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THE BEHAVIOUR OF CERTAIN EPIDEMIC DISEASES IN NATIVES OF POLYNESIA, WITH ESPECIAL REFERENCE TO THE FIJI ISLANDS.

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Before proceeding to the subject we have in hand this evening, I must ask your indulgence for one moment, in order that I may explain to you that I have no newly discovered facts or difficult scientific theories to introduce to your notice; but that, owing to my records being at the present time about sixteen thousand miles from London, I have merely, in response to the invitation with which you have honoured me, been able to throw together from memory a few observations which may be of interest to a medical mind, and which can, perhaps, afford pabulum for a little thought and conversation.

The photographs which are lying on the table before you were taken, with the aid of dry plates carried with him from England, by my friend Mr. Gerrard Ansdell, F.C.S., during a short sojourn in Fiji, and may serve to convey to you a fair conception of the physical appearance of the Fijian mountaineer tribes, and of some of the natives of the New Hebrides and Solomon Islands; and the two Admiralty charts I have pinned up will lend accuracy to your geographical knowledge. There is also a Fijian dictionary and grammar, which those among you who take an interest in the study of language may like to look into.

The epidemic of measles which ravaged the islands of the Fiji group began in the early part of 1875, and was the first visitation of its kind to which the natives there had been exposed. It was not until after its termination that I arrived in the colony; so that, in relating the history of the 1875 epidemic, you will understand that I am not speaking from my own observation at the time; although, by the opportunities since afforded me of gaining reliable information about it, chiefly through conversation with natives who were actual sufferers, and also with trustworthy European eye-

witnesses, I have been able to collect the leading facts of the occurrence, certainly in an accurate, as far as they go, if not in a comprehensive, form.

The knowledge which I have since gained by practical experience of the habits and tendencies of the Fijian race when suffering from illness, tends strongly to confirm in my own mind the numerical truth of the mortality returns when considered in relation to the causes which combined to bring about their excessively high rate. And I shall endeavour to show that this high rate of mortality was not so much the consequence of any special virulence of the disease itself, but that it resulted largely from a chain of circumstances, which, however uncontrollable at the time of the epidemic in question, are, or ought to be, preventable in the future, should the Fijians ever have the misfortune to be exposed to another visitation of zymotic disease.

It may be worth while to observe that the group of islands called by their inhabitants Viti, and known to us as Fiji, consists of about 250 islands, islets, and rocks, eighty or so of which are inhabited. They extend over a portion of the South Pacific Ocean, about 300 miles from east to west, and 240 from north to south, and are 1,100 miles distant in a northerly direction from New Zealand, being a little further eastwards from Queensland. The exact position of Levuka, where measles was first introduced, is lat. 17 deg. 41 min. S., long. 178 deg. 51 min. E. The island of Ovalau, upon which Levuka is situated, is about eight miles in diameter, oval in shape, and mountainous.

The largest island in the group is Viti Levu (*Anglicè,* Great Fiji), and is also irregularly oval, being ninety miles in its long diameter and sixty in the short: its area about equal to Jamaica or Cyprus. The comparative sizes of the other large islands you may see by glancing at the chart before you. That of the whole archipelago, as well as its position with regard to neighbouring islands and groups, is well shown upon the smaller scale chart of the South-West Pacific.

The topographical features of Fiji thus offer the greatest facilities for holding in check the spreading tendency of any zymotic disease, if one could exercise a rigid system of isolation upon any island where it first manifested itself. Owing, however, to the frequent communication which is kept up at ordinary times between island and island for trading purposes, etc., especially by the Fijians themselves, who are a maritime people, and very venturesome at sea, such isolation would be difficult to enforce. And in the case of the great

measles epidemic of 1875, the disease was disseminated throughout almost the entire group by this very means. For, while Thakombau and his sons and retinue were at Levuka, still able to communicate the disease, a great meeting of the chiefs from nearly every district took place, such as had never before been summoned, to discuss the political questions consequent on the annexation of the islands to the British Crown, and to sign the deed of cession.

I shall have to refer to this meeting again presently, but must first of all narrate the circumstances under which the disease came to be introduced.

The late ex-king, Thakombau, was in 1874 the most powerful and the most respected of all the chiefs of Fiji. Certain political and commercial considerations, which I need not detail, gave rise to the negotiations which ended in the cession of Thakombau's government to Great Britain; and in connection with these events, Thakombau visited Sydney as the guest of Sir Hercules Robinson, who was then Governor of New South Wales. Unfortunately, measles was very prevalent in most of the Australian colonies at that period, and one of the old chief's sons, Ratu Timoci, and a native servant, fell ill of that disease during their return voyage to Fiji in H.M.S. *Dido*. According to the report of Dr. Goodman, surgeon of the *Dido*, this occurred on the 6th of January 1875. On the 12th the *Dido* arrived at Levuka; and I regret to have to record the fact that the sick people, with their relatives, friends, and belongings, were permitted to land at once, without any attempt at isolation or quarantine. The tenor of the official correspondence which has been published in respect of this bungle is mutual recrimination between the authorities on shore and those on board the *Dido* —a shifting of blame from one to the other, *viri beibei*, as a Fijian would express it, with excuses which merely resolve themselves into a knotted tangle of red tape.

There was no quarantine law, as the colony had only been chartered so short a time, and the medical officers appointed by the Home Government had not yet arrived from England. Anyone who wishes to know the details of this affair can obtain them by referring to the official correspondence published by the Colonial Office on the subject.

So Thakombau and his sons, with their retinue, landed at Levuka on the 12th of January, with two of their number suffering from measles—it being the sixth day since the disease was identified, and the rash on the wane. Two days later, the other son and another attendant were attacked; and we are told also that on the 26th of the same month the

steamer *Wentworth* arrived at Levuka from Sydney, and was boarded by an officer from the *Dido*, to whom it was reported that a child of one of the passengers, Mrs. Tarte by name, had died of measles during the voyage, as well as its native nurse. In this case, also, no isolation was practised; and Mrs. Tarte took her surviving child ashore, to the house of a Mr. Moore at Levuka, whose children were all subsequently attacked by the disease.

The brig *Western Star*, also from Sydney, arrived about the same period with measles on board, and is said to have communicated the disease, through a boy named Bucknell, to another child of Mr. Moore, while at Suva. So much for the source of infection.

When the *Dido* arrived, she was boarded, I should have said, by the Administrator of the Government, with a boat's crew of native constabulary; and it is amongst these men that we next hear of the disease showing itself. They lived in so-called barracks, close to the Government buildings at Nasova, a suburb of Levuka, and numbered in all a hundred and forty-seven men. Every one of them eventually took the disease; but the first to suffer were the boat's crew who had been off to the *Dido*, and there fraternised with the attendants of the chief and his sons. Up to this time "the probability of its spreading caused no great apprehension. It was understood that the persons affected were convalescent, and they were isolated so far as was practicable or seemed necessary"(!)—I am quoting from a memorandum by the Acting Colonial Secretary, written on the 26th of June of that year, at the request of Sir Arthur Gordon—" but two causes strongly operated to spread the disease.

"1. The great number of Fijians who, in the second or third week after Thakombau's arrival, visited the village in which the ex-king lay.

"2. The impossibility of impressing the natives with a sense of their danger."

The first-named of these causes refers to the meeting of chiefs which I mentioned just now. It had been arranged for before the introduction of the disease; and owing to the widespread position of the various districts, and the fact that it was just then the middle of the hurricane or rainy season, when the winds are uncertain, there was not time to give notice of postponement, even if such a step had been thought necessary. As a matter of fact it was not; and though the disease was already implanted of course at Levuka, and consequently in Ovalau, it had not, on the arrival of the chiefs and their followers from the several districts, begun to spread.

These chiefs were sixty-nine in number, and their followers amounted to nearly five hundred persons. They came from the north and from the south, from the east and from the west. There were some from Viti Levu, some from Vanua Levu: from Kadavu, from Tavinui, and from Lau. Need I say how sure a means this accidental circumstance became of propagating the disease to the uttermost parts of the group, when the gathering broke up and its members returned to their homes?

Having all arrived in Levuka, they first met together to settle their official business, and afterwards proceeded to enjoy themselves by feasting and sight-seeing. The meeting took place on the 22nd of January, and on the 25th—that is to say, nineteen days after the first outbreak of measles on board the *Dido*, and eleven only since Ratu Timoci and his servant fell ill of it—these sixty-nine chiefs paid an official or complimentary visit to Thakombau in his "measly" house near Levuka. Two days later they went over H.M.S. *Dido;* and on the 3rd of March, about five weeks later, Mr. Harding reports from the mountains of Viti Levu that "all the chiefs who came to Levuka have measles, and it is spreading rapidly. They attribute it to poison and treachery. The attacks are so sudden and complete, that every soul in a village will be down at once; and no one will be able to procure food, or if obtainable, to cook it for themselves or others. The people have died from exhaustion and starvation in the midst of plenty."

In the meantime the disease had spread rapidly in Ovalau, from the original centre of infection; and "about the middle of February reports arrived from various provinces that measles had made its appearance. The districts of Kadavu and Rewa were first attacked; but the disease was spreading with great rapidity, and by the early or middle part of March disastrous news came in from all quarters."

It reached its maximum in Ovalau and Bau and their neighbourhood towards the end of March, and in most other places shortly after the beginning of April. The eastern or windward portion, however, was the last affected: a fact which may be accounted for by the lesser facilities which exist there for communication between island and island, owing to the danger of the navigation and the absence of protecting reefs. It did, however, get as far as Ono, which is the most windward place in the group, and consists of a small cluster of islets 240 miles to the south-eastward of Levuka, and over 100 miles from any other civilised place. The infection was carried to it by a canoe sent by the cele-

brated chief Maafu with yams from Loma Loma to relieve the inhabitants, who were reported to be short of food.

About this time we have a record of letters coming in from all parts, describing the ravages of the disease among the natives, and their consequently forlorn state. On April 20th, for instance, Capt. Barrack, of Savu Savu, writes: "I am quite certain we shall lose twenty-five per cent. of the population: if this goes on much longer it will be nearer fifty." He complains that the healthy as well as the sick are panic-stricken, and get quite indifferent about one another; and says that "they sit and look on at their relations and friends dying for want of a drink or a bit of food." He adds that Mrs. Barrack made over five hundred dysentery pills (calomel, opium, and ipecac.) in one week, and was among the sick daily: and it is encouraging to learn that owing to the isolation which this lady enforced upon their own labourers, who, though of a different race from Fijians, were equally unfamiliar with measles, none of these were attacked.

A native teacher named Aiselea (Wesley) writes:—"The healthy congregate together; the sick are left to themselves for very fear." And the Rev. Mr. Webb, a Wesleyan missionary, relates that "that ere long the people lay down in masses . . . . . . old men and infants, young men and mothers of families, one heap of illness." Strong winds and rains added to the horrors of the situation; and starvation was imminent as a consequence of all hands being simultaneously laid up. This, indeed, was one of the main causes of the mortality: and a great want of food occurred, or rather, of physical strength necessary to dig and carry in the yams and "dalo". For the same reason the Government could purchase no supplies for distribution.

In Ovalau, mortality was very great; and many small craft lay in harbour without crews to man them. Sick and dying were attended to only by Europeans, many of whom also contracted the disease; and burials became almost an impossibility. Medicines and other necessaries were freely given by the magistrates and many of the settlers, and much good was doubtless effected. The observations and experience, however, of persons so engaged lead to the conclusion that practically medicine and food were of less importance or value than advice and encouragement: it was possible in some degree to persuade a patient from exposing himself to wet and cold; but owing to the unfortunate belief which possessed the natives, that they were being bewitched, and that the plague was the consequence of annexation to

the white man's empire, it was seldom they would swallow our medicine or partake of our food.

It is recorded that "as the native population has conceived an idea that the sickness was introduced for the special purpose of carrying them off, very few have availed themselves of the offer of hospital accommodation; and many of the sick appear to consider that their only chance of recovery depends upon their not being forced to take European food and medicine." They preferred rather, when overtaken by the fever, and blurred by the rash, to crawl out of their houses and cool their bodies by lying on the damp ground, or in the bed of the nearest creek. Guards were placed over them wherever and whenever possible; but many confessed to escaping at night into friends' houses, and to lying down in waterholes and creeks, or the sea. All these speedily developed dysentery or pneumonia, and died miserably.

As a set-off to this state of affairs, we are reassured by learning, as an evidence of the good results where medical treatment and discipline could be *enforced,* that there was only a slight mortality amongst the members of the Armed Native Constabulary at Nasova. These men lived in so-called barracks, and were under English military discipline. Every one of them, a hundred and forty-seven strong, as I have already mentioned, took the disease; but only nine died. Of course they were all male adults in the prime of life; but six per cent. was their death-rate, as against 26 per cent. of the entire native population. And it happened that amongst the labourers indentured to planters and merchants, the mortality was comparatively small, and that in a few instances, even, the disease never reached them. This was owing to the isolation and discipline which their employers were able to insist upon, among the indentured working population on the various estates. These people were mostly natives of the Solomon Islands, New Hebrides, and Line Islands, who had emigrated to Fiji for a three years' term of indenture; and who were dependent upon their employers, not only for medicine and sanitary care, but for food and housing.

Further, in a letter written by Mr. Emberson, one of the magistrates, whose station was Lau, but *who was absent from home* at the time of the outbreak, he says:—"On my return here, I found death, desolation, and starvation staring the people in the face, and their stern sway is as yet unbroken. Whole families have been carried off, and, but for the incessant beat of the death-drum, one might fancy the place deserted. All my constables are ill, and the people have no one left to bring them food, firewood, medicine, or water, or

to perform the necessary duties of cleansing the houses. They lose courage, cower down to die; and die they do, in dozens and in hundreds. I attended first to the most sensible and influential people, hoping, if they recovered, that heart would be inspired into the others; but the proverb, 'God helpeth those who help themselves', is being fearfully verified."

I might quote numerous other instances from both official and private records of the epidemic, all of which go to show that the high rate of mortality, which, as I have already stated, amounted to no less than 26 per cent., was brought about mainly in consequence of all the people being infected at or about the same time, because none of them were protected by a previous attack of measles. The nation presented a virgin field for its insemination and development. Also, by the untutored and uncontrollable habits of the natives in giving up hope and reason, or acting purely in ignorance, as manifested by their proneness to bathe in cold water, or expose their bodies to cooling influences, such as night air, draughts, or damp earth, when in a state of high fever; these inconsistencies resulting very naturally in dysentery and pneumonia and death. Starvation was a secondary cause, brought about by the first I mentioned, there being no healthy people available to provide food and look after those that were sick. Want of cleanliness, speedy and efficient disposal of the dead, and other sanitary precautions, may be classed under the same category; and superstition and despair contributed also to the fatal results.*

The point which I wish to establish, therefore, is that whatever virulence there may have been in this particular epidemic—and we know that epidemics of measles vary very much in this respect—the excessively high rate of mortality which resulted was not only a direct consequence of the disease being implanted in a nation to whose ancestors, history, and traditions it had hitherto been a stranger, but that it occurred in great measure in a secondary manner, and was brought about in the ways which I just now indicated. In by far the greater number of fatal cases, the cause of death

* It is an indisputable fact that some Polynesians will express their intention of dying, coil themselves away in a corner, and actually die within twenty-four hours, without any sufficient symptoms being discernible to a medical man during life or detectable by *post mortem* examination. It *may* be poison; but the natives attribute it to bewitchment by means of some *other* person eating the poison; so that mental emotion is probably the cause. I have known this happen to a Solomon Islander on the arrival of a ship from his home, bringing a yarn that his cousin had eaten certain leaves and clay, with a view to spite him for some old cause of feud—the bewitcher being 1,350 miles away from the bewitched. Numerous similar instances are spoken of by settlers.

was dysentery or pneumonia, or both together; and these diseases were mainly produced by causes which in a civilised community, even if all new to measles, would not have operated. I know that it is usual to believe that a virgin community will suffer more, other things being equal, on a disease being introduced among them, than will one whose ancestors have been exposed to its influence during successive generations. It may be so, and probably is; but I am confident that, in the case of this epidemic of measles in Fiji, more stress has been generally laid upon this hypothesis than the facts warrant us in believing to have been the fulfilment of it.

I regret that I am not able to lay before you the complete statistics of the mortality. I believe they have not been published *in extenso.* But "not less than 40,000" are the words given by Sir Arthur Gordon in an official despatch* to the Secretary of State as the total number of deaths resulting from the epidemic. The total population soon after its termination was 110,000 Fijians, about 4,000 Polynesians from other islands, 300 half-castes, and 2,000 Europeans, Americans, and Australians. In the two islands of Ovalau and Koro, with a population before the epidemic of 1,546 and 2,543 respectively, 447 and 688 died from it:—equal to 28 and 27 per cent. And in the larger district of the Ba river, with a population of 7,925, the same proportion died, viz., 2,214. Among Polynesians belonging to other groups of islands, but temporarily resident in Fiji, and previously unacquainted with measles, the mortality was considerably less, owing, as I have explained, to the care and influence which could be not only proffered, but enforced by their white employers.

From the middle to the end of March, the disease reached its maximum in Ovalau and the islands to the westward; elsewhere, except Lau (lying furthest to windward), in the beginning of April. By the first of May it had almost died out in Ovalau, and was rapidly declining in the more accessible parts of Viti Levu. Plain directions for nursing and the maintenance of cleanliness had been printed in the Fijian language, and were distributed among the natives; and hygienic measures were now taken—as soon as enough people recovered strength to do the work—to cleanse the villages and raise mounds of earth over the bodies of the half-buried dead. But the sites of the natives' villages were at that time always bad, being chosen with a view to security against an enemy in human form only. Morasses and low-lying places, with dense and often impenetrable vegetation all round them, were the

* C, 1624, No. 23, anno 1875.

positions generally selected. These were fortified by double or treble trenches and dykes, closely planted with arums and lemon bushes respectively, the trenches often becoming a receptacle for the rotting fruit and the yam peelings, offal, and other refuse of the town. To make matters worse, the inevitable pig would frequently find out the shallow graves, and unearth the bodies of those most recently buried.

By the 30th of May, the epidemic was practically at an end; and as this was only four months from the date of its commencement, the death-rate, *while it lasted*, must have been in the proportion of no less than 78 per cent. per annum.

Since 1875, measles has again occasionally made its appearance in Fiji, and may now be regarded as endemic there. Once it was reintroduced from Sydney, once from Auckland, and once from Melbourne. It occurs from time to time in the Lau and Taviuni districts and in Levuka—handed down, it would seem, from the 1875 infection by means of clothing, new babies, and labourers introduced from other groups. The Sydney case (in 1880) extended to seventeen new ones along the estates on the Waimanu; but the cases always come to the knowledge of a District Medical Officer, are well looked after, and nourished by suitable food and drink administered by a European; and out of all those which have occurred in Fiji since the close of the 1875 epidemic, there has been only a single death, and that an infant.*

I have not met with any case of measles occurring for the second time in a Polynesian native, including Fijians, though I am not in a position to affirm that such has never been the case.

There is no doubt that this disease has run through the islands of the New Hebrides and most of the Solomon group, perhaps also the Santa Cruz and Torres islands, for the natives of those islands who come to Fiji relate stories about a "big sickness" which visited their families some few years ago, and was brought by trading vessels from Sydney. I have myself had natives of Santa attending upon measles cases in white children without taking the disease themselves.

The unfortunate *Dido* is pointed at by the natives of Malakula as the vessel which carried infection to their shores. It is known that she returned a hundred or so Polynesians to their homes (from Fiji) about a month after Thakombau and his suite had brought measles to Fiji in the ship; and the Malakula natives informed the master of the schooner *Daphne*, in 1875, of certain labourers who had been returned from Fiji, saying that they had had a visit from a "big fellah ship

* A Gilbert Islander.

—a steamer with three fellah mast", which landed "plenty men. These fellah get plenty sick; by-and-bye plenty fellah die." And the people who reported this conversation saw none but a few women about, and could not obtain yams or bread-fruit.

The evidence of measles having been in these islands is corroborated by European missionaries, who have seen much of the natives of them, and are able to understand and speak some of their languages. I was there myself in 1876.

So far as I can ascertain, or remember without reference to my notes, I believe measles has not yet visited the islands of Tonga and Samoa, nor the Fijian dependency of Rotuma; and no vessels are allowed to communicate with the latter, upon which an English Commissioner resides, without producing a clean bill of health, signed by the port medical officer at Suva or Levuka.

This brings to a conclusion what I have to tell you about measles, and I may pass on to the consideration of the next epidemic disease to which I propose to refer, and that is influenza.

I have noticed on several occasions during my eight years' stay in Fiji the occurrence of a distinctly epidemic outbreak of influenza. In that part of the group over which my information has been chiefly gleaned, the news of its prevalence has always first reached me from Levuka. This is, of course, partly owing to the fact that that town was the settlement with which I had the most frequent and regular mail communication; but I want you to bear in mind its position—to windward of Suva, where I lived. It follows in Suva about a fortnight later, and in the interval declares itself in Bau, Tai Levu, and along the native villages and labouring population situated on the banks of the Rewa river, whose course lies intermediate between the two towns above mentioned. Later on, we hear in Suva of its having been prevalent in Lau, but at an earlier date than at Levuka, and the news reaches us last because of the long distance that district is from Suva, and the irregularity of the mails from it. Batiki and Nairai get it about a week earlier than Bau and Levuka, as their position would lead one to expect.

The disease appears to me to be spread chiefly through the agency of the trade-wind, which blows generally from east-south-east: a process which I have reason to believe is also partly the case with a form of conjunctivitis which is annually epidemic in most parts of Western Polynesia. With the former disease, however, season does not seem to have anything to do; with the latter, on the contrary, almost everything.

Unfortunately, I have only brought notes home with me of one of these outbreaks of influenza; but it was a typical one, and the most severe that I remember. It occurred last year, in January and February—the two hottest months of any. I remember hearing, about the latter part of January, that the Levuka people were "down with colds", as they describe it. On the 27th, an urgent message arrived from Bau, to say that the Vunivalu* was going to die; and upon receiving this news the Governor at once instructed me, with the Colonial Secretary, to proceed to Bau, and do what we could for the old chief. I remember saying to my companion, "They've been reached by the influenza wave at Bau by this time, and I expect the chief is getting bronchitis as a sequel to it." My surmise was wrong, however, as he died from natural decay, culminating in a carbuncle in the loin; which, having been neglected, was the immediate cause of his end. But I had an excellent opportunity of watching the course of influenza in his Fijian subjects, as I found nearly half the adult population of the town, which contains four hundred, then ill with it. The disease had attacked all the Fijians in Suva, within a fortnight of its climax at Bau; and my official returns show that on one day in February every man in the Armed Native Constabulary (then seventy-three strong) was on the sick-list. In the same week, out of 130 and odd prisoners in the gaol, mostly Fijians, the average daily sick amounted to nearly seventy, of whom sixty-four were cases of influenza and its sequelæ. Two were fatal; and another narrowly escaped, being three months laid up and convalescent from double pneumonia, before he could return to prison labour.

In the generality of cases of this affection which I have met with in Fijians, other Polynesians, and white men, the first symptom is a feeling of chilliness, usually at night, with perhaps a rigor: several natives told me of a feeling which they likened to that of ants creeping over their skin —formication. Others described this sensation by comparing it to a "cat's-paw" on the water. This is followed on the succeeding day by immoderate sneezing, aches and pains in the body and limbs, particularly the lumbar region, and severe headache. The temperature now rises; and on the evening after the first day may attain 101 deg.; and the patient has a dry, burning skin. Next morning he is somewhat freer from pain, but has coryza, with pharyngeal dryness and itching; and complains of having passed a sleepless night. Towards evening the temperature again

* Thakombau's native title.

rises, perhaps to 103 deg. or so, with decided inflammation of the naso-pharyngeal mucous tract. The eyes are bloodshot, and the patient is drowsy and stupid. There is constipation, and the urine is scanty and loaded with lithates. From this point the symptoms run more or less rapidly the ordinary course of a severe " cold in the head", with bronchial catarrh; which not unfrequently goes on to capillary bronchitis, or pneumonia, and sometimes terminates fatally.

The best guide to the prognosis of a case is the temperature; as, when the graver complications which I have mentioned ensue, they generally do so early, and without much hesitation. A steady rise to 104 deg. is nearly always indicative of one or other of these; but it is much oftener broncho-pneumonia, than bronchitis *pur et simple*, which results. This is, I think, attributable to the excessive moisture of the air in Fiji, and to an idiosyncrasy of race. That there are such idiosyncrasies is, I think, certainly the case; for I have repeatedly observed in these epidemics of influenza that the Fijians, who are a much more lusty race than the natives of the Solomon and New Hebridean groups, are always attacked first; and any of the latter people who may be living amongst them, if they take the disease at all, are later in being affected by it, though they may suffer with equal severity in the end.

To summarise, then, the results of my acquaintance with influenza in Polynesia, I may say that my observations have led me to the conclusions that it is, in the first place, distinctly a zymotic disease. The name by which I like best to call it is "Epidemic naso-pharyngeal catarrh". That it is disseminated by means of specific germs (for want of a more precise term) which originate in, or first reach, the windward portion of the group, and are carried by the trade-wind to leeward; and that the epidemic spreads by this means—very much in the same way as the spores of the *Heimleia vastatrix* of coffee shrubs travel—rather than by infection from man to man. For whole villages and districts are successively attacked as the disease spreads westwards, in what I may term a wholesale manner; and the period of incubation, though uncertain, appears to be longer than could be the case if whole villages and districts became infected in two or three days by the man-to-man method. A first or subsequent attack affords no protection whatever against its repetition in the same person; and adults and oldish people seem to suffer more than children.

This brings me back to what I said just now about idiosyncrasy of race; and in contradistinction to the effect of influenza amongst Fijians as compared with purer Papuan

tribes, I may adduce, in support of the idiosyncrasy theory, the fact that the Polynesian immigrants to Fiji are the first and most fatally affected there by dysentery when in an epidemic form, while the Fijians living amongst them escape it almost entirely. In Fiji the order would seem to be :—to pulmonary affections the light-skinned races are most liable; to bowel disorders the dark-skinned: though I do not assert that the same postulate will always hold good as to variously shaded individuals of any one race. The straight-haired and fair Line Islanders, whose cognomen sufficiently indicates the latitude of their coral homes, are, nevertheless, always suffering from coughs; and more particularly, the Lord Howe's Islanders, from a small cluster of atolls among the black Papuan Solomon Islanders, but who are themselves as fair as a Maltese, and have straight hair, have chests so delicate that their introduction to Fiji as indentured labourers has had to be restricted by Government regulation.

It may be that we must seek for the causes of these distinctions outside the Fijian group, in the several islands where these emigrants come from ; but at home the New Hebridean and Solomon men do not appear to be thus specially prone to diseases of a dysenteric type; though the Fijians who have gone thither as missionaries and school teachers have constantly become martyrs to intermittent fever in consequence. It is certainly a noteworthy fact that malarial fevers are common, and I may say inevitable, to a white man in the New Hebrides, Solomon Islands, parts of New Guinea, and many other groups in the Western Pacific ; while in Fiji such a thing as what is called malaria (a painfully vague term) does not exist; or if it does, it does not produce intermittent or remittent fevers, even in white men. These facts point, I think, in favour of the specific-germ theory of malaria; and I ought to be unwilling to assert perhaps that we have no malaria in Fiji; because I believe we have. But it is malaria which, when its toxic influence is brought to bear upon a person, induces not ague, nor remittent fever, but dysentery. The French medical authorities at Nouméa, in New Caledonia, attribute this feature to geological distinctions, chief of which is growing coral. Whenever volcanic islands are surrounded by barrier reefs of growing coral, they say, you will meet with no intermittent fever. But whenever the islands are formed of gradually upheaved dead coral, and there is an absence of living reefs, as in the New Hebrides, for instance, you will have malarial fevers. I need scarcely observe that in this instance our republican colleagues have generalised rather freely.

I should here remark, however, that elephantiasis, which is an irregularly intermittent fever, *is* present in Fiji, in common with nearly every other tropical Polynesian island. But it is only to be found in certain districts—not necessarily of similar topographical or geological features—and is often, without the slightest doubt, hereditary. I have not succeeded in catching a filaria. Removal of scrotal elephantiacal tumour is followed by excellent results, child-bearing having become possible to the wife of one such case at least.

I regret that I am not able to offer any satisfactory explanation of these facts about the distribution of malarial fevers, as the data in many contradictory cases are exactly the same, and in some similar ones are opposite. For the present the cause remains hidden, and I can only hazard a theory that geological age may have something to do with it, and that in the case of Mauritius, for instance, the fever-breeding period has been reached in recent years.

I must now close this portion of my subject by expressing the hope that it may be very many years indeed before Fiji becomes a nidus, like Mauritius did in 1867, for intermittent fever, and pass on to the consideration of another class of diseases on my list—variola, vaccinia, and varicella.

The only islands in the South Pacific which small-pox has visited are, I believe, the Marquesas, or Nuka-hiva group. I have been told by the surgeon of a French ship of war, the *Hugon,* who had seen them, that there was an epidemic there about twenty-one years ago, and that all the natives now above that age are pitted by it. So far as I can ascertain, it has never recurred there. There has been none of late years in New Zealand, except at the Auckland Quarantine Station (in 1880, I think), when it was brought in the person of a passenger from San Francisco and Honolulu. As to Fiji, I need hardly say that in a country where such terrible results followed the introduction of measles for the first time, small-pox is spoken of by both natives and Europeans as the most dreaded of all possible calamities. The natives form this estimate, through having been frightened by the accounts given by white men about its ravages and very great fatality in other countries. For Fiji has, up to the present time, remained entirely free from it; and it is on this account that the much abused system of quarantine has, when conducted upon the principles of common sense, as in Fiji, been a blessing as well as a nuisance. And while on two occasions ships have arrived from Calcutta, each with nearly 500 coolies on board, amongst whom there had been

cases of variola during the voyage, yet by means of a plain-dealing method of insular isolation, with strict attention to every detail, the introduction of the disease to the people of Fiji has been happily averted.

I presume it is unnecessary to record in this presence that vaccination, compulsory and universal, was the first and by far most important step taken by the medical authorities to keep out the enemy. Nor was it after the horse had run out that the stable door had been shut, for the name of Dr. William McGregor, C.M.G., Chief Medical Officer of the colony, was long ago recognised by the Secretary of State as that of the man to whose foresight is due the effective carrying out of the maxim, "Prevention is better than cure." The 110,000 Fijians are now all vaccinated, and a series of minor native chiefs have been trained and receive salaries as district vaccinators, who regularly visit all the villages under their control, and keep up the enforcement of the ordinance as fast as the newly-born children achieve the age of from three to six months. Their work is periodically inspected by a European Government Vaccinator, who in his turn is instructed by the Chief Medical Officer. All the District Medical Officers are also District Vaccinators *ex officio.*

This subject leads me on to vaccinia, a disease which I have often met with in calves and in goats, animals which have been introduced to the islands within the present century. The only indigenous mammal is the field-mouse. But though I have tried a few times to vaccinate children with this spontaneous or idiopathic calf lymph, I have not succeeded, owing chiefly, I thought at the time, to the dryness of the vesicle on the udder. For vaccinia runs a more rapid course in the warm climate of Fiji than it does in England, and the truly vesicular stage in natives and in animals is of inconveniently short duration. So much so, indeed, that we have found it impossible to maintain a supply of reliable lymph; and the Colonial Government has to be at the expense of importing nearly six hundred tubes of lymph from London every year, *i.e.*, four dozen monthly.

In European children in Fiji, less difficulty is encountered as to the lymph supply, but its quality is purest on the sixth day after vaccination; that is to say, if a child is vaccinated on a Wednesday, its lymph should be availed of on the succeeding Tuesday if possible. With natives this is more especially the case; and just as in varicella the vesicular stage of the rash is found never to last more than a few hours, and may even be missed altogether, so in vaccination, the contents of the blister become purulent and unfit for use at an earlier period than in England.

The late Governor of Fiji, the Honourable Sir Arthur Gordon, G.C.M.G., once underwent a fortnight's quarantine on arrival at Sydney, in consequence of the Health Officer judging a rash, which had made its appearance during the voyage from Fiji in the person of Sir Arthur's native servant, of so suspicious a character as to warrant the detention of the passengers and crew. A gentleman of Sir Arthur's despotic temperament was naturally very annoyed and irate at being thus dealt with; but though we in Fiji knew well enough that the case could be no other than varicella, it was only natural, and certainly not blameworthy on the part of the Sydney Health Officer, who was not familiar with the characteristics of the disease in natives' skins, to act on the safe side.

The Fijians have several names for varicella. But they have no knowledge of its etiology, beyond the fact that it is communicable from man to man, and that its symptoms only manifest themselves after a period of incubation. One of their names is Sui-sui, which means literally a sprinkling. Another is Thoko ni Tanna, which would lead one to infer that the disease was originally introduced into the islands from Tanna in the New Hebrides. It occurs in an epidemic form in Fiji twice or thrice every year; but, owing to the multi-insular nature of the colony—if I may use such a word—its distribution is very uncertain and irregular. I have had about 1,400 cases under observation, and I believe that a fortnight is the commonest duration of its incubative period in natives of Polynesia. It is oftener between twelve and fourteen days than longer.

A man will complain of severe headache, dry skin, fever, and epigastric uneasiness. His usual action is to point to his forehead and his stomach, saying nothing unless questioned. Next day a vesicle is here and there observable on the forehead and about the lips. Within the next twelve hours they multiply, and begin to appear on the shoulders, chest, and wrists, and afterwards spread over the abdomen, groins, back, and thighs. Lastly, the lower extremities and feet are involved, and by this time the fever has almost entirely subsided. The bowels are usually constipated, and there are thirst and anorexia during the rash. But now we come to a special point. If you carefully sketch on paper a chart of any particular surface of skin upon which the vesicles are in process of development, and watch their stages, you will find that within six or eight hours of their appearance they will be no longer vesicles, but pustules; and soon after becoming purulent, they may here and there be noticed umbilicated, though by no means in every instance. Later still,

they often form scabs, and sometimes leave a cicatrix. I have never known one occur on the conjunctiva or on the cornea, and I have never known a case of this disease prove fatal in any Polynesian.

It now only remains for me to allude briefly to scarlet fever and to yellow fever, by stating that they are up to the present time unknown in Polynesia, except New Zealand, where the former may be now regarded as endemic. Cholera has twice occurred on board coolie ships coming to Fiji from Calcutta; but by means of care during the voyage, and a sensibly regulated quarantine on arrival, its spread to the shore was in each instance prevented. Three cases did indeed occur in Indian coolies in Fiji which strongly simulated cholera; but they were at long intervals, and not in newly arrived coolies—doubtless of a sporadic type. In one of the cases some raw and unripe granadilla seeds were found in the stools; and in another the patient confessed to having eaten a quantity of goat tripe in the night before his attack. It is possible that this tripe may have been poisonous, as goats will eat five or six hundred different kinds of shrubs and herbs (when they can get them), many of which will kill most other animals and man. The third case was fatal, but no cause was discovered for its occurrence. The ship which arrived last year had fifty-four cases of cholera during the voyage (eighty days), seventeen fatal. Seven weeks and a half was the period between the last death and the release from quarantine.

We have had no experience of epidemic diphtheria in Fiji, though it is common in Australia. A few isolated cases have been reported, but their identity is not well authenticated.

It is a noteworthy fact that a variety of yaws, called by the Fijians *thoko,* is endemic in most of the islands of Western Polynesia, including Fiji. The disease is one presenting a subject for study of the deepest interest; but I must not touch upon it, except in the most cursory manner, to-night, as it would require a whole volume to itself. Moreover, its investigation has been very ably begun by Dr. McGregor, whose pen is more worthy of attention than mine. There is no lack either of scope or opportunity for this inquiry, for almost every native takes *thoko* during childhood; and when they are late in doing so the parents generally inoculate it, believing that they will grow up stronger in consequence. They are not quite correct in this theory, though it certainly leaves much less serious effects when incurred during childhood than in after-life. It developes secondary and tertiary symptoms, and its whole course and treatment bear a striking

analogy to syphilis. It is rarely fatal: in Fijians I have never seen it so; and in the few instances which have come before me in other Polynesians, the cause of death has usually been diarrhœa. It is generally communicated by house flies, when they pass from a yaw to a sore, or a scatch on a healthy person. It does not appear to be infectious, but its power of contagion by means of virus from the sore is certain, and I have no doubt that it is also inoculable by blood. When white men get it they suffer very severely; sometimes for years. Venereal diseases are very rare in Fijians, owing to their virtuous habits and circumcision; but in many of the Solomon Islands and New Hebrides they have now gained a footing, having been introduced, it is currently believed, by whaling crews as much as a hundred years ago. They often produce in men the most horrid local effects, owing to the exceedingly long prepuce with which the Papuan races are endowed; but I cannot recollect any case of severe secondary or tertiary syphilis. One feels inclined to connect this immunity with the yaws question; but definite and systematic researches are as yet incomplete.

At Malakula, where they circumcise, I have never seen a case of venereal affection: and every man's genital organs are open to view, owing to the paucity of their dress. In the course of my duties as Medical Officer to the Immigration Department in Fiji, I have, however, carefully examined over seven thousand natives of other groups who have come to Fiji as labourers; and until the most recent years the proportion of venereal cases was decidedly small. The "Polynesian labour traffic" to Fiji, Queensland, and New Caledonia, has been over and over again—to a great extent unfairly—decried; but I am afraid that the spread of syphilis, chancroid, and gonorrhœa, may be in some measure truthfully ascribed to its operation, notwithstanding medical supervision and care. Hundreds of cases of warts and balanitis, however, which occur in these (Papuan) races, are merely the result of long prepuce with narrow orifice, without any sexual origin whatever; and might be easily avoided by circumcision, or by employing a more careful and less hasty toilet than is usual with these singular people.

Certain parasitic skin diseases are very common in Western Polynesia, notably chloasma, and a form of ring-worm which we call *Tinea desquamans*. The latter often covers the entire surface of a native except the scalp, and is a great disfigurement. When of moderately recent origin, fumigation by sulphurous acid, aided by scrubbing and soft soap, will effect a cure; but mercurial applications mostly fail, and so

does sometimes even chrysophanic acid. This disease was unknown in Fiji prior to the introduction of Polynesian labourers from the Line Islands and Solomons about 1870. I believe it extends to New Guinea; and I know it is exceedingly common in New Britain, New Ireland, and as far west as the Admiralty group. There it is not of recent origin, one at least of the early Spanish navigators, and I believe old Dampier also, having mentioned it by describing the natives as being " covered with scales like unto a fish".

Scabies, and various queer-looking eruptions due to the several forms of pediculi and their scratching, are common in places where the natives do not frequently bathe.

Epidemic gangrenous stomatitis, with an analogous condition of rectum, forms the most fatal of all the diseases which I have met with in the South Seas: and its distribution seems almost entirely regulated by idiosyncrasy of race.