

On the epidemics of the Bengal and North-West Presidencies / by K. MacKinnon.

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ON THE EPIDEMICS OF THE BENGAL AND
NORTH-WEST PRESIDENCIES.

BY K. MACKINNON, Esq., M. D.,

BENGAL MEDICAL SERVICE.

SINCE I last wrote on the subject of the epidemics of this climate, the same class of diseases have engaged much of the attention of the profession in Europe, where some new theories have been propounded as to their predisposing and exciting causes, which theories may be supported or contradicted by considering them in connexion with the history and progress of the epidemics of Bengal, and the provinces which now extend to the banks of the Indus. In again dealing with the subject, it will be a chief object to allude to such measures as have been adopted for diminishing the severity of epidemic visitations, and to such as seem yet practicable and desirable for the same purpose.

The subject may be divided into three heads:—1st, the exanthemata;—2nd, climatic epidemics, including such as depend upon the variations of the season and other features of our climate, ardent cartarrhal, intermittent, remittent fevers and dysentery;—3rd, the pestilential epidemics, which division will include cholera and the malignant fevers, which, whatever their exciting causes may be, have a clear and manifest difference in character from the marsh fever, even when that is seen in its most violent form of jungle fever. The Pali-plague of past time, though not very remote, the Mahamurree of Kumaon, it would seem now indeed of the the district of Rohilcund, and the epidemic lately, if not now prevailing in the neighbourhood of Peshawur, may surely be called pestilential epidemics; and seem deserving of separate and serious consideration.

Of the three exanthemata, strictly so called, namely variola, rubeola and scarlatina, the first or the typical one, is that which usually prevails. On the subject of small-pox and vaccination, there is much information scattered over the various periodicals formerly published in this country, and

in the Reports of Drs. Cameron and Stewart published in 1831 and 1844, respectively; the facts then known, will be found ably submitted to the profession, but I think it will still not be unprofitable to go at some length into the interesting, scientific and philanthropic questions, which suggest themselves in the investigation of the local peculiarities of small-pox and vaccination in this country, whether the effect of climate or of the social habits of the people, and I anticipate that what I write may be found worthy in an especial manner of the notice of those who have lately entered, or may yet have to come, upon the wide field of observation and usefulness which the Bengal Medical Service offers. History informs us that small-pox was unknown in European countries before the eighth century, and that it had found its way from the east. In India it certainly seems far more influenced by the seasons, thus showing an endemic character. Though met with in all the cold months, February, March, and even the first fifteen days of April may be said to be its especial time, though in seasons of severe epidemic visitation it will continue till the rains set in. Its entire disappearance, as I believe is the case in our rainy season, naturally raises the question by what means it again shows itself. I must express my own belief in spontaneous origin, for the fact of a total disappearance must, I think, be admitted, and we know that the artificial means of production, even where practised, is never resorted to before the middle of January. In the instance of another exantheme, measles, we seem to have a stronger proof still, that these diseases may have a spontaneous origin, for I believe I shall be borne out in stating, that in Calcutta, and certainly in other parts of the country, many consecutive seasons pass without the occurrence of a single case of rubeola among the European community (of natives we cannot speak so positively); and where, I may be permitted to ask, can we draw the line between the constitutions of the atmosphere that make measles rife one year and dormant, or all but dormant, another, and a state of things which might cause the spontaneous generation of small-pox or measles poison? Professor Alison, in his very able article in the 26th number of the *British and Foreign Medico-Chirurgical Review*, appears to me to prove that though typhus is usually the effect of a specific, contagious and communicated poison it sometimes has a spontaneous origin.

In the 21st No. of the Review just named, there is a paper by Dr. Carpenter on the predisposing causes of epidemics, in

which it is argued, that the ingestion, non-elimination or increased production within the body of azotised substances in a state of retrograde metaphorphosis act as predisposing causes of zymotic diseases. Now, it would appear by what we observe, that the predisposition to small-pox, though Dr. Gregory denies that it requires any predisposing cause, lies in the opposite state of constitution to that pointed to by Dr. Carpenter. The young, the florid, and full-blooded appear to be predisposed to the action of this poison in an especial degree.

It has long been observed that the appearance of small-pox in the end of the cold season, applies *especially* to the North-West Provinces, where also, it is interesting to observe, the vaccine disease is influenced by climate in a similar manner.

It is often of course difficult to say, whether the disease has been the consequence of inoculation, or has arisen naturally, but it would seem that there are some parts of the country where inoculation is not practised, and yet there too, the disease shows the usual influence of climate, and what is more instructive still, although doubtless men who make a livelihood by the practice of inoculation are at work every year, it is only from time to time that the disease breaks out as an epidemic. Thus in Dr. Stewart's Report, we have the records of three epidemic outbreaks, in 1833, 1837 and 1844, in Calcutta,* and though there the disease prevails throughout the cold season, the period of intensity is the same as in the Upper Provinces, February, March and April. We have all the varieties of the disease that are known in Europe, the distinct confluent, petechial horny &c. &c., but when I was in charge of the jail of Tirhoot, I could not fail to be struck with the facts, that prisoners from the Nepaul frontier (Hill people in fact) were exceedingly prone to the infection of small-pox, and when attacked, liable to its most dangerous forms. I then recollected, that when in charge of the Hill Rangers at Bhoglipore, I had seen small-pox prevalent and dangerous, and on subsequently visiting some of the Hill stations, I have been struck with the relations of the awful fatality with which small-pox visits the inhabitants of the Hills.† Connecting these facts with what had previously been published on the comparative mildness with which what was supposed to be degenerated

* And again in 1850.

† The vaccine disease in like manner is stronger among the inhabitants of the Hills.

vaccine virus, appeared in the natives of Hindustan as compared with Europeans, and the recent statistical facts given by Dr. Bedford in his interesting paper on vaccination and inoculation in Bengal, it seems to me a warrantable inference, in the absence of full statistical data on either side, that, in comparison with other races of the human family, those inhabiting the plains of Hindustan are mildly affected by variola, and that this may perhaps be the reason why the vaccine disease is so unsuccessful among them, as it may possibly be an argument, why inoculation ought not to be discouraged.

The whole question of vaccination, as a great protective agent for the mass of our Indian population, is beset with doubt and difficulty, and these have by no means been diminished by the facts disclosed by Dr. Bedford in the very interesting paper he published in the first Number of the *Indian Annals of Medical Science*. By Dr. Bedford's inquiries, it is established that in three districts of Bengal, the people protect themselves from the infection of small-pox by the practice of inoculation, in the large proportion of 85 per cent., and he has adduced strong arguments to show, that this amount of protection is secured with a comparatively small loss of life. It is moreover true, that the practice of inoculation is by no means confined to the districts named in Dr. Bedford's paper, but prevails, it is well known, over the districts of Bengal and Behar. It is indeed stated by Dr. Bedford that inoculation is not practised in the North-West Provinces, but, although this statement is supported by the authority of several medical reporters, I must confess my doubt of its entire correctness; yet if only partially true, the circumstance is not a little surprising, when we consider that inoculation was, as is well known, received into Europe from the Turks.

In the present state of the question, and with reference as well to the opinions which appear to be gaining ground in Europe, as to the peculiar difficulties attending successful vaccination in this country, it would be extremely desirable to ascertain the real extent to which inoculation is practised in the several districts of the Bengal presidencies,* and where the line of demarcation is to be found, showing on one side the success of vaccination, that is said often to

* I am glad to be able to state that, since the above was written, the Medical Board have called for returns from the zillah jails.

prevail in Bengal during the whole year, and on the other side, the inability to produce genuine vaccination save in a very few months. The said line, it may not be expected, will be a very definite one, but I apprehend it will be found in Behar, where there is, as it were, a meeting of the Bengal and Up-country climates. Many of my readers must have witnessed in that part of the country in the early part of the hot season, what the natives call the *doruss*, an easterly humid wind prevailing steadily up to 12 o'clock at noon (the Bengal climate), from which time it blows hot and dry with equal regularity from the west-ward, (the North-West climate.) The opinions to which I have alluded as gaining ground in Europe, on the subject of the comparative merits of vaccination and inoculation, have been promulgated chiefly by Dr. Copland, and the late Dr. Gregory. The figured statements adduced, leave no reason to doubt, that the occurrence of small-pox after vaccination, and even to all appearance successful vaccination, is far more frequent than was at one time supposed. Out of 3,422 cases of small-pox, 1,753 had distinct marks of previous vaccination. But it is equally shown that vaccination greatly reduces the rate of mortality in those who are subsequently attacked with small-pox. Of the 1,753 cases marked above, the mortality was 7 per cent.; of those unprotected, amounting to 1,669, the mortality was 36 per cent., and this is one great practical fact. The argument of Drs. Copland and Gregory is that, while small-pox inoculation is more protective, the mortality which arises from it is so small as scarce to deserve calculation, certainly in England not more than one in 500, while the danger of infection to others might be prevented by proper police regulation, and would cease if the practice was universal. It is a futile argument to say that this would be a retrograde movement. No movement can be called retrograde, which would be for the good of society and for the interests of humanity. In England, inoculation has been suppressed by penal enactment, while vaccination has been rendered compulsory. Even if we concede that these are just laws for the country in which they have been enacted, we have yet to consider the question, as it bears upon the interests of the vast population of the Bengal and North-West Provinces, and we would deal with it, not in a spirit of controversy, but with an earnest desire to arrive at the truth.

In the year 1850, a committee was appointed by the Bengal Government to report by what means the extension

of small-pox can be prevented, or rendered less destructive, and one opinion emphatically expressed by them, is as follows :—

“The Committee are happy to be able to assure his Honor, that nothing has transpired in the course of their inquiries, which has tended to shake in the least degree their unbounded faith in the specific power of vaccination as an antidote and a modifier of small-pox. It is the opinion of every medical man we have consulted, and we believe, it is that of every educated man in India, that, properly and successfully conducted, vaccination is just as efficient a safeguard here, as in England, and the appendix to this report contains numerous striking testimonies to this effect; but the committee deem it unnecessary to occupy his Honor’s time with abstracts or details of these, since more than half a century’s trial of vaccination in India and in every part of the world, has not shaken the well-established validity of its original claims, and at the present day, these can neither admit of question, nor require confirmation.”

I am bound to say, that this statement does not accord with the result of my individual experience, and I believe myself justified in asserting that it is opposed to the general opinion held by the profession in India at the present time. Not only does it happen that individuals who seem to have taken the genuine vaccine disease are afterwards attacked with small-pox, often in a severe and sometimes in a dangerous form, but it would seem that persons coming from Europe are less protected by previous vaccination, than if they had remained in a colder climate.* In seasons of epidemic small-pox, it is exceedingly common to see young persons lately arrived in the country seized with it, and we have it stated by Dr. Macpherson, that out of 30 cases of confluent small-pox, treated by him in one year at the General Hospital, Calcutta, 25 had been vaccinated and 20 died. Of the 76 cases admitted, 41 were vaccinated and had good cicatrices, 10 were not vaccinated, remaining 25 vaccinated, but cicatrices not well marked.

Dr. Gregory, whose experience was so large in this matter, recommends the re-vaccination of all young people going to, or returning from India, though in another place, he seems to throw doubt over its advantage. It is but fair, however,

* I have grounds for stating that, the army returns would fully bear out this statement, and can but regret the limit of time for collecting the figured proof; all soldiers enlisted are vaccinated when there is no good cicatrix.

to state, on the other side of the question, as the result of inquiries made by the Madras Medical Board, that amongst the entire native army, for ten years ending 1838, from an aggregate strength of 568,403, the cases of small-pox recorded, numbered only 415, and the deaths 42.* This would tend to a suspicion, that vaccination protects a native more in this country than it does an European. More definite information on this subject is greatly to be desired. But, if we concede that a good vaccine vesicle is as protective here as it is in Europe, and surely none will assert beyond this, we have by no means disposed of the whole question. We have yet to consider three or four circumstances which oppose themselves to the successful diffusion of vaccination in these provinces:—1st, the prevalence of the practice of inoculation;—2nd, the liability of vaccination to degenerate in quality;—3rd, the difficulty of keeping up the vaccine disease in some parts of the country;—4th, the prejudices of the people, independent of the preference they give to the practice of inoculation; and lastly—the enormous pecuniary outlay which would be required to ensure an efficient and universal system of vaccination. When we see, that the part of the country where vaccination has hitherto been successful is also that in which inoculation is extensively practised, we might infer that the last did not retard, even if did not encourage the other,† but the fact seems to be, that in Bengal, the people are more subservient, and for that reason submit more readily to be vaccinated; besides which, there is less difficulty in producing the vaccine disease.

The liability of the vaccine disease to degenerate in this country cannot be denied, and numerous reports prove it, but I think it is also true, that in some instances real variola has been mistaken for spurious vaccination. The common degeneration is into a spurious progress of the puncture, irregularity of time in maturing, and the puncture often running into a small pustule about the 5th day after the operation.

There have been other instances, in which an angry sloughing sore has succeeded vaccination, ending fatally in one or two instances. Such cases we are disposed to consider may be owing to peculiarity of constitution in the recipient.

* Considerably under one attack on the thousand, less than one-tenth of a unit of mortality.

† Of course, in the districts where inoculation is practised, a large proportion of the people are not available for vaccination.

Whether vaccine ever degenerates to the extent supposed by Dr. T. W. Wilson and others, so as to produce a communicable disease, resembling or identical with small pox, is a graver question, which I now propose to consider. In a small pamphlet he published in 1848, Dr. Wilson gave a number of instances occurring in his own experience, and that of others, where vaccination was supposed to have produced fever and eruption, and from these again a fatal disease was communicated. The question to put here is,—was the disease from which the children were punctured vaccine or variola, or a mixture of both? It appears to me that the very fact of a mortal disease having arisen from it, is in itself proof, that it was the variolous poison. If the cases had not been so numerous, we might suppose, that, as clearly happened in the case given by Dr. Wilson from a Report by Mr. W. Ross, the small-pox infection was separate and unconnected with the vaccination. In 1848, the following occurrences came under my own observation at Cawnpore:

Two children of an Apothecary were vaccinated with a crust I had obtained either from Calcutta or Simla, I now forget which; on the 8th day, both children were brought to me, that I might choose from which to vaccinate my own child. I selected what I considered the best vesicle, but the operation failed. Three days after this, the child I had not selected, but which nevertheless had to all appearance a fair vesicle, was seized with violent fever and died of small-pox, which was prevalent at the time. This was clearly a case of small-pox depending upon infection, for, from the other child, many were vaccinated successfully. At the same station in 1849, an Officer's child died of confluent small-pox, a few weeks after it had been, as was supposed, successfully vaccinated. But, if they show nothing else, these cases prove that immediately after apparently effectual vaccination, the other disease may be fatally contracted.

To return to the pamphlet of Dr. Wilson. The cases given by him, if they were not, as I imagine, true small-pox, the consequence of the substitution of that virus by the native vaccinators, must have been, as he himself supposes, examples of the vaccine virus degenerating into a severe and communicable disease. Whichever be the true explanation, it seems warrantable to draw an important practical inference, namely, that small-pox by inoculation, or the disease which became so very like it, affects natives far more mildly than they do Europeans. Dr. Copland lays it down as a fact, that all the dark races have variola in a more severe form than

white men. The above would seem to make an exception of the people of Hindustan, and this view of the question is corroborated by Table R. in the report of Dr. Bedford, already alluded to, wherein he gives an authentic statement of the inoculation of 79 children without a death, besides offering us other grounds for believing that inoculation is not attended with the amount of danger some would lead us to suppose. To this part of the subject, I shall have to return presently.*

The most singular and inexplicable example of real or supposed degeneration of the vaccine virus, was that, which occurred in Sylhet in 1833; although the particulars I am about to give were made sufficiently public at the time, the periodicals in which they appeared are not now procurable by the younger members of the profession; and I think they are sufficiently interesting again to be made known. Four children were vaccinated in September, 1833, from a cow labouring under the disease called *mahta* by the natives. It should be mentioned that this disease is a very fatal one among horned cattle all over India. The children took the disease, and from this source, vaccination was kept up. As much of the interest of this narrative depends upon the real character of the disease which was established from the cow, I must extract from the report, which will be found at page 97 of the appendix to the Transactions of the Medical and Physical Society of Calcutta, vol. 8:—"In all 4 (that is the children punctured from matter taken off a cow) vesicles, in every respect resembling in their progress and when mature genuine vaccinia, made their appearance, and went through the same regular course, the constitutional disturbance on the 8th day only being more severe than I have usually seen it in the latter. From some of these vesicles, cellular in structure, as it seemed to me from the way the fluid issued, I extracted on the 8th

* Since the above was written, I have been so fortunate as to have had an opportunity of discussing this matter with Dr. Wilson, and I believe I may venture to assert, he now agrees with me in opinion. I must not leave unnoticed that in 1832, Dr. G. Macpherson succeeded in taking from the cow a virus with which he says, ten thousand children were successfully vaccinated. I am unable to discover how the disease was lost, but other attempts were made, and were so far successful but appear to have produced small-pox, I have always been of opinion, that the *mahta* of cattle in this country is not identical with the disease of the same animal in England. It is a fatal disease, and I think seldom affects the teat of the cow. But I believe that the real vaccinia exists as a mild and separate affection, showing itself, as in England, on the udders.

day pure transparent lymph, with which I inoculated several other children, all of whom had the affection as favorably as the first 4."

"From this new virus, vaccination was carefully propagated by either Mr. Furlong or myself, or the native vaccinators under our superintendence."

In November of the same year, three European children were punctured with matter from the same source, and in all three fever occurred on the 8th day after the operation, followed by an eruption on the 3rd day of fever; one of the children died, being very delicate, and a gentleman who had been previously vaccinated in India and in Scotland, and had a good cicatrix, slept in the same room with another of the children. He was affected with modified small-pox in a severe form. The mother of one of the children had also fever and a mild eruption, although previously vaccinated.

Mr. Browne conjectured, that the virus, which had been obtained from the cow affected with *mahta*, was of a compound nature, and produced two diseases, the primary of a decidedly vesicular character, and resembling, as he thought, genuine vaccinia; the second of a varioloid nature, and resembling modified small-pox. To my mind, it is a more rational explanation to suppose, that the disease was varioloid from the first, for I apprehend that is not so easy a matter, as books would lead us to suppose, to distinguish between a genuine vaccine vesicle, and the pock which rises after small-pox inoculation. It is certainly difficult to call in question the positive assertions of Messrs. Browne and Furnell that the disease had all the signs of genuine vaccine, but it is confessed that after inquiry led to the discovery of many of the original cases having had slight fever and eruption after the eighth day. And here again, whichever explanation we adopt, as to the nature of the disease, we have the fact beyond question, that the disease variola, (or vaccine degenerated, so as closely to resemble it,) was mild for a long succession of production among native children, but became violent immediately it was introduced into the system of an European. It is also to be observed, that in the inquiry made by Mr. Browne, no instance of infection among the relatives of the native children, seems to have been brought to his notice.

The next obstacle to the successful diffusion of vaccination which I proposed to consider, was the difficulty of producing the disease at all in some parts of the country,

save for certain limited periods of each year. I might have here included what the annual returns and many separate reports from Medical Officers abundantly show, that even where there is a certain amount of success, this is accompanied by many failures. Medical Officers have been naturally reluctant to throw discredit upon a discovery so important and creditable to science, and upon which so much depends, that is interesting to humanity.

The late orders of the Medical Board, limiting the period of vaccination to, from the 1st November to the 15th of April, might lead to the supposition, that from these dates there is no difficulty, even in the North-Western Provinces, but this is far from being the real state of the case. In some seasons, and at some places, it is only for a very short period, as the weather is becoming a little warm, that the operation will succeed, and in some particular years the operation fails altogether. In proof of the above assertions, I might add almost without limit to the following quotations:—

Extract of Report from T. Leckie, Esq., Civil Surgeon, Benares.

“The difficulties noticed in the former Annual Report, as regards the transmission of the virus on the subjects operated upon here, and the active and successful propagation of vaccination during the favorable season, have again been met with, and, I regret to add, in an increased degree.”

2nd Extract.—“In January and February, only a quarter of the cases proved successful, and in March, the ratio decreased to one-ninth; finding this, I obtained, towards the end of the month of March or February, a fresh supply from the Superintendent General, but the result with this was equally abortive, and no further attempts to keep up the disease, were made until November.”

Extract Report of R. Cockburn, Assistant Surgeon, Juanpore.

“In November, I failed altogether in re-producing the disease. During the last cold season (1851), there were a considerable number of successful cases of vaccination, and from these, several of the neighbouring stations were supplied with virus,* but since the commencement of the present cold season (1852), only one successful case has

* More proof of failure and difficulty.

occurred, notwithstanding that a large number have been vaccinated with the virus received from Calcutta."

*Extract Report of J. P. Walker, Civil Surgeon,
Mynpooree, 1851.*

"Unfortunately vaccination has not taken during the past year. I have not seen a successful case. The native vaccinators reported a few successful cases as having occurred in the district, but did not bring me a single crust. I learn from the medical officers in the adjoining districts of Futtyghur and Etawah, that vaccination has there been unsuccessful. It is with great difficulty, that parents can be induced to allow their children to be vaccinated, and I fear from their expecting immunity from small-pox, even after an unsuccessful operation, that they will lose faith in the process, I had intended to have made a vaccination tour through the principal towns in the zillah, but perceiving that the very small, if any, success likely to attend the operation, would tend to bring it into disrepute, I deferred it till a more favorable season."

This failure is not an unusual occurrence, as the last reporter would appear to suppose, but one which is frequent, and most discouraging, as well to the parties applying for protection, as to the medical officers who are anxious but unable to be in this respect useful. In fact nothing can be more disheartening, and it is my belief that, but for the wants and anxieties of European parents at the different stations, few medical officers would have sufficient patient zeal to continue exertions which receive so little of even the reward of success.

As regards the prejudices of the people against vaccination, I may remark that, according to my own observation, it is apathy more than real prejudice which is opposed to us; but whichever it be, or if it be both, I fear we must believe that the bad success of the operation has its own share of mal-influence. In the sister presidencies of Madras and Bombay, where the same difficulties do not seem to attend the successful maintenance of cow-pox, there is a different system followed at each, and both appear to be successful. At Madras, a large establishment of native vaccinators, 247 in all, are under the orders of the civil authorities, and the system would appear to work well, for before the late increase was sanctioned, and while the vaccinators only numbered 163, 204,097 persons were vaccinated during the year out of a population

of 16 millions. The Civil Surgeons are Superintendents of vaccination at the zillah stations. There may, of course, be a suspicion against the correctness of these returns, which are furnished by native vaccinators, but there is a system of cheque, by which the civil functionaries and their subordinates test their accuracy, by making local inquiries. In the success attending this system of vaccination, we have proof, that, as I have long been convinced of, the arm of authority is the only instrument by which we can confer substantial and extended benefit on the people of India, in respect to measures of sanitary improvement, but in expressing my opinion that such authority might be beneficially exercised with great advantage, and without causing discontent, I am desirous at the same time to express my entire conviction, that the system of non-interference has been dictated by the most humane and considerate motives, nor must we forget that, even in our own country, acts of the legislature have been required, ere sanitary improvements could be effected.

In the Bombay presidency a different system of vaccination maintains. The duty is performed by six European Superintendents, whose whole time and attention is devoted to the task, with a subordinate staff of operators,* whose proceedings are under special, strict and constant control. Before a late increase of the establishments, which now costs 56,000 rupees per annum, the number of persons vaccinated in the year, was 104,904 out of a population of 10 millions, while in Bengal we only vaccinate, say 70,000 persons, out of a population of 75 millions. It would thus appear that either by placing vaccination under the protection and orders of the civil authority, or by appointing European agency for its diffusion, the prejudices of the people may be overcome. I believe there is nothing to show, that the people of the minor presidencies are less prejudiced than our population. Looking back to what I have said of the population of the sister presidencies, and to the outlay which has been found necessary for successful vaccination, a consideration of the vast extent of territory and population included in our Bengal and North-Western Presidencies, must lead to the conviction, that for any thing like a general diffusion of vaccination among the mass of the people, an

* In the Bombay records of vaccination, there is some proof of the disease degenerating during the hot months, but it is said to resume its genuine character, even without the infusion of fresh virus.

enormous machinery and pecuniary outlay would be required;* and taking further into account the peculiar difficulties attending successful vaccination with us, it naturally suggests itself, whether the public funds might not be more advantageously bestowed in the promotion of general measures of sanitary improvement.

It may be asked, why this disease, small-pox, loathesome and fatal though it be, should receive peculiar, I may say indeed undivided, attention for its prevention? There are many other diseases which prove more fatal to the people, and the causes of which are, to a great extent, removable. In a highly valuable table, which will be found in the report of Dr. Stewart, already alluded to, it appears that out of 20,000 deaths among Hindus in Calcutta, in a period of five years, there were but 488 of these from eruptive fevers, while from common fevers, the prevalence of which so much depends on local and social disadvantages, there were 5,672 deaths. In the same period, from the same 20,000 deaths, there were 6,044 deaths from diarrhœa and dysentery, and 4,773 from cholera. This is not the place to dwell upon the causes of these diseases, or to suggest to what extent they are removable, but I may here quote the opinion of Mr. Simon, the officer of health for the city of London, with respect to the last named disease.

The book being in circulation among the members of our medical reading society, I cannot quote the passage I have alluded to, but it strongly propounds the opinion that the exciting cause or poison of cholera, which he calls a migrating ferment, will pass perfectly harmless over localities where there are not conditions present which favor the development it seems to require, before it acts upon the human body. These conditions, he thinks, are humidity and organic decomposition.† Again in the work which I published in 1848 on public health, there will be found a table compiled by Dr. E. Goodeve, and for which I was indebted to Mr. Montgomery, now the Judicial Commissioner in the Punjaub, showing the mortality in the Cawnpore district for 1847. Out of a population of 1,000,320, there were, it is said, 7,043 deaths, of which 744 only were from small-pox, while from

* About four lacs of Rupees per annum by the Bombay Scheme, and nearly two lacs by the Madras one. Our present outlay is below 40,000.

† All this is of course to a great extent theoretical, but it is grounded on the known fact, that cholera does chiefly affect low-lying, damp, filthy, and ill-ventilated localities.

fever there were 2,565 deaths. If we confine our views to removing the causes of death among the troops, or the prisoners in jails, it becomes still more apparent how little small-pox has to do with the general mortality.

And yet those who have studied the laws, upon which health and disease depend, must feel that there is much which might be done to lower the rate of mortality in barracks and jails.

There is a pleasure even in painting an imaginary picture of what might be done for India, in regard to sanatory improvement, if those vested with local authority could be taught the importance of the subject. As I shall endeavour to show, the measures required to eradicate the sources of disease in this country, are, generally speaking, neither intricate nor expensive, and there is no reason why vaccination should not have its own share of encouragement. But to give the due stimulus to measures for improving the public health, we must, I think, have the subject engaging the special and undivided attention of some superintending officer selected for the duty. Thus it was with the suppression of Thuggee, there were magistrates spread all over the country, but they did nothing to put a stop to the fearful and organized system, which made murder an hereditary profession, practised with the seeming sanction of religious observances, but when officers were specially appointed for the duty, the horrible practice was soon suppressed. For insuring a proper system of prison discipline, an inspector of prisons was appointed some years ago in the Upper Provinces, whose efforts have been so successful that we have lately seen a like appointment created in Bengal. For sanatory measures, the local agency is available—the civil surgeons to suggest and the magistrates to execute, but a responsible and energetic head is wanted.

Having, as I believe, shown that, all circumstances considered, it is inexpedient to attempt extensive and costly measures exclusively for the spread of vaccination, I may, in concluding this part of my subject, deal a little further with the question, whether instead of suppressing inoculation by penal enactment, it ought not rather to be encouraged. It may well excite our surprise, that, with the knowledge before them how little the present system of vaccination protects the mass of the people (for leaving want of success and imperfect protection out of the question, it is not even accessible to the great bulk of the population), it may well, I say, excite our surprise, that the

Small-pox Committee, upon whose opinions I have once already commented, should have, without hesitation, recommended the total and immediate abolition of small-pox inoculation. Seeing how this Committee was constituted, and since they grounded their sweeping proposal upon some plausible reasoning, it may be held as a matter of congratulation, that by the exercise of a sounder discretion, those in authority did not act upon the Committee's suggestion, but left to the people freedom of action to protect themselves. The Committee condemn the practice of inoculation upon two special grounds:—*first*, that in those operated upon, it causes great mortality; *secondly*, that it proves a source of infection to the unprotected. In support of the first position, they adduce written evidence, given very much upon hearsay, but we all know how little such evidence can be trusted; and to say that inoculation causes much mortality in those operated upon, is opposed to past experience, and is entirely contradicted by the tables contained in Dr. Bedford's paper, already alluded to. Dr. Watson, at page 733 of the 1st edition of his lectures says:—"Among 5,964 individuals inoculated at the Small-pox Hospital in 1797-98-99, there were nine deaths, *i. e.*, one in 662. We may take Dr. Gregory's estimate of one death in 500 cases, as being probably within the mark." It might have been almost assumed that inoculation in India would show similar results, but fortunately we have facts also in proof of it. I refer to tables O. and P. of Dr. Bedford's report just alluded to. The first proves, that among the Rajshahye prisoners and their relatives, being an aggregate number of above 2,500, the deaths among the inoculated only amounted to the ratio of 3.25 per thousand. The second proves that out of 79 children inoculated there were no deaths. I may add, that in my own opinion, the report already alluded to, by Drs. Wilson and Browne, give further evidence, that inoculation causes even a milder disease in natives than it does in Europeans.

With regard to infection, as a consequence of inoculation, the Small-pox Committee are so impressed with its fatal consequences, that they term inoculation a murderous practice; but I would modify the reader's indignation against it by stating what is mentioned by Dr. Bedford that, though inoculation is known to be practised every year, it is only in seasons of epidemic outbreak, that there is any noticeable mortality from small-pox. He further shows, that in non-epidemic years, there is as much proportionate mortality from

small-pox in London as there is in Calcutta with 71 inoculation practitioners.*

From these facts, I would infer, what it is singular to me should not have been deduced from general reasoning, that a person having small-pox after inoculation is not so active an instrument of infection, as a person having the disease naturally; and for the simple reason, that having a smaller amount of the disease, he diffuses less poison into the atmosphere. Is it not true that for the same reasons, persons labouring under small-pox, who inhabit confined, ill-ventilated places, are especially dangerous to approach, because the poison is abundant and concentrated? It is further to be observed, that the natives, aware of the risk of infection, appear to isolate those who are inoculated, and that where 85 per cent. of the people are protected, we need not feel much anxiety; moreover it might be possible to protect all.

It appears then, I think, from all I have said, that to organize a legal system of inoculation might be for this country a wise and considerate measure of medical police. I say might be, because I do not wish to commit the mistake of making a rash proposition; my desire is that the question should receive deliberate consideration. On the point of suppressing inoculation by penal enactment, there may be less hesitation in expressing an opinion: such a measure would, I believe, be unwise and unjustifiable, at any rate until we have the substitute to offer in exchange. According to my own belief, we may have the shadow of the substitute, but we never can have its substance. I hinted the opinions, now more definitely enunciated, as early as 1848, but even yet, I am ready and willing for the discussion of the subject in all its bearings. Having expressed myself as I have done, it may be well to add my belief, that the vaccine returns by no means show the total amount of failure, all the European functionaries connected with vaccination bear me out in asserting, that the reports of native vaccinators were unworthy of trust.

I have before me a letter written during the present year by a Medical Officer of my acquaintance, which shows with what an amount of faith some of the profession yet cling to vaccination, and with an excusable confidence in the lessons received in their youth, how they are apt to attribute all failure in this country to the prejudices of the people, rather

* Dr. Gregory, in his valuable lectures on eruptive fevers, bears out this view, and shows that since the total suppression of inoculation, the severity of small-pox epidemics has not diminished.

than to any difficulty in producing the disease in those who do submit to vaccination, or to its want of protective power afterwards.

The author proposes compulsory vaccination in the case of recruits, and of all other natives entering the public service, and by the adoption of this measure he anticipates, that the people, seeing its advantages, would gradually seek for vaccination and abandon small-pox inoculation where it is now practised. The proposal, though not original, is still creditable to the writer's zeal and public spirit. After seeing this letter I addressed the author, Dr. A. Cheek, asking him to do me the favor to ascertain how many of the Sepoys of the Regiment of which he has charge bore marks of inoculation. He has given me no figured statement in reply, but he thus expresses himself: "I have made inquiries about the inoculation, and find several have undergone this ordeal in the 30th, more particularly from some districts, less from Oude. It may be decreasing, but it is still being carried on to a great extent." It is to be remarked, that the great bulk of the Sepoys, are the natives of the North-West Provinces, and I shall therefore endeavor to append to this paper the amount of mortality from small-pox in the native army for a series of years.

Since the foregoing pages were written, I am in possession of figured statements, which seem to me singularly corroborative of the views I entertain, as to the non-protective powers of vaccination in Europeans coming to India, and of the comparative mildness of variola in the Natives of Hindustan.

During the six years from 1846-47 to 1851-52, the strength of the European Troops in Bengal has averaged 18,795; in that period there have been 229 cases of small-pox, and of these 65 died, being a rate of mortality from treated of 28.38 per cent. It must be borne in mind, that the soldiers being apart from the people ought to be less exposed to infection, and that when attacked they are kept separate from the other patients in Hospital. In the native army which during the same period has averaged 1,12,952 men, 3,324 cases of eruptive fevers have been treated in the Hospitals, and there have been 259 deaths which gives a ratio of deaths to treated of 7.79 per cent.* It would have been highly interesting to know what proportion of the sepoy bore marks of inoculation, but even without this information, it is

* In the case of the sepoy, there is of course more intercourse with the native population, but they too are isolated when affected with small-pox.

known that the occurrence of a second attack of small-pox is very unusual after inoculation; Dr. Copland says, this risk hardly exceeds a possibility, and it appears to me a most important fact, that the European soldiers are protected by inoculation in the ratio of .37 per cent. to strength, while the sepoy unprotected by inoculation, in a proportion of which we are ignorant, die only in the ratio of .23 per cent. to strength.

VARICELLA.

Of this disease, I have not had much personal observation, but if it be true, as the best home authorities assure us, that it is mostly a disease of childhood, and that it is seldom preceded by febrile symptoms, I can have no hesitation in thinking that modified small-pox is often mistaken for it. My friend Dr. Duncan Stewart, who must be considered a high authority on all subjects connected with eruptive disease in this country, assures me he often feels difficulty in deciding, and when there is difficulty it appears to me, if the character given of chicken-pox by Drs. Watson and Gregory* be correct, that the case is more likely to be one of modified small-pox than one of the other malady. Not long ago I incurred dire displeasure by pronouncing a young lady's case to be modified small-pox, after it had been called chicken-pox. It was so far proved that my opinion was correct, that none of the other inmates of the house, two ladies and four young children, caught the infection. They were protected by vaccination, but that of course was no safeguard against varicella. With this disease, as with small-pox and cow-pox, the end of the cold season and the hot months is the culminating period. In the letter from Dr. Stewart already alluded to, he states what is very important, if it meets the experience of other observers—1st, that in seasons of epidemic small-pox, the varicella is not seen;† 2nd, that on the other hand in seasons when chicken-pox shows itself, we need not fear an outbreak of small-pox

* The former physician cites two cases occurring in adults as exceptional and singular.

† This is not supported by Returns I have now before me, showing the admissions and death, from eruptive fevers in the European troops in Bengal for 23 years. There are in all 36 cases of varicella, and of these 26 occurred in the two worst years of small-pox, one of these was 1842, when there were 116 cases, chiefly, I believe, in the army of Sir George Pollock, as it marched back through the Punjaub from Cabool.

during that season. He says "When a well-marked case occurs in a school early in the season, I have no fear of small-pox appearing also that year." This certainly upholds the view of the identity of the two diseases, the difference depending, as Dr. S. argues, upon the constitution of the season, but there is so much to show, that varicella is a different poison that we must attribute what Dr. Stewart mentions to something else. Dr. John Thompson used it as an argument of identity, that he had seen the two diseases prevailing at the same time. In Denmark, it is said, that chicken-pox was seen from 1809 to 1823 without accompanying small-pox. "Varicella is taken indiscriminately," says Dr. Gregory, "by those who have and those who have not been vaccinated, and it cannot be produced by inoculation." I point it out as an interesting subject of inquiry in this country, whether varicella is seen after small-pox inoculation. Sir Henry Halford says, that in England it was not. Dr. Stewart says, he has seen the disease so often re-occur that he scarcely thinks one attack affords any protection against another. This is not consonant with its European history, nor with its identity with small-pox.

I may finish my remarks on varicella by the following quotation from a paper written many years ago, by the present esteemed head of the Medical Department in Bengal: "Of the controversy that has arisen at home respecting the identity of variola, modified small-pox, and varicella I should think the remarks of the *North American Review*, (*vide* No. 33) strongly against the abettors of that doctrine. The Reviewer says—Chicken-pox, in the form described by Dr. Willan and other accurate observers in Europe, is a disease here of frequent occurrence, prevailing equally in all classes of subjects, whether they have undergone small-pox, cow-pox, or neither, exhibiting in its severe form a near approach to the middle cases of small-pox, but never giving rise to any thing like a strongly marked case of that disease. Now this is a fact notorious to every practitioner of medicine amongst us, and is alone sufficient to settle the controversy; small-pox has been in effect exterminated with us by the introduction of vaccination, and yet chicken-pox continues to exist. Were the opinion of Dr. Thompson correct, this ought not to be the case, we ought either to be entirely free from both of these diseases, or from neither, for neither could prevail singly."

In an average for three years of the children of the European soldiers in Bengal, amounting to 2,291 from 1849

to 1852, there were only 24 cases of varicella during the whole period, and no deaths.

RUBEOLA.

When may we hope for improvement or important discovery, in what I may call Metereological Chemistry? There are many poisons, which we know, must have a substantial existence and float in the atmosphere, yet we have no manipulation that can recognise them, no chemical tests that show their presence. Further, beyond the actual presence of the poison itself, we cannot doubt that there are other conditions in or of the atmosphere which favor the action of the different specific poisons upon the human body; stranger still, but undoubtedly true, there is at one time the condition favoring the action of one poison, at another time that which aids the effect of a different one. Up to this time, the conditions of the atmosphere which are favorable to the spread of epidemics have not, it must be confessed, been recognised to any satisfactory amount.

I have lately observed that by experiments made upon atmospheric air in different latitudes and altitudes, the proportions of oxygen and nitrogen are said to vary considerably and that the new constituent of air called ozone, has been discovered to be an oxyde of hydrogen, which is present in the atmosphere in very varied and changing proportions. One of the active poisons being present, such as that of small-pox or measles (on which last, I am about to offer some observations referring to its local peculiarities,) the varying conditions of the atmosphere just noticed may operate upon the human organism in some way, so as to assist the action of the specific agent. With respect to diseases of a less specific character, but which still rage epidemically, such as Marsh fever, dysentery, &c., though it seems probable, as suggested by Professor Alison, that they depend upon specific poisons generated in the course of animal or vegetable decomposition, at certain stages not putrefactive, their occasional more active virulence must depend upon some atmospheric conditions, which we have not yet been able to recognize, but which at some future time will probably be discovered.

It appears from the Returns of the Registrar General, that measles may prevail in England with equal severity in any of the four quarters of the year. In our climate the

case is different.* The disease is mostly confined to the hot months. I have elsewhere stated that during a long service in Behar, more than 14 years, during which I had extensive practice among children, I had only seen one case of Rubeola, while at Cawnpore, on the other hand, I had known it prevail every hot season. It is not, according to my observation, vicarious with small-pox; I have seen both prevalent at the same time.

Since these observations were written, I have seen an account of a severe epidemic of Rubeola among the children of H. M.'s 80th, while stationed at Dinapore, drawn up by Assistant Surgeon Murphy; there were no less than 120 cases among the children of H. M.'s 80th Regt. out of a strength of 165, with six deaths, and I have known several seasons pass at Cawnpore without the appearance of measles. The disease, I believe I am correct in stating, only appears in Calcutta during the hot months, and not every year in succession.† To what element of climate are we to attribute this peculiarity in the history of measles? It cannot be elevation of temperature alone which makes the disease show itself, for it prevails at home in the coldest months. Dr. Murphy makes the following remarks on this head:—"The occurrence of the disease is comparatively rare in India, this epidemic being the first of the kind in the writer's experience of five years in the country, and it may perhaps be not uninteresting to investigate how far the present season has tended to its production and spreading." The quarter (that is the quarter ending 30th June,) has been one of unusual heat: it is reported that the temperature has been higher than in any year since 1837, and though temperature tends to check infection or spreading of disease ordinarily, yet its influence has in this season been counter-balanced by the great dampness of the atmosphere, which has acted like a porous body in propagating fomites. The winds have been light and variable, and during a considerable portion of the quarter there has been a total absence

* Dr. Gregory in his lectures on eruptive diseases says: "In Bengal, however, Rubeola is governed by different laws. There the disease never originates except in the cold season." This word originates is singular to be made use of by one who in other places advocates the doctrine of contagion in all cases, as strongly as Harvey did his of omnia ab ovo.

† In the years 1850 and 1854 there were 80 cases of measles in the Free School of Calcutta, 23 in February, 35 in March and 22 in April. In 1851, 52 and 53, there were no cases. There are upwards of 300 boys and girls in this school.

of wind, and to these must be added the undoubted, though not appreciable change, in the normal electrical condition of the atmosphere. The reporter then alludes to the predisposing causes of disease existing in the barracks at Dinapore, over-crowding and imperfect ventilation, and then on the subject of the exciting cause, thus expresses himself:—
 “In such a state of predisposition, the appearance of measles, whether originating by the arrival of an infected subject in the station, which may have taken place, though there is no evidence of it, or developing itself spontaneously, would act similarly to the setting on fire of gun-powder. I would observe that it requires something much liker gun-powder than over-crowding and bad ventilation (to which Mr. Murphy adds bad food and clothing) to account for an epidemic outbreak of a specific disease in a locality where it seldom appears. The predisposing causes he enumerates are present every year, yet we know that Dinapore is, for hot seasons in succession, without a case of measles, and we might have the poison in the shape of sporadic cases without such an explosion of measles as Dr. Murphy reports upon.

If we try to discover meteorological phenomena, by which to account for the outbreak, I do not think we learn much by our present mode of testing atmospheric conditions. The following figured statement will show the maximum, medium and minimum temperature for the months of April, May and June in the year of measles, and in the three years preceding it, and with reference to Mr. Murphy's remark that the atmosphere was unusually damp, the Register, from which I quote, proves that double the quantity of rain fell in the previous year.

Maximum, medium and minimum range of the thermometer at Dinapore for the months of April, May and June for four years :

	Max.	Med.	Min.
1848 ..	97	86	83
1849 ..	105	88	74
1850 ..	107	85	72
1851 ..	107	91	74

In hinting at electrical changes, although he gives nothing specific, Mr. Murphy probably comes nearer what may add intensity to the specific poison of this and allied epidemics. It is certain that the same range of temperature communicates very different sensations without reference to the evaporating effect of a moving atmosphere, but

how far this depends upon electrical condition in excess or diminution we can only guess at. It seems to me extremely probable that varied electrical states of the atmosphere may greatly influence the performance of bodily functions, and it seems certain that these conditions change to a greater extent than our instruments acknowledge. At any rate it appears to be beyond question that no changes of temperature, of hydrometrical saturation or dryness, of the weight of air or of the state of the winds, will account for the rise and fall of epidemics. But some of the atmospherical conditions which our instruments recognize, do assuredly influence the complications of the disease I am now especially considering. In this climate, for instance, the chest complications are far less severe than in colder countries, and even here they vary according as the season is a mild or severe one, or one attended by unusual vicissitudes of temperature. In the epidemic described by Dr. Murphy, the heat having been very great, head complications, often attended by convulsions, were prevalent, and there were six deaths so caused, none from chest affection. In my own experience the complications were congestion and inflammation of the textures of the lungs, bronchitis most commonly, but sometimes pneumonia; I noticed as an accompaniment to the lungs being affected, what I have not seen mentioned by European authors, namely, a very marked amount of drowsiness. I have no cases or record to refer to, but my impression is, that this drowsiness showed itself before there was much physical sign or any general symptoms of mischief, and I know that I made it a test for the necessity of leeching, which in such cases I found of extraordinary and immediate advantage. Upon the whole, the complications of measles are far milder than in Europe, and the sequelæ also, but as we can never say a broad assertion without having occasion to qualify it, we shall find occasionally severe pectoral symptoms during the disease, a morbid action set up in the lungs as the consequence of measles in India, and at other times congestion of the kidney, with albuminuria and dropsical effusion. In our Hill stations, where so many children are gathered together from the plains, in which last locality as I have stated they usually escape measles, we might expect severe epidemical outbreaks of the disease, but it is not so, if I may judge from the tables furnished in my friend Dr. A. Grant's valuable paper on Hill Diarrhœa and Dysentery in the first number of the *Annals*, and from a perusal of the reports of medical officers attached to

European regiments stationed in the Hills. Dr. Grant shows that in the Lawrence Asylum, the average number of children was 106 for a period of 4 years. There were only four deaths and none from measles. I have also to judge from personal observation at Nynee Tal and Darjeeling leading to the same conclusions. When the disease does occur, it appears to be violent. It is its rare occurrence more than its mildness we have to notice. In concluding this branch of my subject, I would express my regret, that I did not earlier avail myself of the opportunity so kindly afforded to refer to the records of the Medical Board. I might have been able to show by figures the prevalence or absence of the epidemics now under consideration, at the different stations where European regiments are cantoned, and on their occasional occurrence at what periods of the year they usually show themselves. But time presses and with this and other imperfections, the present communication must go to press.

Since the above was written I can supply the following information :—average strength of children of European soldiers for 3 years 1849-50, 50-51, 51-52,—2,291. Total cases of measles in 3 years 271, average 90 of 3 years, deaths 22 in the same 3 years. Ratio of deaths to treated, 8 per cent., treated to strength, 11·82 per cent.

SCARLATINA.

Although I have headed this branch of my subject as above, I have great doubt on my own mind whether any of the epidemics which have been described as attended by red efflorescence of the skin, can be identified with one of the varieties of scarlatina in Europe; if with any, it must be the scarlatina mitis of authors; comparing them with each other too, they exhibit capricious and perplexing differences. In 1848 I published a short account of an epidemic of this kind which I had seen at Cawnpore, the same which Dr. E. Goodeve refers to in his paper published in the first number of the *Annals*, and I made allusion to what had previously been recorded on the same subject by Messrs. Melliss, Twining, Cavell, J. Mouat and H. Goodeve, and though not now engaged in practice, some cases of the disease have fallen under my own observation during the present season. The grand and striking feature of the epidemics under notice, has been the trivial amount of mortality which has attended them. In 1824 and 1825, the disease spread over a vast tract

of country, and affected a great portion of the population, yet all the reporters give testimony how little fatality attended it. In the account of the disease given by Dr. H. Goodeve, the same immunity from death is remarkable; so also with regard to the disease at Cawnpore in 1847, and last year in Calcutta, as reported by Dr. Edward Goodeve.

Now it is scarcely conceivable, that if these were all epidemics of scarlet fever, none of them should even occasionally have been accompanied with the sloughing of the throat, or other inflammatory and dangerous complications attending the disease in other countries. In 1824, the symptoms, such as they were, were exceedingly severe. The occurrence of dropsy as a sequela, and consequent upon a congested state of the kidney, with albumen and epithelial casts in the urine, were never noticed until in the epidemic of 1853, the latter appearance, slight in degree and unconnected with dropsical effusion, was seen by Dr. E. Goodeve in 2 cases out of 28. It is true that the connexion of dropsy after scarlet fever with kidney affection, is a somewhat modern discovery, but if so prominent a symptom as dropsy had succeeded to attacks of the disease in 1824-25, we need not doubt that it would have been noticed. The extraordinary prevalence of the disease at that time is proved by the following quotation from Dr. Melliss:—"I am led to make these remarks, from the circumstances of this disease having, with very few exceptions, spared none of either sex or of any age. The new-born infant, and the aged, the weak and the robust, the rich and the poor, those reduced by disease to the lowest state of existence as well as those under the influence of medicine, and under usual discharges from the system—all were alike the objects of its attack, for no condition nor circumstances of any kind seem to have availed in preventing its attack." This universal invasion of the disease is in itself proof against its being scarlatina, but what I would insist upon now is, that in so wide-spread an outbreak in a large city, with intelligent men to record the result, there is no evidence of local inflammatory complication or of dropsy as a result, nor can we explain the absence of such symptoms by the circumstance of this epidemic of 1824 having been unaccompanied by desquamation. It was a common occurrence.*

* Dr. Twining calculated that only 2 per cent of the population escaped, Mr. Carell had 300 cases in Fort William. So many adult Europeans having the disease, is proof against the disease being scarlatina; many of them must have had this disease in England.

Drawing his conclusions from the history of the epidemic I have just noticed, that of 1824, and from a similar invasion of disease occurring in the West Indies, Dr. Copland, with that leaning to the sub-division and naming of diseases for which he is remarkable, has called the disease I am now considering scarlatina, rheumatica. If he were now again to write on the subject, he would either have to change its name, or to add other varieties, for it has lately been known with little of the rheumatic character adhering to it, and with more tendency towards the throat affection accompanying true scarlatina, although I believe I may venture to say, no case has been yet known where this fever and eruption, succeeding each other, an ulcer in the throat has also presented itself.* I have alluded to the differences characterizing the several appearances in this fever, of which red eruptions over some part of the body, with remissions in the febrile movement, when fever is at all present, appear to be the only invariable signs. These differences, as well as the long intervals of time at which the disease has shown itself, appear altogether inexplicable. In 1824-25, Europeans, natives, and half-castes were alike submissive to the epidemic influence. According to Dr. H. Goodeve's observation, only imported Europeans were affected, those born in India, even of European parentage, escaping the attack. By what I saw at Cawnpore, it was decidedly confined to Europeans, and even with them it appeared to limit itself to a confined locality in a large station. Though he has not noticed these facts in his late paper, I think Dr. E. Goodeve will bear me out as to their correctness. In that paper he states, that the disease in 1853 attacked natives and Europeans indiscriminately, while this year again it has, I believe, been very much confined to Europeans. Again Dr. Henry Goodeve, who appears to record his general observations of this fever and not the history of any particular epidemic, thus expresses himself:—"The fever always subsides upon the outbreak of the eruption, and never re-appears in the secondary form." Let us contrast this with what is stated by his brother in his paper published in 1853:—"The fever did not disappear with the establishment of the eruption, but the paroxysms often

* I just recollect that Dr. Goodeve mentions a case having occurred in the practice of Mr. Shireore. I look upon this as incidental, and I take the same view of the case of ulceration of the parotid, also mentioned by Dr. Goodeve, who states this affection was rather common during the season unconnected with eruptive fever.

continued for some days afterwards." In the Cawnpore epidemic, there were paroxysms of fever after the appearance of the eruption with the occurrence of collapse, such as Dr. E. Goodeve describes in his paper. I recollect, indeed, that one of his own patients at Cawnpore, a medical officer, since retired, became so low, that strong stimulants were required to restore the circulation. In truth, when this disease is well developed, the paroxysmal fever appears an essential part of its character, and I would refer to Professor O'Shaughnessy's excellent account of the disease, which is a part of Dr. Goodeve's paper so often referred to. Lastly, with reference to the varying character of this fever, it was remarked in 24 and 25, that convalescence was extremely slow and protracted. This was true also of the Cawnpore invasion, but in a far less degree. In 53 again, and during the present season, recovery has been rapid. During the present season the disease has been pretty common, and in one family three cases came under my observation, of which I may offer a brief account: all the subjects of the complaint were young ladies recently arrived from England. In the first case the young lady had scarlet fever in England; the paroxysmal character was well marked, the exacerbations of fever being pretty severe, but without any collapse; quinine was given with the best effect. In the two other cases the appearance of the eruption was scarcely preceded by any febrile movement, but by slight headache, a general feeling of malaise and soreness of the limbs scarcely amounting to pain; after the eruption came out this sensation in the limbs was complained of, and seemed to run along the large nervous trunks. In none of these cases did the skin abrade in the least, nor were the mouth and throat affected beyond having a slight blush of redness; pain of the throat was felt beyond what might have been expected from appearances, but still it was trifling. Here we have two mild cases closely resembling the scarlatina mitis of Europe, but the third and the typical one, not having the symptoms which attend severe cases of scarlatina, all three cases occurring in the same house within a week of each other. Dr. Copland, in the article to which I have already alluded, and which will be found in the 14th number of his Dictionary of Practical Medicine, sneers at our Indian writers for their attempts to connect the disease under notice with metereological conditions, overlooking, as he imagines, the real cause of spread, namely, his own favorite instrument, contagion. Now, if we even admit that this disease is propagated by a specific and communicable poison, we have yet

to explain how in 1824, the disease, as stated by Dr. Melliss, spared neither age, sex, occupation, rank in life or locality, while in other years, it appears to observe a principle of selection, though yet epidemic, and in other instances, still, as noticed by Dr. H. Goodeve, it is seen sporadically. Those who may like to refer to the report of Drs. Melliss and Twining, will find, according to my humble opinion, some very profound and interesting observations on the causes of epidemics. I must beg permission to quote one paragraph from the report of Dr. Twining, a man who would have been an honor to our profession in any age or country :

“ There are states of the atmosphere which influence our feelings of health and comfort, and doubtless exercise an action on the human constitution in a degree not to be ascertained by any instruments or scales hitherto invented. To some occult and not easily appreciable agency of this sort, may be referred a state of the atmosphere which occurred in the latter end of May, frequently in June and July, but in a more remarkable degree from the 4th to the 9th of July, and again on the first four days of August. There was an intense glare of white light from the whole sky, extremely painful to the sight, at the same time there was such a hazy state of the regions of the atmosphere, that the sun could with difficulty be distinguished. This was attended with an extremely close, damp, heat, more distressing than the heat of the brightest sun-beams I ever experienced ; can this effect arise from the transmission of the rays of light through a hazy atmosphere, and depend on the increased refractive power of the latter, bringing the rays through innumerable watery lenses, more perpendicularly on the earth in the early parts of the day : so that, conjoined with the influence of a humid atmosphere, the effects of the noon-day sun are experienced at a much earlier hour than when the sky is quite clear ?”*

“ On both the occasions above alluded to, this state of atmosphere just noticed, was succeeded by an increased frequency of the attacks and by relapses of the prevailing fever in a great number of instances. It is true that a similar state of atmosphere prevails at Calcutta more or less every

* Numerous facts prove the increased refractive power of a hazy atmosphere. I recollect none more remarkable than the observations made in some Swedish mines, where it has been found that on hazy days a moderate sized print could be easily read at 100 yards depth under the shaft of a mine, but on days of bright sun-shine, there was difficulty in reading the same print at the depth of 60 yards.

year in those months, but its predominance in 1824 may be attributed to the early setting in of the rains in unusual quantity." Although it has been noticed by most of the authors who have described the disease that it appears in still sultry weather after rains, it is nevertheless true that in Goozerat, in 1824, and at Berhampore, in the following year, the hot dry months were the period of invasion. Here again we have proof that there must be conditions of the atmosphere with which we are yet unacquainted, upon which the spread of epidemics must depend. I have been inclined often to draw a comparison between the vicissitudes of season which make one prolific and the other scanty in vegetable production and the sudden influences which at one time propagate, and at another time suppress, epidemics; on the question of the contagious nature of this fever (for which perhaps the red fever is as good a name as any other), I differ from Dr. Copland, and in that opinion I am supported by all who have themselves seen the disease. My limits forbid my entering at length upon the arguments *pro* and *con*, and I must be satisfied with observing that those who gave their opinion in 1824 had immense opportunities of judging, and could have had no object in view but to arrive at the truth.

I may just add, with reference to later visitations, which it must be confessed approach nearer in character to scarlatina than earlier ones, that the fact stated by Dr. E. Goodeve of his cases having come into Hospital from different ships on the river, and from the scattered native population at the same time, seems strong evidence against contagion. In the three cases I have myself noticed, the infection must have been received by three persons at one and the same time, or the period of incubation must have been much shorter than has yet been supposed true of any of the exanthemata.

DIPHTHERITE AND ERYSIPELAS.

It is not a little singular that while the epidemic I have just noticed appears to be gradually approaching nearer in character to scarlatina, throat affections, which are so often associated with that disease, appear also to be more frequent among us, and to have been more severe. But unless the case mentioned by Dr. E. Goodeve, as occurring in the practice of Mr. Shircore, be one exception, the eruptive fever

and severe affection of the throat have not been seen in the same person. It seems yet to be a question among pathologists, whether the croupal exudation called diphtherite, be only a milder phase of the cynanche maligna, as seen in scarlatina, or a separate and distinct disease. Be that as it may, the local affection, diphtherite exudation, seems to have first shown itself in Calcutta in 1852, when it destroyed several children at the Martiniere School, and elsewhere ;* no scarlet eruption was seen in any of the cases. This year the disease has again appeared, but not in the same locality. There has been one fatal case, a most sudden and afflicting visitation occurring in a young married lady. I know of another young lady who had the complaint rather severely, for flakes of the exudation were removed by the forceps. This person some weeks after recovering from the throat affection, had a scarlet eruption not preceded by fever. The scarlatina described by Sydenham, says Dr. Watson, must have been of a very mild kind, for he does not mention any ulceration of the throat. Let me not be considered an alarmist, if I suggest the possibility of our some day having a visit of the real scarlet fever.

The idiopathic erysipelas as it appears on the face and lower extremities, unconnected with wounds, is a rare affection in India, and I know of no instance of its epidemic appearance. But if the theory of the connexion between epidemic invasions of this disease, and vitiated collections of impure discharges, as well as with the cadaveric poison be true, as it seems undoubtedly to be, the observance of all due caution seems advisable, nor does it seem unnecessary to warn the Indian practitioner that one of the most afflicting diseases known, the puerperal fever, has been clearly traced to infection from the erysepelatos and cadaveric poison. Erysepelas attacking wounds, I have frequently seen prevail as an epidemic, exciting in the merest abrasions of the skin, as in the sores on the legs of prisoners from the chafing of their irons, high and diffuse inflammation, requiring free incisions to prevent sloughing. It has been during humid sultry weather, and especially at the breaking up of the rains, I have seen wounds take on this action in an epidemic form.

* Professor Webb has connected the fatality of the disease at La Martiniere with the foul state of the drains, and with the existence of numerous sheep pens both in the immediate vicinity. I shall consider in another place the interesting question of the influence of animal and vegetable effluvia upon disease.

In the Medical College Hospital and in the Native Hospital in the Durrumtollah, wounds made in operating, are apt to take on this action, especially in the rains.

The hospital gangrene which appeared among the wounded after the battles on the Sutlege in the first Seikh Campaign, offered a fine illustration how the atmosphere may be poisoned by over-crowding and foul discharges, not carefully enough removed.* In the next campaign, things were better managed, and the disease did not appear. In the Jail Hospital of Tirhoot, I once witnessed a very severe invasion of hospital gangrene at a time when the weather was extremely close and sultry after a rainy season, during which the fall of rain had been unusually copious. The Jail Hospital was surrounded by stagnant water. The destructive process was not accompanied by much surrounding inflammatory action. It was what I may call an eating away of the textures with highly fœtid discharge from the sores. The countenance had a sodden look. The conjunctiva tinged perhaps not with bile, but with diseased blood. I found no local application do good but pure undiluted nitric acid, applied on lint, making the parts smoke, and literally burning out the whole diseased surface.

HOOPING COUGH.

Ere I conclude the series of papers to which the subject I have chosen must, of necessity, extend, I hope to show more conclusively by figures, my opinion to be correct, that the exanthemata, of which I have already written, as well as the epidemic, the notice of which will conclude the present communication, namely, hooping cough, are all known most commonly to show themselves at the change of season which ushers in the hot weather. Individual experience is not to be relied on, till tested by tabular proof. The army returns and the records of the noble educational Institutions existing at this presidency, will enable me to give some definite information on these epidemics, as they affect European and Eurasian children in the separate months of each year. If my opinion shall be found correct, the explanation will still be difficult, why diseases, which in other countries

* The Military Surgeon should not overlook the fact that the canvas of tents is a substance to which impure effluvia are likely to attach themselves.

are not confined to particular seasons of the year, should here be obedient to a different law of appearance; but it is certain, that atmospherical changes are more recognized even by the senses at the time when the hot weather sets in. The variations of temperature are great and sudden, with other signs of meteorological disturbance.

Hooping cough has been associated with the exanthemata, and assuredly it has some features in common. If I were to judge from the only return at present before me, I would say that it is a rare disease in this climate, for in the return already quoted, showing the average strength for three years of European soldiers' children to have been 2,291, there were only 23 cases of pertussis, being, we shall say, 8 per annum out of the above strength, and there was only one death, but my own observation leads me to conclude that, if we had a larger and wider field of observation, it would show a different result, both as respects prevalence and severity. In private practice and among isolated families, I have seen many cases of this disease, and have known it to be exceedingly distressing and severe, sometimes fatal. But its severity is greatly moderated, and, apparently so, by the high range of the thermometer, this showing that the poison is one thing, and the superadded bronchitis or other complication another. The effect of the poison is to excite paroxysms of spasmodic cough, depending, of course, upon some specific irritable or inflammatory condition of the bronchial linings, (for I venture to discard the visionary theories of remote cerebral, nervous or gastric irritation,) add to this the influences of cold or exposure, and we have bronchitis or pneumonia. But even with this disease there seems to be an epidemic constitution of season apart from mere variations of temperature which influence its severity. The disease I have seen sometimes so mild as to render it difficult to distinguish it from common cough, although the manner in which the cough attacks in fits more or less violent, and the specific hoop, ought to be enough to guide us.

It seems to me that, there are few things more curious in the study of disease than the fact of a local disease, like hooping cough once affecting a person, rendering that person immune from future visitation.

The general fact is undoubtedly true, but I have known children who have had well-marked hooping cough in India have the disease again severely in Europe. We may imagine the Indian attack not severe enough to protect the organism from a future invasion, as appears to happen

when vaccination, though successful, is not entirely protective. At some of our Hill stations, the disease is severe and often fatal, another proof seemingly that it owes its generally mild character with us to the high range of temperature.

When we consider, that the three diseases—scarlatina, measles, and hooping cough—carry off so large a portion of the young in other countries,* and that here two are so mild in character, and the other unknown, and assuredly the remark is applicable to the native population, we might be led to suppose that mortality would be lower in early age than in colder climates. According to Dr. Stewart's table, already quoted, it is so in Calcutta with Hindus up to the age of six, from which time it goes far above the European standard, according to the same authority. It is no doubt true, that in all ranks and races, diseases of the abdominal viscera are far more prevalent in this country, and as regards children, in whom the period of dentition predisposes so much to bowel derangement, this will no doubt make up in part for the mildness and absence of the epidemics I have alluded to; but I have grounds for believing that the absence of these diseases tell in enhancing the value of early life in the case of children, who are not exposed to privations, to an extent which has scarcely yet been appreciated.

The subject is deserving of a closer investigation than I have at present the means of bestowing upon it, but I may mention the following facts, of which I am at present cognizant. In the Free School of this city, with a monthly strength ranging, as I find, from 330 to 400—and the inmates being of all ages, from 5 to 15, there has not been a single death during the years 1852 and 1853—and I am informed, that the amount of mortality is always surprisingly small.

In European Barracks the deaths by all diseases out of an average strength of 2,291, amounted in three years to 596, which gives an average for each year, of 196, or at the rate of 8·55 per cent. per annum of deaths to strength; as this return includes children of all ages, it cannot be considered a high rate of mortality.

In the Lower Orphan Schools at Allipore and Kidderpore, the inmates of which amount to 250 children of all ages,

* Measles one in 38·62 of all diseases, one in 12·4 of epidemics, scarlatina one in 150·56, of the total recorded mortality one in 48·34 of deaths by epidemics.

from 4 to 15 years, the rate of mortality is singularly small. I had hoped to give a table, but have been disappointed.*

My next communication will treat of such epidemics as depend upon the changes and peculiarities of the seasons, and as these affect topographical conditions. The diseases which come under this category are those which so often render our troops more or less inefficient, and which, along with cholera, cause the chief mortality in the army and in jails. It will be necessary to give a short preliminary sketch of the climate and topography of the vast provinces included in these presidencies, and which now extend from the Bay of Bengal to the Indus. While they hold many features in common, there are local peculiarities which affect their salubrity, and cause them to be differently influenced by the usual changes of season, and by such anomalies in the phases of these as sometimes present themselves.

In treating of this class of epidemics, I shall enter on a consideration of their pre-disposing and exciting causes, with a view to suggest measures of prevention, and in order to investigate the interesting questions which are connected with the subject of malaria, its identity or otherwise with vegetable decomposition as cognizable to our sensations, whether there are different kinds of the poison, &c., &c. The present prevailing views on the treatment of fever will be deserving of prominent notice, and I shall also discuss the question of dysentery being ever produced, as some now suppose, by a specific and communicable poison. The present method of treating this disease will also be deserving of remark.

* A table has reached me since the above was written, but it is not what I wanted. It shows that for the last five years there has not been a death, at either of the three schools from eruptive fever. The whole number is above an average of 300, and the general condition of health is something surprising.

