

opposite the ninth and tenth vertebræ, was so little increased, that it could scarcely have exerted any undue pressure upon these bones; and that part of the vessel in contact with the eighth and eleventh, whose bodies were also carious, was perfectly sound. Moreover, the inflamed and softened state of the sternum gave further indication of the proneness of the cancellated bones generally to become diseased. Mr. Hodgson, in his work on *Diseases of Arteries and Veins*, informs us, that the carious and corroded state of the bones produced by aneurism is hardly ever attended with exfoliation; whereas, in the case now related, several pieces of exfoliated bone were lying loose among the coagula.

Coventry, November 1851.

HISTORY OF AN EPIDEMIC OF SMALL-POX IN THE MAURITIUS :

WITH REMARKS ON THE PROTECTIVE POWER OF VACCINATION.

By W. H. GARDNER, Esq., M.R.C.S.Eng.

(Read before the *Epidemiological Society*, November 3, 1851.)

HAVING received from the secretaries of the Epidemiological Society a series of questions on the subjects of small-pox and vaccination, I have thought that the best way of answering them would be to give that account which my experience, during a most arduous practice, enables me to do with the most perfect confidence, and yet, I hope, without presumption.

During the month of June 1840, Her Majesty's sloop the *Lily* arrived outside the harbour of Port Louis, Mauritius, having on board between two and three hundred negroes, captured three weeks previously from a slave ship on the Mozambique, or eastern coast of Africa. Small-pox prevailed to some extent on board. Three hundred and forty of these poor creatures were taken from the slaver by the *Lily*; but, before this vessel arrived at the Mauritius, ninety died, many from small-pox, others from rapidly falling into a state of cachexia or atrophy. This great fatality will be easily accounted for, when we reflect upon the crowded state of Her Majesty's sloop, the short allowance of food and water consequent upon that number, the high state of the atmospheric temperature, and the impurities incidental to such a dense mass of people confined in so small a space. The *Lily* was not allowed any communication with the shore, not even to enter the harbour. Great alarm was created amongst the inhabitants, as the disease had not visited the island for upwards of thirty years; a lengthened exemption, which, perhaps, few, if any, of the most favoured climates can boast of, and a striking illustration of the healthy character of the island. The vessel could not be detained, her sailing orders being positive; directions were accordingly given for the instant disembarcation of the unfortunate Africans on board. To meet the necessity of the case, government decided that two hulks should be procured to receive the sufferers; and orders were at

the same time given that these should be placed under the most rigorous quarantine regulations. These instructions were given on the 26th June, on which day I was appointed to the sole medical charge of the vessels in question, and received on board 255 Negroes, viz., men, 63; women, 8; boys, 123; girls, 61. Of these, 37 were labouring under small-pox; and I found that at least 80 others had had the disease. I ascertained this either from their own recollection, or from marks visible upon their persons.

Of those labouring under the disease, the majority had it in its most virulent form. I have seen small-pox in this country, but have never witnessed anything to equal that which I met with in quarantine off Port Louis. A hot climate always renders the disease worse; but these poor creatures had everything against them. The Mozambiques are a much more delicate race than their neighbours the natives of Madagascar, or those of the other coasts of Africa: they live almost entirely on a vegetable diet, and are soon prostrated by sickness.

In the very severe cases, all the worst symptoms of typhus supervened; the eruption assumed a dark livid or black hue, and became highly confluent; the swelling of the face was intense; the pustules contained a brownish ichor, giving out a most offensive odour; sloughing of the mouth and gums, coma, convulsions, etc., etc., were the usual symptoms observable in the very severe cases. In most of these medical aid was, of course, of little avail; good nourishing diet, free ventilation, and cleanliness were the primary desiderata.

Of about forty-one cases, eight died. It must be borne in mind that these patients were bad subjects for the disease. Not only were they naturally delicate, but, from the hardships they endured during the time they were on board the slaver, and the privations on board the sloop, the majority were in a deplorable state of emaciation when they arrived in quarantine. Of those who escaped small-pox, many died from this cachectic condition of body.

Fortunately, all the cases were not of the confluent type; indeed, many were so mild and shortened in their course, as to resemble the modified form with which we meet after vaccination, or a previous attack of the disease. Vaccination was not known in their country, and consequently could not have caused this modification; and I am confining myself strictly to facts when I add, that, out of a dozen modified cases which came under my notice, not more than three or four had had a previous attack, so far as my investigation enabled me to ascertain. The majority of these mild cases occurred in children, and it struck me as remarkable, that the disease should have been so slight with them. Some had not a hundred pustules, and these did not regularly go through their different stages, maturation occurring early, and the whole disappearing sooner than in ordinary cases. What caused this modification I am unable to say.

After these people joined the quarantine hulks, the disease almost ceased to spread. Good ventilation, proper food, strict attention to cleanliness, studying their comforts, and inducing content and cheerfulness amongst them, did much towards this.

The disease was almost entirely confined to the children. On referring to the numbers received on board, it will be seen why this

should have been the case. I have no doubt that most of the men and women had had the disease, as it was constantly prevailing in their country.

A circumstance occurred, showing most strikingly how powerful an agent *fear* is in predisposing to small-pox. When I took charge of the quarantine vessels, twelve of the police brigade of the island were sent on board to act under my directions, in seeing to the comforts and wants of the negroes. Although increase of pay was offered to those who volunteered to perform the duties of the office, only eight out of a large number could be tempted; the other four were consequently pressed or sent against their inclination. Not one of the twelve had had small-pox; but all had been vaccinated, and showed good marks of this operation having been well performed. Of the twelve, four were Europeans, and eight half-casts. On the morning of the eleventh day after joining the hulks and being exposed to the infection, two of the latter had the premonitory symptoms of small-pox; and on the evening of the same day two others, also half-casts, sickened. On the thirteenth day, the eruption appeared upon the four. They all had the disease in its most modified form, and were soon well. I have no doubt that the infection was imbibed as soon as they joined the negroes and became exposed to it. Upon being questioned, they all admitted that they had joined the quarantine against their inclination, that they dreaded the disease, and felt certain they would take it; and I ascertained from the eight who did not have it, that they had no fear whatever; they told me that they thought nothing of small-pox, but a great deal of the increase of pay, and how well off they would consequently be when liberated from quarantine.

I have frequently noticed, both in this country as well as within the tropics, that the premonitory fever generally shows itself about the eleventh, and the eruption on the thirteenth day.

After being on board the hulks thirteen weeks, and the last case having been well forty days, we were allowed pratique.

Before this period, the disease had reached the island, and was committing great ravages. A hospital was in consequence opened expressly for small-pox; the government placed Dr. Rogers, the civil medical officer, and myself in charge of it, he having the women under his care, and I the men.

Up to January 2nd, 1841,—702 cases, 491 males, and 211 females, had been taken in: of these 438 were discharged cured, 150 died, and 114 remained under treatment. Of the above 702 cases, 281 showed no marks of vaccination; of the 150 deaths, 120 took place in persons bearing no marks of vaccination, 17 in persons where the marks of vaccination were unsatisfactory or imperfect, and 13 of the remainder had satisfactory marks. Many were known drunkards.

Total admissions from September 9, 1840,	} Males	491
to January 2, 1841			
Of which were,			702
True discrete small-pox		8
— confluent ditto		260
			268

Brought forward (true and confluent discrete)	268
Modified discrete	271
_____ confluent	126
	_____ 397
Varicella	12
Cases still doubtful.....	25
Of which were	_____ 702
Discharged cured	438
Died	150
	_____ 588
Remaining under treatment.....	114
Of which were	_____ 702
Serious cases	20
Convalescents	40

The inhabitants of the island are a compound of many countries. Our patients were principally the Creole, Mozambique, Malagasi (natives of Madagascar), Indians, etc. Their occupation was that of labourers, draymen, bargemen, domestic servants, etc., etc. Nearly all were frightfully addicted to the practice of drinking a strong spirit called arrack,—a liquor too well known from its disastrous consequences in our army and navy to require further notice; consequently they were the very worst subjects for a disease like small-pox. Of those who had never been vaccinated, many had it most fearfully, and a large proportion died—much greater than in those who were attacked on board the hulks; and of those who had been vaccinated, very many died also—not so much from the disease itself, as from the after-consequences. When vital organs, as the brain, liver, stomach, etc., were previously in a morbid state, much was not required to ensure a fatal termination. Madness, severe biliary derangement, distressing retching, jaundice, dropsy, and dysentery, were among the more common causes of death.

The result of my experience in small-pox at the Mauritius convinced me, that it there assumed a more virulent character, and consequently was much more fatal, than in this country.

On board the hulks, this arose from the negroes being naturally a very delicate race of people; from the mode of living, viz., abstaining entirely from animal food, so that they were unable to bear up against severe disease; from the intense heat of the climate; and from want of the protective power of vaccination.

On shore, the very same results were unfortunately witnessed, although many individuals had been vaccinated. But these results must be attributed to the effects of an excessive indulgence in spirituous liquors, which, operating upon naturally weak constitutions, nullified, to a certain extent, the beneficial influence of vaccination.

I am inclined to think that, even in a completely healthy condition of the body, the protective power of vaccination is not so great in a country averaging so high a temperature as obtains in intertropical regions, as it is in colder latitudes.

As some difference of opinion has appeared lately to exist concerning the protective power of vaccination *after a certain period of life*, as well as with regard to the powers of *revaccination*, we ought unhesitatingly to give the results of our experience in this matter; the

more so, as one, who has hitherto been looked up to as a high authority, has propounded a theory which appears most unaccountable.

From the length of time which had elapsed since small-pox had visited the Mauritius, vaccination had of course been much neglected; and, at the first alarm, vaccine lymph could not be procured; indeed, there was none in the island.

Soon after I had been placed in charge of the quarantine hulks, Dr. St. John, the chief government medical officer, received from England the journals containing the accounts of the experiments of Mr. Ceely, and he desired me to repeat them, sending on board seven cows of different ages, and in various states, for this purpose. These cows were exposed to the fomites of the disease; and I inoculated them in every possible manner, and in various parts of the body, viz., in the teat, udder, mucous membrane of the vagina, rectum, and tonsils, with matter in every stage; also, by inserting scabs beneath the cuticle, but I did not succeed in producing any effect. The utmost result was slight inflammation about the punctures. Although this proves nothing against Mr. Ceely's experiments, it presents one fact, viz., failure of the most favouring circumstances, in a tropical climate, to infect the animal with small-pox.

Vaccine matter was sent for, to Calcutta, Ceylon, the Cape, etc.; but three months elapsed before any arrived. By this time, the disease was spreading over the island, and I was then in charge of the hospital on shore. Vaccination was now largely practised all over the island. Many patients presented themselves at the hospital, who had been vaccinated during the period of incubation of small-pox; and I was in the habit of performing it even immediately upon the attack of fever.

With regard to the results: in the former cases, I often observed that the disease was rendered milder, and was indeed distinctly modified; but, as might be anticipated, the more advanced the vaccine vesicles were upon the accession of fever, the more marked was the effect upon the small-pox; and the less forward the vesicle, the more it was itself disturbed, and deviated from a normal course. I never witnessed a perfect vesicle to pass through all its natural course, when the small-pox infection had been received; although the contrary has, I know, been stated to have been met with.

I am inclined to believe, that a favourable influence is exerted, to a certain extent, by practising vaccination during the preliminary fever of small-pox, although it may be but small. The power of our remedial means in this disease, is too inconsiderable to warrant us in refusing the least accession to it. I should, therefore, practise and recommend the insertion of vaccine matter freely, when a patient comes under treatment, the instant the nature of the fever is discovered; and I would do so, whether the patient had been vaccinated before or not.

Dr. Gregory has lately stated, that vaccination does not protect after puberty. He says, that "up to puberty, vaccination protects, but after that, a change takes place, and persons are liable to small-pox once and again."

This is certainly a bold assertion, and likely, I think, to meet with but few, if any, supporters. No doubt the vaccine does, after a time, with many, lose somewhat its power of protection; but why the period

of puberty should be fixed upon for its effect being lost, I cannot understand. Few persons have been more exposed than myself to the disease, yet I never took it, although I had long passed the period at which Dr. Gregory would have considered me safe. The only protection I had, was vaccination performed once during infancy. I was so placed on board the hulks, that it might be said I was night and day breathing air rendered most impure from the loathsome cases under my charge, yet, thanks to vaccination, I escaped. The twelve police, who have been before alluded to, had only vaccination to protect them, and they, too, had long passed the period of puberty. Eight did not take the disease; it is true that four did, but they had it were mildly; and I believe that if fear had not predisposed them to it, they would have escaped altogether.

Dr. Gregory is no advocate for *revaccination*; indeed, he goes so far as to say, that "revaccination is a proceeding of little moment; it satisfies the mind of the public, rather than effects real good."

Here again he will, I think, meet with but few supporters. How often do we find a decided effect produced by revaccination! It is remarkable, that in all the children from India on whom I have had to perform this operation, success has attended it, whether the marks of the vaccination performed in India were distinct or not. In many cases, I have produced a vesicle as perfect, to all appearance, as if it was the first time of its being done; and yet I have been satisfied, both by the distinct cicatrices, and the statement of the friends of the child, that vaccination had been successfully done in India.

Very lately, during my attendance upon a family who had just arrived from Calcutta, I suggested to the parent the propriety of her children being revaccinated. She did not think it necessary, as they had all been vaccinated in India, and with perfect success. But, upon my telling her how often I found children from tropical climates take the disease again, she consented. She had four children, the youngest three years old, and the eldest eleven. The youngest and second had as fine arms as if the operation had never before been performed, and the other two took well for revaccination. I may mention, that all showed good marks of its having been successfully done when in India; in the first two, the vesicles went through their stages with perfect regularity, as much so as if they had never been operated on before. I am unable to say if the second vaccination has really rendered them less liable to take small-pox; but I am strongly inclined to believe that it has. I have faith in revaccination, and shall continue to practise it, more especially with children from hot climates; because, in my practice at the Mauritius, and in other tropical countries, I have often witnessed the beneficial effects derived from this practice.

Dr. Gregory says, he "could find no reports of modified small-pox under puberty; that form occurred in grown-up persons only." Does he mean, after vaccination? If so, I can assure him that, within the last twelve months, I have seen several instances in this neighbourhood (Bayswater). Or does he mean where there has been *no* vaccination? If so, I can also tell him, that I have seen many such cases, to some of which I have already alluded in this paper.

As this Society is desirous of obtaining information relative to the

first appearance or outbreak of small-pox, it may be interesting to know how it first appeared on shore at the Mauritius, where it had not been for many years. It is an ascertained fact, that it was not by the infectious matter being conveyed by atmospheric agency, as some suppose it often to be; neither was it from any communication taking place between the hulks and the shore. The quarantine was most rigid; had any person on board attempted to leave, or any one from the shore come alongside, the sentries, placed in a guard-boat near us, would have shot them instantly, in compliance with their instructions. Nothing was allowed to be sent by any one on board to the shore, except letters; and these had to pass through my hands first, for the purpose of being thoroughly fumigated.

Some ten or twelve days after my taking charge of the quarantine hulk, there was sent me from the chief medical officer, a man in a boat by himself, towed by another boat. He was left alongside the vessel, with a note to me, saying that there was some doubt as to the nature of his case. A suspicious kind of pock was making its appearance. As he had been vaccinated, it was thought better that he should remain with me; for, supposing the disease to be small-pox, his being sent from the island might prevent the disease from spreading; and if it were not, his vaccination might save him from taking it from the negroes. A medical board had met for the purpose of examining the man; half thought it small-pox, and the rest chicken-pock. I was requested, when he was sent to me, to give my opinion: I did so, by asserting it to be modified small-pox. My decision caused the authorities at once to place the house he had occupied in strict quarantine, and to watch those who had been living with him. Ten or twelve days after, a woman, who had resided in the same house, had the disease. Others living near soon took it; and it spread from this man, until it got all over the island, destroying hundreds, and, indeed, thousands.

How did this man get the disease? He at first declared that he had not been near the *Lily* sloop, which had brought the negroes; and it was for some time a mystery how he got it. At last it was discovered that he had been near, and he confessed to having been alongside the *Lily* in a barge which took water to that vessel. Although strict orders had been given, that no person on board the barge should have any communication with those on board the *Lily*, yet, having been alongside for some hours, and being very hungry, he begged a sailor to give him some food through a port-hole. This, he declared, was all the communication which took place. Had it not been for this man's misconduct, the island might have escaped the dreadful scourge. Although the attack he had was so modified as to resemble varicella, yet it had the effect of causing the whole island to become affected with the disease.

9, Orme Square, Bayswater, November 1851.