in the hospitals of Calcutta within the endemic area, and also of hospitals elsewhere, to show that apparent communication of cholera from affected patients to attendants or to other patients is a rare occurrence, if it ever really takes place.

He calls in question all the recent popular theories of epidemic cholera, and shows that none of them can account for the facts of epidemics. He shows that the dry-earth system, from which so much was expected on account of its supposed more complete disinfection of cholera excreta, had led to no apparent result as regards this disease. He sets aside the decisions of the Constantinople conference regarding the movement of cholera, as not being in conformity with facts. Dr. Bryden adduces some most interesting, though melancholy, facts, showing the influence of cholera on different races attacked at the same stations and at the same dates.

The general results are as follows:—

Attacks per 1,000:							
European troops -	-	-	-	-	-	-	89.20
Native troops	-	-	-	-	-	-	9.56
Died per 1,000:							
Europeans	-	-	-	-	-	-	53.68
Natives	-	-	-	-	-	-	4.11
Died out of every 100 cases:							
Europeans	-	-	-	-	-	-	60.19
Natives	-	-	-	-	-	-	43.02

Goorkhas suffer even more than Europeans from cholera.

These figures represent the terms of the great problem which has to be studied and solved in India.

If cholera depends on a specific cause, what is the reason that it is 13 times more fatal to one class of men than to another? And can we by any procedure reduce the mortality among British and Native troops serving at the same station to the same figure?

Dr. Bryden makes a few important suggestions, and brings forward a few facts on the subject which merit consideration.

The history of cholera and its origin within the endemic area has never been studied. This should certainly be done at once. It would be a special application of our instructions if it were undertaken.

Dr. Bryden has adduced strong reasons for anticipating that the severity of epidemics in India would be materially diminished by attacking cholera in the endemic district. If the waters of this great area were brought under some control; if wet parts were drained; if the localities where cholera is ever present were specially dealt with; if above all things this rich province were to be placed under improved culture and its malaria exchanged for useful produce, should we have reason to anticipate less cholera, or even its extinction?

This is a question to be specially dealt with in India; it can only be hinted at here as an apparent induction from Dr. Bryden's facts.

Another striking class of facts is the exemption from cholera of well wooded districts, and increasing liability to the disease apparently in proportion to the denudation of the country.

Allied to this class of facts is the practice successfully followed by Native villagers of flying to the jungle for safety during cholera seasons.

The greater sub-division of Native than of European regiments, from the practice of Native hutting, is another point worthy of notice.

Cholera is stated to have appeared in double-storied barracks in India, but Dr. Bryden shows that for seven years the new lofty barracks in Fort William have enjoyed comparative immunity from cholera.

An important fact, as bearing on the probable effect of keeping masses of men aggregated on a small surface in augmenting the severity of cholera, is that Native troops crowded together in boats appear to suffer as great a mortality as European troops in barracks.

The argument from this class of facts bears on the necessity of separation among men when cholera is expected, sowing them, as it were, broad cast over the ground.

Dr. Bryden adduces striking proof of great loss of life from increasing the number of men in a barrack during cholera times.

These are the main practical points in the report, which, it must be borne in mind, has for its object ascertaining the laws of movement of cholera, rather than suggesting means of diminishing its mortality. If our "Instructions" for the Indian Cholera Enquiry are rigidly followed, additional light will be thrown on all the questions dealt with by Dr. Bryden, as well as on many other questions beyond the scope of this valuable report, which, in addition to its special object contains a large number of facts of great interest to all engaged on similar enquiries.

War Office,
20th May 1870.

Sanitary
No 7.

India Office
London, 14th July 1870.

My Lord

I forward herewith, for the information of Your Excellency in Council, Ten copies of a Memorandum by the Army Sanitary Commission on Dr. Bryden's Report on Epidemic Cholera.

I have the honour to be
My Lord

Your Lordships most
obedient humble servant,

His Excellency
The Right Honorable
The Governor in Council
Fort St. George

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Public No 5
 Sanitary
 14th July 1870
 The Letter to Fort St George
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