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REPORT

ON

YAWS

IN

TOBAGO, GRENADA, ST. VINCENT, ST. LUCIA, AND THE LEEWARD ISLANDS,

ADDRESSED TO

THE RIGHT HONOURABLE LORD KNUTSFORD, G.C.M.G.,

Her Majesty's Principal Secretary of State for the Colonies,

BY

H. A. ALFORD NICHOLLS, M.D., F.L.S.

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REPORT

ON

YAWS

IN

TOBAGO, GRENADA, ST. VINCENT, ST. LUCIA, AND THE LEEWARD ISLANDS,

ADDRESSED TO

THE RIGHT HONOURABLE LORD KNUTSFORD, G.C.M.G.,

Her Majesty's Principal Secretary of State for the Colonies,

BY

H. A. ALFORD NICHOLLS, M.D., F.L.S.

REPORT ON YAWS.

By Dr. Nicholls.

I.

Preliminary Observations.

My Lord, St. Aroment, Dominica, 6 August, 1892.

The inquiry into the numerous questions relating to the prevalence of the disease known as yaws in various colonies of the West Indies that I have been engaged in prosecuting since March, 1891, was undertaken by your Lordship's instructions, conveyed to me by the government of the Leeward Islands, in which colony I have been medical superintendent of the yaws hospitals since the year 1877, and medical officer of the public institutions since the year 1880.

In October, 1889, I received the following Despatch from the Officer Administering the Government of the Leeward Islands:—

(No. 1324.)

Colonial Secretary's Office, Antigua,
21 October, 1889.

Sir,

I am directed by the Administrator to inform you that in consequence of the unsatisfactory state of medical opinion in the West Indies as to the possibility of crushing out the disease known as yaws, the Secretary of State considers that it is desirable to have a complete report from an expert upon the progress of yaws during the last 15 years in the various Leeward and Windward Islands, and in Trinidad and Tobago, and upon the success of the measures adopted in each case for coping with the disease.

The Secretary of State proposes to select you for this important duty. His Lordship requests that you will in the first instance draw up a scheme for a complete inquiry and report, for submission to the Colonial Office, and that you will send in some estimate of the time and money you would expect to expend on the inquiry. The Administrator will be glad if you will favour him with this information at your convenience.

I have, &c.
(signed) *Charles E. Mercier*,
Acting Colonial Secretary.

H. A. Alford Nicholls, Esq., M.D.
&c. &c. &c.
Dominica.

In reply to this Despatch, on the 30th October, in a letter sent through the government of the Leeward Islands, I gave, as far as was then possible, an estimate of the time and money likely to be expended in prosecuting the inquiry. I asked that a secretary should be appointed to the Commission; and in compliance with your Lordship's request I drew up the following scheme for a complete inquiry into the various questions relating to yaws:—

The disease called yaws has prevailed in the various islands of the West Indies, and especially in Jamaica and Dominica, since the time of slavery, and within recent years it has become epidemic in some of the islands, and showed signs of spreading in others. It is necessary, therefore, that each island should be visited if the question of the progress of the disease is to be properly inquired into.

In all the West Indian colonies there is, I believe, a mass of documentary evidence relating to the spread of the disease during the last 15 years. This evidence is to be found in official reports from medical men and others, in official correspondence, in minutes of boards of health, in hospital statistics, and elsewhere. The information to be derived from these various sources must be examined into carefully, arranged and sifted, the more important facts being recorded for use in the report to be drawn up at the termination of the inquiry.

A good deal of this evidence will doubtless be found amongst the documents preserved in the office of the Colonial Secretary at the seat of the government of each colony. For this reason, therefore, and in order to confer with the Governor before commencing the inquiry in the colony administered by him, it will be advisable first to visit the seats of government, and then to work through the various islands forming the political group.

I propose, in the first instance, to prosecute the inquiry in the Leeward Islands, then to proceed to the Windward Islands, taking in Barbados, if it be the wish of the Secretary of State, and to finish with Trinidad and Tobago. Geographically, Barbados is one of the Windward Islands, but, as it is now excluded politically, I am not quite certain whether or not it is considered to be within the scope of the inquiry.

In order to gain as much information as possible, it will be necessary for me to interrogate medical men and others in the service of the various governments, and I assume that the Governors of the colonies will be advised by the Secretary of State to instruct these officers to aid me in the work by every means in their power.

I propose to draw up a series of interrogations to be sent through the chief of the executive to each medical officer in the island in which the inquiry is going on. The interrogations will be so drawn up as to elicit the opinions of the medical men on the various questions concerning the disease, that is to say, its true nature, modes of propagation, &c., and the best methods of treating it and preventing its further spread. In this way a great deal of most important evidence will be obtained which, when properly classified, will show the true state of the opinion of the medical profession in that part of the West Indies to which the special inquiry will extend. Having carefully examined the replies so obtained in an island, and having studied the reports and other documents relating to the spread of the disease in the place, the special hospitals, if any, and the infected districts will have to be visited, and the yaws patients, or many of them, will have to be examined so as to ascertain whether the disease is modified in any way by climate, locality, condition of life, diet, &c. In these visits, if required, the medical officer of the hospital or district should be instructed to be present, as by an interchange of ideas information may be elicited which for some reason or other may have been omitted from the replies to the wrttten interrogations submitted to the medical officer.

After the completion of the inquiry carried out in the manner suggested, the large mass of evidence collected will have to be arranged for the purpose of the report.

As far as I can at present judge, the report should be arranged under the following heads :—

I. The disease : its nature, clinical history, treatment, &c.

II. An account of the progress of the disease during the last 15 years in the various islands, each island being treated of under a separate subdivision.

III. An account of the measures adopted in the various islands for grappling with the disease, with conclusions as to the success or otherwise of those measures.

IV. A digest of the opinions of the medical men as given in their reports and answers to the written interrogations.

V. The results of the inquiry.

VI. Suggestions as to the methods to be adopted in future for grappling with the disease.

In an Appendix to the Report will be placed all reports and other documents considered to be of use to the Government and the medical profession.

(signed) *H. A. Alford Nicholls.*

Dominica, 30 October 1889.

No further communication was made to me concerning the matter until the 3rd December, 1890, when I received a despatch from the Governor of the Leeward Islands informing me that your Lordship had determined to confine my mission to the Leeward Islands, Grenada, St. Vincent, St. Lucia, and Tobago, and that the appointment of a Secretary would be allowed.

A confidential communication was also transmitted to me containing suggestions as to certain matters relating to the inquiry made by Sir George (then Dr.) Buchanan, the Chief Medical Officer of the Local Government Board. As your Lordships will see from this Report the advice of Sir George Buchanan has been acted on ; and, I may be permitted to observe that I was very glad to get his communication, inasmuch as it removed certain doubts from my own mind as to the line of action that should be followed.

No provision having been made for the performance of my local official duties, the Governor of the Leeward Islands requested me to delay my departure until he had communicated with your Lordship, and I did not take up the work of my mission until early in March, 1891, instructions by that time having been telegraphed from Downing-street that Mr. Numa Rat was to act for me during my absence.

I appointed Mr. C. A. Seignoret—a supernumerary officer in the Treasury of Dominica—as my Secretary, and we left that island by the Royal Mail steamer on the 12th March for Trinidad, where we arrived on the 18th.

As the Island of Tobago is now annexed to Trinidad, it was necessary for me to proceed to the headquarters of the Government of the united colony, in order to confer with the Governor, and to examine any documents relating to yaws in Tobago that might be recorded in the Colonial Secretary's Office.

I called on the Governor, who was then Sir William Robinson, K.C.M.G., and the Colonial Secretary without delay, and I was informed by both these officials that there were no documents or other data in Trinidad relating to yaws in Tobago. As the Royal Mail steamer passes between the two islands only once a fortnight, I remained in Trinidad until the 1st day of April, when Mr. Seignoret and I left for Tobago.

As Trinidad had been at first included in the scope of the inquiry, it appeared to me that it would be advantageous to obtain as many facts as possible concerning the spread of yaws in that island; and, accordingly, I visited the hospital and leper asylum, and endeavoured in various ways to collect information relating to the prevalence of the disease. The facts so obtained are detailed in a special section of this Report.

I arrived in Tobago on the 2nd April, 1891, and then the real work of the Commission began. During the progress of the inquiry in the various islands visited there appeared to me to be no reason to deviate from the essential details of the scheme drawn up in October, 1889, but, in writing the Report, it has been found advisable in certain particulars to depart from the plan as originally sketched out.

The great obstacle in the way of an uniformly successful treatment of the disease in all its types has always been the remarkable ignorance concerning its pathology. It was of the utmost importance, therefore, that this question should be worked out. Whilst I was in Antigua, the Governor of the Leeward Islands very kindly placed the Chemical Laboratory at my disposal, and with the very skilful help of Mr. Watts, the Government Chemist of Antigua, enough preliminary work was done there to enable me, with the aid of some scientific apparatus got out from England, to carry on the investigation when I returned to Dominica. This work has added somewhat to the cost of the mission, and it has considerably delayed the completion of the Report, but it has resulted in eliciting some very important facts that add much to the knowledge of the nature of the disease, and that will help to place its treatment on a proper scientific basis.

An enormous mass of documentary and other evidence bearing on the general subject of the inquiry was accumulated during the course of my mission to the various islands, and its careful consideration and arrangement occupied a much longer period of time than was at first expected.

The result of all this work, and the narrative of my proceedings in the variou colonies comprised within the scope of the mission are duly set forth in this Report which I beg to submit for your Lordship's consideration.

II.

History of Yaws in the West Indies.

The disease known generally as yaws or frambœsia was unquestionably introduced into the West Indies by the negroes brought from the coasts of Africa as slaves; indeed, some of the older writers on medical questions in the West Indies mention the fact of negroes suffering from yaws being landed from the slave ships from Guinea. But in regard to each island there is no definite information obtainable as to whether the footing gained by the disease amongst the slaves on the plantations was due to direct importation of affected persons from Africa, or by the spread of the infection from a neighbouring colony. It might have been one or the other, for slaves were often shipped from one colony to another, but, be that as it may, it is abundantly evident that every island in which slave-worked plantations were established became infected sooner or later, and the disease—which did not exist in the West Indies until after the inauguration of the slave trade—spread far and wide amongst the negroes, insomuch that the planters had to take steps to prevent the loss or deterioration of their "human property."

Some of the older writers say that the medical men then practising in the West Indies knew next to nothing of this new disease, and the empiric professional treatment of those days was not calculated to prove successful in combating a malady that even within the last 20 years has been alluded to by high medical authority as a disease of which

" the nature is not understood." Gavin Milroy states, in his Report published in 1873:— " The resident medical men seem to have been almost as imperfectly acquainted, from " actual examination, with many of its chief phenomena, particularly with those relating " to its development and spread, as we are at the present day. This ignorance was " mainly due to the circumstance that the sick were seldom or ever treated by the regular " medical attendants, but were left in the care of old negresses known as 'yaws grandies,' " who were universally believed to know much better how to treat it than any of the " 'Buckra doctors.'" The description of the results of excessive mercurial treatment of yaws contained in the works of some of the older West Indian practitioners is a shocking illustration of death caused, and disease aggravated by metallic poisoning. It is evident, too, by a careful perusal of these old works that lupus, syphilis, and even leprosy were confounded with yaws by the writers.

As the old planters soon found out that the regular medical treatment was not successful in curing the negroes suffering from yaws, the care of the cases was taken in hand by the proprietors or managers of the estates. The contagious nature of the disease being evident to those in charge of the slaves, isolation was at once decided on, and the cases were banished to some remote or unfrequented part of the plantation, and left under the care of an old negress, who was styled the yaws nurse.

In some of the colonies convenient islets off the coast were utilised for the purpose of isolating the yaws cases from the unaffected negroes, and this was more especially the case in the Grenadines, where nearly all the islands are surrounded with rocks and islets. Even in the gaols of some of the larger colonies separate wards and yards were provided for the negro prisoners who were suffering from the disease, efforts being made everywhere to prevent the communication of yaws cases with healthy persons.

The disease, in most instances, is of a loathsome nature; persons affected with it have often a characteristic evil odour, and some of the aggravated cases are such hideous objects of deformity and disease that most persons would turn away from them with feelings of uncontrollable disgust. There was, therefore, every reason why the planters should isolate those slaves suffering from yaws, and it was manifestly to the advantage of the owners to take the best steps possible for the restoration to health of their negroes, who were considered in the light of valuable property, and on whose labour the planters' income depended.

The nurse placed in charge of the yaws patients was usually an old negress who had had the disease herself, and who was incapable of the severe exertion of labouring in the fields. She attended to the wants of those under her care, dressed their sores with simple applications, and gave the patients tisanes, or decoctions of native herbs, considered to have alterative, demulcent, and sudorific properties. If the slaves suffering from yaws were attacked by some intercurrent disease the medical man under contract to attend the negroes on the plantation was called in; but, otherwise, he had nothing whatever to do with the inmates of the "Yaws House," as this early example of a distinct yaws hospital was called. In most of the islands at the present day there are places where old negro men and women, who have lived on from slavery days, will point to as the sites of the "yaws houses." Dr. Tulloch, in his third Report, gives a list of estates in Tobago on which there were yaws houses, and I have had pointed out to me during my mission through the islands numerous isolated spots where yaw houses formerly stood. I have also met several old white-headed black men and women who have told me of their experiences as inmates of the yaws houses in their childhood.

During the time of slavery, as now, the disease attacked principally children; and, as all the children had to do was to grow up into strong labouring slaves, time was of no moment to the planter, and the actual cure of the cases of yaws was practically left to nature. Cleanliness, sea-bathing if possible, good plain food, and the simple bush tea, with an occasional draught of sea water, and doses of sulphur and cream of tartar, formed the basis of treatment. And it would appear that such simple treatment, by giving full scope to the curative power of nature, was successful in most instances. Indeed, Bryan Edwards, in his book on the West Indies, published in 1794, says:— " Young negro children often catch the yaws, and get through it without medicine or " much inconveniency."

In reference to this matter Dr. Tulloch writes in his third report:—" Naturally, in " such circumstances, the disease ran a long and tedious course, and its duration was " often measured by years. In all probability, where adult, and therefore useful, slaves " were affected, more active steps were taken to rid them of their malady; but the " 'little creoles' were just as well off in the hospital as they would have been anywhere " else, and their recovery was left principally to time. The *laissez faire* policy of pro- " prietors was well expressed by an old slave woman, who had herself been an inmate of

" the Yaws House, when she said, 'Massa, if you well, you well; if you dead, you
" 'dead.'"

Dr. Tulloch is, I think, wrong in his allusion to the *laissez faire* policy of the proprietors in reference to those slaves attacked with yaws. The old West Indian planters were alive to their interests, and the physical well-being of the slaves, both old and young, too nearly affected their personal advantage to be neglected. As a matter of fact, the slave was looked upon by even the cruelest owner in much the same light as one would now regard a valuable horse. Here and there might be found planters so inhuman as to treat their slaves worse than they treated their cattle, but in the great majority of instances self-interest happily helped to secure the physical welfare of the negro slave.

If it had been found by experience that medical treatment would have brought about more satisfactory cures in the case of the children, and an earlier release from the yaws house in the case of the field labourers, there can be but little doubt that the planters would have availed themselves of the doctor's services, for each proprietor in most of the islands contracted with medical men to pay periodical visits to the estates to treat the sick negroes. In reference to this matter, Bryan Edwards, in 1794, says:—
" Every plantation that I am acquainted with is under the daily or weekly inspection of
" a practitioner in physick and surgery, who very frequently resides on the spot." *

My predecessor in office in Dominica, the late Dr. Imray, was in his early professional life the contract medical practitioner for some of the estates in that island, and he often described the yaws houses to me, and the treatment adopted by the old black nurses. On several occasions he was called upon to visit yaws patients who were suffering from some intercurrent disease, but he was not expected to interfere, and neither did he, with the special treatment of the yaws cases by the nurse in charge of them.

It is proper to point out in regard to this matter that there was more often than not a disinclination on the part of the earlier medical practitioners to run even the slightest risk of contracting the disease. Its contagious properties were well known, its loathsome character was looked upon with horror, and an indelible stigma attached to any white person known to have suffered from the disease; he became, in fact, an outcast from the society of his fellows, and his existence became a burden to him. Dr. Williamson, writing in 1817 of his experiences in Jamaica, advises those visiting yaws houses
" to have some covering over the face and hands to protect them against the con-
" sequences which might follow from a fly, having yaws fluid on it, alighting on and
" inoculating any part of the eyes, nose, lips, ears, &c., as these parts are obviously
" more readily susceptible of infection." And Dr. William Wright, in 1791, wrote as follows:—" Pysicians or surgeons who are employed on estates are not understood to
" have the immediate charge of negroes in the yaws, unless some other acute disease
" supervene, as dysentery, pleurisy, &c. The risk such gentlemen run is very great; for
" should a medical man contract this filthy disease, his fortune and future prospects are
" ruined. He must be secluded many months from society; and if he at last escapes
" with his life it is well. From hence we may see the reason that the yaws is so little
" understood, and often so ill treated."

The following extract from Dr, Williamson's "Medical and Miscellaneous Observations relative to the West India Islands" gives a clear indication of the light in which the disease was regarded in the early part of the present century:—" The yaws is a
" disease of such a contagious character that white people naturally feel a horror in
" exposing themselves to the risk of the infection." Later on, however, he expresses his own doubt as to " the extent of this contagion in an equal degree to the whites as to the
" African or Creole negroes." And he further states that he frequently visited the yaws house, and endeavoured to get the inmates placed under proper medical treatment, but he found his attempts to this end unavailing; and, as he says, "I gave them up, for
" reasons not within my control or direction as practitioner on the estate."

During the time of the traffic in slaves between Africa and the West Indies, fresh cases of disease were continually being imported. The disease was endemic on the coast of Guinea, whence the slaves came, and no care was taken to separate the healthy from the diseased by those who trafficked in this human merchandise. The horrible huddling together of negroes of all ages and both sexes in the holds of the slave vessels has often been described, and it may readily be imagined how even one case of yaws would spread the disease amongst the mass of humanity cooped up, sometimes for weeks, during " the middle passage," in a stifling hot, ill-ventilated, filthy hold of a sailing ship. It

* *The History of the West Indies.* By Bryan Edwards, London, 3 vols., 1794.

has been stated that nearly 60,000 slaves were imported annually by British vessels alone. The older writers, both lay and medical, speak of the introduction of yaws into the West Indies by the Guinea negroes. Bryan Edwards, speaking of the English Colonies, says :—" Among the diseases which negroes bring with them from Africa, the " most loathsome are the cacobay [leprosy] and the yaws ; and it is difficult to say which " is the worst." Levacher, in alluding to the French islands, in his " Guide Médicale des Antilles," says :—" Le pian [yaws] règne aujourd'hui endemiquement dans les colonies, " où il a été introduit par la traite des Noirs." And Hillary, in his " Observations on the Changes of the Air and the Concomitant Epidemical Diseases in the Island of Barbados," published in London in 1759, writes of the " vile custom " of " the surgeons " of the Guinea ships," in so treating the slaves when yaws broke out on them during their passage from Africa as to repel the disease for a time in order to get a higher price for the negroes when sold at auction."

During the time of the slave trade, then, the disease occurred frequently amongst the newly imported slaves, as well as amongst those born in the West Indies, so that the planters had to exercise the utmost vigilance to prevent its rapid spread. But, when the slave trade was finally put an end to in 1811, by the passing of the Felony Act of that year, the cases of yaws began to diminish as one fruitful source of contagion was put an end to. From 1811 until the emancipation of the slaves, in 1834, the yaws houses were kept up on those estates where the disease still lingered. In some of the colonies it would appear that the disease entirely disappeared in consequence of this stringent segregation of the cases. Dr. Imray, in his Memoir on Yaws, written in 1872, says, in reference to the system of yaws houses :—" By this means the disease was always kept in check, and in some of the islands altogether extinguished." This occurred, however, only in those colonies, such as Barbados, Antigua, St. Kitts, and Carriacou, where the whole of the available land was cultivated, or taken up by settlers, and where, therefore, all the negroes were, more or less, constantly under the observation of the ruling classes. But, in the more mountainous islands, where the virgin forests provided food, shelter and a safe hiding-place for the runaway negroes, the disease appears to have lingered on.

After emancipation all effectual control of the spread of yaws was at an end. The negro was free to come and to go, and his up-bringing had not fitted him to concern himself with the warding off of disease. He had been taught, too, by the system adopted by his old masters, to look to aged persons of his own race for the cure of yaws. He could and did apply to them for their " remedies," but his newly found freedom would not brook the constraint and mild imprisonment of the old yaws house. Later on the financial crisis that followed the period of emancipation, and the consequent wide-spread ruin of the planters, brought forward a new set of men to whom the negro gave his labour for payment, but with whom he had no tie of old association and no link of mutual interest.

And so matters went on whilst a new generation of negroes reared in ignorance and superstition had grown up into manhood. During this period, extending over a time of from twenty to thirty years, very little, if anything, was heard of yaws, its name even was forgotten in some places, and the successors of the medical men of slavery days were in complete ignorance of the disease. In illustration of these facts it may be mentioned that the late Dr. Bowerbank, of Jamaica, in reply to the interrogations of Dr. Gavin Milroy, wrote, in 1872, as follows :—" For years past, in fact I should say soon after " Emancipation, yaws almost entirely disappeared from this parish up to the year 1854, " since which time occasional cases have presented themselves ; but the disease has all " along been rare in Kingston parish. When the first cases of yaws, subsequently to the " subsidence of the disease after the Emancipation, made their first appearance in " this part of the island, they proved very puzzling to the members of the faculty, " and perplexed not a little the prison and parochial authorities ; for in the prisons and " poorhouses the previously existing separate yards and wards appropriated to persons " suffering from yaws had been removed, there having been no inmates for a series of " years. About 1863 I saw more cases within a few months than I had seen during " twenty years before, and I may observe that these were chiefly in adults ; in fact, I do " not recollect seeing children affected with the disease from about 1839 to 1866 or " thereabouts."

The fact is the negro population during this period, was left almost entirely to itself. In the flat and thickly settled islands the negro had to work to live, but in those islands that are mountainous and contain large tracts of unoccupied forest land, as Jamaica, Dominica, St. Vincent, St. Lucia, and Tobago, negro families settled in remote districts, away from all civilising influences, and lived on the produce of their own intermittent industry. The increasing prevalence, therefore, of such a disease as yaws was not likely

to attract the attention of those entrusted with the government of the people; and the high fees of the few medical men settled in the various colonies were beyond the resources of the poverty-striken lately emancipated slaves. Thus the negroes treated their maladies themselves; ignorance and superstition ran riot: and the bush doctor, the obeahman, and the yaws nurse were resorted to constantly by a rapidly-increasing number who believed in their power over disease; for in many instances the free man was less civilised than the slave had been; and, but for the exertions of the ministers of the various religious denominations, there would have been in some places a lapse into savagery.

Happily, however, the home and the local governments awakened to a sense of their duty in this and other matters, and increasing attention was paid to the well-being of the people who were providing a large portion of the revenue of the various colonies. Government schools were established, denominational schools received State assistance, and systems of medical aid to the people of the various districts were established.

Then it was that yaws was said to have re-appeared after the "subsidence" of the disease. There had been no subsidence, however. The disease, it is true, disappeared from the observation of the upper classes in some of the colonies, inasmuch as those in authority had made no effort to ascertain the hygenic condition of the people. The physical welfare of the slaves was a matter of interest to the old planters. But under the new conditions of emancipation the proprietor, or—as often was the case—his attorney, wanted simply the negroes' labour, and when that was sold and bought there was an end of the matter. There was no one to take the place of the old "master," and the ignorant, uneducated, unthrifty labourer lived from hand to mouth, and when he fell ill he died, or got better in spite of the ignorant treatment of the bush doctor.

The few cases of yaws that had been turned loose about the country after the emancipation acted as *foci* for the dissemination of the disease by contagion. By this time the people had forgotten their dread of it in slavery days, or constant familiarity had bred a contempt for its manifestations and consequences. Children with yaws went to school and gave the disease to their schoolfellows. Settlements and villages that had been free of yaws became infected, and at last the disease became practically endemic in some of the islands. The late Dr. Imray, in his "Memoir on Yaws in Dominica," written in 1872, and published in Dr. Gavin Milroy's Report, thus describes the spread of the disease in that island:—"When the hitherto bond people of the colony became "their own masters, yaws still existed amongst them, though it had been greatly kept in "check by repressive means. Sanitary measures were scarcely then dreamt of; and the "people having all the privileges of freemen, wandered about when they pleased, and "settled where they pleased, quite uncontrolled, so long as the laws of the country were "respected. Under these conditions a disease so contagious as yaws, not only held its "own, but gained ground. It spread stealthily, surely, and unheeded, for there was "none to take intelligent notice of it. The great bulk of the population was left entirely "without medical care and supervision, an evil that has only of late been partially "remedied by the Government of the country. The fear of contagion that was so "salutary and effective a check in former times, and which doubtless exerted a repressive "influence long after the period of freedom, had become blunted by the people being "gradually familiarised with the disease in their midst. Each case as it occurred formed "a new centre of contagion, and so it passed from house to house, hamlet to hamlet, "town to town, increasing more rapidly where the people were not crowded together, and "always most affecting, as might be supposed, the dirtiest and largest portion of the "people, and sparing the more industrious, intelligent, and cleanly, who, no doubt, "avoided as much as possible contact with the infected, but by no means escaping."

This graphic description of the condition of affairs in Dominica may be taken, *cæteris paribus*, as a sketch of what occurred in those islands where the disease has obtained a firm footing. In some colonies the existence of the evil was brought into prominent notice earlier than in others, and their local governments began to grapple with the difficulty. In Dominica the gravity of the question was recognised over 20 years ago, and action was taken to arrest the spread of the disease by the Board of Health of the island. Grenada and St. Lucia adopted the same course afterwards, and later still Tobago and Nevis strove to keep the ravages of yaws in check. Islands such as Antigua and St. Kitts, which had been held up as examples of places in which the disease was unknown, I found to be seriously affected; and if nothing be done to prevent the spread of the malady in these countries, the Government will later on have to deal with a "yaws epidemic" as has been the case in Dominica, Tobago, and other colonies.

It was thought that the creation of a Government medical service in the various islands would have been the means of preventing so serious a blot on the public health

as the prevalence of a loathsome disease amongst those entitled by law to the services of the district medical officers; but this hope for various reasons has not in most instances been realised. A belief has got hold of the people that it is good for the children to have the yaws, that everyone is liable to be attacked sooner or later, and that the younger the patient the less virulent will be the disease. Thus it happens that the contact of the healthy with infected persons is often encouraged. Again, in some of the islands, more especially those wherein the population speak the French patois, and are more French than English in manner and thought, it has come to pass that the people believe that the treatment of the medical man is all wrong, and that none but the bush "doctors" and the old "wise" women know anything of the nature and cure of the disease. I shall have occasion to refer to this question when I come to treat of the various islands in detail.

The mission of Dr. Gavin Milroy to the West Indies, whither he was sent by the Colonial Office at the suggestion of the College of Physicians, marks off a distinct epoch in the history of yaws. Dr. Milroy's Report on Leprosy and Yaws in the West Indies was addressed to the Secretary of State for the Colonies in December 1872, and it was printed as a Blue Book and published in March 1873. In that part of the Report referring to yaws Dr. Milroy states: "There has always been, and there still is, much "obscurity about this disease—its history, nature, and general attributes." Dr. Milroy saw and examined cases of the disease in Berbice, Dominica, and Jamaica, and in the latter two colonies he addressed interrogations to the medical men in order to elicit as much information as possible on the question. The conclusions he came to as the result of his inquiry are, in his own words, as follows:—"From all the evidence that has "been now adduced we may fairly infer that, although there yet remains much respecting "the origin and attributes of yaws requiring more accurate investigation than has "yet been applied to the subject, everywhere it is fostered, if not engendered, amid "poverty and its ordinary accompaniments of squalor and semi-starvation. Proofs of "this were given me alike in Berbice, Dominica, and Jamaica. Yaws is thus obviously "another member of that multiform brood of evil known by the family name of "'Mal de Misère.' Cases are certainly extremely rare among the cleanly and well "conditioned. What is the exact part that contagion plays in the development and "spread of the disease is a point which still, I think, waits for further and more "searching inquiry."

Beyond throwing doubt on the contagious nature of the malady Dr. Milroy does not seem himself to have made any original observations on the various questions relating to the disease. But he elicited the opinions and experiences of some of the medical men acquainted with it, and he published, as an Appendix to his Report, "A Memoir on Yaws in Dominica," by the late Dr. John Imray of that island. This memoir was certainly the ablest and most complete account of the disease that had been written, and it has been largely quoted by writers on the subject since the date of its publication.

Dr. Milroy was sent to the West Indies to inquire into certain questions respecting leprosy; but, whilst in Trinidad, he learnt "that the opinion of the College of Physicians "had been asked by the Secretary of State for the Colonies upon certain rules drawn up "by the Government of Dominica for enforcement against persons affected with yaws, "and particularly as to the propriety and necessity of isolating those suffering from the "disease, and detaining them compulsorily in hospitals till cured." Dr. Milroy further says that he knew the College could not be prepared to give the desired information as the disease did not occur in Europe, so he decided to go on to Dominica, and in this accidental way yaws came to be treated of in his Report.

The publication of the Report certainly did much good by directing the attention of medical men, and persons of authority in the West Indies, to the question of yaws, and it increased to a great extent the knowledge of the local members of the profession, many of whom had had no opportunity of reading any printed account of the disease. Since then much of the information furnished to Dr. Milroy and printed in his Report, by Dr. Imray of Dominica, and Dr. Bowerbank of Jamaica, has been re-published in various text books within the reach of all the members of the medical profession.

The action of the Government of Dominica in grappling with the disease, which led to the investigation of Dr. Milroy into the question of yaws, was followed after a time by other West India Governments, with the result that within the last 20 years the literature of the prevalence of the disease in the West Indies, both published and unpublished, has been enormously increased. Of the published reports only four appear to have been printed for general circulation. They are as follows:—

1. *Third Report of The Medical Superintendent of the Dominica Yaws Hospitals.* Dominica, 1879.
2. *Fourth Report of the Medical Superintendent of the Dominica Yaws Hospitals.* Waterlow and Sons, London, 1880.
3. *Third Report on Yaws.* By T. P. Tulloch, M.A., M.B. Tobago, 1890.
4. *Yaws; its nature and treatment.* By J. Numa Rat, Medical Officer, Leeward Islands. Waterlow and Sons, London, 1891.

In the course of my mission all the documents relating to yaws in the various islands I visited were laid before me by the local authorities, and the information gained therefrom will appear in the various sections of this report.

III.

History of Yaws in Tobago.

It is evident that the disease was prevalent amongst the negroes in Tobago during the time of slavery, and that the system of sending the cases to isolated "yaws houses" was adopted by the planters. Dr. Tulloch in his third Report gives a list of those estates now known to have had yaws houses. He says: "Hospitals, known as 'yaws houses,' "were established on probably all the estates. Charlotte Ville, Merchiston, King's Bay, "Betsey's Hope, Auchenskeoch, and Lowlands, certainly each had one, while smaller "estates, as Trois Rivières and Lucy Vale, supported one between them. In these hospi-"tals, and within certain recognised bounds, all patients were strictly detained."

When the slaves were emancipated, all control of the disease was at an end, and it gradually spread throughout the length and breadth of the island, until the people became so accustomed to it that they were quite indifferent to its dissemination, indeed they regarded it as one of those ills of the flesh to which they were all liable at some time or another. When schools were established, they became a recognised source of the spread of the disease. Dr. Tulloch says on this head: "schools were established, and became, "as they often are now, centres for the propagation of the disease."

In 1882, a medical aid ordinance was passed, providing gratuitous medical aid to all labourers over 60, and for all children of labourers under eight years of age, and district medical officers were appointed under its provisions. But the people suffering from yaws did not apply for medical treatment; and, as attendance was not compulsory, the medical officers were powerless to control the ravages of the disease. Dr. Tulloch, whose experience of all that relates to medical affairs in Tobago is probably unique, states that 'Children suffering from yaws were constantly brought to the medical officer for the "treatment of concurrent diseases, and many efforts were then made to keep them under "observation, but without success. As soon as the 'fever,' or the 'fresh cold,' had dis-"appeared, or 'the worms' had been got rid of, the existence of yaws was ignored, and "the patient was seen no more."

The following year, namely in 1883, Mr. J. W. Carrington, the Administrator, visited No. 4. medical district, on the windward side of the island; and Dr. Tulloch, who was then the medical officer in charge, drew the Administrator's attention to the existence of yaws in all parts of his district. It would appear that Mr. Carrington requested a written report on the subject, for on the 19th August Dr. Tulloch wrote a despatch on yaws, in which he speaks of "its increasing frequency in the extreme windward part of the island." He urged the Government 'to take steps in the direction of some medical scheme for "the malady," and he alludes to the fact of the disease disabling the people. Dr. Tulloch concluded his letter by recommending the following scheme for combating the evil:—

"I. A small yaws hospital should be established in each district, or say two "in the island, with a resident nurse, and a stock of suitable drugs.

"II. A constable should be told off for each district, with instructions to "discover all cases of yaws, and to require their attendance at stated times on the "district medical officer.

"III. In addition to hospital treatment, a system of compulsory out-door "relief for yaws should be enforced by means of the police.

"IV. Any person found neglecting to report his or her child suffering from "yaws to the medical officer, should be held liable to punishment under the "Medical Aid Ordinance (1882)."

In consequence of the facts laid before him in Dr. Tulloch's letter, the Administrator addressed a circular letter to the other medical officers, and to a number of the residents in the island, asking for special information in regard to the disease. The replies, which are all dated September, 1883, fortunately have been preserved, and as some of them contain important information bearing on the spread of the disease and the habits of the people, I give the following extracts :—

Mr. Samuel T. W. Charity, Registrar, No. 4 District. "The sick and the healthy "associate one with another, and occupy the same sleeping apartment."

The Rev. Canon Smart, M.A. "With regard to 'yaws,' I beg to state that since I "have been acquainted with the district, a considerable number of persons have always "been suffering from yaws, and I have no reason to suppose that the disease is on the "increase at this particular time. It is the general opinion of the people that every "coloured person must have the complaint sooner or later, and therefore they are by no "means sorry when their children take it when young. I am of opinion that no greater "benefit could be given to our labouring population than freedom from a complaint "which inflicts enforced idleness upon a number of adults, detains a large number of "children from school, sometimes for a period of two or three years, and inflicts so much "suffering on old and young."

The Rev. S. Bacchus, Wesleyan Minister. "Firstly, some of the oldest inhabitants "have assured me that in places where the disease did not exist it now exists. Secondly, "from personal observation I find scarcely 20 in 100 native labourers who have not "suffered from the disease."

Dr. R. Maxwell Clark. "It will be worthy of notice that this disease seems more "frequent in children than in the adult. My experience has been, that the adult suffers "more severely, and more steadily resists curative treatment."

Mr. Wm. Allen Purser, L.R.C.S.I., Medical Officer, District No. 3. "The general "impression that the disease is contagious, seems borne out by the number of cases in "several families, the parents too being of opinion that one child takes it from another."

The Rev. Samuel L. Thaeler, Superintendent of the Moravian Mission. "I would "state that I am decidedly of the opinion that it is increasing among our labouring popu-"lation, in many instances whole families suffering at the same time. To my mind the "only measure likely to be effectual would be that of complete isolation, so that the "patients might be under the complete control of the medical authority as to diet as well "as other treatment."

The Rev. W. H. Engledow, LL.D., T.C.D. "I am given to understand that the disease "prevails now largely in all parts of the island, but neither more nor less severely than in "times past. It is a thing the people look for, and believe that it lies upon the young "more favourably than upon adults, whom it hardly ever attacks without deforming "them. They say they never think of going to the doctor about yaws, and yet their "treatment of the complaint is most barbarous. The patient is taken down to the river, "out of which they have to draw all their water for drinking, and for culinary and other "domestic purposes, and there he or she is scrubbed with corn husks, applying sand or "salt."

Mr. Dougall Yates, Police Magistrate. "No good will come of any attempt to "grapple with this disease unless parents or those in charge of households are made in "some way responsible for its spread. I say so, for at present parents view with perfect "indifference the mingling of their hale children with those affected, and as yaws are very "catching (to use the language of the people) this indifference is a very fruitful source of "the spread of the yaws. In my immediate neighbourhood I witnessed, not long ago, "how a neighbourhood that was quite free from yaws became infected. The grandchild "of a woman that lives not far from me, was brought to her soon after a son of hers was "affected; I saw him sitting in the midst of children about the houses, and I remon-"strated with their parents, but to no good, for every child with whom this boy mixed is "now covered with yaws. I entertain a strong conviction that it is spreading, and must "continue to do so as long as parents remain indifferent as to their children contracting "the disease. I may say so, from what I know of the people. They believe that their "children sooner or later must have yaws, and imagine that 'the sooner they get it the "'better.'"

Mr. J. Fred. Witz, L.R.C.S., Medical Officer, No. 1. District.—"It has come to my "knowledge that there is no desire among those suffering from yaws to be cured, as they

" have some superstition as to its being an hereditary disease, which on that account " ought not to be cured. The fact of so few coming under treatment would help to bear " out that argument. They do not seem to mind giving the disease to others; I heard " an instance of a man covered with yaws who had been seen hugging children free from " the disease."

Mr. W. B. Sladden, Resident Proprietor.—" I think, if more cleanly habits were " observed by our labouring class the spread of this disease would not be so great; for " instance, young and old sleep in the same garments that they perform their daily work " in, and I have often witnessed those with yaws mixed up with those not affected, even " eating and drinking out of the same calabash or pan, the healthy not dreading contagion " in the least. I have also witnessed many with yaws bathing in the same water where " people are washing clothes, and apparently no dread on the part of the healthy is " observed. Parents thinks so little, and make so light of this loathsome disease, that " they try and force their children to school with it on them, but are very properly sent " home again; this precaution against contagion I have observed is carried out by all the " schoolmasters in this district. I have heard mothers say that they like their children to " get yaws when in their infancy, and I have every reason to believe that the disease is " encouraged by them, for it is a known fact that there is no effort made by parents to " keep their children with yaws from those not affected, allowing them all to eat and " sleep together, and I have further noticed that if one in a family be affected, the " disease will visit the whole in the house before it leaves. These few remarks that I " have furnished to your Honor are from what I have witnessed for the past 38 years as " a planter. In conclusion, I will add that I have been present when many people with " yaws on them have been tried at Petty Sessions."

Mr. R. B. Anderson, F.R.C.S, England, Colonial Surgeon.—In a long and interesting letter, says that he had had only one case under his observation lately, and states, " Probably the greatest evils in connection with this disease are the comparatively small " importance attached to it, and the resignation with which it is regarded by the classes " which suffer from it. In consequence of this apathy, and of the long continued custom " of employing their own remedies, or no remedies at all, which are productive in so " many diseases of unnecessary sacrifice of health and of life the disease does not come " much under the professional observation of medical men." *Mr. Anderson* recommends the compulsory notification of cases of the disease, each case to be treated by the district medical officer, and he advises that " a small extent of proper hospital accommodation " should be provided at first, to be enlarged subsequently if necessary."

Mr. J. Goodrich Anderson, M.R.C.S.—Suggested, " on its being proved that a child " suffering from yaws is being neglected, magistrate to have power to place child in " charge of some responsible person, and to make order against parent or parents for " maintenance of child."

From these replies it would appear that there was a concensus of opinion as to the existence of a grave evil, and the necessity for the adoption of some measure to counteract it. The Rev. Dr. Engledow was the only person who expressed doubts as to the increasing prevalence of the disease; but he says that he is given to understand that it prevails largely in all parts of the island as it has done in past times. There was no disinclination on the part of the medical officers to treat cases of the disease; on the contrary, they complained that the people would not go to them. It was evidently time for the Government to take some action to remove so serious a blot on the public health, but for some reason or other nothing was done, and the correspondence was put in one of the pigeon-holes at the Government office.

I am satisfied, however, that there must have been some cogent reason, possibly the embarrassed financial condition of the island, that prevented Mr. Carrington from taking Government action to control the spread of the disease, for immediately after the yaws inquiry he endeavoured to mitigate the excessive infant mortality that prevails in Tobago as it does in many of the other West Indian Islands. This unfortunate mortality amongst infants and children of tender years is due, in a great measure, to defective and improper methods of feeding. And the result is that those children that survive are usually of weakly constitution, and thus more prone to become affected with yaws and other prevalent diseases.

By direction of the administrator, Dr. Tulloch drew up a paper of advice to parents as to the rearing of infants, and this excellent paper* was printed and circulated throughout

* See Appendix F.

the island. It would appear that the chief causes of death amongst infants are diarrhœa, dysentery, and marasmus; and Dr. Tulloch very properly states that "these diseases are "caused chiefly by the use of wrong food, and by over-feeding."

Governor Sir William Robinson, K.C.M.G., in a Despatch to the Earl of Derby, brought Dr. Tulloch's paper to the notice of the Colonial Office. He drew attention to the fact that excessive infant mortality prevails throughout the West Indies, and suggested the circulation of the paper of advice amongst the Windward and Leeward Islands and Jamaica. A copy of the paper will be found in the Appendix to this Report.

In 1885, Mr. R. B. Llewelyn was appointed Administrator, and his attention appears to have been directed to the question of yaws early in 1887, for on March 2nd, Dr. Tulloch in an official letter states: "I am of opinion that this disease is on the "increase. I think that the two last years during which the people have been subjected "to harder times than usual have multiplied cases. I beg to refer your Honor to the "accompanying letter I wrote to Dr. Carrington on this subject during his adminis-"tration. My views on the measures necessary to eradicate the disease have not altered "since the date of that letter."

Arrangements were made by the Government with the medical officers to furnish gratuitous advice and medicines to all persons suffering from yaws, and a supply of medicines was obtained at the public cost.

The treatment was commenced by Dr. Tulloch, who had by this time become Colonial Surgeon, at the Dispensary of the Colonial Hospital on the 12th of September. The medical officers in the country districts were unable to carry out the provisions of the law until the arrival from England of a fresh supply of drugs.

A "Regulation" under the Medical Aid Ordinance, 1882, was published, bringing parents and guardians of children suffering from yaws under the 14th Section of the Medical Aid Ordinance. Although this "Regulation" made medical attendance compulsory on children under eight years of age, there was no provision for the enforced attendance at the district dispensaries of persons of eight years of age and upwards. Thus it happened that, in families where several persons were affected with yaws, perhaps only one of the cases was brought to the medical officer, and the others were kept away; for there was, as might have been expected from the details given of the history of yaws in the West Indies, a prejudice against regular medical treatment in the disease. Some of the more intelligent persons over the legal age of course applied for medical treatment, but the percentage of this class was small.

The mistake that had been made in not rendering it obligatory on persons of all ages suffering from the disease to place themselves under proper medical treatment was soon recognised, and the Board of Health at a meeting held on the 26th of October took the question up by adopting the following resolution:—"That with reference to the late "Order dealing with yaws the Board is of opinion that attendances for the treatment of "this disease should be compulsory on all persons (adults and children) suffering from "yaws."

As an evidence of the fact of the spread of the disease, and the indifference to it by the people, it may be here mentioned that at the same meeting the Board of Health passed the following resolution:—"That His Honor the Administrator be requested to "substitute another person in the place of the man who now attends to the supply of "water at the King's Well; as this person is suffering from yaws, which might be "communicated to the people who go to the Well."

The Board does not appear to have had many meetings, and the members have not been called together for some years past; indeed, I understand that there are some doubts as to whether the annexation of the island to the Trinidad Government has not abolished the Board.

Such boards in these small islands are of great service, they tend to keep questions relating to the public health before the people, and every member is in a measure a sanitary officer. If, too, the minutes be properly kept, they afford after a time very valuable records of questions relating to the hygiene of the country. I may, perhaps, be allowed to suggest that the Board of Health of Tobago should be resuscitated, that regular meetings of the members should be held, and that the minutes should be properly kept and preserved in some public office.

On the 3rd January, 1888, Dr. Tulloch's first report was published. It showed that no less than 329 patients of all ages had been attended at the dispensary at the colonial hospital. Dr. Tulloch unfortunately did not in his tables give the exact proportion of children under eight years of age to persons above that age. He says in his report: "Patients were of all ages, from 11 months to 75 years. I attach a table

" showing the number of cases at various ages. It will be seen that 254 or 77·3 per " cent. were between the ages of one year and 20." Two important matters in regard to the yaws question are alluded to in this report in the following language :—

" In conclusion I have two suggestions to make :—

" I. That a circular letter should be addressed to all school-masters, impressing on " them the necessity for extreme vigilance in their efforts to keep children infected with " yaws, or suspected to be so infected, out of their schools."

" II. That if any permanent good is to be done, attendance for the treatment of " this loathsome disease must be made compulsory on every individual, adult or child, " respectable or the reverse, who suffers from it or is suspected of suffering from it."

On the 30th January, 1888, Dr. Tulloch's Report was sent to Governor Sendall by Mr. Llewelyn, who, in an accompanying despatch, gave the following sketch of the action he had taken in grappling with the disease.

"The loathsome disease of yaws has been prevalent in this island for many years, " but owing, I presume, to the embarrassed state of the finances no effort has heretofore " been made by the Government to stamp out this malady. It seems as if the " Government was always waiting until it could afford to build a 'yaws asylum'; and " not being able to do that, the unpleasant matter has been allowed to take care of " itself.

" As the prospects of the colony began to brighten in September I determined to " try what could be done in Scarborough and the neighbourhood by supplying the " necessary drugs, which are expensive, to the district medical officer in No. 1 district, " and by issuing notices that the parents or guardians of children suffering from yaws " would, if they neglected to take them for treatment, be considered to have infringed " the 14th Section of the Medical Aid Ordinance of 1882.

" I append to this the report prepared by Dr. Tulloch of the result of this attempt " to check the disease, and as the experiment is believed to be doing some good the " Legislative Council have voted the sum of 150 *l.* to enable the Government to purchase " medicines to supply all the district medical officers, and so start the same plan " throughout the island.

" I am quite certain that the disease is very prevalent in the island, but I hope that " the effort now being made by the Government will have very beneficial results before " the end of the year."

On the 8th October Dr. Tulloch addressed his second report to the Administrator. This report was sent to the Colonial Office, and it is published in the Report on the Blue Book for 1888. The following extract points out the defects in the scheme being carried out, and emphasises the necessity for compulsory legislation.

" The Government's scheme is a partial one, and therefore in some ways a defective " one. It makes no provision in the first place for the isolation of yaws patients, but " this is an unavoidable defect, as it is of course quite impossible in the present financial " state of the colony to provide yaws hospitals which would be necessary to accommodate " the large number of persons suffering from the disease. But in another respect the " scheme is an extremely unsatisfactory one, and this is a matter which, in my opinion, " might be easily remedied. Attendance for treatment is only compulsory for children " under eight years of age, while persons over that age may attend or not as they please. " It must be obvious to every one that this arrangement throws the greatest possible " obstacle in the way of the medical officers, especially in the case of a disease which " requires such close watching and persistent treatment as yaws does. The children " under eight were only 247, or 39·4 per cent. of the 626 patients treated by me during " the year under consideration. Over their parents and guardians I had a certain " amount of control, and I prosecuted several defaulters before the police magistrate, " but the remaining 379 were quite independent of me, and knew it, and this made the " carrying out of the treatment properly a matter of impossibility. I recommended " early in this year that attendance for treatment be made compulsory on all suffering " from the disorder. The Board of Health did the same thing, and I beg to say now " that my conviction is stronger than ever that unless this is done the success of the " scheme will be seriously imperilled. I believe the objection to adopting any such " measure is that, in the absence of yaws hospitals, it would be an unwarrantable " interference with the liberty of the subject; but a person suffering from yaws is really " a serious menace to the health of the community and should be treated accordingly. " Any measure, however apparently severe, should be adopted without hesitation which " would have even a tendency to lesson the number of cases of this loathsome disease."

Dr. Tulloch points out in this report that each case treated attended, on an average, between seven and eight times; that thirteen cases were sent away owing to their persistent neglect in following out the treatment; and that the relapses of the disease after apparent cure were 42 out of 345 cases, a percentage of 12·1. Two cases are stated to have relapsed twice; and Dr. Tulloch says: "Doubtless there were more relapses not reported to me."

The number of illegitimate births is fearfully common all over the West Indies, showing a condition of immorality that is due in a great measure to the action of the old slaveholders, who used to encourage polygamy amongst the negroes with the object of increasing the number of slaves. In Tobago, in 1888, the illegitimate births were 59·29 *per centum* of the total births. In these circumstances it is interesting to find that of the cases of yaws coming under Dr. Tulloch's notice the legitimate children outnumbered the illegitimate, the figures being 220 to 209. Dr. Tulloch states:—"As I "pointed out in my last Report, this is evidently due to the greater anxiety of the "respectable married class to have their children attended to."

Matters went on in their old groove until about the middle of July, when legislative action was taken to render it compulsory on all persons suffering from yaws to apply to the medical officers for treatment. The Yaws Suppression Regulation was passed by the Financial Board (which has certain legislative functions) on the 18th of July, 1889, and so at last the medical officers were armed with power to place every case of the disease under proper treatment. A copy of this Regulation is appended. It provides: Gratuitous advice and medicine for all persons suffering from yaws, who are obliged to attend at certain stations, to be regularly visited by the medical officers. In the event of the patients being unable to attend, they are required to send a report of their condition. Bathing, and washing of clothes, &c., of persons affected with the disease is forbidden, except at appointed places, and parents and guardians are made responsible for neglect in securing medical attendance for children up to fifteen years of age.

Later on, namely on the 1st of October, Mr. L. G. Hay, the Commissioner (as the chief executive officer is now called) issued a Government notice informing the people of the passing of the Regulation, and giving details of the days and hours of the attendance of the medical officers at the various stations. This notice concluded with the following significant paragraph:

"The Regulation, which provides for the punishment of persons neglecting or "evading treatment by imprisonment without the option of a fine, will be rigidly "enforced."

It appears that the medical officers then stationed in the island set to work with praiseworthy zeal to wage war against the disease, and large numbers of cases were attended with so much success that the people found out at last that the doctors understood the treatment of yaws. The revulsion of feeling was complete, for Tobago had the good fortune to be free of agitators, who in some islands do all they can to prejudice the people against the regular medical treatment of the disease and against the Government measures adopted with a view to prevent its prevalence.

From the date of the passing of the Yaws Suppression Regulation until the publication of Dr. Tulloch's third and last Report on 4th April 1890, I am unable to discover any document referring to the disease. Dr. Tulloch's last Report is a long and able one, and it contains some interesting photographs of examples of the disease; indeed, it may rank with Dr. Imray's Memoir as one of the ablest accounts of the malady published during the present generation. In reference to the Yaws Suppression Regulation, and the measures taken by the Government to control the disease, Dr. Tulloch says:—"This "enactment only came into force on the 30th August 1889, and it is as yet too early to "speak definitely of its probable results. These promise, however, to be good, if the "provisions of the Regulation are carried out, and the efforts of the medical officers "adequately backed up by the stipendiary justices of the peace. The increased stringency "and the additional surveillance supplied by the new Regulation ought most certainly to "place it within the power of the medical officers to reduce the cases of yaws in Tobago "to a manageable minimum. Of course there are many cases of old standing utterly "beyond cure, and for which a judicious euthanasia would be the kindest course of "treatment, but these must of necessity be left out of account; and, so far as fresh "cases are concerned, the medical officers of the island are unanimous in the belief that "if these can only be got at and kept under treatment yaws may in a few years be "practically eradicated from Tobago."

The Report shows that during the two years and four months ending with December 1889 the medical officers treated altogether no less than 1,423 cases of the disease, or about 8 *per centum* of the total population of the island; and of that number 763 cases

were treated by Dr. Tulloch at the dispensary in the chief town, who says, in regard to the disease: "As far as I can learn, Tobago is much more seriously affected than any "other West Indian island."

Dr. Tulloch has drawn up some interesting analytical tables of the 763 cases that came under his treatment. In regard to the cures and the relapses of the disease, he says:—

"It is not easy to give accurate statistics of the actual percentage of cases, on "account of the frequency with which patients disappear from observation when they "are marked 'almost well' or 'practically cured'; but I calculate that of the 763 cases "treated by me, 423, or 58 per cent., have been cured, and the results obtained by the "other district medical officers are much the same. Relapses are fairly common, and I "have known several cases which have relapsed twice, with a distinct interval between "the different attacks."

The return showing the occupation of the patients or their parents shows conclusively that the disease, which in former years had attacked only the lowest stratum of society, was gradually spreading into the upper ranks. Of the 763 cases, 601 were of the labouring population, so that 21·2 *per centum* belonged to what may be described as the middle class in the social system of the island. Amongst these may be enumerated carpenters, tailors, coopers, blacksmiths, washerwomen, domestic servants, seamstresses, bakers, shoemakers, &c.; and I find that two schoolmasters, three superintendents, and one manager are included in the table. When it is remembered that the disease is a loathsome one, the publication of such a table could not but have created alarm in the public mind. In his reply to my interrogations Dr. Tulloch mentioned that several cases have occurred in the upper ranks of the island community; and it is evident that the Government interfered just in time to prevent a most serious epidemic of the disease.

Shortly before my arrival in Tobago Drs. Tulloch and Blanc sent circular letters to residents in their respective districts able to speak with authority on the condition of the people, and requested of them their experiences in regard to the result of the compulsory treatment of persons suffering from yaws. Dr. Tulloch handed to me the replies received by him and Dr. Blanc; and the following extracts from this correspondence clearly indicate that much good has been effected by the Government measures, and the zealous way in which they have been carried out by the medical officers.

The Rev. J. Thomas.—"Your circular is to hand, and in reply I beg to state that in "my neighbourhood (to the best of my knowledge) all yaws patients treated by Govern-"ment have been cured, and cases of the disease are fewer than in times past. What is "very much required is some measure to compel patients with this disease to apply for "treatment. Many who suffer (among adults) from this complaint, and also parents and "guardians, are quite indifferent about it, and as long as this state of indifference exists "the efforts to control the disease will be checkmated to some extent."

Mr. E. D. Ewen, Resident Proprietor.—"In reply to your circular *re* Yaws, I "believe the result of the yaws scheme has been to reduce the number of cases in a "very marked degree. In three years in this neighbourhood I think from about 30 to 36 "cases the number has been brought down to about 6 or 7 real cases, and I think if the "Government could adopt some means of segregation for the few remaining cases, yaws "would be soon stamped out for the present, though probably to recur in the next "generation."

The Rev. Canon Turpin.—"I beg to state that in my opinion, judging from the "results I see every day before me, the control of yaws disease has been a decided success. "I am sure that in my districts, and as far as I have noticed in my tour through the "island, the yaws is disappearing fast, and I hope the Government do not contemplate "withdrawing its aid to entirely destroy this loathsome disease in the Island."

The Rev. G. Irvine, Wesleyan Missionary.—"In reply to your circular I have "pleasure in stating that the result of the observation, with regard to the Government "scheme for checking the prevalence of yaws, is that it has been most successful, and of "good benefit to the island. In many localities where I had observed some very bad "cases the disease seems to have disappeared. I may mention Morne Quiton as an "instance. I think, however, the Government ought not to discontinue the effort at "present."

The Rev. H. A. Todd.—"My duties as parish priest take me to the homes of not a "few of the people in the Windward District. It is from personal knowledge that I am

" able to state in answer to your circular that the step taken by the Government in 1887 " to control the spread of yaws has, to a marked extent, succeeded in this district. " There are cases still existing, but not to that alarming extent as heretofore. I am " sanguine in the belief that if the effort of the Government be continued, and a like " success crowned the efforts of the other medical officers, as I am glad to repeat " distinguished yours, at no very distant date, the foul disease would be known in Tobago " only by name."

Mr. J. S. Tucker, Resident Proprietor.—" I am of opinion that the disease is not " so prevalent now as it was when I arrived in this island three years ago, and the " endeavour made by the Government has greatly assisted in doing this. As to the " continuation of the treatment to those suffering from this loathsome disease, it would " be a mistake now to abandon a measure producing the good that this has done, and I " submit that a far more effectual way of carrying out a proper and reliable treatment " would be by establishing a district hospital where this and other like sufferings of the " people would be conducted under the directions of the Medical Officer of the district " where patients would get a proper diet and cleanliness insisted upon by those in charge " of the hospital."

Mr. J. G. McCall.—" I think the scheme to assist the spread of yaws has done " some good, but I am of the opinion that this terrible disease cannot be controlled " properly without a hospital, in which persons suffering from yaws could be treated."

Immediately before my arrival in the island Dr. R. W. C. Norman, in the quarterly report on his district, made the following observations :

" There still continues to be a considerable amount of yaws, especially so at " Plymouth. Whether this can be accounted for by the fish diet I am not in a position " to say, but I may mention that there is not much yaws at Parlatuvier. The method of " treatment prescribed by the Government seems to me to be very satisfactory in its " results, but the difficulty is to get the patients to carry it out conscientiously, but when " they do so the results are very good."

I arrived in Tobago from Trinadad on the 2nd April and remained in the island until the 6th of May, a period of nearly five weeks. As the only communication between Tobago and Grenada is by Royal Mail Steamer, *viâ* Trinidad once a fortnight, I had to remain in Tobago more than a week after I had completed my investigations.

I was met by the Colonial Surgeon on my arrival, and I called on the Commissioner, Mr. L. G. Hay, without delay. Both these officers placed their services at my disposal, and assisted me greatly in the work of my mission.

The early part of my stay in the island was taken up in examining all the available documents relating to yaws, and in carefully studying the case book of the dispensary at the Colonial Hospital. The Colonial Surgeon has kept this book with much care, and I was able to obtain from it some valuable information.

On the 3rd and 10th of April I went with Dr. Tulloch to the Colonial Dispensary to enquire into the system of treatment, and to see the yaws patients with him, Friday being the day on which he attends gratuitously to the cases. The Colonial Hospital is situated at Fort King George on the summit of a hill 400 feet high to the east of the town, some of the old military buildings having been utilised for hospital purposes. The yaws patients from the surrounding districts all attend at the hospital, those from the south having to pass through the town and toil up the steep road to the Fort, an arrangement that is not a satisfactory one.

A great number of persons suffering from the disease attended, and Dr. Tulloch and I spent several hours in examining them. We saw a case of yaws associated with syphilis, and several cases associated with lupus of the face, this complication being fairly common in the island.

Dr. Tulloch pointed out to me that the system of dealing with the disease was unsatisfactory in many instances, for the people were careless in following out the prescribed treatment, and a good number of them neglected to attend at the dispensary or to send a report of their condition to the medical officer. An immense amount of good undoubtedly has been done by the system of supplying gratuitous advice and medicines to all suffering from yaws, but it would appear that there are many diseased persons in all parts of the island, who, with perfect immunity, discontinue their attendance at the dispensary, or fail to report themselves to the medical officer for treatment.

This is due in a great measure to the ignorance and carelessness of the people themselves, some few of them being prejudiced against the regular medical attendance of a disease they had been taught to consider as one that should be left alone or treated by

their own nostrums, and a disease, moreover, to which they had become quite indifferent by long familiarity.

It is true that the Yaws Suppression Regulation, 1889, provided that persons guilty of such neglect should be punished by imprisonment without a fine, but this enactment has been rendered nugatory by the action of the chief magistrate of the island, and the people have come to believe that they can attend for medical treatment or stay away, according to the dictates of their own caprice.

In reference to this matter Dr. Tulloch makes the following remarks in his last report: "In estimating the results of treatment it has to be kept in mind that patients "usually belong to the lower and more ignorant classes; that they are not under our "direct supervision except on the one day in each week on which they are supposed to "report; that they themselves have no such loathing of the disease as would urge them "to assiduous care and cleanliness, and the regular application of remedies, and that, "in consequence, they undoubtedly neglect to use much of the medicine supplied to "them. Further, that, although legal provision is now made for the punishment of "defaulters, it is difficult to substantiate charges of neglect, or of absence from the station "without due cause. I have prosecuted in several cases, but without success, and the "stipendiary magistrate for the Leeward District has recently decided that the plea of "sickness, which is the excuse invariably offered for non-attendance, is, unless proved by "the prosecutor to be false, sufficient excuse, not only for non-attendance, but for failing "to send a report with regard to the case, the latter being an alternative provided by the "Regulation in case of inability to attend. It would be out of place in this report to "question the propriety of such a decision, but it has most certainly lessened our control "of yaws patients."

In order to exemplify the unsatisfactory termination of some of the attempts of the medical officer to rid the island of the disease, it is well for me to give the following notes of cases that are recorded in the hospital books:—

Case No. 3.—First seen by the medical officer on 12th September, 1887. On 3rd May, 1888, whilst still uncured, the patient went to Trinidad, doubtless to act as a *focus* for the spread of the disease in some district of that island.

Case No. 178.—First seen by medical officer, 18th October, 1887. The patient returned several times until 6th December, when he was dismissed for neglecting the treatment prescribed for him.

Case No. 226.—First seen on 11th November, 1887. On 2nd March, 1888, the medical officer made a note to the effect that the patient was "worse," and the person never appeared again, nor did he send any report.

Case No. 234.—First seen, 15th November, 1887. On 16th March, 1888, that is, after four months' attendance, there is the following note in the book: "No proper "message. No medicine." And, as there is no further entry, the person withdrew himself from treatment. There are a number of similar cases to this typical one.

Case No. 240.—First seen on 18th November, 1887. On the 2nd December, it is noted that the patient is "the same way;" and, as this is the last entry, it is evident that there was no further treatment. A good number of persons ceased attending in this manner.

Case No. 290.—Seen on the 27th March, 1888, and this is the following significant note in the case book: "Is in market; can't come up as she has something to sell." There is no further entry, and thus this person, who, with the disease on her went to sell in the public market, ceased attending where she could get free advice and medicine, and doubtless became responsible afterwards for the spread of the disease to other persons. No attempt appears to have been made to punish her for her disregard of the law.

Case No. 546.—A woman 42 years of age. Seen first on 27th April, 1888. On the 15th May a messenger, who came for more medicine from the dispensary, knew nothing about the patient; and, as there is no further entry in the case book, it is clear that the woman withdrew herself from medical attendance.

Case No. 547.—This woman first appeared on 1st May, 1888, before the medical officer. She had been ill for four months with the disease. She was placed under treatment by Dr. Tulloch, and on the 29th May she sent a message to him to say that "the "drink disturb her belly, and she don't want any more," and she did not return for further treatment.

Case No. 620.—A boy aged one year and eight months. Seen on 18th April, 1888, and prescribed for by the medical officer. There is no note again under the case heading until the 5th October. On the 2nd November a message was sent to the medical officer to say that "the medicine don't agree," and Dr. Tulloch heard no more of the case.

Case No. 785.—A boy nine years of age. Ill one month. First seen on 14th March, 1890. On 16th May he appeared at the dispensary again, and the following note is in the case book: "Couldn't come last week, as mother was sick and father was hired to "play tambourine at Plymouth. Sores dirty. Washed day before yesterday at river. "Nicodemus also. They are always washed at Spring Garden River." On the 23rd May there is a note to the effect that this boy had been again bathed the day before in the Spring Garden River.

These cases could be multiplied, but sufficient have been brought forward to show the fact that people ignore with perfect safety the provisions of the law on the subject of compulsory medical treatment of yaws.

As will be seen, on reference to Clause 5 of the Yaws Suppression Regulation in the Appendix, most of the persons whose cases have been given above were liable to be imprisoned, with or without hard labour, for a term not exceeding three months; but they were not even prosecuted. It cannot be said, however, that the medical officer was to blame in the matter, for in his report he states that the law is a dead letter, inasmuch as the chief magistrate will not convict. It seems that, by the decision of this magistrate, the words "who shall neglect to attend" stand in the way of convictions, for a plea of illness, which, of course, all yaws patients can bring forward with perfect propriety, has been magisterially decided as a sufficient defence, and thus, as far as the medical officers were concerned, there was an end of the matter.

It would appear, too, that it is not very judicious for the medical officer to prosecute, because it brings him too much in conflict with the people, whose confidence and goodwill it is necessary for him to secure.

Although these matters were forcibly brought before the Local Government by Dr. Tulloch in his report, published in April, 1890, nothing has been done to alter the law if the magistrate's decision be right, or to reverse that decision if it be a wrong one, and so matters were still going on in the old groove during my visit to the island, the law being disregarded, and the yaws patients attending at the stations or not, according to their own will.

It was to be expected, therefore, that the administration of the law passed with a view of enforcing compulsory medical attendance would not have been so successful as could be hoped, and such I found to be the case.

When Dr. Tulloch wrote his last report in April, 1890, I believe great headway had been made against the ravages of the disease; but of late, owing to the number of persons who have withdrawn themselves from medical attendance, and in consequence of the general belief that the penal clauses of the Yaws Suppression Regulation cannot be enforced, the disease has again got beyond control, although its prevalence is not anything like what it was before the medical officers commenced their onerous and apparently thankless duties.

I visited all parts of the island, and saw a great number of cases of the disease in the various districts. Most of the people were in a very dirty condition, and the evidences of extreme poverty were abundantly apparent. This is owing to the fact of the widespread abandonment of estates that had been in cultivation until within the last few years. A good deal of the land is now in the hands of planters who, for want of capital, cannot work their properties, and the result is that very little money is spent amongst the labouring classes. The metayer system, that promised to counteract this evil in a measure, has come practically to a standstill, in consequence of the extraordinary amount of litigation that has followed the annexation of the island to the Government of Trinidad, for, owing to the decisions of the Trinidad judges, the metayers and the landowners are, for the most part, arrayed in hostile camps. It does not become me to do anything more than to allude to this matter; but its deplorable results in heightening the general agricultural distress of this fertile island has much emphasised the difficulties that beset "the yaws question."

The lower orders of people live huddled together in huts scarcely fit for the accommodation of the beasts of the field, and a contagious disease is, therefore, liable to spread amongst them with rapidity. The huts are made of rough boards, split from the groo groo palm (*Acrocomia sclerocarpa*), which is very common in the island. The roof is thatched, and the floor is the earth beaten down, so that in the dry season the hut is full of dust and dirt, and in the wet season the floor is extremely damp and filthy. It is not to be wondered at, therefore, that rheumatism and such-like complaints are extremely

common. These huts are appropriately called by the people "dirty groo-groo houses;" the expression "dirty," however, refers to the dirt floor, but it is quite applicable in its ordinary signification.

In company with the town magistrate, Mr. S. J. Fraser, and a planter of the neighbourhood, I visited and examined one of these huts, and the following description will give a good idea of the conditions under which the poorer people live.

The hut was 14 feet long by 10 feet wide, boarded up with strips of the stem of the groo groo palm, and thatched with coarse grass. The bare earth served for the floor. In this hovel, which was without furniture, I saw a young unmarried woman, about 23 years of age, in the sixth month of pregnancy, with large encrusted yaws granulomata about the face, and ulcers about both feet and ankles. The ulcers were tied up with filthy rags. The woman was fairly nourished, and not cachectic, and she told me that she had had the disease for some months, and had not undergone any treatment until she went to Dr. Norman some weeks before my visit. On some of the yaws tumours was red precipitate powder, which she said she had applied of her own accord "to dry up "the yaws." Her father and mother and five brothers and sisters lived in the hut, and they all slept together. She tells us that the others had not got the yaws "yet," but she expected them to get it later on. Of course, in such houses as this hygiene and sanitation are out of the question, any sense of modesty and decency is blunted or entirely got rid of, and the shocking proportion of illegitimate births is easily understood.

On 11th September I visited the town of Plymouth with Dr. Tulloch, in order to be present whilst Dr. Norman attended the yaws cases at the Government Dispensary of District No. 3. A great number of people were collected together, and, after seeing them-the doctor had to dispense the medicines. None of the cases I saw call for any special remark, but a few had been attended for some time, and they were evidently fit subjects for hospital treatment.

After seeing these patients Dr. Tulloch and I rode down to Great Courland Bay, where five seine nets were being drawn by fishermen. To my astonishment some of the yaws people I had seen at the dispensary were up to their knees in the sea, helping in drawing the nets, or engaged in throwing the fish on to the beach. Other yaws patients came trooping down; they stuck their bottles of medicine into the soft sand, and then rushed into the sea to assist the fishermen, in the hope of getting a small share of the fish. One of the patients broke the bottle of medicine that was to serve him for a week's use, and the incident was regarded as a great joke by himself and the other patients. The fishermen took the whole proceedings as a matter of course, and they did not show the least concern about the near proximity of persons with a loathsome disease, nor did they object to the fish being handled by the yaws patients, although the greater part of the fish was to be carried to the towns and villages for sale to all classes of the community.

On the 21st April, whilst fording the Courland River in company with Mr. Fraser, the magistrate, I saw a woman standing in the water with bare legs and washing clothes on a submerged rock. A little above this woman was a child lying in the shallow stream on its back, and I found that the child was suffering very badly from yaws. There were large masses of encrusted granulomata, the so-called "tubercles" about the thighs and above the pudenda. The water flowing over the child ran down against the woman's legs and over the clothes she was washing. There is a penal clause in the Yaws Suppression Regulation against the bathing of yaws patients in the streams of the island, but this woman allowed her child to soak in the water above the public ford with absolute immunity, even in the presence of the senior magistrate of the island.

I spent several days with Dr. Blanc, and went to every part of his extensive district with him. At Pembroke, where the medical officer resides, I saw a few cases of yaws and syphilis, and one of these cases, a middle-aged woman, admitted to me that she had been treated for syphilis in the hospital at Barbados fifteen years before I saw her.

Dr. Blanc informed me that syphilis was very common in his district, and I soon had abundant evidence of the fact. One doubtful case, that of a young woman, had been entered in the case book as follows: "Three months sick. Only yaws pain, which is "universal, syphilitic cachexia."

I learnt from the woman that she had had miscarriages, and that she had a bad sore throat nine years ago. There were evidences of old syphilitic ulceration about the fauces. She had periostitis of the bones of the arms and legs, with nodes on the ulna radius and tarsal bones. There were also syphilitic ulcers on both feet. The case was one of syphilis and not of yaws.

This yaws "pain" seems to be made more of in Tobago by the people than it is in

the other islands. I shall have occasion to speak of the symptom when I come to treat of the disease, but taken by itself, without other indications of yaws, it is valueless from a diagnostic point of view.

At Charlotteville Dr. Blanc and I saw a great many cases of the disease, two of which were complicated with lupus of the face, several with syphilis, and several also with that condition of tuberculosis to which the term "scrofula" is sometimes applied.

One of the children examined by us had a flat circular yaws "tubercle" on the mucous membrane of the inner side of the cheek. The granulation tumours of yaws are often seen on the lips and at the nasal orifices, where they sometimes invade the contiguous mucous surfaces, but it is extremely rare to see tumours growing in isolated positions on the mucous membranes, as was the case in this child. Dr. Blanc told me he had never seen a similar case, and Dr. Tulloch informed me that he had not seen more than two or three cases.

At Roxborough we saw two cases of second infection. One was that of a child who had had yaws several years before, and got completely cured and remained perfectly healthy until a few weeks before I saw her, when the disease had appeared again, after she had associated with other children who were affected.

The second case was that of a black man, named William Ewen, who stated positively to Dr. Blanc and myself that he had had the disease when a child.

At Roxborough a child was brought to us who had hereditary syphilis. It had snuffles and a well-marked syphilide on its cheek. The mother thought the child had yaws.

On the 21st April, at Mr. Purser's house, I saw, with him and the medical officer of the district, the following case, which will illustrate the contagious nature of the disease. I transcribe from my notes:—

A negro boy, three years of age; well nourished. The following history given by boy's mother. Fourteen months ago the child fell and cut his lip; he played with other children affected with yaws, and two months afterwards the cut, which had not healed, became the site of yaws granulomata. Nothing was done for the child beyond bathing him frequently until six weeks ago, when the case came under Dr. Norman's care. The child has now a mass of encrusted "tubercles" on the upper lip, implicating the mucous membrane, and a circular encrusted "tubercle" on the chin. There are also squamæ about the hips and legs. The mother says the child has improved since it has been under medical treatment.

Three or four months after this child became affected his little brother caught the disease from him, but the infant got better in about ten months without any treatment whatever. Mr. Purser informs me that the mother's statement can be relied on.

On examining the vital statistics of the island I was very much struck with the proportion of deaths from diseases of the digestive organs, and I have prepared the following table in illustration thereof:—

Year.	Number of Total Deaths.	Number of Deaths from Diseases of Stomach, Liver, and other Organs of Digestion.	Percentage of Deaths from Diseases of Stomach, &c., on Total Deaths for the Year.
1885 - - -	426	45	10·5
1886 - - -	398	53	13·3
1887 - - -	381	52	13·6
1888 - - -	361	72	19·9
1889 - - -	437	114	26·0
1890 - - -	453	109	24·0
Total for the Six Years - -	2,456	445	18·1

The percentage of deaths from diseases of the digestive organs is 18·1 on the total number of deaths for the past six years, but for the last three years, that is, during the period of greatest agricultural depression, the percentage has been greatly increased.

The Deputy Registrar General, in his Report on the Vital Statistics for the Year 1889, states in reference to this question as follows:—

"The greatest mortality appears from the returns to have been from diseases of the "stomach and other organs of digestion, the number being 114, 77 of which occur in "ages from under one year to under 15."

The amount of money that seems to have been expended by the Government in its effort to cope with the disease appears to have been very small, for, as the medical officers have received no addition to their salaries in consideration of the large amount of extra work thrown on them, the only item of expenditure is that for drugs, which cost at the rate of 150 *l.* a year. Thus, altogether about 500 *l.* has been spent since 1887, and, considering the amount of good that has been done, it cannot be said that there has been any extravagance in the matter.

IV.

History of Yaws in Grenada.

The disease prevailed amongst the negroes in Grenada during the time of slavery as it did in the other islands; and the planters, in order to control its spread, were obliged to establish yaws houses on their plantations for the segregation of the affected slaves.

On the abolition of the apprenticeship system in 1838, which was carried on for four years after the day of emancipation, the yaws houses were closed, and the negroes wandered about at will and did as they liked as long as they respected the laws of the island. The same influences were at work as in the other islands, and the people became so accustomed and indifferent to the manifestations of the loathsome disease that they considered it advantageous for their children to become affected by it.

Unfortunately, there are no records in the island giving any information concerning the progress of the disease during this period, and the only reference to the state of affairs in the time of slavery is contained in a despatch, dated 3rd July 1890, to the Colonial Office from the Honourable Sir Walter Hely Hutchinson, K.C.M.G., the present Governor in Chief of the Colony of the Windward Islands.

In this despatch the Governor states as follows: "During the continuance of slavery "every estate had its yaws house, where cases were segregated and treated. Your "Lordship may be sure that the planters would not have gone to the trouble and expense "of maintaining those establishments if they had not learnt by experience that it was "in their interest, as owners of the slaves on the estate, to do so, and that the segregation "of the cases and treatment of the disease prevented it from spreading amongst their "slaves, and from disabling them from labour."

The appointment of Government medical officers, who were required to supply gratuitous advice and medicines to children, and to labourers over 60 years of age, was not followed by any check on the spread of the disease, for the people suffering from yaws would not go to the medical men, and thus cases of it rarely came under the notice of the members of the profession practising in the island.

The country being of a mountainous nature, many of the negroes had settled in the interior valleys, or on the uplands, to which the only access was by winding tracks or break-neck bridle paths. Thus the people were away from the observation and civilising influences of the upper and educated classes, and they had every facility for hiding the cases of disease that might attract what would be to them unpleasant attention and irksome interference. For they had grown up in the belief that yaws should not be cured, or that the only persons able to cure it satisfactorily were their own native bush doctors, and not the Government medical officers.

In illustration of these facts I give the following extracts from official reports that were placed before me.

Dr. Orgias, the Colonial Surgeon, in reply to a request from the Governor for a return of the number of cases in the island, wrote as follows on the 22nd November 1882:—

"The district medical officers have no means of supplying the information asked "for, as the native population seldom or never seek for medical advice for this disease. "There is a prejudice existing amongst them that yaws is not a curable disease, and that "medicinal agents do more harm than good. They believe in the '*vis medicatrix* "*naturæ*.'"

And the late Dr. Alfred Cantin, writing on the subject about the same time, says, " I find it impossible to state, even approximately, the number of cases of yaws there are " in the medical district under my charge, owing to the fact that creoles suffering from " that disease seldom, if ever, seek medical advice."

From the period of emancipation, in 1834, until the year 1875, there is no record in the island of any attention having been directed by the local authorities to the various questions relating to the spread of the disease. In 1875, however, it would appear that 33 cases were treated at the Colony Hospital, and during the next year an "auxiliary " hospital" was opened for the treatment of yaws, and 41 persons were admitted. The accommodation in this hospital was small, there being room only for 26 patients, 16 males and 10 females. The hospital was often overcrowded, and its inadequacy to the wants of the island was emphasised by Dr. Cantin, who, on the 30th September, 1881, reported as follows; " Yaws is still prevalent at Belmont and at Mount Rich. Isolation " being the only means we have of eradicating this loathsome disease, it is a matter for " regret that, owing to the overcrowded state of the Yaws Hospital, some of the cases have " to be detained on the estates, while others are discharged from that institution before " a cure is effected, in order to make room for more urgent ones." The number of inmates under treatment in 1877 was reduced to 29, one of whom died of " consumption," and from that year, until a more commodious hospital was opened, in 1882, the number of admissions increased year by year, as will be seen from the following table: —

Year.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.
Number of cases admitted -	33	41	18	46	60	76	87	118

Thus, during the eight years altogether, 479 cases were treated in the Colony Hospital or the Auxiliary Yaws Hospital. The latter institution had got into a state of disrepair, and the accommodation was inadequate for the number of persons applying for admission. In his report on the hospitals for the year 1881 the Colonial Surgeon pointed out that the disease was on the increase in the colony, and said, "The Yaws Hospital is incon- " veniently small; during the whole of the year it was constantly filled, and yet many " cases had to be refused admittance." The Government consequently resolved that the hospital should be enlarged, and put into thorough order. But the Colonial Surgeon suggested that the ulcer hospital should be converted into a yaws hospital, as appears by the following extracts from a minute written by him to the Administrator of Grenada on the 23rd June 1882:—

" It is impossible to enlarge the present Yaws Hospital, as the space about it will not " admit of such an alteration. There is no suitable site about Fort George for the " building of a yaws hospital without incurring very great and very unnecessary expense. " If the alterations at the Colony Hospital, ordered by the Secretary of State in a Despatch, " No. 34, of 28th October 1880, are carried out, ample accommodation will be afforded " there for the treatment of ulcer cases. The Ulcer Hospital, a large and commodious " building, capable of accommodating 40 males and 30 females, could then be converted " into a yaws hospital, which, in my opinion, would be the best scheme that could be " adopted under the circumstances. This building is in good order, and would only " require the erection of two side walls to isolate the patients."

Governor Sir William Robinson approved of the suggestion of the Colonial Surgeon in a Despatch written from Barbados to the Administrator of Grenada on the 17th of July, but nothing appears to have been done until the arrival of the Governor from Barbados, in November, when the various questions relating to the disease were gone into.

Sir William Robinson endeavoured to ascertain the actual number of cases of yaws in the island, and he inquired into the hospital accommodation, and into the facts relating to the spread of the disease amongst the East Indian immigrants, who had been brought to the island as labourers on the estates, and who, consequently, associated with the negroes, and thus placed themselves within the operation of the *contagium* of the disease.

The result of this inquiry on the spot by the Governor was, that the old hospital was found to be much overcrowded, and that nothing had been done to convert the ulcer into a yaws hospital, although 250 *l.* had been placed on the estimates for that purpose.

Meanwhile the reports of the medical officers showed that the disease was on the increase, as will be seen from the following extracts from their letters :—

Dr. Orgias, Colonial Surgeon.—"The disease is, beyond doubt, on the increase in "this island." He then gives particulars of the admissions to the hospital during the five previous years, and adds : "The above numerals give but a faint idea of the number of "cases in the island, if I may draw my conclusion from the fact that a great number of "cases are daily refused admittance into the hospital for want of accommodation. The "Indian immigrants are very much predisposed to the disease, and on their arrival here "few escape the contagion. The number treated in hospital this year was 25, exclusive "of children. This number I believe to be less than that of the previous three years, "from the fact that we have had no fresh importation of immigrants during that time, "and that those in the island have nearly all passed through the disease." . . . . . "The hospital is always overcrowded, and patients frequently turned away for want of "room."

Dr. McLeod.—"It is impossible for me to say with any accuracy the number of "yaws cases in Grenada." . . . . . "Making a rough guess at the approximate "number from my own experience of the prevalency of the disease, I should say that "probably there are no less than six to eight hundred cases in the colony." . . . . "The Indian immigrants are very susceptible, particularly on their arrival, to the contagion "of yaws, and I feel certain that a large proportion of them are victims. It was the case "when I was medical officer of the parish of St. Patrick."

Dr. William Lang.—"The disease of yaws prevails to a great extent in this parish "[St. Andrews]. It is impossible to arrive at the number of persons afflicted with it, as "they are allowed to roam about without restriction among their fellows. Cases have "existed among the immigrants on every estate on which they are located."

Dr. Alfred Cantin.—"There are at present no cases of yaws among the indentured "immigrants under my charge. Whenever such a disease shows itself on an estate I "order the patients to be sent to the Yaws Hospital without delay. There are, I think, "several of them now under treatment in St. George." . . . . . "Although I am "unable to lay any statistical information before your Honour, yet I can confidently "assert that yaws is very prevalent among creoles in this parish, and that, with regard to "indentured immigrants, only those located at Mount Rich and at Belmont seem to be "afflicted with such a disease to any extent, owing, I believe, to the proximity of the "coolie barracks to the negro houses, and to the freer intercourse of their respective "inmates."

Dr. Latour.—"I am not in a position to be able to give the information you require "with respect to the number of cases of yaws in Grenada, and the accommodation for "them. The only immigrant suffering from yaws from my district is at present in the "Yaws Hospital."

The grave state of affairs set forth in these reports rendered it necessary for the authorities to take some action. The disease was on the increase, one of the medical officers having estimated that about 2 *per centum* of the population were suffering from it; the Indian immigrants were peculiarly susceptible to the contagion, and the hospital was totally inadequate to provide even sufficient accommodation for those few cases applying for admission. It may also be mentioned that, as these facts became public, there was some alarm created, and this found expression in the newspaper press of the island.

Sir William Robinson acted with promptitude. He ordered the ulcer wards of the Colony Hospital to be converted at once into a new yaws hospital, capable of accommodating 100 cases, and he set to work to ensure the passing of a law for compulsory hospital treatment of all persons suffering from the disease. Mr. Moylan, the Attorney General, in a minute to the Governor, dated the 21st November, says, in reference to this matter, "There is no Yaws Prevention Ordinance in operation here. The St. Lucia "Ordinance, which your Excellency encloses, appears to me to be well suited, with some "trifling alterations, for this colony. Such a measure would, in my opinion, be very "popular in this colony, and of late there have been demands in the press for the intro-"duction of such a measure."

The yaws patients were removed to the new hospital on the 1st of January, and "The Yaws Prevention Ordinance" was passed by the Legislative Council on the 22nd February, and came into operation on the 6th March, 1883.

A copy of the Ordinance will be found in the Appendix, and I would draw attention to Clause 14, which reads as follows :—

" It shall be lawful for the Governor from time to time to cause to be framed rules " and regulations for the carrying out the provisions of this Ordinance, including the " compulsory registration of all houses in which there may be persons suffering from " yaws, and such rules and regulations, when approved by the Governor in Council, and " published in the 'Gazette,' shall have the force of law."

This provision for compulsory registration was introduced at the suggestion of the Colonial Surgeon, but it does not appear that any rules or regulations have been framed in regard to the matter, and practically this clause has been left in abeyance.

The year 1882 seems to have been a turning-point in the history of the disease in Grenada, and increased attention has been given to all questions relating to the malady since that time. In his report on the hospital for 1882 the Colonial Surgeon alluded to the yaws affairs in the following words : —

" The enlargement of this hospital has occupied the attention of the Government for " the last two years. Numerous correspondences have taken place on the subject, in " which I have always endeavoured to show the impossibility of enlarging the building " without incurring very great and very unnecessary expense, and suggested, in lieu of " building, that the Ulcer Hospital should be converted into a yaws hospital. In the month " of November last, during the visit of his Excellency the Governor in Chief to this island, " I was consulted on the subject, and pointed out to him the advantage that would accrue " by adopting the plan that I proposed. His Excellency inspected the hospital with me, " approved of the change, and gave instructions that the alteration should be immediately " carried into effect. The change was effected that month by the removal of the ulcer " patients to the General Hospital, which afforded ample accommodation for their re- " ception.

" The Ulcer Hospital, in which the yaws patients are now located, is a large and " commodious building, with upper and ground floor. It is well ventilated, and capable of " giving accommodation for 100 patients, with a cubic space of 800 feet to each bed. " The building is situated on a slight elevation near the seaside, and affords excellent ' sea-bathing to the inmates of the hospital.

" The general management of this hospital is vested in the Colonial Surgeon, assisted " by Dr. Hatton, the house surgeon of the Colony Hospital. The staff consists of a " steward and two nurses.

" On the 1st January 1882 there remained in the late Yaws Hospital 25 patients " from the previous year, of whom 17 were males and eight were females. During the year " 118 cases were admitted, of whom 81 were males and 37 were females, making a " total of 143 patients treated ; of them, 85 were discharged cured, five were relieved, " and one died ; and there remained at the close of the year 52 patients, of whom 25 were " males and 27 were females. A few cases were of re-admission, but, as the patients were " apparently cured when discharged, I have counted each re-admission as a fresh case.

" The mortality during the year was very small. Only one death in a male, a " native of Carriacou. The disease did not assume a bad type in his case, but he was " an intemperate man, and at the time of his admission was suffering from dysentery, " from the effects of which disease he succumbed.

" Two births took place in the hospital during the year ; one died a few days after " from hemorrhage from the umbilical cord.

" The number of cases admitted during the year shows a decided increase over " previous years, as follows : in 1878, 53 cases ; in 1879, 73 cases ; in 1880, 94 cases ; " in 1881, 105 cases ; and in 1882, 143 cases. These figures substantiate the opinion " that I expressed in my report last year, that the disease is on the increase in this " colony.

" The class of patients admitted into the hospital were principally coolies. These " labourers seem very susceptible to the contagion of yaws, and some of the worst forms " of the disease are to be seen in them. Of the 143 cases treated, 76 (a trifle more than " one-half) occurred in that class of labourers and their children."

During the two succeeding years matters went on smoothly. In 1882 the number of cases admitted to the old Yaws Hospital was 118, and in the new institution, during the years 1883, and 1884, the numbers were raised to 324 and 200 respectively.

In November, 1884, the Colonial Surgeon addressed a circular letter to the district medical officers, asking them for information as to the working of the Yaws Prevention Ordinance, and the amount of good done by the Yaws Hospital, and the following extracts from the replies of these officials show that, as far as their knowledge went, the disease was generally on the decrease.

Dr. McLeod.—" In my opinion the opening of the Yaws Hospital, and the working " of the Ordinance connected with it, has been a success, and will, if continued, be the " means of stamping out the disease. Within the last week I visited the most thickly " populated parts of my district, and made inquiry as to the existing cases, and the " answer given was to the effect that they knew of none, nor had any been seen for " some time. The care that I took when a case came under observation, was to order " the patient immediately into the hospital, and I was glad to find that little opposition " was offered, to the contrary, a willingness evinced to fulfil the requirements of the " Ordinance."

Dr. Cantin.—" As far as my knowledge extends, there are very few cases of yaws " in this district. This, I believe, is attributable to the fact that the population of " St. David's being more scattered than that of any other parish in Grenada, the con- " ditions which obtain here are not so favourable to the development and spread of the " disease. I have always taken care to order to hospital any case of yaws I might come " across. . . . . I am not aware of any case amongst the few old coolies resident " in this district."

Dr. Lang.—" The disease does not seem to me so prevalent in this district since the " Ordinance regarding it has been in force as was the case formerly. The people are " aware of the existence of the law, and come to me frequently about cases with a view " to removal to hospital."

Mr. Bennett.—" In my opinion, the Yaws Ordinance, 1883, is working well, and has " had a most beneficial effect on the health of the people of Grenada. It is quite the " exception to see a person suffering from yaws at the present time in the district."

Dr. E. F. Hatton.—" I have to state that I have seen very few cases of yaws in the " parishes of St. John and St. Mark during the two months I have been here. . . . . I " believe I have sent five or six cases to the hospital in the two months."

Dr. Paulin Orgias.—" Very few cases are now seen knocking about, and every care " is taken to run them in as soon as detected."

As these reports showed on the whole a satisfactory state of affairs, no alteration was made in the system adopted for grappling with the disease, and affairs went on uneventfully until the year 1888, when another similar inquiry was made.

During the six years from the opening of the new hospital until the end of the year 1888, the number of cases admitted to the hospital showed a marked increase, as will be seen from the following table :—

Year.	1883.	1884.	1885.	1886.	1887.	1888.	Totals.
Number of Cases admitted to the Hospital - - - - -	376*	200	243	260	265	247	1,591
Annual Expenditure - - -	£. 1,011†	£. 643	£. 816	£. 731	£. 818	£. 770	£. 4,789

* Including 52 cases removed from the old Yaws Hospital, the actual number of new admissions was 324.
† Approximately only.

This table shows that during the six years, 1,591 cases were treated in the hospital at a cost to the public revenue of 4,789 *l.*, that is 3 *l.* – *s.* 2 *d.* a head.

In February, 1888, the Governor, Mr. Sendall, called on the medical officers for a report in regard to the working of the Ordinance in their respective districts, and the following is a copy of his minute addressed to these officers by the Colonial Surgeon.

" His Excellency the Governor requests that you will report on the condition of the " disease yaws in your district. You will state if the disease has been on the increase or " decrease during the last three years, and give as near as you possibly can ascertain the " number of persons suffering from the disease at the present time."

The following extracts are taken from the replies to this minute :—

Dr. Edwin F. Hatton.—" I have made inquiries myself, and through the police, in " different parts of my district, and have not been able to find anyone suffering from " yaws. I believe the disease has decreased considerably during the last three years, " both with respect to the number of cases and the severity of the affection. I believe

" the people of St. David's Parish go voluntarily, or are sent by their friends to the Yaws " Hospital as soon as they are known to be suffering from yaws. A few years ago persons " suffering from this disease might been seen at the courts, on the streets, at the schools, " and, in fact, wherever there was a public gathering ; this is not the case now."

Mr. H. J. L. Bennett.—" Yaws is certainly less often encountered in this district at " the present time than formerly ; and I think it has been decreased slightly during the " past two years. Although a few cases are now seen about the thoroughfares many " persons are still at large and concealing their complaint ; but even in these untreated " cases the disease is not of so confirmed and intractable a character as it often used to " be. Taking all things into consideration, I believe the ' Yaws Ordinance ' has worked " well, and that the continuance of the disease in Grenada is due chiefly to contagion " with imported cases."

Dr. Wm. Lang.—" The disease yaws exists throughout the parish, but it is by no " means so prevalent as it was before it was made compulsory on persons suffering from " it to repair to the Yaws Hospital for treatment. There seems to be an idea amongst " the people than an attack of it is inevitable and unavoidable. There is no horror of " this loathsome disease, and no precaution whatever is taken to avoid it. Those affected " with it mix indiscriminately with their fellows. It is impossible to ascertain the " number of persons suffering from the disease in this district."

Dr. P. F. McLeod.—" I inspected the most populated parts of my district with the " view of ascertaining the probable number of persons affected with yaws, but failed to " discover one case, although I had enlisted the services of a few reliable persons to aid " me in the search.

" I am of opinion that the disease has decreased in the district within the last three " years, which may be due to the facility afforded in sending cases to the hospital.

" That good results have been obtained from the working of the ' Yaws Ordinance ' " and the maintaining of a hospital for the treatment and isolation of cases as a means of " stamping out the disease is in my opinion questionable, and unless more stringent " measures are adopted to carry out the provisions of the Ordinance there is little chance " of the disease decreasing generally throughout the island.

" It has occurred to me that the appointment of one or two inspectors to each " district would have a beneficial effect in bringing persons suffering from the disease in " its primary stage under the observation of the medical officer, when there is much less " risk of contagion than when the disease has arrived at the stage of suppuration.

" As a recurrence of the disease is not unfrequent in cases discharged from the " hospital apparently cured, I would recommend that all patients leaving the hospital " should be on probation for six months, and they should be ordered to report themselves " to the medical officer once a month for the purpose of inspection. The utility of such " a procedure would be an early recognition of the disease, immediate isolation, and a " preventative of the person becoming again a medium of conveying the disease to others.

" What operates against the natives having confidence in the means adopted by the " Government, and complying with the provisions of the Ordinance is, that they have " equally as much faith in the curative properties of their own nostrums as in the treatment " adopted by professional men."

Dr. Latour.—" During the last six months there has been a considerable increase " in the number of persons suffering from yaws who have been recommended to the " Yaws Hospital for treatment. The disease has varied very much for the past three " years.

" It is impossible to ascertain even approximately the number of persons now " suffering from this complaint. I would recommend, with a view of keeping this disease " under, that patients discharged from the Yaws Hospital should be considered out on " probation, as in the case of lunatics discharged from the lunatic asylum. They should " be provided with a ticket containing their name and residence, and be required to " report themselves to the medical officer of the parish once in each month for a period " of 12 months.

" Should they fail to attend, the police would be informed of their non-attendance, " and the patients be made to attend. Such an arrangement would enable the medical " officer to send back to the Yaws Hospital all cases which show a return of the malady. " At present, patients in whom the eruption re-appears, after having been at the Yaws " Hospital, are unwilling to return on the plea that they have already been to hospital " for the same complaint. Whilst at large they not only infect those with whom they " are brought in contact, but the cure of their disease is retarded. The system proposed

" would not only detain the patient in hospital so long as his disease required treatment " but it would have the still greater effect of preventing him from communicating so " contagious a disease to others."

These reports are far more unfavourable as regards the ultimate success of the measures adopted for arresting the progress of the disease than were those written by the same officials in 1884, although the Yaws Prevention Ordinance had been in operation for nearly five years, and large sums of money had been expended on the special hospital.

It would appear, however, that the people were still indifferent to the spread of the disease, they believed an attack inevitable during some period of their lives, they still had no faith in medical treatment, and they concealed the yaws cases from the authorities. The only persons likely to be able to speak with authority on the prevalence of yaws, viz.: the district medical officers, confessed that it was impossible to ascertain even approximately the number of cases of the disease in their districts, and one of these officers stated that the disease was still spreading in that part of the island under his charge.

The hospital had undoubtedly done a great deal of good, and had it not been established the labour supply would probably have been crippled in part, owing to the wide spread of the disease that would have happened had those cases segregated in the hospital been allowed at large. But the expectation that the Yaws Ordinance would have 'stamped out' the malady from the island was not realised, and there was much disappointment in consequence. Nevertheless the measures, although not so successful as was at first hoped, had to be continued, and so the hospital was carried on as before.

Governor Sir Walter J. Sendall, K.C.M.G., in July, 1889, sent on to the Colonial Office a Report on the Blue Book drawn up by Mr. Edward Drayton, the Acting Colonial Secretary, and in this Report occurs the following passage, which shows that the authorities despaired of eradicating the disease from the island:—" This loathsome " disease [yaws] is largely prevalent in some districts of the island, and although the " work at the hospital serves in some measure to keep it in check, there seems little " prospect of extirpating it without incurring an enormous annual expenditure."

In July, 1890, the Hon. Sir Walter Hely-Hutchinson, K.C.M.G., who had recently been appointed Governor, called on the Colonial Surgeon for a report on the progress made in dealing with the disease; and Dr. Orgias wrote in reply a letter containing much valuable and interesting information; and it is advisable, therefore, to make from it the following copious extracts:—

" I have adopted the suggestion of the Secretary of State, contained in his Despatch " of 1st October, 1889, and extended my inquiry during the last 15 years.

" The only reliable source of information I can venture to advance on the subject is " culled from the records of the Yaws Hospital for that period of time; any other source " would be problematical and open to error.

" The following table shows the number of cases treated in the Yaws Hospital from " the year 1875 to 1889, embracing the period of 15 years."

[This table is omitted, as the figures do not agree with the Blue Book Returns and the figures given in the published medical reports, but the actual number of cases admitted to the hospital has been shown already.]

" It will be observed by the table that from 1875 to 1883 the number of cases were " few in comparison to those in the year succeeding. The increase was no doubt due " to the fact that the Compulsory Yaws Ordinance came into operation during the latter " year.

" The highest record, 324, was reached during the year 1883, exceeding that of any " preceding or succeeding years within the limits of this inquiry. The increase was no " doubt due to the vigorous efforts of the police to carry out the provisions of the new " Ordinance. The broom was new, and was made to sweep clean every case that came " before it into hospital. I regret to say that this vigorous effort was not of long dura- " tion. After the first year it relaxed considerably, and at the present time very few " cases are sent into hospital by the police.

" There is every reason to believe that the majority of the people view the " Ordinance with favour, and as a beneficial measure for the relief of those suffering " from the disease. In proof of this I may mention that the cases that apply for " admission into hospital come voluntarily, or are sent by relatives or friends.

" I forward Reports made by the district medical officers in 1888 on the working of " the Compulsory Yaws Ordinance. The reporters agree that the Ordinance has done " good, that the disease by its means has been arrested in its progress, and that with " more stringent supervision better results would be obtained. Their conclusions point

" to the fact that the hospital should be maintained, as it is a necessary and useful " institution.

" From the weight of evidence, and in face of the figures shown in the table, I am " of opinion that it would be a wrong measure to close the Yaws Hospital of this island, " an institution that affords annually cure and relief for over 200 patients who are " afflicted with a loathsome and contagious disease."

This Report of the Colonial Surgeon was sent on by the Governor to the Colonial Office; and in his interesting despatch, another portion of which I have already quoted, Sir Walter Hely-Hutchinson makes the following remarks:—

" It is beyond a doubt that the application of the Ordinance which provides for the " compulsory treatment and segregation of yaws cases in Grenada has been beneficial. " On the other hand, it is evident, from the experience of St. Vincent, that the discon- " tinuance of compulsory treatment and segregation of yaws cases tends to produce " results the reverse of beneficial."

Beyond the statistical tables attached to the annual hospital reports, there is no record of the progress of the yaws affairs from the date of this despatch until the period of my visit to the island in May, 1891.

During the year 1889 the number of cases admitted was 230, and the expenditure on the hospital was 610 *l.*

During the year 1890 the number of cases admitted was reduced to 102, and the expenditure was 472 *l.*

A reference to the foregoing tables will show that 479 cases of the disease were treated in the old yaws hospital during the eight years ending 1882, and that from the opening of the new hospital until the end of the year 1888 no less than 1,591 cases were treated in the institution. If to these figures be added the 230 cases admitted in 1889, and the 102 admitted in 1890, it is found that altogether 2,402 cases of yaws have been under medical treatment in the island since the opening of the yaws hospitals. The population of the whole colony, taken at the census of 1881, was 42,403, and at the census of 1891 it had increased to 53,209, so that the mean population for the decennial period was 47,806, 5 *per centum* of which number may be said to have been under treatment in the yaws hospitals.

The expenditure on the 1,923 cases treated in the new hospital from the 1 January 1883, when it was opened, until the end of the year 1890, was 5,871 *l.* I have been unable to obtain the expenditure on the old yaws hospital for the eight years ending with 1882; but, calculating the expenditure on the basis of the figures of the new institution, it may be said that the total approximate cost of treating the 479 patients was 1,462 *l.*, and this sum added to 5,871 *l.* brings the cost of the yaws hospitals during the 16 years to 7,333 *l.* This, however, is exclusive of the salary of the medical officer, which in the figures given to me by the Acting Colonial Secretary, is put down at 125 *l.* a year, this being a moiety of the salary of the house surgeon.

The Medical Ordinance, which provides for the appointment of a house surgeon to the Colony Hospital and Yaws Hospital was passed in 1880, so that at the rate of 125 *l.* a year for 10 years the medical attendance has cost 1,250 *l.*, which added to 7,333 *l.*, brings the total expenditure on the yaws hospitals for the past 16 years up to the sum of 8,583 *l.*, and this is exclusive of the cost of medicines, which does not appear in the medical reports. These figures show the cost of hospital treatment of each case to have been about 3 *l.* 11 *s.* 6 *d.*

There certainly has been no extravagance in the management; indeed, the yaws patients cost much less than the patients at the Colony Hospital, as will be seen from the following table, the figures of which are extracted from the reports of the Colonial Surgeon:—

Year.	1884.	1885.	1886.	1887.	1888.	1889.	Average Cost for the six years.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Daily average cost of each inmate of the Colony Hospital - -	1 3¾	1 3	1 1½	1	1 4½	1 -	1 2¾
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Daily average cost of each inmate of the Yaws Hospital - -	- 8¾	- 8½	- 8½	- 8	- 6	- 6	- 7¾

The Medical Report for the year 1890 does not give the daily average cost of the inmates for that year, but the period of six years in the table may be taken as a safe basis of calculation. In arriving at these figures the Colonial Surgeon has only taken into account the cost of provisions, petty supplies, clothing, bedding, and salaries of nurses and servants. And as the patients of the Colony Hospital cost 47·5 *per centum* more than those of the Yaws Hospital it would appear that the authorities err if anything on the side of economy in dealing with these unfortunate people to whom good nourishing diet is of so much importance.

I had sent on from Trinidad to the Governor of the Windward Islands the interrogations to be replied to by the medical officers of the colony, and His Excellency was duly apprised of the date of my arrival at the seat of his government.

I got to Grenada on the 8th of May, and I found that the Governor had interested himself specially in the matters relating to my mission, and that he had collected together all the documents and reports that might be of use to me in my inquiry. The Governor also kindly assisted me in every other way in his power, and the Colonial Surgeon rode through the country districts with me and gave me on all occasions the benefit of his knowledge of matters relating to the island in which he has practised his profession for many years. The result was that I was able to get through that portion of the inquiry concerning Grenada more expeditiously than could be done in any of the other islands, where I had, for the most part, to ferret everything out myself, at an expenditure sometimes of considerable time and trouble.

The day after my arrival I visited the Yaws Hospital with the Colonial Surgeon, Dr. Orgias, and the House Surgeon, Mr. Boyd. The building is a well-ventilated two-storied one, close to the sea, and there is accommodation for 100 patients. The male ward contains 25 beds, the female ward 50 beds, and the children's ward 25 beds. The minimum amount of cubic space allowed for each patient is 756 feet. This quantity is low according to European ideas, but as in the tropics the windows and doors are thrown open all day long, and provision is made for ample ventilation during the warm nights, the space allowed is sufficient.

There were 25 patients in the hospital at the time of my visit, and most of them were children. With one exception, all the cases were doing well, and most were on the road to recovery. The type of the disease called for no special comment. The exceptional case was a chronic relapsing one in a prematurely aged Indian immigrant. The proximity of the hospital to the sea enables the patients to enjoy the advantages of sea-bathing, and they are so fond of swimming about that Dr. Orgias informed me that it was sometimes difficult to keep them out of the water. On the whole the hospital is an excellent one, and the patients appeared to be well contented and happy.

The death rate is very small. During the five years from 1886 to 1890 inclusive, there were admitted 1,104 patients to the hospital, and of this number there were only seven deaths, that is at the rate of 6·3 per thousand, an exceptionally low death rate. I find, on reference to the Blue Book for the year 1886, that the death rate of Grenada for the preceding five years was 23·3 per thousand. It is a remarkable fact, therefore, that the mortality in the yaws hospital for five years was only about a fourth of the annual death rate of the island generally. Among these deaths there were recorded one from dropsy and two from general debility.

Previous to 1885 there is no record of a patient having absconded from the hospital, but in that year one person ran away. In 1886 there were two escapes, and in 1887 there were eight. Since then no person appears to have absconded from the institution.

On the 14th May, Dr. Orgias and I left the town of St. George for a four days' ride round the island to inspect the medical districts. Dr. Latour met us half way to Gouyave, and accompanied us to the extreme end of the long Concord Valley. This valley is entirely taken up with small holdings of peasant proprietors whose cacao cultivation extends from the sea far into the interior. Most of these small settlers appeared to be in comfortable positions. We visited the Concord School and found 104 children of both sexes present, all of whom were neatly clothed, and appeared to be healthy, well nourished, and intelligent.

Next day Dr. Orgias and I visited the school at the town of Sauteurs, at the north end of the island, and we were equally pleased with the condition of the children there. We did not see a sickly child at either school, and all were, for their position in life, well-dressed and well-behaved. In riding along the coast we had stopped at the villages and made special inquiries as to the existence of cases of yaws, but every person interrogated denied the presence of the disease. In the Concord Valley, however, we found one case. We received information from a cacao planter that a girl in a certain house was suffering from yaws, and he begged us to be careful not to disclose the fact

that he had told us so. On visiting the house a woman residing there denied that she had any case of yaws on the premises, but we insisted on seeing her daughter, and we found the child, who was about four years of age, to be suffering from the disease.

This was one of the hidden cases that it is the duty of the police to search for, arrest, and convey to the yaws hospital. But the police appear to be very lax in regard to the matter, and the people are afraid "to tell on each other," as the informer would be abused roundly or made to suffer in some way or other; and, as I was informed, he might have *obeah* "worked on him."

At the town of Gouyave a typical case was brought to Dr. Latour's house for me to see. The patient was a little negro girl 6 years of age, and she had large encrusted "tubercles" on the inside of the left thigh. In reply to one of my questions, she said the tubercles were not painful except "when de woman krub it with karn husk." The child was living in the heart of the town, but for some unaccountable reason the police, who had knowledge of the child's condition, did not send her to the hospital.

Along the western or leeward side of the island, and at the south end, the people appear to be well off, and their houses are neater, cleaner, and altogether in better order than on the windward or eastern side, where lie the half or altogether abandoned sugar estates, the lower classes of the people are apparently in the same condition as those in the other islands.

On the 17th May Dr. Orgias and I rode through the abandoned Union Sugar estate to the Village of Marquis on the Windward Coast. This village is inhabited principally by negroes, and the huts, which are situated on either side of a street running along the sea-shore, were the poorest and dirtiest and most over-crowded of any I saw in Grenada. The whole village was planted with trees of which the sea-side grape and coco-nut predominated, and the villagers were lolling about in groups in the shade. We had evidence of two cases of yaws secreted in the village. There were, doubtless, many cases, but we heard only of two. We unearthed one case, but the other eluded our quest. At the hut where we found a child with yaws the mother positively denied in indignant terms that there was anyone in the house with any disease, and yet all the time the child was hidden behind her in the folds of her dress.

As the result of our investigation Dr. Orgias and I were satisfied that there were a good many cases hidden away in various parts of the island, and as each case would act as a focus for the spread of the disease, it is to be feared that the good work of the hospital will be neutralised unless some means be adopted for ascertaining with accuracy the number of affected persons and their residences.

In consequence of the attention directed to the prevalence of the disease by my visit to the island, the various authorities stirred themselves up, and on the 4th June, when I was in St. Vincent, Dr. Orgias wrote to me as follows:

"You will be delighted to hear that some good has accrued from our trip round "the country. The doctors and constables have been on the *qui vive*, and succeeded in "ferretting out 15 cases of yaws, which were sent to the hospital a few days after you "left. The cases were mild, and I fancy are the sweepings of the Augean stables."

And, on the 31st July, Mr. Walter Boyd wrote to me a letter, in which the following passage occurs:—

"Since you left, our number of cases have increased to 54, all the new ones coming "from Gouyave and Grand Pauvre districts. . . . I expect this is the last of it "to be found, as every one has been on the look out for cases."

Unfortunately, however, the disease has spread again since then, for whilst writing this report I received a letter from the Colonial Secretary informing me that "numerous "cases had been brought to light," and that the hospital was so overcrowded as to necessitate the stoppage of admissions. The following is the correspondence between the Colonial Secretary and myself on the subject:—

The Colonial Secretary to *Dr. Alford Nicholls.*

(No. 229.)

Colonial Secretary's Office, Grenada,
10 March 1892.

Sir,

I AM directed by the Governor to inform you that since your visit to this colony, and consequent upon a circular addressed to the medical officers, and on the appointment of a relieving officer, numerous cases of yaws have been brought to light, so much so that His Excellency has been compelled to direct that no more cases be admitted to the

hospital, the number in that institution having gone up to 107, and there being only adequate accommodation for 80.*

2. An attempt will be made to treat some of the more urgent cases outside by free medical attendance and medicines.

I have, &c.,
(signed) *Edward Drayton.*
Acting Colonial Secretary.

H. A. Alford Nicholls, Esq., M.D.,
Dominica.

Dr. Alford Nicholls to the Colonial Secretary.

(No. 90.)

Dominica,
18 March 1892.

Sir,

I HAVE the honor to acknowledge your letter, No. 229 of the 10th inst., and I shall be glad if you will thank his Excellency the Governor for the information contained therein.

2. I discovered during the progress of my inquiry in Grenada that many cases of yaws were hidden away in order to evade hospital treatment.

3. I met with cases of this kind in the Concord Valley, in the town of Gouyave, and the village of Marquis. Each case acts as a focus for the dissemination of the disease, and it is to be expected, therefore, that a house to house visitation will bring to light a far more unsatisfactory condition of the public health than the authorities thought possible.

4. I am now writing my report to the Secretary of State on my mission, and these matters will be duly considered in it, and doubtless the local Governments will be instructed later on as to the system to be adopted in controlling the spread of yaws in the various islands.

5. I would, however, take this opportuuity of expressing my entire approval of the recent measures undertaken by Sir Walter Hely-Hutchinson, and I shall be obliged if you will forward to me a copy of the circular addressed to the medical officers, particulars as to the duties of the relieving officer, and a copy of the medical reports on the charitable institutions for the past year.

6. The only way for the Government to be kept informed of the actual prevalence of the disease is for the Legislature to pass an Ordinance for the Compulsory Notification of every case by the head of the family, nearest relative, or guardian of the patient. The Imperial Act of 1889 (52 & 53 Vict., c. 72) might be used for the model of the local enactment.

7. During my recent investigation I found that, with the exception of Tobago, the district medical officers are not expected as a rule to treat cases of yaws, the affected people being left entirely to themselves, except in the islands where Yaws Hospitals have been established. The result is that the people have become on the whole indifferent to the spread of the disease, and have also become prejudiced against proper medical treatment.

8. It is a matter of satisfaction, therefore, to find that the Governor has issued instructions for cases of the disease to be treated outside the Yaws Hospital. This system, whilst relieving the public revenue of the heavy drain consequent on expenditure for large hospitals, will result in the cure of many persons suffering from the malady, and accustom the people to the advantages of proper medical treatment in a disease they unhappily prefer to treat themselves.

I have, &c.
(signed) *H. A. Alford Nicholls,*
Special Commissioner.

The Honourable,
The Acting Colonial Secretary of Grenada.

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* In the Blue Book for 1890, and for previous years, it is stated that there is accommodation for 100 patients in the Yaws Hospital.

History of Yaws in Carriacou.

This island is the largest of the chain of small islands called the Grenadines, lying between St. Vincent and Grenada. It has an area of about 13 square miles, and a population of upwards of 6,000, which gives the large number of over 450 persons to the square mile. As it is attached to the Government of Grenada it has participated to a certain extent in the general prosperity of that colony. There are a resident medical officer, a magistrate, a revenue officer, and a detachment of police stationed in Carriacou, and one of the residents has a seat in the Legislative Council of Grenada. As it was said that yaws had been stamped out of the island, I thought it advisable to visit the place in order to satisfy myself by an inquiry on the spot as to the actual condition of affairs.

One of the small coasting steamers that ply round Grenada visits Carriacou once a week and returns to St. Georges the next day, and thus a visit to the island was not a matter of any difficulty.

I left, accompanied by the Colonial Surgeon, on the 20th May at 8 a.m., and reached Hillsborough Bay, at Carriacou, at 3 p.m., the little steamer "Waltham" having called at the towns of Gouyave, Grand Pauvre and Sauteurs, in Grenada. On our arrival at Hillsborough, Dr. Orgias and I were met by Mr. Durrant, the Medical Officer of Carriacou, and we inspected the excellent little district hospital, situated on a hill to the east of the town. There is accommodation for 10 patients, occasionally however this number is exceeded, but as the cubic space allowed each inmate varies from 1,400 to 1,700 cubic feet, slight over-crowding is not followed by any ill result.

In the days of slavery Carriacou was very prosperous, and the planters were rich, as is evidenced by the remains of old mansions built of solid stone in an elaborate style with much ornamentation; but now, notwithstanding the large population, the island is poor, and frequently the necessaries of life are dear in consequence of the frequent droughts. The old estates have been, in almost every instance, thrown out of cultivation, and most of the cotton and other products of the island are raised by the peasants who hire the land at what appears to me to be a very exorbitant rate, considering that fertile and well-watered crown lands are sold in Dominica at 10 *s.* an acre. The able-bodied men sow their cotton, and then go away to Trinidad and other places to find work, and meanwhile the weeding is done by the women folk, who take charge of the cultivation until the men come back to reap the crops. The land of Carriacou is rented out to the people at the rate of 30 *s.* an acre per annum, and cotton, maize, and pigeon peas have to be cultivated in order to pay the rent. Consequently plantains, yams, and other nourishing ground provisions consumed largely by inhabitants of the bigger islands do not enter much into the diet of the people of Carriacou, who are obliged to live mainly on maize, pigeon peas, fresh fish caught in the sea, and salted food. Owing to the droughts and the absence of springs, good fresh water is not obtainable, except sparingly, in wet weather. The greater part of the water consumed by the people is got from brackish wells, and muddy ponds wherein the surface drainage has collected. These ponds are unenclosed, the people wash their bedding and their garments at the margins, and cattle wade in the water and pollute it every day. The resident medical officer told me that he has often expostulated with the people about the matter, and they say that the cattle tread down and harden the muddy bottoms, and prevent the ponds from "leaking"! Some parts of the island are malarious, and periodic fevers are not unfrequent even in the town of Hillsborough.

The huts of the people are frail in construction, and small in size. There is scarcely a tree of any height to be seen in the island, as all the larger indigenous vegetation has been destroyed. Consequently there is no wood obtainable on the spot for building purposes, and so the huts are built of mud and wattles, and plastered with cow-dung. The earth is the floor, and, as the medical officer points out in his reply to the interrogations, "a part is partitioned off for the parents, and all other inmates, grown or "otherwise, couch at night in their clothes together on the ground."

In all these circumstances one might have expected yaws to have been very prevalent in the island, if the disease be capable, as some say, of development *de novo* by poverty, bad diet, and defective sanitation. Dr. Gavin Milroy says in his report:—"From all "the evidence that has been now adduced we may fairly infer that, although there yet "remains much respecting the origin and attributes of yaws requiring more accurate "investigation than has yet been applied to the subject, everywhere it is fostered, if not "engendered amid poverty, and its ordinary accompaniments of squalor and semi-starvation. . . . . Yaws is thus obviously another member of that multifarious

" brood of evil known by the name of 'Mal de Misère.' Cases are certainly extremely " rare among the cleanly and well-conditioned."

Although many members of this "brood of evil" exist and thrive in Carriacou, yaws does not; indeed, when I visited the island, there was not a single case, and there had not been since the year before, when the disease was introduced from Grenada, and promptly "stamped out" again.

In the time of slavery yaws prevailed amongst the negroes, and on some of the estates there are the remains of buildings formerly used as yaws houses; I find that in my notes taken in the island the following paragraph occurs:—

" *Yaws Bay, Carriacou.*—The bay to the south of the large village of Bogle. It has " a fine shelving white sandy beach, and the remains of the walls of the old yaws house " are still to be seen."

In reference to this Yaws Bay it may be remarked that an old negro servant in the house of Mr. Durrant assured Dr. Orgias, Mr. Durrant and me that he remembers patients being segregated in the yaws house there when he was a child, and that cases were sent there from Bogle, Craigton, Meldrum, and other estates. Mr. Durrant said that the man's word could be relied on, and certainly it is probable that the planters by rigidly carrying out a system of segregation had so reduced the number of cases in their small island as to render it necessary only for one yaws house to be kept up. Sea bathing being considered beneficial in the disease, this hospital was naturally placed near to the sea shore, and hence probably the name "Yaws Bay" was applied to the selected site, and has remained ever since to indicate the spot. If all the cases of the disease were kept in this yaws house when there were few affected negroes in the island, it is perhaps not going too far to conjecture that the malady was in the end eradicated from Carriacou either before the period of emancipation, or during the apprenticeship system that succeeded slavery and was kept up in some colonies for a few years afterwards.

There is no record concerning the existence of the disease in the island from the time of slavery until after the appointment of Dr. Lang as medical officer in 1863. Indeed, it is doubtful if the disease existed in the island at all during this period, when, as I have shown in my sketch of the history of the disease in the West Indies, the negroes shunned observation, and the authorities left them to themselves. There were no interior valleys and mountain forests in Carriacou where the negro with yaws could seclude himself, so that if the disease had prevailed the fact would have been now known.

Dr. Lang was medical officer in the island from 1863 to 1867, and he says, in his reply to the interrogations: "A low diet is certainly conducive to the disease. In " Carriacou, where whale beef preserved by being dried by exposure to the sun's rays " is easily obtained, and partaken of largely by the people, I observed the disease to be " very obstinate and recovery protracted." I had some conversation with Dr. Lang in Grenada in reference to this statement, and he then gave Dr. Orgias and myself the important information that he was some years in Carriacou before he found a case of yaws, although he was most anxious to see the malady. This case was that of a young man who came from Trinidad in the year 1865 with the disease. He was a native of Carriacou, and had gone to Trinidad to find work, and had caught the yaws in that colony. Dr. Lang further said that he attended to the man and that the disease did not spread.

In December, 1884, Dr. Leonard Archer, who was then the district medical officer, wrote to the Colonial Surgeon as follows:—"In reply to your letter dated December 3rd, " 1884, I can state that I know of no case of yaws in my district. Since my arrival here " I have seen no one suffering from yaws."

Dr. Hatton, who was medical officer of the island at a subsequent period, says:— " In Barbados and Carriacou the diet is pretty much the same as it is here, yet in these " places the disease does not prevail, though it probably did prevail in Carriacou at one " time, as there are the remains of buildings formerly used for yaws patients on some " of the estates, and there is a bay known as Yaws Bay where the patients used to " bathe."

Mr. Durrant, the present medical officer, who has been some time in the island, gives in his reply to one of the interrogations, the history of the importation of the disease into the island from Grenada, in 1889, by a child named Johnny Mann, and shows how it spread to three other persons, viz.:—Venus Jones, Nathaniel Joseph, and Joseph Cox, by contagion, all of whom were sent to the Grenada Yaws Hospital on the 25th August, 1890.

In January, 1891, Joseph Cox returned from the Yaws Hospital in Grenada "with no sign of the disease upon his body," but a relapse came on during the month of March, and he was sent back to Grenada on the 13th April, 1891. Since then, namely in October, 1891, the disease has been again introduced, and the following account taken from my notes explains the circumstances.

"21 May, 1891. A Mrs. Sylvestre told us that she came to Carriacou from "Crayfish Estate on the leeward side of Grenada in April last year. Whilst she was in "Grenada her children caught the disease by playing with other children who had yaws, "and she used to wash them and handle them freely. In October the yaws broke out "on her forehead. Mr. Durrant tells me that he learnt of the mother's case as soon "as the disease appeared, and that he sent the woman on to the Yaws Hospital in "Grenada at once. She recovered under treatment and has just returned. Owing "to the prompt action taken in this case the disease did not spread in the island."

This is the last occasion on which the disease has been seen in the island, and Mr. Durrant assured me that a case could not occur without his knowledge. His long residence in so small a place has enabled him to become acquainted with the whole population, and his kindness and untiring attention to all classes of the people have gained their entire confidence. His word, therefore, concerning anything relating to Carriacou may be accepted without reserve.

It is thus seen that on four separate occasions since the year 1865 yaws has appeared in Carriacou, and that, owing to the prompt action of the medical officers who were at once acquainted with the knowledge of the outbreak, the disease was "stamped out."

These facts are of extreme interest and pregnant with important suggestion. I shall have occasion to allude to them later on in this report.

V.

History of Yaws in St. Vincent.

This island, in which yaws prevails very extensively, is peculiarly barren of documents referring to the spread of the disease prior to the year 1889.

During the time of slavery the malady existed amongst the negroes, and the early history of yaws in the West Indies, given in a former section of this Report, applies as much to St. Vincent as to the other islands.

Chisholm, in 1794,* mentions that Dr. Harries, of St. Vincent, treated cases of yaws by the internal administration of nitrous acid with "happy results."

A Professional Planter's Practical Rules for the Management and Medical Treatment of Negro Slaves in the Colonies, published in 1803, contains particulars regarding yaws, and is said by the late Dr. Bowerbank, of Jamaica, to have been written by Dr. Collins, of St. Vincent. And, as I shall show, too, later on, there is evidence of the disease having prevailed in the small islands called the Grenadines lying between Grenada and St. Vincent, most of which have been since the year 1783 attached to the government of the latter colony.

St. Vincent is a mountainous island; the interior is still covered with the primeval forest, and the soil is exceedingly fertile. There was, therefore, every temptation for the emancipated slaves to settle themselves in out-of-the-way places difficult of access, and beyond the notice of the colonial authorities. Here in small communities the negroes lived without being obliged to work on the estates; for, their wants were few, the sea teemed with fish, the rich soil gave abundant food products without much toil, and the forest was at hand wherein to get materials for building their huts. As late as 1871 Lieutenant Governor Rannie, in his Report on the Blue Book, referring to the arrival that year of a batch of East Indian immigrants, says:—"The labour question in St. "Vincent presents peculiar difficulties. It is not like in Trinidad, where the native "population is insufficient; or like in British Guiana, where the native population is both "insufficient and of a character not suited to much work; nor is it like that in the "neighbouring islands of Grenada and St. Lucia, where there are fewer large estates, "and the native population work the soil, badly enough perhaps, for their own profit. "Here the natives are sufficient in number for the culture of the land in cultivation, "strong, and adapted for work, but they prefer living on the easily-raised products and "the food-producing trees of the island, with an occasional day's work in crop season, to "anything like steady labour."

* *An Essay on the Malignant Pestilential Fever introduced into the West India Islands from Boullam, on the Coast of Guinea.* By C. Chisholm, M.D. Second Edition: London, 1801.

And, in his Report for the year 1873, the same officer refers to "the difficulty of "supervision over the out-lying districts."

In such circumstances it was to be expected that a disease like yaws would take a firm hold of the lower orders of the people; and so, indeed, has been the case, for after Tobago it is the island most seriously affected.

Medical Aid Acts were passed in the years 1868, 1871, and 1872, and the "Medical "Aid Ordinance" now in force, was passed in 1878. It repealed the earlier Acts, and provides *inter alia* that any district medical officer shall "inspect, at least once in every "quarter, every village within his district," and that he shall "furnish the Governor at "at the end of every quarter a return setting forth the sanitary condition of his district, "especially the villages therein." It would appear that this part of the law relating to the quarterly sanitary reports on the condition of the districts has not been carried out with any degree of regularity, and, with the exception of certain reports from Dr. Kirkpatrick when he was in the island, there is, as far as I could ascertain, no reference by the district medical officers to yaws, a disease that prevailed extensively in all parts of the island. It must be mentioned, however, that the medical officer afforded gratuitous medical attendance to all those suffering from yaws who applied to him, but in the absence of compulsory legislation numbers of affected persons never came under the observation of the district doctors.

No special measures appear to have been taken by the Government to stop the headway made by the malady until after the East Indian immigrants were settled on the estates, when it was found that the disease spread amongst them with alarming rapidity, and it became necessary to adopt some measures to combat the evil, for the coolies, by the terms of their contract, had to be supplied with medical attendance.

In his Report on the Blue Book for the year 1883, Lieutenant Governor Gore says :— "Amongst the general works also contemplated under the proposed loan were quarters "for the medical officers of three districts, the renewal of the jetty, and the conversion "of certain old military buildings into a 'Yaws Hospital.' In concluding these remarks, "I am glad to say that in two districts, those of Dr. Boyd (No. 4) and Dr. Kirkpatrick "(No. 5), this loathsome disease, for which the hospital above alluded to is to be "prepared, has been all but exterminated amongst the indentured coolies; and that by "far the greater number of coolies under indenture are found on the estates in medical "districts Nos. 4 and 5."

The Yaws "Asylum" as it was called was opened in 1884; one of the old military buildings below Fort Charlotte, about a mile to the west of Kingstown, having been adapted for the purpose. This hospital was closed in 1888. On the 24th April, 1885, "The Yaws Prevention Ordinance" was passed by the Legislative Council, and the enactment was assented to on the 4th June. The Ordinance, a copy of which is appended, made provision for the establishment of yaws hospitals, and provided the necessary machinery for carrying out the compulsory segregation of those of the population of the island who might be suffering from yaws. It would appear that the Ordinance was never put in force, owing to the fact that the embarrassed financial condition of the colony did not warrant the heavy expenditure that would have been caused by the establishment of yaws hospitals.

The small Yaws Asylum, however, which was opened at the end of the year 1883, was allowed to remain, but it was impossible to make much impression on the spread of the disease by means of a hospital capable of accommodating 20 patients at most.

I was unable to obtain any old correspondence referring to the institution, or any reports concerning its establishment and working. Accordingly I wrote to the Administrator for information on the subject and the following correspondence took place :—

Dr. *Alford Nicholls* to Administrator *Maling*.

Kingstown, St. Vincent.
27 May, 1891.

Sir,

I notice that the Yaws Prevention Ordinance, 1885, makes provision for the treatment of yaws cases in special hospitals, and that in February, 1889, Mr. Administrator Llewelyn communicated to the Executive Council the sanction of the Secretary of State for the Colonies to his proposal to close "a yaws asylum in which 20 patients are "confined;" and, further, that the Yaws Ordinance was suspended in Executive Council until the 31st December, 1889.

2. There is no further reference, in the documents placed in my possession by Your Honour, to the yaws hospital, which appears to have been in existence early in the year 1889.

3. I shall be glad if you will kindly direct that I be supplied with full information in regard to this hospital, the number of patients treated therein, the proportion of re-admissions (if any), the dietary, &c.

4. And I shall be further obliged if you will direct that the case and other books of the hospital be sent to me for my examination.

I have, &c.

His Honour, Captain Maling,
Administrator of St. Vincent.

(signed) *H. A. Alford Nicholls.*

Dr. *Newsam* to Administrator *Maling*.

His Honour the Administrator,

I WITH pleasure forward all the information I can give on the subject referred to :—

The temporary yaws hospital at Low Point was opened some time in 1883, and from that time to the end of 1888, when it was ordered to be closed, owing to financial embarrassment of the colony and consequent general retrenchment, it remained under Dr. Arnott's charge.

I append tables taken from the Annual Reports on Hospitals which show the numbers treated in each year from 1884 to 1888 inclusive, with results.

The dietary was the same as that in use at Colonial Hospital, from which institution supplies were daily sent up. I attach a Table. The "Full" and "Middle" were those in use, the latter more, as most of the patients were children.

There was no case-book kept, I understand. The admission and discharge-book were mislaid during the change of dispensers. I forward Dr. Arnott's prescription-book, which shows the treatment adopted. Comparatively few typical cases of tubercle and attendant suppuration came in, I gather, the majority being extensive ulceration and consequent deformities. A few recognised in the popular and other early stages were sent to Colonial Hospital, and to Pauper Asylum. I am told by Dr. Arnott that the re-admissions were about 4 per cent.

(signed) *W. F. Newsam,*
Colonial Surgeon.

6th June, 1891.

From the return that accompanied the minute of the Colonial Surgeon I have made up the following table which shows the number of cases admitted, and other particulars concerning the work done at the hospital, during the time it was in existence :—

Year.	Number of Cases admitted.			Number of cases discharged cured.	Number of Deaths.	Number of Patients that absconded.	Annual Expenditure.
	Males	Females.	Total.				£ s. d.
1883 - - -	1	2	3	—	—	—	—
1884 - - -	21	16	37	19	—	—	—
1885 - - -	36	10	46	37	—	16	—
1886 - - -	36	18	54	48	—	—	207 19 8
1887 - - -	25	19	44	38	2	—	—
1888 - - -	7	15	22	41	1	—	—
Total - - -	126	80	206	183	3	16	800 - -

It is seen from this Table that 206 patients were under treatment at the hospital during a period of a little more than five years. Of this number 183 were discharged cured, three died, 16 absconded, and four are unaccounted for; they were, probably, sent to the Leper Asylum. The admission of males was far more numerous than that of females, in fact the percentage of male admissions was over 61. The three deaths amongst 206 inmates gives a mortality rate of 14·6 per thousand, which, although low, is much in excess of the Grenada figures.

The cost of the establishment is given only for one year, viz., that for 1886, but basing a calculation on the figures for that year it would appear that the total expenditure for the five years was about 800*l.*, or at the rate of 3*l.* 17*s.* 8*d.* for each patient.

As soon as it was decided to close the Yaws Asylum, Administrator Llewelyn contemplated introducing into the island the Tobago system of treating persons suffering from yaws as dispensary patients. Dr. Tulloch, of Tobago, had then just written his second Report, which was afterwards published in the Colonial Office Reports on the Blue Book for the year 1888. The following correspondence thereupon took place between the Administrator and the Colonial Surgeon :—

Administrator *Llewelyn*, C.M.G., to Dr. *Newsam*.

Dr. Newsam,

PLEASE read a report written by Dr. Tulloch, of Tobago, on the working of a system of "home treatment" of yaws.

The Government then could not afford to build a hospital large enough for all the yaws patients so I proposed that the Government should give a special grant for the purchase of medicines, &c., required in the treatment of yaws cases, and that it should be made a duty of the district medical officer to treat all cases of yaws free, and an offence for a parent, &c., who failed to take a child suffering from yaws to be treated.

You will see there is some hitch about adults and children over eight years, but from the certificates received from very good representative and impartial men it appears that some good is being done by this plan.

As the yaws asylum is to be closed, perhaps the introduction of the Tobago system will help.

(Inld.) *R. B. L.*

29 October 1888.

Dr. *Newsam* to Administrator *Llewelyn*, C.M.G.

His Honor,

I HAVE received Dr. Tulloch's report. Although his experience is too limited to admit of certainty in predicting results, still they seem tending in the right direction. Undoubtedly, in the absence of regular hospital treatment, much may be done, in each district, to keep the loathsome disease yaws under control, and in fact, contract its area. For years past district medical officers here have been battling with this pest with varied results; with a limited allowance at their disposal for purchasing medicines and hampered by having to dispense their own prescriptions.

It was the invariable custom of my colleagues and myself to afford relief gratuitously, and since eight years ago, Governor Gore, at my suggestion, imported several gallons of Gurgon oil from Trinidad which I distributed among other district medical officers, and for a time results were favourable, but ultimately the application for relief fell off, owing to apathy on the part of the people, and I suppose the feeling that what was "got for nothing was good for nothing."

We found, as Dr. Tulloch does, that the children under eight only could well be got at. I see no difficulty about adapting the existing Yaws Ordinance to present necessity, as in my opinion, it is no more an infringement on the right of the subject to make gratuitous attendance compulsory than the enforced segregation in a larzaretto would be.

I think with your Honor that it is as impossible at present to keep up district hospitals, or one central one commodious enough to thoroughly segregate the masses afflicted with yaws in this island; the next best plan would be to make an extra allowance for medicines, and for hiring of stations when necessary, to district medical officers with the understanding that they should treat these cases gratuitously.

Should there be fresh legislation upon the subject, perhaps the several rural constables in the villages might be instructed to keep an eye upon the afflicted, with a view to urging them to attend for treatment. Half-yearly reports upon the working would be interesting.

Respectfully submitted.

(Inld.) *W. F. N.*

31 October 1888.

There would appear to have been nothing to prevent the adoption of the Tobago system in St. Vincent at this juncture ; the financial condition of the island was certainly not worse than that of Tobago, and the small sum needed for extra supplies of medicines could have come out of the annual amount saved by closing the yaws asylum. The disease was spreading with rapidity, and Dr. Kirkpatrick, concerning whose district Lieutenant Governor Gore, in 1883, said the yaws asylum was partly prepared for, wrote at the end of 1888 as follows :—

"There is nothing new to report as to the sanitary condition of my district, except " increased poverty, distress and incurable ulcers. Diseases of this class are increasing, " while the loathsome disease yaws is so rapidly spreading, that in my opinion, a year " or two further will place it beyond all control. Vaccination under the circumstances " is rendered nugatory and valueless, even dangerous."

In regard to Dr. Kirkpatrick's statement concerning vaccination and yaws, I may here remark that I inquired into the matter while I was at St. Vincent, and that the question will be fully considered later on in this report.

Mr. Llewelyn called on Dr. Kirkpatrick to suggest some practicable plan for preventing the disease getting beyond control, and the Doctor in reply suggested the establishment of a district yaws hospital, and said that " There is scarcely a labourer's " house in the district that has not one or more of these cases in it."

In support of his statements concerning the alarming prevalence of the disease, Dr. Kirkpatrick attached to his letters several communications he had received from leading residents in the district, and the following extracts will show that the extent of the evil had not been overestimated.

The town wardens of Layon said, in a joint letter :—" There is no doubt that yaws " is rapidly spreading and increasing in this town and neighbourhood."

The town wardens of Chateaubelair said :—" The yaws in the town of Chateaubelair " and the surrounding estates and villages is greatly increasing. Unless something be " done to check this contagious disease, in three or four years it will become dangerous " to the inhabitants."

The Rev. Canon Branch said :—" No signs of yaws dying out, far from it. I know " eight houses in Barrouallie alone, in which there are some thirteen cases ; in one I " visited to-day the mother and two of her children had it in a distressing form. As " you know, as one child is attacked it goes through the family, so the only plan to " stamp out the disease would be to separate the sufferer at once from the rest of the " family."

As Dr. Kirkpatrick's suggestion to open district hospitals was opposed to the decision arrived at by the Government, the Administrator sent to him Dr. Tulloch's report on the Tobago system, and asked for his views in regard to the matter. Dr. Kirkpatrick thereupon wrote another despatch, in which the following passages occur :—

" Report on yaws by Dr. Tulloch received. I agree with all said, and will cheerfully " treat out-door cases free, but this method is not complete unless those suffering are " separated from others. The Tobago system is good. . . . . Whatever little " we may do *re* yaws as a beginning here will be no small help in the end. As the " disease is upon a large number of the community, I see no reason that the present " Ordinance should not be enforced. The rural constables ought to be instructed to " compel those suffering from the disease to seek at once medical treatment. Quarterly " reports should be sent in by every medical officer, *re* all cases under observation."

After this correspondence, viz. : on 28th February, 1889, the Administrator sent the following minute to the members of the Executive Council of the Colony.

" The Secretary of State for the Colonies agrees with me that it is useless to keep " open a Yaws Asylum in which 20 patients are confined, when probably 2,000 persons " afflicted with the disease are at large in the island. Unfortunately, the state of the " public finances will not permit of a grant sufficient to cope with this disease thoroughly, " therefore I beg to suggest that a notice be published in the Gazette, as provided for in " Section 18 of the ' Yaws Prevention Ordinance of 1885,' declaring that the Governor " in Council has suspended the operation of the Ordinance until the 31st December, " 1889. If times improve the Ordinance can be revived, or the suspension continued if " necessary."

Two of the Members of the Council, viz. : Messrs. W. E. Hughes and W. B. Griffith demurred to a stop being put to every effort to control the disease, and they jointly appended the following note to the Administrator's minute :—

" We would much prefer that the disease should be under treatment, if possible, but " if this cannot be done effectually, I presume the only alternative is to adopt your " Honor's suggestion."

Notwithstanding this expression of opinion, the Yaws Ordinance was suspended in Executive Council until 31st December, 1889; but it is still in abeyance, and since its suspension no effort whatever has been made to cope with a disease that early in 1889 is said to have held 2,000 persons in its grasp, that is to say, nearly 5 *per centum* of the entire population.

It may perhaps be advisable to remark here that there is in St. Vincent, as in other West Indian Colonies, no member of the medical profession in the Executive Council; considering the important hygienic and sanitary questions that must necessarily be often under considerations in islands when hospitals for, and medical aid to the people are paid for out of public funds, it would be, it appears to me, a matter of sound policy if the Secretary of State were to instruct the various Governors to see that at least one medical man should be appointed a member of every local Executive Council.

In May, 1890, Captain Irwin C. Maling, who had been appointed Administrator the year before, made special inquiries into the question of the spread of yaws and leprosy; and Dr. Newsam, the Colonial Surgeon, reported as follows in regard to yaws:—

"The country districts are over-run with yaws, especially No. 2 and No. 4 districts, "and I feel confident that I speak within bounds when I say that there are at least 1,500 "cases in all stages scattered throughout the island. As the disease is undoubtedly "communicable, and as there has been no adequate provision in all these years for "separating the sick from the whole, it is obvious that the disease must have spread "considerably since 1883, when a joint report of medical officers showed that there were "at least 600 cases then in the country. The labouring population is fast becoming "crippled, and there is great apprehension on the part of the better classes that this "disease should find its way into their families. In my opinion nothing but segregation "on an extensive scale, and regular treatment of those affected in a properly appointed "asylum can avail against an affection so wide-spread."

Captain Maling, who appears to have at once grasped the magnitude of the evil, wrote a despatch on the subject to the Governor-in-Chief, and pointed out that some measures would have to be adopted to check the spread of the disease. The correspondence that followed is of considerable interest, and it may with advantage be given *in extenso*. It is as follows:—

Administrator *Maling* to Governor the Hon. Sir *Walter Hely-Hutchinson*, K.C.M.G.

Government House, St. Vincent,
10 May, 1890.

Sir,

I DEEM it right that I should bring to Your Excellency's notice the fact that the disease called yaws is increasing in the colony to a serious extent, and that some measure will have to be adopted to check its spread.

2. As Your Excellency is aware, at present there is no yaws hospital open; the one at Low Point having been closed in January 1889, owing to the then depressed state of the finances of the colony, and I would ask for your approval of the re-opening of this hospital as soon as I can satisfy myself that the finances of the colony will permit the necessary expenditure for its up-keep.

3. I have myself noticed many cases, and the Colonial Surgeon whom I have consulted informs me that the disease is wide-spread, and on the increase. It not only affects the general health of the colony, but must tend to diminish the supply of labourers, as those who are afflicted will gradually be obliged to give up work owing to being crippled by this loathsome complaint.

4. I find in 1883 the number of cases reported in the island was 600, and it is alarming to contemplate the number that these may now be increased to.

5. The Ordinance which compels people with yaws to go to hospital is in abeyance, but can be brought into force by notice in the "Gazette."

6. Whilst on this subject I may also mention that the Colonial Surgeon informs me that leprosy, though perhaps slowly, is steadily on the increase amongst the poorer classes. An average of 15 is steadily maintained at the Leper Asylum, and there are many more at large, especially in No. 2 and No. 4 districts and the Grenadines. The native labourer, as a rule, has a decided objection to going to the medical officer for

treatment of leprosy, and his relations shrink from making it known there is leprosy in the family; hence the difficulty in ascertaining the exact number of cases in the community.

7. There is no law (as in the case of yaws) to compel lepers to enter the Asylum, and I fail to see how this disease can be successfully dealt with unless a compulsory law is brought into operation.

8. This opens up another serious feature, namely, whether vaccination is safe or even desirable for children who are suffering from these complaints, and if proved undesirable, is it not opening the door to the admission of an equally serious complaint, viz.: small-pox.

9. The re-opening of the yaws hospital, and the increase of leper patients, will throw additional duties upon the Colonial Surgeon, who has already more than he can well perform. These institutions and the poor-house are situated a considerable distance from town, consequently much of his time is taken up in visiting them, and consequently will render the appointment of an assistant surgeon necessary, as contemplated by Ordinance No. 25, of 1886.

10. I attach a copy of a report which I have received from the Colonial Surgeon.

I have, &c.
(signed) *I. C. Maling.*

His Excellency,
The Hon. Sir Walter Hely-Hutchinson, K.C.M.G.,
&c. &c. &c.

Governor the Hon. Sir *Walter Hely-Hutchinson*, K.C.M.G., to Administrator *Maling*.

Administrator Maling,

HAVE you read Dr. Tulloch's report? It is altogether impossible, for financial reasons, for the Government to segregate 2,000 yaws patients. But if it be the case that the system adopted in Tobago has been moderately successful, there seems no reason why we should not try it here.

Please write to the Commissioner of Tobago and ask him about it. Meanwhile circulate these papers to Executive Council for consideration at next meeting.

15 May, 1890. (Inld.) *W. H. H.*

Administrator *Maling* to Governor the Hon. Sir *Walter Hely-Hutchinson*, K.C.M.G.

His Excellency,

YES, I have read Dr. Tulloch's report, and I have no doubt that the scheme adopted in Tobago has to some extent produced good results, but I am afraid (though I do not see this stated in the report) that for every case reported as cured there is a fresh case to add to the original number, and thus the disease is not really being extirpated.

However, as extirpation by segregation must necessarily entail expenses upon the colony which it could not meet, the intermediate course seems to me the only one that can be adopted, but I think every person should be compelled by law to seek medical attendance.

I have written to the Commissioner of Tobago asking him to inform me if the system has continued to produce beneficial results.

Papers circulated.

(Inld.) *J. C. M.*

19 May, 1890.

EXTRACT from the Despatch of Governor the Hon. Sir *Walter Hely-Hutchinson*, K.C.M.G., to Lord *Knutsford*, dated 6th June 1890.

THIS disease is apparently seriously on the increase in St. Vincent, and I am making inquiries as to the results of a system of home treatment adopted three years ago in Tobago, with a view of adopting it in St. Vincent. The cost of re-establishing compulsory hospital treatment of the disease in St. Vincent would, I fear, be beyond the resources of the Colony.

Administrator

Administrator *Maling* to Governor the Honourable Sir *Walter Hely-Hutchinson*, K.C.M.G.

His Excellency,

Dr. Tulloch's report was received last month, and after circulating it, with the whole correspondence on this subject, among members of the Executive Council, I brought the matter before them on the 6th instant.

After careful consideration, members strongly advised that the services of a medical officer should be obtained for the treatment throughout the Colony of yaws patients *solely;* that he should receive a salary of 240 *l.* per annum, with travelling allowance of 50 *l.* and the right of private practice; that the necessary medicine for the treatment of this class of patients should be supplied to him by the Government. They further considered that provision should be made for the compulsory attendance on certain days at certain stations of persons suffering from this disease. The Council recommend that, if possible, the services of a medical officer who has had experience in dealing with yaws should be procured from Tobago.

(Inld.) *J. C. M.*

19 December, 1890.

In reply to this last Minute, Sir Walter Hely-Hutchinson wrote to Captain Maling informing him that your Lordship had selected me to inquire into and to report on yaws in St. Vincent and certain other West Indian Islands, and that in the circumstances action on the recommendations of the Executive Council would be postponed.

I arrived at St. Vincent on the 22nd May, and left on the 19th June, thus spending about a month in the Colony.

The earlier part of my stay was occupied in looking up and examining the literature of the disease in the island, and later on I visited the various districts in St. Vincent and the Grenadines.

On the 28th May I visited the public institutions and the site of the old yaws asylum with Dr. Newsam, the Colonial surgeon. In the Colonial Hospital several of the inmates, in addition to other diseases, were suffering from yaws. The old yaws hospital situated to the west of Kingstown, on the lower slope of the heights that are crowned by Fort Charlotte, was in former days in use by the garrison of the island. It is a substantial, well-ventilated building, but the water-supply is defective, as rain from the roof collected into tanks has to be entirely depended on, and in dry weather this source is liable to fail. Although near to the shore, sea-bathing is impossible, as the waves beat high against the sharp and jagged rocks at the base of the hill.

Between this abandoned hospital and the fort is the leper asylum, in which I found two cases of yaws. This so-called hospital was also formerly one of the military buildings, and it is in a bad condition and quite unfitted for the purpose for which it is used. There were 20 miserable inmates altogether, some of them living in the cellars of the house. The whole institution is a disgrace to a British Colony.

On the 3rd June I left the town for the windward side of the island, and remained there four days, returning to Kingstown on the 7th. The medical officer of the northern half of the windward side of the island was ill, and unable to accompany me; but Mr. J. Gregg Hazell rode with me through the Carib country right on to Owia, and he assisted me materially in my inquiries. At Overland Village the people said there was no yaws in the district, but that the disease had prevailed last year, and the cases had been cured by sea-bathing, and by drinking decoctions of a native weed called "very-vain" (vervain).* I succeeded, however, with Mr. Hazell's assistance, in finding several typical cases of the disease, and it was evident that there were other cases secreted, and that we could expect nothing but misleading information concerning them or denials of their existence.

At Sandy Bay, where there are some yellow Caribs—the remnant of the aboriginal inhabitants of the island—we found two Carib children affected with the characteristic encrusted excrescences produced by the disease. This fact was most interesting, as it has been stated that Caribs do not get yaws, and such is the popular belief in Dominica.

The medical officer of the southern half of the windward side of the island rode over his district with me, and rendered me all the assistance in his power. We found the disease to be rife in places all along the coast, and in the deep Mariaqua Valley, where there are many small settlements of the peasants.

At Spring I saw two cases of yaws and leprosy combined. The following are the notes



* *Stachytarpha jamaicensis*, V.

I took of the cases at the time :—" In a miserable hut was a man with leprosy of the " mixed type, and his wife also had the disease in the tubercular form. They were " both over 50 years of age. The wife, who is an intelligent woman, was formerly in the " so-called Leper Asylum at Fort Charlotte, and she was allowed to leave the insti- " tution by Lieut.-Governor Gore. She went back to her husband, who was then, as " they both said, free from the disease, and within a year the man became a leper. These " people have several young children in good health. The children do not live in the " hut, but they go to see their parents, and I met them on my visit. Both the man " and his wife have yaws in a typical form—the two diseases apparently running their " courses independently of each other.

" In a hut close by, and more wretched if possible than the other, lives by himself " a youth with leprosy. His face is hideous with tubercles, and his feet are ulcerated, " and tied up with dirty rags. He is free from yaws."

Leprosy is common in the colony of St. Vincent, the census returns showing 62 cases in a population of 41,000, but there are probably many more cases than those brought to the knowledge of the enumerators.

At Argyle the manager had no knowledge of the existence of yaws amongst the labourers ; indeed he said there was no example of the disease on the estate. I saw, however, a " pasture boy " limping along after some cattle, and I sent to call him to see what was the matter with his foot. He came, and I found, much to the manager's astonishment, that he had yaws tubercles (" tubboes ") in the soles of his feet. I then made a careful inquiry into the matter, and ascertained that several of the East Indian coolies had lately become affected, and that the disease had been apparently introduced from Trinidad. The following were the facts elicited :—A coolie woman formerly indentured on the estate had left for Trinidad with her children, and remained there for several years, and returned to Argyle less than twelve months ago. Whilst in Trinidad, at St. Joseph, two of her children contracted yaws, which she said was prevalent there, and when she came back to St. Vincent the children were not cured. Sometime after her arrival other children living near her got ill of the same disease, and these children played with hers.

At Mesopotamia, a large village some distance up the Mariaqua Valley, we saw a good many cases of the disease. The wife of the principal shopkeeper said she would soon collect the yaws people, and she asked us into a room off the shop. In a short time a number of children suffering from yaws were brought to the room through the shop, which was full of purchasers. No one seemed to think it at all strange that children with a contagious disease should be brought into close contact with persons purchasing in a shop, and this incident illustrates very well the indifference to the disease created by long familiarity.

Higher up the Mariaqua Valley, at Evesham and other places, we saw a good many cases. The people told us that they did nothing for yaws except to bathe the patients in the streams ; and as these streams supply drinking water, and are used for washing and bathing purposes by the whole population, this practice is doubtless a fruitful source of contagion. There is provision in " The Yaws Prevention " Ordinance " for the imprisonment, without the option of a fine, of all persons suffering from yaws bathing or washing his clothes " in any river or stream, except at such " place or places as shall be appointed for such purpose by the Colonial Surgeon ;" but this clause of the Ordinance was never, as far as I could ascertain, put in force.

I was very anxious to visit Three Rivers Village, situated some distance up the Colonorie Valley, through which flows one of the largest rivers in the island. This village is said to be a hot-bed of the disease, every house containing persons suffering from yaws. It was therefore, with much regret, that I had to give up all idea of visiting the place, for the Colonorie River, which has to be forded several times, was so swollen by the heavy rains that had fallen for several days, that the District Medical Officer and I were unable to cross the stream, which had become a raging torrent.

On the 17th June I left the town for the leeward side of the island, and found the disease to prevail more than it did on the windward coast. At a small settlement at Belleisle, in the interior of Wallilaboo, and about 1,100 feet above the sea, I found two children in one of the huts suffering from the disease. There were also two cases in the village of Wallilaboo situated on the sea-shore.

Canon Branch, who by a long residence as rector of the leeward parish has become intimately acquainted with the people, very kindly rode with me from Wallilaboo to Layou, and we visited the villages and settlements *en route*, and found cases of yaws at every place where a few huts were collected together. It was evident that the condition of affairs depicted by Dr. Kirkpatrick has remained to the present time, and the disease has certainly got a firm hold of the people.

On the 18th June I visited the town of Chateau Belair and the Richmond District and found that yaws prevailed very extensively amongst the people. I saw and examined 20 cases in the mill-yard of the Richmond Estate, and Mr. Fraser, the manager, informed me that they were only some of the cases. A large proportion of these persons were cachectic. They looked half-starved; they were in a most filthy condition, and many of them had large ulcers on the legs and feet. Some of the ulcers were said by Mr. Fraser to have been caused by the irritation of the "tetter worm," which is frequent here. I made a careful search for this so-called worm, but was unable to find it. The people apply the pounded leaves of the "Piaba bush"* to the yaws ulcers.

At Chateau Belair the town warden, town clerk, and the police collected as many cases as they could for me, and altogether I saw and examined 34 persons, and they, I was told, were only a few of the cases. They all had yaws; some in an aggravated form, with ulceration and cachexia. A more distressing and repulsive sight than these 34 wretched, dirty, half-starved yaws people could scarcely be seen in any other part of the West Indies. The respectable residents in the town are quite alive to the gravity of the question, and they are naturally most anxious for the Government to do something to mitigate the evil.

As an example of the extent to which the disease prevails in St. Vincent, I may mention the following circumstance. I was told that sometimes children, with their faces covered with the yaws excrescences, are brought to the churches to be baptized. I wrote to the Rev. C. G. Clark-Hunt, the rector of the cathedral church at Kingstown, about the matter, and he sent me the following reply, which speaks for itself:—

"You ask me whether it is the case that children have been brought to me for "baptism so covered with yaws that it has been difficult to find an uninfected spot in the "forehead for making the sign of the cross.

"This has happened twice; once with a child of some coolies living in Lowman's "Village, called Chetura and Mary, which I baptized on the 3rd November 1890; and "again with an infant of Bundoo and Docea, coolie labourers on Peniston's Estate, living "at a place popularly known as Barbadian Hill, which I baptized on the 10th February "1891. I extract these facts from a carefully-kept diary.

"I only wish that I had arranged a ride with you over the Buccament Valley. The "latter case I could have let you observe for yourself, with many similar cases."

The Grenadines.

This chain of small islands lying between Grenada and St. Vincent is divided between the Governments of those colonies, the boundary line running to the north of Carriacou, the largest of the group, and thus most of the islands are dependencies of St. Vincent. The St. Vincent Grenadines contain altogether an area of about 17 square miles, and a population, according to the last census, of 3,071, of which number 1,707 are females.

In taking the census of St. Vincent, an effort was made to ascertain the number of persons in the colony affected with yaws. In ordinary circumstances such returns are always misleading, inasmuch as the people will not, and can scarcely be expected to voluntarily declare themselves to be suffering from a loathsome disease; and, in the case of such a malady as yaws, that is hidden as much as possible from the knowledge of the authorities, census returns are really not worth the paper they are written upon. On the 1st June Captain Maling wrote to me as follows:—"I have just received the following "from the compiler of census. 'There are no cases of yaws reported in the schedules "'from the islands in the Grenadines. There are six lepers, three males and three "'females, in the Grenadines. There are no cases reported in the town of Kingstown. "'There are 54 cases of yaws in the Windward Police District, and 132 cases of yaws at "'Leeward District.'"

Captain Maling informed me that he did not think much reliance could be placed on these reports, and my investigations in St. Vincent thoroughly satisfied me that the 186 cases of yaws shown by the census returns to be all the affected persons in the island are totally inadequate to represent anything like the prevalence of the disease amongst the people.

My visit to Carriacou had elicited important information, and I decided to go to the other islands of the Grenadines, as inquiries on the spot might add to the knowledge concerning the spread of the disease from one colony to another. The Kingstown magistrate had to visit the islands, and thus there was an excellent opportunity of giving effect to the decision I had arrived at. A schooner was chartered by the St. Vincent government, and Mr. St. Aubyn, the magistrate, and I left Kingstown, and sailed for Bequia, on the morning of the 10th June.

* *Eupatorium odoratum, L.*

Bequia.

We reached this island about noon on the 10th June, and were received by Mr. F. D Rice, the principal resident, who was good enough to accompany me in a long ride about the place, and to give me much information concerning the people. The island contains an area of about six square miles, and a population of 1,264. Owing to the abandonment of the few sugar estates that were formerly cultivated, the people are very poor, for there is no regular work for them. Their huts are dirty, small and frail in construction, and often the earth serves for the floor. The supply of water is scanty and bad, the shallow wells rendering the water somewhat brackish. The food of the people consists of fresh fish, which are caught in the sea in abundance, and of vegetables which are grown in the island: cassava, plaintains, pigeon peas, maize, and sweet potatoes being cultivated in small patches. Fresh meat is rarely seen by the inhabitants of the island; but there is a whaling station on the eastern coast, and during the whaling season, which lasts from January to May, whale "beef" is plentiful, and it is consumed in large quantities. It is dried in the sun and eaten in a rancid condition. I saw some of this whale meat exposed for sale in the market at Kingstown, St. Vincent; it was nasty-looking, black stuff, exhaling a disgusting odour.

The census returns showed that Bequia was exempt from yaws, and Mr. Rice told me that there was no example of the disease on the island. I walked through Admiralty "Town" and the neighbouring Hamilton Village, visiting hut after hut, and entering into conversation with the people, and in the space of less than two hours twenty-one cases of yaws were found. In one house I found a woman and three children suffering from the disease.

By the Medical Aid Ordinance, 1878, "Bequia and the islands called the Grenadines" form the No. 6 medical district. An officer was appointed, and he resided in Bequia, and to his office was attached that of magistrate for the Grenadines, but of late years there has been no appointment, and the inhabitants of all these islands are practically without medical aid. During my visit there was a good deal of general sickness; dysentery and influenza were prevalent, and many of the people were suffering from ulcers of the feet and legs. When it became known that I was a "doctor" the sick people flocked to me in great numbers and were much disappointed when they found I had brought no medicine for them. There are three cases of leprosy on the island. One lived at a place called Paget Farm, and I rode across the island to see him. When Mr. Rice and I got to his wretched hut, bare of furniture, and with two rotten boards to serve for a door, we found it empty, and we were told that the leper had gone to attend a dance got up at a village further on.

In passing along the road we saw the habitation of another leper, and the following extract from my note-book will show how these miserable people are treated in the Grenadines:—"At Friendship we saw a hideous-looking leper sitting by the roadside "and talking to a pretty coloured girl who came from a house near by. The man, a "young negro, was attacked with the anæsthetic variety of leprosy; all the toes and "fingers were absorbed, the hands and feet being mere stumps with the nails attached to "them. The man had lived for years like a rat in a hole. Against a large *Ficus* tree, "with small ovate leaves and many aerial roots, he had rested in a sloping way a few old "boards, a piece of galvanized iron roofing, and some large, flat scapular bones of the "spermaceti whale, and under this primitive lean-to shed the leper had lived from one "year's end to another, eking out the very small charitable allowance of 1 *s.* a month, "allowed to him by the St. Vincent Government, by begging from his poor neighbours."

Union.

We sailed from Admiralty Bay, Bequia, at 4.30 a.m. on the 11th June, and we reached Union at 10 a.m., dropping anchor off a place called Clifton, where there is a fine stone house now falling into a state of decay. At the end of last century and the early part of this the owner of the island and the neighbouring island of Mayero must have been a man of wealth. He had a large number of slaves, and he paid a medical man to reside at Union to look after them. He kept a sloop to travel about from island to island in, and he used to welcome frequently the officers of the "King's ships."

Below Clifton House, on a spur running towards the sea, and commanding the passage through the coral reefs, is a little fort, built last century to beat off pirates. Mr. Mulzac, the present lessee, kindly presented me with some old overseers' diaries and slave records referring to the last century and the early part of this one.

These old records show that the island was divided into districts, or estates, each with its own gang of negroes under an overseer, and that Ashton was the principal

division. Two small islands near the coast, called Prune Island and Frigate Island, were used as places for the segregation of lepers and yaws patients. Frigate Island was sometimes called Yaws Island, as the yaws cases were sent there.

In one of the old diaries there is the following note under the date of 24th January 1789:—"Brought over from Prune Island Francis and Tom, the latter having yaws."

For the years 1806. 1807, and 1808 there is a slave register in which there are columns for the number of negroes in the different gangs, in the hospital, &c., and there are separate columns for "infants," "yaws," and "guinea worm negroes." According to the diary the slaves worked on the estate every day of the week, and they were sent to their "grounds" to cultivate provisions on Sundays.

On the 26th September, 1806, the slave register of Clifton shows that there were one case of yaws and "two guinea worm negroes" out of a total number of 62 slaves. On the 6th November in the same year there were two cases of yaws. On the 2nd January, 1807, the number of cases of yaws had increased to four, and by the 18th March to five. In January, 1808, there were three cases of the disease, showing that two had been cured; and, on 12th February, there is the following note in the "Occurrence" Book. "Received from the Yaws Island three of the small negroes well of the yaws." After this date the column in the register marked "yaws" is left blank until the 28th April, when one case occurred, but as the number of slaves had not been increased by fresh arrivals it is probable that this case was one of relapse.

Those slaves suffering from guinea-worm were given light work, and on nearly every week-day the following note was written in the Occurrence Book:—"Guinea-worm negroes cleaning cotton."

These old records are extremely valuable, for they show that yaws obtained a footing in the island, and that by a rigid system of segregation it was "stamped out."

I walked all over the villages of Clifton and Ashton. At Clifton there were no cases of the disease, but at Ashton, which is a larger village, and where the houses are crowded together, I discovered three cases. One was that of a woman who was very bad; she had had the disease four years. She was cachectic, and her arms and legs were ulcerated. The other two cases were those of a man and his child, both of whom had the typical encrusted granulomata of yaws. Some of the people told me that the disease first got into the island three or four years ago, and that it "was a bad sickness as it "nearly killed the people." There was doubtless other cases of the disease on the island, for I was not able to inspect all the huts.

I found a leper in one of the huts. She was a black woman about 60 years of age, and the disease was a mild form of the anæsthetic variety without deformity. She had four children and four grandchildren alive, none of whom had been affected with leprosy. Her husband, too, had remained well, but he came from an affected family. The woman, who lives in a hut by herself, told me that she was married a long time before the disease broke out. She was unaffected with yaws.

The people of Union Island are very poor; they cultivate cotton on the metayer system, and plant provisions in the hills, but on the whole they seem to be well nourished and strong. The huts all belong to the proprietor of the island, and the result is that they are better and cleaner than the Bequia ones.

Mayero.

This small island, lying to the north of Union, belongs to a gentleman of French descent, Mr. Henry St. Hilaire, who resides on his property. The area is scarcely 800 acres, and the population is put down at 283. The people appear to be comfortably housed, but they are very poor. A little cotton is cultivated on the metayer system, and a salt pond gives annual crops of salt, of which the labourers obtain a share in lieu of wages, but the proprietor had not taken off the last crop, "in order to punish the people "who had misbehaved themselves," as I was informed by a member of the St. Hilaire family.

In a house in the little village, perched on the side of a hill, 200 feet above the sea, I saw a leper who also had yaws in a mild form. He was a negro about 24 years of age, living by himself in the hut, and he was unable or unwilling to give me any history of his case. Indeed none of the people were willing to give any information, and they appeared to be of a very quarrelsome nature. The villagers were quarrelling when the magistrate and I climbed up the hill; they scuffled with the policemen outside the magistrate's court whilst his Worship was deciding a quarrel between two women, and they were quarrelling most violently when we were leaving their island.

Cannouan.

We sailed from Mayero on the night of the 13th June and reached Charlestown Bay, in Cannouan, before daybreak on the 14th. Cannouan is about twice the area of Mayero, and it contains a population of 443. The inhabitants are mostly engaged in cultivating, sparingly, cotton, maize, and "ground provisions." The island still belongs to the Snagg family, who were in possession of it during the period of slavery, and I am indebted to Mr. Henry Snagg, and his brother-in-law, Mr. Balfour, a retired naval officer, for much information concerning the island and its inhabitants.

The people are better housed, and altogether better off than those of the other islands of the Grenadines. In Charlestown Bay I saw the only seine net that appears to be used between Carriacou and St. Vincent. I found no yaws on the island, and I was assured that no case had occurred within the present generation.

Mr. Snagg kindly allowed me to look through some of the old records kept by his grandfather, and I found that the island was visited periodically by a medical man from Carriacou who had charge of the slaves on the plantation. The last medical man who so visited Cannouan was a Dr. Blair, whose prescription book I was allowed to examine. The latest mention of yaws is on the 9th July, 1837, when a child became affected. Several cases of syphilis were prescribed for, and it is evident that at that time, viz., from 1827 to 1837, the two diseases were differentiated by Dr. Blair, who from his notes and prescriptions appears to have been a medical man of much knowledge and ability.

I was informed that yaws was introduced into the island during the time of slavery, and that a small islet, called Dove Bay, lying close to the south end of Cannouan, and having an area of three acres, was the place where the cases were segregated.

Mustique.

We reached this island on the 14th June, and remained until noon the next day. It lies to the east of Bequia, and it belongs to the Hon. H. A. Hazell, and his brother, Mr. J. Gregg Hazell, of St. Vincent. There are 97 inhabitants, who are engaged in rearing stock, the proprietors having made the place into a cattle farm. Mr. J. Gregg Hazell came over from St. Vincent during the time we were on the island, and he was good enough to accompany me to a small village, where we found, to his surprise and concern, three cases of yaws amongst the children. Mr. Hazell and Mr. Wallace, the manager of the island, believed the disease to have been recently introduced from Bequia, as there were no cases in Mustique within a few months of my visit.

VI.

History of Yaws in St. Lucia.

Beyond the fact that yaws prevailed amongst the slaves on the plantations, nothing seems to be known of its early history in St. Lucia, and the only real evidence that I have been able to discover that the disease was still lurking in the various districts of the island just prior to the period of emancipation is contained in the work of Dr. G. Levacher, entitled "Guide Médical des Antilles," and published in Paris in 1834. Dr. Levacher was a French creole of St. Lucia, and he says in the preface to the first edition of his work, that he was in practice in Paris, but owing to family affairs he returned to St. Lucia in 1829, and practised in the island for four years. He then goes on to say: "Je n'ai pas voulu quitter mon pays natal sans en rapporter quelques matériaux "scientifiques, et j'ai pensé que l'expérience acquise à Sainte-Lucie pourrait profiter un "jour aux praticiens qui iraient exercer leur art à la Martinique, à la Guadeloupe, à la "Guiane française, et dans toute la partie sud du continent d'Amérique."

Dr. Levacher wrote in his book a chapter on yaws, giving his experience of the disease in St. Lucia, and it appears to me from a perusal of what he has written, both in the first and second editions of the work, that he had ample opportunity of studying the symptoms and treatment of the malady.

From the time of Levacher until within the last 12 years there is a wide gap in the history of the disease in St. Lucia. For, in the Government Office in Castries, there appears to be no document relating to yaws until November, 1879, but "The Medical Aid "and Poor Relief Ordinance," 1871, makes mention of a Yaws Hospital, as being included under the term "Medical Institutions." In the report on the St. Lucia Blue Book for

the year 1871, the Administrator, Mr. G. William Des Vœux, alluding to the passing of this measure, says :—" The Ordinance also provides for the better government of what " are called 'The Charitable Institutions,' viz. : the General Hospital, the Yaws Hospital, " and the Lunatic Asylum." In a despatch addressed to Administrator Dix, on the 13th November, 1879, the Colonial Surgeon asserts his belief that provision " formerly " existed in the island for the detection, isolation, and effectual treatment " of those persons suffering from yaws. But I have been unable to obtain any reliable information concerning the hospital that must have been in existence in the year 1871, when the Ordinance was passed, and amongst the documents I examined there is no reference to the closing of the institution.

In November, 1879, the attention of Mr. Thomas H. Dix, one of the stipendiary magistrates and Chairman of the Poor Law Committee of the second and third districts, was called to the prevalence of yaws in the Micoud quarter by some of the inhabitants, and Mr. Dix sent a police sergeant to make inquiries into the matter. Sergeant Howe reported as follows :—" I proceeded to Micoud, and from thence to Bellevue, where I " found several cases of framboesia or yaws. Nearly all the houses in that quarter are " infected." Mr. Dix thereupon wrote to the Administrator, calling attention to the matter, and in his letter there is the following passage : -" I would beg to state for your " Honor's information that I believe that not only in this district, but also in the second, " this disease is on the increase, and that owing to its contagious nature it might be " advisable by legal enactment to provide for rendering its isolation compulsory."

The correspondence was forwarded to the Colonial Surgeon, who suggested that the District Medical Officers should be required to make a special inquiry into the matter, and said " if the disease is so prevalent as reported by Sergeant Howe to the C. P. L. " Committee, no doubt your Honor will deem it necessary to make some provision " similar to what is now at work in Dominica."

On the 23rd March, 1880, Governor Strahan requested the Administrator to furnish him with a special report on the prevelance of yaws in St. Lucia, " and as to whether it " is increasing or diminishing ; together with any further information of interest on the " subject."

Mr. Macnamara Dix, the Administrator, replied to this despatch on the 19th April, 1880, stating that an inquiry instituted by the Colonial Surgeon brought to light only eight cases of the disease ; but a second inquiry resulted in the finding of 14 cases, and the knowledge that many more were hidden away by their friends. The Administrator then goes on to say :—" I am of opinion that legislation has become necessary, with a view to " prevent the spreading of the disease, and I have therefore requested the Attorney " General to prepare an Ordinance on the subject similar to the Dominica Act, a copy of " which has been supplied to me by President Eldridge. . . . . Accommodation " for persons affected with the disease can be provided at Fort Charlotte, Morne Fortuné ; " but some expenses in adopting the building to the purpose, and enclosing the grounds " about it, so as to isolate it from other buildings appropriated for the lunatics and " incurables, would have to be incurred. I shall later on ask your Excellency's authority " to submit a vote to the Legislative Council for the amount required for the " purpose."

The Ordinance was drafted and sent on to Lieut.-Governor Robinson, who had succeeded Sir George Strahan at Barbadoes ; and, in his despatch, Mr. M. Dix stated that " Cases of yaws have been reported to exist in different parts of the island. Persons " afflicted with the disease have a reluctance to go into hospital for treatment. Compulsion " is, therefore, necessary, as well for the purpose of preventing the spread of the disease " as for the benefit of the patient, the disease being easy of cure under proper treatment " and a nourishing diet."

Lieut.-Governor Robinson replied to Mr. Goldsworthy, who had by then assumed the administration of the Government of St. Lucia, suggesting several minor alterations in the draft, and adding, " In his despatch, No. 58, of 19th April, 1880, Mr. Dix " evidently contemplated the establishment of one yaws hospital at Fort Charlotte. " This Ordinance, however, seems to provide for four district hospitals. I am inclined " to think that one central hospital would, as at Grenada, be more efficient and " economical, and if you agree with me you will be good enough to amend the draft in " this direction."

The Ordinance was duly amended, and it was unanimously passed by the Legisiative Council on the 2nd November, 1881, and sent on, as is usual, to the Attorney General for his report previous to its submission for the Royal Assent. Mr. Attorney General Ferguson's report is dated 31st December, 1881 ; it recommends that the Ordinance shall be assented to, and alludes to its necessity in the following language :—" The disease

" known as the yaws having again made made its appearance in this Colony, it has " become necessary that provision should be made for arresting its progress, and, if " possible, for extirpating the disease. The present Ordinance has been passed with " that object."

Mr. Attorney General Fergusson made the same mistake as was made in Jamaica concerning the disappearance of yaws from the Colony. The disease was in the island all the time, but for reasons given in a former section of this report, it did not come under the notice of the authorities, and possibly up to now one would have heard very little of the malady had it not spread far and wide amongst the East Indian immigrants, for the physical peculiarities of St. Lucia render it easy for the negroes to conceal themselves in mountain districts, away from what they consider to be troublesome interference with their habits and freedom of action. Then, too, the dread of the deadly serpent (*Trigonocephalus lanceolatus*) that abounds in the island prevents most persons from travelling much in the interior of the country. As an instance of the danger of this serpent to those who have to go near to its haunts, I may point out that the returns of deaths from 1884 to 1890 amongst the East Indian immigrants who were brought over in the ships " Bracadaile " and " Poonah," show that of a total of 51 deaths no less than four were from " serpent bite." And this percentage of 7·8 of the total mortality only gives some idea of the number of persons bitten, inasmuch as most cases recover under proper treatment after much suffering.

The Ordinance was assented to, and a copy of it is given in the Appendix, and it will be found that it closely follows the Dominica Act in most of its provisions. There is a penalty of imprisonment imposed on any person suffering from yaws who shall bathe or wash his clothes in any stream except at such places as may be appointed by the authorities, but as far as I could ascertain this clause has remained a dead letter.

When the Ordinance was passed by the Legislature, Mr. Goldsworthy appears to have informed the Council of what arrangements it was proposed to make in regard to the hospital, for the following occurs in the minutes of the meeting :—" The Administrator " said that, after consultation with the Colonial Surgeon, he had decided, as a temporary " measure, to take advantage of one of the vacant houses at Morne Fortuné, formerly " used as the canteen, for the reception of yaws patients. With a few necessary repairs " and fittings, this building could be adapted for the purpose. It could, when better " accommodation was provided for, be advantageously utilised for the transfer of certain " convalescent patients from the general hospital. His Honor did not expect that there " would be more than 20 yaws patients in all."

In his report on the hospitals and charitable institutions for the year 1882, the Colonial Surgeon appeared to think with the Administrator that there were very few cases of yaws in the island, and that the admission of several persons to a temporary hospital was all that was necessary to carry out the provisions of the Ordinance. This report was sent on to the Colonial Office, and the Earl of Derby, then Colonial Minister, wrote as follows, on 26th April, 1883, to Governor Robinson :—" It appears from this " report that a permanent yaws hospital is not required, and I should wish to be furnished " with a further report upon the subject, and in the meantime no expenditure should be " incurred for that purpose."

The statements of the Administrator and Colonial Surgeon show how little the authorities knew of the extent to which the disease prevailed in the unfrequented districts of the island. The hospital was opened at Fort Charlotte in October, 1882, and by the end of the year, instead of 20 there were 145 admissions. Of this number 16 cases were discharged cured, one case was discharged " not improved," and there were 10 deaths; that is a mortality of over 68·9 per thousand. It should be mentioned, however, that this death-rate was exceptionally high, and it has never been approached in any later year.

The site of the hospital, and the building itself, were ill-adapted for the treatment of patients suffering from a loathsome contagious disease like yaws. The water supply was defective, as the catch of rain-water from the roofs of the buildings was the only source. The drainage and sewerage arrangements were faulty, and the available cubic space was not half what it ought to have been. In his report on the medical institutions for the year 1885, the Colonial Surgeon says, in regard to the yaws hospital, " This " institution is out of place in its present position, it should be situated near the sea, and " thus admit of the inmates indulging in the inestimable advantage of sea-bathing."

And, on the 18th January, 1889, the same officer writes to the Colonial Secretary as follows :—" A yaws hospital was opened in 1882. A building in Fort Charlotte was " hastily adapted - a building in every respect unsuited for its intended purpose. " Impecuniosity dictated its selection and necessitated our making the best of it at the " least possible cost to construction or fittings."

Notwithstanding these defects the patients were treated in this so-called hospital for six years, that is until October, 1888, when all the cases were removed to the yaws hospital now in existence at Rat Island.

In June, 1883, the Colonial Surgeon reported favourably on the working of the hospital, and said that "the results so far obtained in the treatment of the disease have been "very satisfactory." He applied to the Government for the appointment of "a special "constable such as exists in Dominica, to hunt up concealed cases of the disease if any "such there be in any of the remote huts and hamlets."

A yaws constable was appointed, as I was informed by the Colonial Surgeon, some time during the year 1884, and his services were dispensed with in March, 1889, when it was decided by the Local Government that the hospital should be abolished. This constable did not receive a regular salary, but was paid sums varying from three to four shillings a head for each yaws patient brought in, and such payments "did not include "boat hire and cost of maintenance."

The yaws affairs appear on the whole to have gone on satisfactorily. The accommodation at the hospital was increased by the occupation of a contiguous building used as a lunatic asylum, the lunatics being placed elsewhere; the special constable found out numbers of persons suffering from the disease, who were taken to the hospital and placed under treatment; but there was some trouble as regards "the internal "discipline" of the institution, for the inmates became noisy, and there was a spirit of insubordination amongst them. Still, on the 16th June, 1884, Administrator Knollys was able to report to the Governor-in-Chief, Sir Walter Sendall, that "There is no doubt "that the treatment here has been successful, and that the disease has already much "decreased."

On the 2nd July Colonial Assistant Surgeon Norton, the medical officer in charge of the hospital, sent in a favourable report pointing out that "many of the patients came "voluntarily into the hospital satisfied by the favourable reports of those discharged "cured. There were six cases of re-admission from a form of the disease called 'crab "yaws,' which I attribute to their having returned to their old homes, where in one "case the child's mother was suffering from the same disease, and was subsequently "brought to the hospital by the yaws constable." In order to decrease the number of cases of relapse, two convalescent wards were opened, where the patients were detained for a month after discharge from the yaws ward, and six weeks after all sign of the disease had disappeared. Attached to this report was the following table of "Rations "distributed daily to each patient":—

Breakfast.

Bread	½ pound.
Orange-leaf tea	1 pint.
Syrup	1 ounce.

Dinner.

Ground provisions, cooked	1 pound.
Fresh meat	½ pound.
Olive oil	1 ounce.
Vegetable soup, flavoured with rice, and 1 lb. salt pork ½ lb. to every twenty patients.	1 pint.

Tea.

Bread	½ pound.
Orange-leaf tea	1 pint.
Syrup	1 ounce.

Children, fifteen and under, to have half a pint of arrowroot boiled with milk and sweetened at 7 a.m. Children from one to four years to have ¼ lb. of bread at each meal.

In his report on the medical institutions, the Colonial Surgeon refers to the work done during the year 1885, in the following words:—"The yaws hospital continued through "the year in active service, and a large number were discharged cured. It is "encouraging to observe that the cases now seeking admission are of a milder type and "in a less advanced stage of the disease."

From 1885 to the beginning of the year 1888, there appears to be no document relating to the yaws affairs. Judging by the hospital returns, however, the wards were full, and there was no relaxation in the efforts of those in charge to turn out as many cures as possible. But, notwithstanding, it was found that there was no diminution in the number of patients, and the Government who had expected that treatment in a temporary hospital for a few cases would have been sufficient to rid the island of the disease, became alarmed at the constant expenditure, more especially as a new hospital in a better position was called for by the medical authorities.

On the 14th February, 1888, Sir Walter Sendall, the Governor-in-Chief, sent the following Minute to the Administrator :—

Administrator Laborde,

In Minute St. Lucia 1335A—87, you inform me in connection with the building of the yaws hospital, that the number of yaws patients has so increased that you fear the ground space will not accommodate huts sufficient for their reception, except an upper floor be added.

With reference to this increase, I shall be glad if you will obtain a report from the medical officers upon the present state of this disease in the colony, and especially whether the establishment of a yaws hospital in Castries has had any appreciable effect towards its extirpation.

(signed) *Walter J. Sendall.*

14 February, 1888.

Reports from all the medical officers were obtained, and the following extracts will show the experience and opinions of these gentlemen on the measures adopted by the Government for ridding the island of the disease.

Otho Galgey, Esq., Colonial Assistant Surgeon :—"On rare occasions a case of "framboesia presents itself at the dispensary, either at Gros Islet or Castries, and the "patient is at once sent to the yaws hospital. . . .

"In my opinion yaws has not decreased since the opening of the yaws hospital; on "the contrary, I observe that it has spread steadily amongst the indentured and free "coolies who come under my notice. A few years ago the disease was almost "unknown amongst the coolies of the first district, where as recently it has become "prevalent. . . .

"When the temporary hospital was adjoining the yaws institution on the Morne, I "on several occasions noticed that coolies who were admitted without the least apparent "sign of yaws developed the disease after a short residence in hospital. This is "attributed to contagion from the inmates of the neighbouring institution. All "authorities on the subject are agreed that yaws is decidedly contagious, and that it is "conveyed from one person to another by direct contact, or that it may be carried from "diseased to healthy individuals by flies.

"This is a serious question, and one which, I submit, ought to be carefully "considered before building a yaws house in the vicinity of a general hospital. Patients "with small sores, or skin diseases, are the most subject to contagion from flies, and as "coolies are, I may say, never free from one or the other, they are peculiarly liable to "inoculation from this source. The coolies, especially the lazy and idly-disposed, do not "consider the disease loathsome and disgusting; in fact, those that I have sent to the "yaws hospital have always gone willingly, thinking it rather a good pretext for shirking "work on the estate for some months.

"I consider that yaws patients should be isolated or segregated, but not in the "neighbourhood of a general hospital . . . . . "

Herbert Norton, Esq., Colonial Assistant Surgeon :—"The yaws patients in my "portion of the first district are not so numerous as they were among the natives of the "island, but the coolies are getting attacked with the disease from having a good deal of "intercourse with the natives about Roseau, and those attacked not being found out "sometimes immediately, go to the other estates and so spread it about.

"It is not always possible to verify reports, as in almost all cases where reports are "made the people reported keep a good look-out and immediately on the arrival of a "doctor, or a policeman, are off away into the high woods.

"In my opinion the disease has greatly decreased since the opening of the yaws "hospital. At the present moment I have 25 of the indentured coolies, and those who

" have served their time in the hospital; these are the only cases that I know of, but I " can quite believe that there are others who have the yaws, but in positions where it is " not easily noticed.

" My opinion is that, if the yaws patients were allowed to go about as they liked, tha " this island would in the course of a few years become like the island of Dominica was in " the years of 1870 and 1872, perfectly infested; but in that island they had very stringent " laws for punishing those who ran away, which, I am sorry to say we have not here; as " when the police are informed of such cases I do not think there is very much trouble taken " to bring back the delinquent as, at the present moment, there is one patient who escaped, " and is, I believe, still at large, as he has not been brought back to the hospital.'

S. Fitzgerald Proctor, Esq., Colonial Assistant Surgeon :—" I am at this date only " aware of two cases of yaws in this district, which await an opportunity for Castries. " Some other cases are, probably, to be yet found. It is always difficult to get at yaws " patients among a scattered creole population. These cases seldom, if ever, spontaneously " come forward to be sent to the proper asylum, and it has been my experience when a " case has been reported to find the subject of it avoiding me. For the first time, to my " knowledge, yaws has attacked two indentured immigrants, and their two children.

" There can be no doubt that the yaws hospital has done good service as an asylum " for cases which, if left at large, would go from bad to worse, and disseminate the " disease, but I am not prepared to say that the disease has actually decreased since the " opening of it.

" I consider that the result of leaving yaws cases at large would be to spread the " disease, which, as far as my experience goes, appears to be mildly contagious, besides " being capable of being generated *de novo*."

Dr. V. E. Tabone, Colonial Assistant Surgeon :—" To my personal knowledge no " yaws cases exist in my district . . . . . To my knowledge no case of yaws has " spread amongst indentured coolies of my district."

" *Dr. J. Lestrade*, Colonial Assistant Surgeon :—" I have personally met with a few " cases of yaws patients coming for advice at the hospital, and these I have invariably " sent up to Castries as soon as the existence of yaws was undoubted. These were " patients of long standing, who had been known to have had previous attacks, and had " already been treated at the Castries yaws hospital. They were generally young adults " of both sexes, and commonly appeared to come from the heights of St. Urbain and " La Plute, both in this quarter.

" Viewing my limited experience in this quarter, I cannot rightly state whether the " disease has decreased since the opening of the Castries yaws hospital, but as far as I can " judge, I believe this has been the case.

" I am not aware that the disease is spreading among the indentured and recently " indentured coolies in my district; on the contrary, I think not, for I have seen most of " them in my quarter, and have not had occasion to identify yaws among any of them. " What they are most prone to is a kind of 'impetigo,' known as 'coolie itch," due, I " believe, to the irritation of dirt. I believe that yaws is not common with them, though " liable to infect them.

" I believe also that with proper precautionary measures yaws is not necessarily " contagious, though certainly infectious, that is to say, healthy persons are not liable to " catch the disease by simple proximity to tainted ones, as is the case with small-pox, " scarlet fever, &c., but will certainly catch it if infected by the morbid fluid of the sores " through the medium of breaches of continuity of the healthy skin, such as wounds and " ulcers, &c., or by continually living in a place where the accumulation of diseased " particles is excessive, or where the water supply is contaminated.

" For these reasons, therefore, I certainly think that the result of leaving yaws patients " at large would be to induce the disease to spread; the carelessness and ignorance of " hygienic measures among the negroes greatly aiding its spread."

Charles Dennehy, Esq., Colonial Surgeon :—" In submitting the annexed medical " reports on yaws, as called for in his Honour's Minute 88,243, I need only refer to " Dr. Galgey's.

" Dr. Galgey expresses himself strongly on the contagiousness of yaws, and of the " danger of infecting patients in a general hospital by the too close proximity of a yaws " asylum.

" I must confess there are strong objections to such proximity, and there are good " grounds for suspecting that the present prevalence of the disease among the coolies " of the Crown Lands and Roseau estates originated at the temporary hospital separated " by a wooden fence and only a few yards distant from the yaws hospital.

"The yaws quarters from the nature of their structure, the scarcity of water, the "presence of many children and infants, the half-savage and filthy habits of the inmates, "and from the nature of the disease itself, always swarmed with flies and others insects, "a nuisance that could only be mitigated by the daily burning of sulphur. But expelling "the flies from the yaws quarters was only transferring them to the hospital and other "buildings close by. No case of infection has occurred in the lunatic asylum.

"A fly that lights on a yaws sore—flies are fond of all sores, the fouler the better "appreciated—must of necessity have a portion of the discharge adhere to its feet, it "is of little consequence how minute it may be, like a bee passing from flower to flower, "it may visit many sores and accumulate in proportion. It is driven or flies away, and "within a short period lights again on some wound or sore otherwise healthy, or it may "be a scratch or abrasion scarcely attracting notice. The result is inoculation. Inocu-"lation as perfect as human hands could do it.

"The proposed site for the new yaws building, although in every respect infinitely "superior to what existed in Fort Charlotte, is still by its proximity to the Victoria "Hospital very objectionable; there are also some very solid reasons against the choice "of this position.

"There cannot be a doubt but that the disease had greatly diminished among the "native population since the opening of the yaws asylum, and its now spreading among "the coolies is a great misfortune . . . . ."

"It is, I submit, essential that a yaws asylum should be situated close to the sea, "and where the sea-shore is of gravel or sand, so as to admit of every inducement for "sea-bathing, particularly by the women and children. The sea-shore at proposed site "consists of rock and live coral infested with sea-eggs. Moreover, I submit there are "strong ethic and æsthetic reasons against selecting any position on the shores of "Castries Harbour for a yaws asylum.

"Anyone who has seen the utter misery of bad yaws patients will admit that such "cases must be provided for; humanity, civilisation, and the self-interest of the community, "forbid their neglect. I therefore take it for granted that we must have a yaws asylum, "even though we could not show any diminution of the disease. But where is it to be? "Soufriere is a central position, and, after much thought, I venture to submit that some "place on the sea-shore in its vicinity might be found suitable for the purpose."

From these documents it appears that the balance of evidence was on the side of the diminution of the disease amongst the negro population, but that as affected persons hid themselves away in the mountainous districts, it was impossible for the medical officers to give any accurate information regarding its prevalence. It would appear also that the police authorities took no trouble to carry out their duties as regards the Yaws Ordinance, and finally that the disease was spreading amongst the East Indian immigrants. There is also evidence of the important fact that the inmates of the temporary quarters arranged for the patients of the Colonial Hospital that was burnt down on the 3rd January, 1884, became affected with the disease owing to their contiguity to the yaws hospital. Possibly some cases may have arisen by contagion in this manner, but the history of the disease in Grenada and St. Vincent shows that the association of the coolies with the native population is quite sufficient to account for the spread of yaws amongst the East Indian immigrants. The matter was a very serious one, for coolie immigration was still going on, and the coolies were entitled to be taken proper care of when they were suffering from disease. The gravity of the question was at once seen by Mr. R. P. Cropper, the Protector of Immigrants, and he spared no effort by example and precept to stay the spread of the scourge amongst the East Indians under his care. In his June report, 1888, Mr. Cropper thus alludes to the matter:—

"I regret to report that the number of coolies suffering from yaws in the hospital "set apart for these unfortunates is twenty-seven, of which nineteen are under indenture. "All of these are children, except three adults. Yaws is a disease not known in India, "and is decidedly infectious. The coolies take it by intercourse with the creoles. The "precautions taken by the Immigration Office in having the coolie houses on the "estates apart from those of the creoles have not prevented the disease from spreading "amongst the coolies, as their children play with the creole children; and even at the "Morne, where unfortunately the temporary hospital and the yaws hospital were in "close neighbourhood, and intercourse could not be prevented, sound coolies (or at "the least one) who went to the temporary hospital became after a time inmates of the "yaws hospital, probably infected by patients of the latter establishment."

In October, 1888, the yaws patients were removed from the quarters at Morne Fortuné to a hospital that had been prepared for them on Rat Island in Choc Bay, to the north of Castries Harbour. This institution, which cost 2,000 *l.* to put into perfect

order, was in every way well adapted for the purpose of a yaws hospital. The isolation was perfect, sea-bathing was obtainable, the premises were airy and commodious, and the site, according to all accounts, was a healthy one, and a dispenser was appointed. Thus for the first time in the history of the yaws affairs in the island, the medical officers were provided with proper machinery for making headway against the disease. The hospital at Morne Fortuné was opened in October, 1882, and was closed at the end of September, 1888, when the patients were removed to Rat Island. During the six years in all 1,411 patients had been treated, as will be seen from the following table:—

Years.	Number of Cases Treated.	Discharged.		Deaths.	Death Rate per Thousand.
		Cured.	Not Improved.		
October and December, 1882 -	145	16	1	10	69·0
1883 - - - - - - -	201	138	4	2	10·0
1884 - - - - - - -	160	132	1	2	12·5
1885 - - - - - - -	204	127	1	3	14·7
1886 - - - - - -	235	132	—	5	21·3
1887 - - - - - - -	220	129	—	2	9·0
January to September 1888 - -	246	120	1	3	12·2
Totals.	1,411	794	8	27	19·1

The death-rate for a hospital was low, the figures showing a mortality of 19·1 per thousand, against 6·3 per thousand in Grenada, and 14·6 per thousand in St. Vincent.

It is to be observed that a small number of cases was discharged as "not improved." They were doubtless chronic cases—the *residuum*, as it were, of the many patients admitted,—that is to say, similar cases that occur in all hospitals of persons who seem to derive no benefit from treatment, and who are usually classed as "incurable." But it appears to me that they should not have been discharged, for as the Government were endeavouring to eradicate the disease from the island, it was wrong to let loose these *foci* of contagion amongst the people, and I would strongly advise that strict orders be issued to the officers in charge of yaws hospitals that no case be discharged unless there be reasonable belief that the disease is cured.

The daily average number of inmates at the beginning of the year 1888 was 85, and when the Morne Fortuné Hospital was closed this number had increased to 108. At the new hospital at Rat Island at the end of the year the daily average number had reached 158, and no less than 91 cases were admitted during the three months the institution had been established. These figures alarmed the Government, for, apart from the grave question of public hygiene involved, the greatly increased expenditure was calculated to embarrass the finances of the colony, unless the drain were met by increased taxation. By direction of the Governor, on the 16th January, 1889, the Acting Colonial Secretary addressed the following minute to the Colonial Surgeon:—

"Notwithstanding the fact that many years back persons in the colony afflicted with "yaws were housed and cared for medically in a Government asylum, and that since "1881 there has been a compulsory treatment of yaws cases under the direct supervision "of the Medical Department, yet it is evident from the returns herewith that the disease "is still on the increase. His Excellency desires that you will make to him a full report "on the subject under the following heads:

"1. What is the cause of the increase in the number of cases at the yaws hospital "at the present time, after that institution has been in active operation, affording "treatment to large numbers of yaws cases during the last seven years?

"2. Is there any prospect of the disease being reduced to reasonable limits, or "stamped out of the colony, and, if so, at what time?"

In reply to this minute the Colonial Surgeon wrote as follows:—

"3rd January, 1884, the general hospital was burned, its form of reconstruction was "long under consideration, and when at last decided on, over another year was consumed "in its completion, and was first occupied 28th September 1887.

"From October 1884 to September 1887, all patients, the great majority being "coolies, were accommodated for hospital treatment in buildings also in Fort Charlotte, "and now called 'temporary hospital.' A wooden fence partly surrounding yaws "building and grounds made pretence at separation.

"So far as I can form an opinion, the increase of yaws is now due to its spreading "among the coolies, and it is open to strong suspicion that at least some of these people "contracted the disease while in 'temporary hospital,' not only from communication "with yaws patients, but also from their close proximity to their hospital.

"Coolie immigrants are with few exceptions a dirty people; while with a view to "saving money they eat bad and scanty food; they are very subject to skin eruptions "and ulcers, they are thus specially obnoxious to this disease.

"The more perfect isolation capable of being enforced since the transfer to Rat "Island may inspire, in a sanguine mind, hopes of the disease being reduced to "'reasonable limits.' As for its being 'stamped out' of the colony, the date of such a "wished-for event is far beyond my power to state.

"The cost of care and treatment is very great, good feeding is essential, never-"theless, the diet scale has been recently, and is still being, gradually reduced, leaving "little further for economy in this direction.

"I presume affected coolies must be cared for, also destitute natives suffering from "inveterate yaws, and who are willing to place themselves under some restraint. I "confess to doubts on the success or policy of treating the mass of creoles under "isolation and against their will and prejudices, and I fear that little impression has "been made on reducing the prevalence of the disease."

On the 22nd January, Mr. Herbert Norton, the medical officer of the yaws hospital, sent in a return showing that 1,091 cases had been treated up to date, that there had been 18 deaths and 42 readmissions, or in other words that 3·8 *per centum* had returned for further treatment.

A consideration of these documents shows that the administration of the yaws affairs had been very costly, that the mistake in selecting a bad site for the hospital had been followed by evil results, and that the Government had now to deal with widespread disease amongst the East Indian immigrants, although at the time of the passing of the Yaws Ordinance it had only been contemplated to treat a few of the negroes.

At this juncture of affairs the Government looked abroad for guidance, and the following letter was addressed to the Colonial Secretary of Antigua:—

No. 85.

Government Office, St. Lucia,
29 January, 1889.

Sir,

I AM directed by His Excellency the Governor-in-Chief to request you to be good enough to furnish him with any information in your possession showing what measure of success has attended the system of specially housing and treating yaws patients in the Leeward Islands Government, and more especially as to what success has resulted from the operation of Dr. Nicholls in connection with the yaws hospital in Dominica.

I have, &c.
(signed) *D. G. Garraway.*

Acting Colonial Secretary.

To this letter the following reply was received:—

Colonial Secretary's Office, Antigua,
19 March, 1889.

Sir,

IN reply to your letter of the 29th January last, No. 85, asking what success has resulted from the operations of Dr. Nicholls in connection with the yaws hospital in Dominica, I am directed by the Governor to inform you that the stationing of constables in the districts with instructions to report all cases of yaws, and the establishment of hospitals practically, Dr. Nicholls reports, eradicated the disease (which prevailed epidemically) from the greater part of the island. These special precautions were, however, relaxed in or about 1881, with the result that the disease has to some extent reappeared.

I have, &c.
(signed) *Fred. Evans.*

Colonial Secretary.

The unsatisfactory letter from the Colonial Secretary of Antigua had the unfortunate effect of causing the Government to relax all efforts to control the disease, and to decide to close the yaws hospital, as will be seen from the following correspondence :—

Administrator *Llewelyn*, C.M.G., to Governor *Sendall*, K.C.M.G.

Your Excellency,

PLEASE read this letter from the Colonial Secretary of the Leeward Islands. It is not very encouraging.

1 April, 1889. (signed) *R. B. Llewelyn.*

Governor *Sendall* to Administrator *Llewelyn*.

IT is not, and we are not told at what cost the partial eradication before 1881 was effected.

2 April, 1889. (inld) *W. J. S.*

LAID before Executive Council, 4th April 1889, and it was decided to gradually close the Asylum at Rat Island.

Colonial Surgeon and police informed.

5 April, 1889. (inld.) *R. B. L.*

Administrator *Llewelyn* to the Colonial Surgeon.

Colonial Surgeon,

THE Governor in Council has decided that the establishment of a single yaws asylum is not doing the good that was anticipated, or is required, and that one yaws asylum, or even more, will not eradicate the disease from the colony. It has therefore been decided that the institution on Rat Island should be gradually closed, and no fresh cases admitted.

You will please inform Dr. Norton of this, and I will instruct the police not to take any further steps for sending people to the institution. If any sick person at the hospital is also afflicted with yaws, separate accommodation is to be provided.

I shall be glad to receive your suggestions for carrying out the above paragraph.

The general question of gradually closing the asylum at Rat Island has been fully and fairly discussed, and it is not now open to any further discussion.

5 April, 1889. (inld.) *R. B. L.*

Thus at once the Government decided that the, for the island, enormous expenditure on the yaws hospitals during the past seven years had been practically wasted; and that, moreover, the institution at Rat Island which had been open less than a year, and had cost 2,000 *l.* to establish, was to be altogether abandoned. This would have been most unfortunate if the Government had arrived at their decision on exact and accurate information, but I regret to have to point out that the St. Lucia authorities were misled in the matter, and that the full information on which they could have based a correct judgment was in the possession of the Antigua government and was withheld from them. The despatch from St. Lucia was forwarded to me, and I took pains to supply facts that I thought would have been of use to the Government of the Windward Islands, as will appear from the following copy of the letter I wrote at the time :—

Dr. *Alford Nicholls* to President *Le Hunte*.

Sir, Dominica, 6 February, 1889.

I HAVE the honor to report as follows, in regard to the information required by the Government of the Windward Islands as to "what success has resulted from the "operations of Dr. Nicholls in connection with the yaws hospitals in Dominica."

It is evident from the Colonial Secretary's letter that the Government of the Windward Islands are not aware of the fact that the yaws administration, which effected so much good in this island, was practically put an end to in December, 1881, in consequence of the embarrassed condition of the finances.

For some years before that date large sums were expended on the yaws affairs. Hospitals were established, and yaws constables were stationed in various districts of the island, whose duty it was to report all cases of yaws, and to carry out any orders given to them by the Medical Superintendent.

As a result, the disease, which prevailed epidemically, was practically eradicated from the greater part of the island. Indeed, weeks would sometimes occur without a single case being found at the north end and throughout the leeward districts of the island, the Laplaine quarter being the only part that had not been cleared of the cases of yaws, and thus the expensive operations undertaken to rid the island of the loathsome disease were, it may be said, on the eve of success.

Unhappily, in January, 1882, the large Central Hospital at Canefield was closed, the yaws constables were discharged, and the small hospital at Morne Bruce was kept open simply to treat the worst cases of the disease. It was thought at the time by the Government that the District Medical Officers, then four in number, might do much to relieve the hospital, and to prevent the spread of the malady, and to that end they were all placed under my direction in regard to the yaws affairs.

In my report, written on the 19th September, 1882, for the information of the Secretary of State, all these facts were set forth, and I there pointed out the determination of the Government that "this modified plan was to be fairly tried, and after a year, if "necessary, the vote for yaws expenditure was to be increased."

But, unfortunately, the plan was not carried out. The District Medical Officers were relieved of their special duties in regard to the yaws affairs, and, as the constables had been dismissed, there were no proper means of ascertaining the condition of the country districts, and many of the cases of yaws that cropped up here and there remained as centres to infect the neighbourhood. For some time past, too, a great portion of the island has been without any medical attendance whatever, as the Medical District appointments have been kept vacant for economical reasons, and the duties of magistrate have been combined with the office of the only medical officer who now resides away from the chief town.

Yaws is a contagious disease that sometimes prevails epidemically in the West Indies and on the West Coast of Africa. As most of the cases occurring for several years past in the country districts of Dominica have been necessarily left to themselves, each affected person has thus acted as a *focus* for the spread of the disease; and, therefore, considering all the circumstances I have detailed above, it was to be expected that yaws would again make headway in the island.

This is what I fear has now really occurred, for the disease is reported to be spreading, and the small hospital at Morne Bruce is incapable of accommodating sufficient patients to make any marked impression on the progress of the malady in parts of the island distant from Roseau.

In many instances the people do not like to be sent to a hospital, and they are often hidden by their friends. It might be suggested, therefore, for the consideration of the Government of the Windward Islands, whether a system of compulsory notification would not greatly aid in rendering more efficient those measures adopted for the suppression of yaws when the disease occurs epidemically.

I have, &c.

His Honor, President Le Hunte. (signed) *H. A. Alford Nicholls.*

Had a copy of this letter been sent to the Governor of the Windward Islands, I believe the error of coming to the decision to close the newly-established yaws hospital would not have been arrived at. If even the Colonial Surgeon had been in the Executive Council his words of warning may have caused Administrator Llewelyn and the Councillors to hesitate, for I find that on the 12th April, 1889, he addressed a minute to the Chief Executive Officer, in which occurs the following paragraphs :—

"Clause 23 of 'the Medical and Relief of Poor Ordinance' provides that persons "afflicted with infectious, contagious, or incurable disease, shall not be admitted as "inmates of general or auxiliary hospitals. I beg to point out that indentured coolies "afflicted with yaws must be taken care of, and I would suggest that these people should "continue to be admitted at Rat Island."

The strongest protest, however, came from Mr. Cropper, the protector of immigrants. In his report for the first quarter of 1889 he writes at length on the regrettable prevalence of the disease amongst the East Indian immigrants. In this report he says: "I "regret to be obliged to report now, not only on the continuance of the malady, but on

"its extension to two additional estates. . . . The valley of Roseau, where there "are two estates having indentured immigrants, seems a hot-bed for the disease. Seven- "teen of the indentured patients at Rat Island are from that valley." As soon as Mr. Cropper learnt of the decision to close the yaws hospital, he addressed a strong and able protest to the Administrator. His minute is long, but considering the gravity of the question, and the danger of the importation of the disease into India, it appears to me necessary for the document to appear in this report *in extenso*. It reads as follows:—

"I was greatly surprised by your Honour's minute of 6th April 1889, announcing "the Government's decision gradually to close the asylum for yaws, and to admit no fresh "cases. I appeal most energetically against the decision. I cannot doubt that the "Government came to its decision under pressure of very urgent necessity. But, I "contend, your Honour, that the necessity for keeping the establishment at Rat Island "is most imperious. First, there is danger of sending this fearful malady to India "with return immigrants. Last year the most scrutinizing examination by experts was "made of every man, woman, and child before embarkation in the Moy. Second, adults "are disabled for years from the service for which they are introduced into the Colony, "or crippled for life, or even doomed to death by the malady. Third, the disease is "very infectious and pertinacious whenever it gets a footing. At the Morne, when the "yaws rooms were in close proximity to those for fever and other ailments, the inter- "course between the two sets of patients was frequent, and an Indian went in for fever "and was discharged with yaws; and last year some Leonidas Indians could not get "back passage to India or take bounty, because they were in the asylum, and are still "there. These Leonidas (1878) Indians belonged to Morne Courbaril, and from the "same estate, Bracadaile, (1884) Indians are now for a long time patients in the asylum. "And I have shown elsewhere how stubbornly it clings to the people on the Roseau "estates. Fourth, it is a disease that returns to a patient. There is an Indian boy who "was cured of it several years ago, yet is again an inmate of the asylum. But perhaps "this case is one induced by returning to associate with other cases on the estate. "Fifth, it seems to run through families. For instance, Moorte's two children, Maugri "and child, Rhatnie's three children and others. These are sufficient grounds on which "to rest my pleading that cases of yaws should not be left where the malady breaks our, "and that the only hope of stamping out the disease is to isolate the cases.

"I therefore use the utmost importunity in praying that every fresh case should be "sent on for treatment. If, as I suppose, the necessity for closing the asylum arises "from the financial circumstances of the colony, I suggest that the cost of treatment "of every Indian patient should be estimated at 1*s*. per day, as at the four hospitals, and "if the immigration fund is at present unable to meet this claim, that an addition of "a penny should be made to the export tax on sugar, raising it from 4*d*. to 5*d*. on every "100lbs., or the tariff of charges on the packages in which sugar is exported should be "revised and raised; *e.g.*, a barrel of sugar is estimated at 200lbs. This I know to be "too little, and in Grenada it is estimated at 250lbs. Our other packages, I have no "doubt, are proportionally underweighted.

"On the whole, the question, as it appears to me, is not whether it is a hardship to "maintain the asylum at any cost, but whether it is not an immeasurably greater evil to "allow yaws to make such havoc among these Indians who are so specially under the "care of the Government. And, so far, your Honour, from gradually reducing the "establishment, with a view to its being ultimately closed, I should suggest that there be "an additional establishment to which should be sent for three months all patients that "are pronounced cured, that the effectiveness of the cure might be tested before the "final discharge."

On the 25th March, that is previous to the receipt of the communications from the Colonial Surgeon and Protector of Immigrants, Governor Sir Walter Sendall, addressed a despatch to your Lordship, in which he stated that a necessity existed for the reduction of the expenditure on the medical and charitable institutions which had reached a point in excess of what could be properly maintained; that a sum of nearly 2,000*l*. had been spent on the buildings of the present yaws hospital; that all expectation of stamping out the disease "must be abandoned as chimerical," and that "even a temporary eradication "of this disorder could only be effected at a cost far beyond the resources of the Colony, "which it would be next to impossible, the habits of the people remaining what they are, "to prevent its re-introduction at an early date." Although the local authorities had given explicit instructions for the gradual closure of the hospital, the final decision was left with the Colonial Office, and your Lordship decided that it was inexpedient to reverse "the policy which was adopted with a view to the suppression of yaws."

In reply to this despatch, Governor Sendall again urged the views of Mr. Llewelyn and himself as to the advisability of closing the hospital, the number of inmates of which had been reduced from 150 to 90 by stopping admissions; but your Lordship informed him that you were "unable to sanction such a step without evidence that the Ordinance "of 1882 has been vigorously enforced and has nevertheless failed to check the progress "of yaws in the Colony."

Unfortunately, however, the Ordinance had not been rigorously enforced. The medical officer of the hospital in March, 1888, had pointed out that the police took no trouble in the mattter; and, in a depatch to Governor the Hon. Sir Walter Hely-Hutchinson on 30th September, 1890, the Protector of Immigrants sums up the question in the following significant words:—"There is a very good yaws Ordinance in the "statute book of the Colony. A great many people have power and authority under it, "but how many actually move in the matter? The Ordinance requires an officer in "charge of its machinery, to set it in motion and to keep it moving."

On the 7th October, Administrator Llewelyn wrote to the Colonial Surgeon suggesting that the medical officers should attend to yaws patients at dispensaries as was being done in Tobago, the Colonial Surgeon replied that the Tobago system might effect some good in the course of time, but he practically advised against it, and no further action was taken in the matter.

In the meantime the energetic action of Mr. Cropper in insisting that coolies affected with yaws should be promptly attended to had borne fruit, for the spread of the disease amongst them had been checked. In December he made a careful inspection of all the coolies on the estates under his supervision, and he reported as follows:—"This "inspection shows an increase on the report for the September quarter, but still a small "number of cases compared with the record of the March quarter. It also shows, so far "as time allows a judgment to be formed, that the disease is tractable; that if means be "employed for systematically searching it out, its haunts can be traced and vigorously "dealt with; and that if not completely stamped out by active medical treatment, only "the few incurable cases would remain to die."

The effect on the creole population of the discharge of the yaws constable, and the stoppage of admissions to the hospital were disastrous, for the disease again made headway, and the results of the heavy expenditure on the yaws administration were being fast swept away.

On the 23rd December the medical officer of the hospital reported to the Colonial Surgeon as follows:—"The disease greatly diminished whilst the patients were being "hunted up, but from what I hear in the old haunts it is showing itself again as strong "as ever, and I am of opinion that something must be done to eradicate the disease, or "we shall have some of the black troops down with it." The Colonial Surgeon, in his observations on this report, said:—"I think there need not be the slightest fear of any "of the black troops contracting the disease. The clean, well-fed, and well-housed, are "safe." In this opinion, however, he is wrong, for ample evidence will be adduced in this report to show that when placed within the operation of the contagion, even people in the upper ranks of society may become affected. Some of the replies of the medical men to the interrogations give examples of even Europeans and their children having contracted the disease by going amongst the people in places where the disease has prevailed. The fear of the extension of yaws to the black troops is one that in the circumstances is not groundless, and this question opens up another view of serious import, and points to the necessity of every effort being made to keep the disease within control. It may be stated in connection with this matter that Lempriere* mentions the fact of white soldiers being attacked with yaws in Jamaica. He says that flies infect the ulcers with the contagion of the disease, and proceeds to assert that "In this manner, the yaws has been "communicated to a whole ward, with ulcers."

Notwithstanding the explicit instructions from the Colonial Office the island authorities did not countermand their orders given in June for the gradual closing of the hospital by stopping admissions. In his report for the year 1889 the medical officer in charge states as follows:—"We began the year with 88 males and 74 females, and "continued well for the first six months, admitting 45 males and 36 females, when we "received an order from the Governor not to admit any more creoles, but only coolies, "with the result that in the last six months only eight males and five females were "admitted. This course of action will allow the disease to regain the ground that we "have been struggling for for seven long years."

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* "Practical Observations on the Diseases of the Army in Jamaica." Vol. II. London, 1799.

It will be observed that, owing to the insistence of the Protector of Immigrants, the coolies affected with yaws had been admitted to the hospital with the most satisfactory results, as shown in the report of this officer for the year 1889. He says :—

"The year was not distinguished by any other remarkable incident, unless an "exception be made regarding the treatment of yaws at Rat Island. This disease prevails "more or less in all these Colonies, and as it does not exist in India, the greatest care has "been taken to prevent its being carried to that country by immigrants returning home. "The Asylum for this disease having been removed to a little island in the neighbourhood "of Castries the greatest facilities for cleanliness were afforded by the easy access to the "sea.

"The treatment of the patients in the Asylum at Rat Island was watched with "considerable interest by this department, and months after patients were discharged "they were visited in every part of the Colony, and subjected to most searching exami- "nation to test the efficacy of the treatment. The result was successful beyond "expectation. And I take it to be established that the disease is very tractable, and that "when it is promptly brought under treatment, a few months suffice to cure cases of "large and multitudinous eruptions. If provision could be made for keeping the cured "cases for a few months under medical surveillance, on good diet and separate from those "still suffering, the cases of relapse that occur might disappear."

This report is very instructive as indicating what is possible to be done as regards the creole population if the direction of affairs be in the hands of an officer armed with ample power, and energetic in the performance of his duties. Mr. Cropper had to deal with the outbreak of the disease amongst the coolie population of the Colony. Recognising at once the gravity of the question, and fearing that the disease might be conveyed to India by returning immigrants whose period of indenture had expired, he set himself to work to carry out the terms of the Yaws Ordinance as regards the people under his protection. In the face of executive opposition and no ordinary difficulties, he persevered in his course, and was able to report that "the result was successful beyond expectation." And his experience proves incontestably that the treatment of the patients in the special hospitals is efficacious notwithstanding the relapsing nature of a small proportion of the cases. What can be done in regard to one section of the population is possible to be accomplished in the other, even though extra difficulties have to be surmounted.

On the 25th April Administrator Llewelyn called upon the Colonial Surgeon to obtain from the district medical officers reports as to the prevalence of the disease throughout the island. The following extracts from the reports will give a fair idea of the condition of affairs in May, 1890 :—

Colonial Assistant Surgeon Proctor :—"The disease had broken out among the "coolies at Morne Courbaril Estate some time ago, and some of the cases still remain at "the yaws hospital, but among those who were discharged from the yaws hospital, now "some considerable time ago, the disease has not recurred. Among the native population, "however, I think the disease is spreading slowly but surely. The native never seeks "medical advice, the disease being generally kept a secret, except manifest signs urge the "neighbours to seek safety by reporting the cases. I fear from these causes that yaws "may be even more prevalent than I am aware of."

Colonial Assistant Surgeon Lestrade :—"It is impossible for me to make a report of "the number of cases of yaws in my district, for the simple reason that cases of yaws "shun the medical officers like poison ; you only find them out when they come com- "plaining of disease, but not in the least suspecting the case is yaws. Formerly, when I "had found out such cases, I used to report them to the officer in charge of the station, "but now I simply give them medicines and send them away, as I was told it was useless "to report these cases any more to the officers in charge of the stations. There used to be "a man who hunted them out, and brought them to Castries, but he comes no more. "Even then his visits were sometimes futile, for they used to evade him. I only know "at present of three persons with yaws in the district, though I am certain there are "many more, and these are the two boys of Hyacinth sent from the hospital, and another "of his I found out in his house, and whom I suspect he was hiding."

Colonial Assistant Surgeon Galgey :—The greater part of the report of this officer is taken up by an attack on the administration of the yaws hospital that it is unnecessary to reproduce here. He says he is "not in a position to supply the actual number of yaws cases" in his district, as very few had come under his notice, and, in reference to relapses, of which he states he has seen many, he writes as follows :—"It is acknowledged by "authorities on yaws that a few months after the first attack had apparently come to an

" end, a second eruption, generally milder than the first, is liable to appear. This is so " well known that the term ' Ratoon yaws ' has been applied to it."

Colonial Assistant Surgeon Tabone :—" I have been in some parts of this quarter to " look for yaws, but although I know there are a good many (from information) I cannot " find them out, as I do not know their names, and, besides, when they see me they hide " themselves, and shall never come across them unless I would be authorised to take with " me one of the police constables, who, of course, will claim a fee for his day's work. " Shall I do so? The same, I should say, will occur in the Micoud quarter."

Colonial Assistant Surgeon Norton :—" Yaws are spreading since the hospital was " closed to creole patients. In the heights of Ance Galet and Roseau, also in Ance la " Verdure there are many cases. In the heights of Union, Dr. Galgey's district, there are " several cases, and one case came down from Marquis covered with yaws, and begged of " me to take him into the hospital, and so I told him to get an order from His Honour, but " from that day to this I have not seen him again."

In sending on the reports of the district medical officers, the Colonial Surgeon stated that by the appointment of a yaws constable, and the prompt hospital treatment of all cases found, " a considerable impression had been made towards eradicating the " disease," and said that at least eight or ten years should be allowed for a fair trial. He reported against the Tobago system, and asserted that no other method than hospital treatment would have the slightest effect.

Administrator Llewelyn considered these reports, and then wrote a minute to the Colonial Surgeon in which he gave his opinion that " Asylums are a failure, and " most costly experiments to the Colonies which have them," and said that he was awaiting a definite answer from the Secretary of State on the question of closing the hospital.

Early in June, six " free " coolies suffering from the disease were sent into the hospital by one of the medical officers, and some correspondence took place on the subject, and the Administrator issued the following orders to the Colonial Surgeon :— " The only way to gradually close the yaws hospital is not to admit fresh cases. Do " not hunt any up. Let them come in voluntarily, and if they do, receive them."

In September, the Protector of Immigrants brought the whole question of the extension of the disease to the coolies before Governor Sir Walter Hely-Hutchinson, and in his despatch he made the following statement:—" In the course of six or seven " months 600 coolies will be landed in St. Lucia. One-third of them are to be located " on Crown Lands Estate, which has now become a nursery of yaws. If the new " comers be exposed to contact with this unsightly disease, they will surely fall victims " to it."

By this time the report of the medical officer for the year 1889 had reached the Colonial Office, and your Lordship wrote to the Governor as follows :— " I observe that " in Dr. Dennehy's report, the orders given by Sir Walter Sendall for closing the Yaws " Asylum are referred to as though they were still in force. I presume, however, that " the order was countermanded in pursuance of the instructions contained in my " Despatch No. 104 of the 1st October 1889." As I have pointed out, however, the instructions from Downing Street had not been given effect to, and it was not until the visit of Governor Sir Walter Hely-Hutchinson to St. Lucia about September, 1890, that the order for closing the hospital was countermanded.

By the end of the year 1890, the new hospital at Rat Island had been opened a little over two years, and the work that had been done during this period will be seen by the ollowing Table :—

Years.	Number of cases treated.	Discharged.		Deaths.
		Cured.	Not improved.	
Rat Island Hospital:				
October to December 1888 - - - -	211	43	5	2
1889 - - - - - - - - -	256	200	5	6
1890 - - - - - - - - -	110	62	2	5
	577	305	12	13
Morne Fortuné Hospital: 1st October 1882 to 30th September 1888 (six years) - - - - - - - -	1,411	749	8	27
Totals for both hospitals - - -	1,988	1,054	20	40

These figures show an increased mortality at the new hospital. At Morne Fortuné the rate per thousand was 19·1, and at Rat Island it rose to 22·5.

The unfortunate system of discharging cases "not improved" had been continued, and as it appears that over 2 *per centum* of those admitted were sent away to their friends with the disease in an aggravated and obstinate form, no doubt the discharge of these patients helped in a measure to increase the spread of the malady.

Taking the returns of both hospitals, it is seen that in the eight years and two months, from October, 1882, to the end of 1890, no less than 1,988 persons had been under treatment in the yaws hospitals. The population of St. Lucia, according to the census of 1881, was 38,551, and at the last census it had increased to 42,220. It may, therefore, be considered that the mean population of this decennial period was a little over 40,000, which shows that about 5 *per centum* of the people of St. Lucia have been under treatment in the yaws hospitals.

The expenditure on the hospital for the three years ending 1890 was as follows:—In 1888, 1,040*l.* 9*s.* 2*d.*; in 1889, 883*l.* 8*s.* 3*d.*; and in 1890, 527*l.* 17*s.* 3*d.*—making a total of 2,451*l.* 14*s.* 8*d.* But if to this sum be added 2,000*l.* expended on the buildings at Rat Island in 1888, it is found that nearly 4,500*l.* have been spent by the colony under the head of "yaws" during the three years. Taking the figures for the years 1889 and 1890 as the basis of calculation, I estimate that 7,665*l.* have been expended on the hospitals from October 1882 to the end of the year 1890. Adding to this sum the cost of the buildings at Rat Island, it is found that the total expenditure for the eight years and two months, without counting what was spent on the buildings of the Morne Fortuné Hospital was 9,665*l.*, and this gives a sum of 4*l.* 17*s.* 3*d.* expended by the colony on each patient admitted to the institution.

It had been proposed to make certain alterations at Rat Island in order to provide convalescent wards and cells for refractory patients; but it was decided to wait for my report before action was taken, for the various Governments had been informed of my intending visit to inquire into all matters relating to the disease. On several occasions there had been disturbances at the hospital, and as the patients could not be sent to the gaol for fear of spreading the disease amongst the prisoners, it was suggested by Governor Hely-Hutchinson to have cells at Rat Island, and to legislate so as to enable the magistrate to try cases there, and to carry out the sentence on the island.

I arrived at St. Lucia from St. Vincent on the 23rd June, and left on the 21st July for Antigua, *viâ* Dominica, thus spending four weeks in St Lucia. I called on Dr. Gouldsbury, C.M.G., the Administrator, on the day of my arrival, and he was good enough during my stay to do everything in his power to further the object of my mission. A considerable time was taken up in examining the documents in order to make myself conversant with the leading facts of the past history of the disease in the colony. There was some delay in obtaining all the documents I required to examine and have copied, for as the Government offices were undergoing repairs, the various departments were in confusion, and it was difficult to find what was wanted.

On the 28th June the Colonial Surgeon visited the yaws hospital at Rat Island with me. The island is very small, and at some little distance from the coast of St. Lucia, so that none but a very good swimmer could cross the channel. The buildings are very well adapted for a yaws hospital, but they are in a state of disrepair. Greater isolation of the sexes is necessary, and more precaution should be taken to stop unauthorised communication between the patients and their friends. A boat is kept on the shore, but landing is difficult, and a small jetty should be erected, and a boat-house built, in order to secure the boat under lock and key. I learned that several inmates had got possession of the boat without being seen, and thus effected their escape.

At the time of my visit there were altogether 32 inmates, 15 males and 17 females. Several of the cases, however, were lepers, with no sign of yaws about them. Separate accommodation should be found elsewhere for lepers, for it is wrong in every way to place these unfortunate people amongst persons suffering from a loathsome contagious disease like yaws. A few of the patients were cachectic and tuberculous; and one very interesting case, that of a negro boy, 14 years of age, was the subject of *Tinea tropica*, in a very bad form, and the margins of the parasitic patches that had doubtless been abraded by scratching were covered with the typical yaws incrustations. Most of the inmates were taking a mixture containing mercury, arsenic, iodide of potassium, and cinchona, and the ulcers were dressed with iodoform and carbolic acid ointments. The dietary of the hospital will be found in the Appendix.

On the 30th June I rode across the island to Dr. Tabone's district. In passing through the Mabouya Valley I saw a coolie man carrying a child with the encrusted yaws tumours all over its face. As the coolie spoke neither English nor creole French, I was unable to obtain any information regarding the child.

There were no cases of yaws in the town of Dennery, but I found a coolie child in the district hospital suffering from the disease; there were also in the institution several cases of the so-called "coolie itch."

On the 1st July Dr. Tabone and I rode on to Micoud, but we were unable to find any persons suffering from yaws in the village or in the vicinity of the public road. I was surprised at this, for Mr. J. A. Cooper, the warden of Micoud, had written on the 24th March a letter, which will be found in the Appendix, stating "the fact of "the prevalence to a most frightful extent" of the disease in the Micoud quarter; that "in four or five houses which were visited there were found about 13 cases of persons "affected," and recommending the Government to employ native "experts" to treat persons suffering from yaws.

Unfortunately Mr. Cooper was not at Micoud at the time of my visit, but he called on me afterwards, and made various statements concerning the failure of the hospital treatment, and concerning his belief as to the efficacy of the remedies of the bush doctors. I took considerable trouble to inquire into the matter, and the whole correspondence is appended to this report. I shall have occasion to allude to the matter later on, but I would here say that, whilst Mr. Cooper's details of the native treatment are extremely interesting, his assertions made in the exaggerated language usually employed by believers in empiric methods of treating disease were not borne out by the facts observed by me and other medical men, and his attack on the efficacy of the treatment of the patients at the yaws hospital is proved to be unjust and unfounded. Indeed, the incontrovertible testimony of the Protector of Immigrants is to the effect that the medical officers understand the disease, and are able to cure it.

Whilst at Micoud, I heard of cases of yaws hidden away in the heights of Canelles; and Mr. St. Croix, a shopkeeper in the village, told me that there were no affected persons in the vicinity, but that a few were hidden in inaccessible parts of the interior. He said that "when persons get yaws, their relations or friends take them into the "mountains of the interior of the island, and build an ajoupa" [a Carib name for a native hut roughly constructed from forest materials] "for them in an isolated and "secret spot, and place them under the care of native yaws doctors."

On the 6th July I left Castries for the southern part of the island; and, on the following day, accompanied by the Hon. Henry Reeve, Director of Surveys for the Windward Islands, and M. Charleroy, a French gentleman residing at Morne Lézard, I visited the heights of Choiseuil, and found some yaws cases at a small settlement beyond a place called Coco-nut. The distance in the interior was considerable, and the bridle path was little better than a goat track. We had to dismount and drag our horses across ravines and up steep hill-sides, where the path had been nearly washed away by heavy rains. In one wretched hut I found a woman and two children, all of whom had yaws. The woman became very angry and abusive when I alluded to the disease as "Pian"—as yaws is called by the French creoles—she said it was "Bouton coolie," the name in the patois for the "coolie-itch." Afterwards, however, when I told her that I was not going to send her and her children to the hospital, she admitted to me that the disease was yaws. All the cases had the characteristic encrusted "tubercles," and maculæ showing the sites of former yaws excrescences.

On the 8th July I reached Vieux Fort at the extreme south of the island, and was received by Dr. Lestrade, the medical officer of the quarter. At the district hospital was a case of yaws and elephantiasis in an old negro, and there were several cases of the coolie-itch, that Dr. Lestrade thought to be *Impetigo contagiosa*.

After visiting the hospital, we went to a small house in the town of Vieux Fort, the occupant of which was a celebrated "yaws doctor" of the district. The man was away, but we found his wife and three children all to be suffering from the disease, two of the children being very bad. On seeing the medical officer the woman hurried one of the children away, but Dr. Lestrade ran round the hut and caught the child. One boy, ten years of age, had been an inmate of the yaws hospital, and he was given up to the father by the orders of a former Administrator as an experiment, for the father had asserted that he could cure the child, and promised that he would allow the district medical officer to see the details of treatment and to watch the progress of the cure. The case was visited by Colonial Assistant Surgeons Norton and Lestrade, but the father had failed to cure his child, whom I found in a pitiable condition. He had many yaws tubercles and ulcers, and was scrofulous. Dr. Lestrade considered that he had been half-poisoned by the mercury administered by the "yaws doctor."

On the same day I rode on to Canelles, a sugar estate on the windward side of the island, and there met, by appointment, Mr. J. A. Cooper, the warden of Micoud, and he piloted me to a settlement of squatters on the crown lands of the interior heights to see

some cases of yaws said to be hidden there. Travelling was difficult and fatiguing, as there was no regular road to the place. We got to the heights of Canelles estate, and passed on to the crown lands, where we came to a straggling settlement of considerable extent. In one miserable and dirty hut we found a woman and her two children with yaws in an advanced stage. Afterwards, in riding along, I noticed a girl running away. I jumped off my horse and pursued her, and she took refuge in a hut. I went inside, and after my eyes got accustomed to the semi-darkness, I noticed that the interior of the hut was divided into two by a mud and wattle partition. On going into the inner compartment, the girl was not to be seen, but under a rough platform of boards that did duty for a bed in the unfloored chamber, I noticed a bundle of dirty rags and a foot sticking out from it. Pulling at the foot I drew out the child, and found the poor creature to be a repulsive example of the ravages of the disease. Her face was literally a mass of encrusted yaws tubercles, through which her bright eyes gleamed with a look of terror. I spoke soothingly to her and gave her money, when she became reassured and said she thought I had come to catch her to take her to the hospital. She had had the disease for nearly a year and been under the treatment of a native "yaws doctor," but evidently with little benefit to the poor patient.

In passing through the town of Laborie on the 7th July, whilst *en route* to Vieux Fort, I had requested the corporal of police in charge of the station to have the district searched for cases of yaws and to report the result to me on my return. I reached Laborie again on the 9th July, and the corporal said he had searched the town and that he had sent two road constables into the interior, but that they had not succeeded in finding a single person suffering from the disease. I heard afterwards, however, that there were yaws patients hidden in the district, and from the history of the disease in the island it is to be expected that such would be the case.

On the 10th July, I visited the hospital and the lunatic asylum at Soufrière with Colonial Assistant Surgeon Proctor, and had some conversation with him about the disease in his district. He had found recently several cases in a house close to the town, but they had not been sent on to the hospital. He complained of the extreme difficulty in finding out the cases; indeed, the careful way in which persons suffering from yaws are hidden is soon evident to even a casual observer. This is due partly to the aversion of the negroes to the restraint of a hospital, and partly to the belief amongst them that the medical men are unable to cure the disease. This belief prevails most in those islands where the French patois is the language of the people, and I regret to have to say that this belief is frequently stimulated by those whom from their position and education one would expect a different line of action. Happily, however, this idea is becoming changed, for in Grenada, St. Lucia, and Dominica many of the people now apply voluntarily for admission into the hospitals for themselves or their children.

The following extract from the report on the St. Lucia Census Returns for 1891, is interesting as showing the difficulties the authorities have to deal with in regard to finding out cases of yaws:

"The schedules which were received in the Colony for the purposes of the census "had a column in which inquiry was made for the number of lepers. From it yaws "were omitted. As a consequence, few volunteered any information in respect of the "latter disease. Of yaws at large, only 10 cases were returned, viz.:—nine in the "Castries district, and one at Gros Islet. I have excluded 'yaws' from Table XI., as "the information given is deceptive. Vieux Fort, known to contain within its boundaries "the hot-bed of the disease, returns not one. It is not certain that, if the schedule had "been complete in this respect, a reliable return of persons suffering from the complaint "would have been obtained; for, even when discovered, sufferers have had to be removed "from their residence to the asylum, by force."

"*Dermatitis Orientalis.*"

A skin eruption that has a superficial resemblance to yaws appears to have been introduced into the island by the East Indian immigrants. It is called by most of the medical men "eruption" or "coolie-itch," and by the creoles "bouton coolie." I made a careful inquiry into the matter, and at the Colonial and District Hospitals examined a number of cases. The disease is said to be highly contagious, to take from six weeks to several months to cure, and to be liable to relapses. At times there are successive crops of the eruption. Mr. Norton, the medical officer in charge of the yaws hospital, informed

me that he had seen a chronic case in which five successive crops evolved. He treated his cases with two grains of the sulphurated potash, to be taken three times a day, and to the ulcers he applied the ointment of the same drug. The eruption first appears as a small vesicle, which becomes pustular; the yellowish pus then partly dries and forms a moist gamboge-coloured crust. Under the crust the skin ulcerates, and the ulceration spreads and may join other ulcers produced in the same way. On removing the crust a shallow dirty ulcer is seen of an irregular shape and with sharply defined edges. The pustules and ulcers are very painful, and the patients appear to suffer constitutionally from the disease. Adults are more frequently attacked, but many children also suffer from the affection, which appears to have been unknown in St. Lucia until after the arrival of the East Indian immigrants. A tonic general treatment is adopted by the medical men; and, as regards local treatment, the crusts are torn off with a pair of forceps and a stimulating antiseptic ointment applied.

It was thought by some of the medical officers that the disease was *Impetigo contagiosa*, and others thought it to be true itch. Whilst at the hospital I made a careful search for a parasite but found none; it is, therefore, not an "itch." One patient at the hospital, a coolie man thirty years of age, had many pustules about the body and on the arms and legs. Under a Coddington lens the smaller pustules were seen surrounding the hair follicles, the hair, or hairs, if close together, springing out from the summit of the pustules. There were no means in the colony of performing any culture experiments, but on examination of some stained cover-glass preparations I found both micrococci and bacilli, but careful bacteriological work extending over a considerable time will have to be performed before it can be determined whether either of these micro-organisms is the virus of the disease. It appears to me, however, that the so-called "coolie-itch" has a microbic origin.

I suggested to the members of the profession in St. Lucia the name of *Dermatitis orientalis* for the disease, and I drew up the following table of diagnosis between it and *Impetigo contagiosa*. The malady, although new to the West Indies, may be well-known in the East. It is probably identical with, or closely allied to Bouton de Biskra, Delhi boil, &c.

Impetigo contagiosa.	*Dermatitis orientalis.*
1. Attacks principally children.	1. Attacks principally adults.
2. Crusts dry.	2. Crusts in early stages moist.
3. "Spots" isolated.	3. "Spots" frequently confluent.
4. Eruption uniform in character.	4. Eruption difform.
5. Commences about the face and head.	5. Commences on exposed surfaces of body and limbs.
6. Crusts circular.	6. Crusts of varying shapes.
7. Crusts flat.	7. Crusts frequently elevated and rounded.
8. Painless.	8. Painful.

Although, as I have said, *Dermatitis orientalis* has a superficial resemblance to yaws, the diagnosis is easy on removing the crusts, for in the case of yaws the granuloma may be seen at the early stage, although it may later on break down into ulceration. And then the squamous and papular eruptions of yaws, and the maculæ left by the absorbed granulomata are absent in *Dermatitis orientalis*, which appears to be an inflammatory disease, whereas yaws must be classed amongst the neoplasmata. Dr. Lestrade stated to me that, in his experience, the so-called "coolie button" eruption is most prevalent in those places where yaws cases occur in the greater number, as for instance at the Hope Estate. I saw several cases pronounced to be coolie-itch that were undoubtedly yaws, for on removing the crusts the granulomata of that disease were disclosed, and at various parts of the body the characteristic maculæ were to be seen.

VII.

History of Yaws in Antigua.

Yaws existed in Antigua during the time of slavery, and although I have not been able to discover any direct evidence of the system adopted by the planters to prevent the spread of the disease from those imported negroes who were suffering from it, the plan of treatment in yaws houses adopted generally in the West Indies, was no doubt also established in Antigua. The island is flat; there are no forests or extensive tracts of Crown land; and, at an early period of its settlement, the country was cultivated throughout its whole extent. Cases of yaws would, therefore, easily be detected, and the organised system of segregation adopted by the old West Indian planters, was likely to keep the disease under control during the period of the slave trade, and to cause its elimination after the influx of Africans was stopped. The late Dr. Imray—whose active professional life in Dominica bridged over the time from pre-emancipation days to the present era, with its colonial hospitals and district medical officers—in his Memoir on Yaws, written in 1872, stated, "I am informed that it [yaws] disappeared early in the present century." And Dr. Milroy, in his Report, published in 1873, says, "Dr. Nicholson, of Antigua, "assured me that, during a practice of nearly 50 years in that colony, he had never met "with an instance of the disease." Dr. Nicholson, who was at the head of the medical profession in the colony, was one of the ablest West Indian practitioners of the day, and his extensive "estate practice" brought him much in contact with the labouring population of every district of the island. His testimony, therefore, is conclusive, and it may be accepted as a fact that, from early in the present century until the year 1872, Antigua was free from the disease. And it was not until two years afterwards, viz., in 1874, that there was any evidence of cases having been seen in the island. Thus, for a period of considerably over half a century, the country was rid of yaws. This fact is most interesting and instructive. There is nothing in the people themselves, or in their hygienic or sanitary condition, that would tend to exempt them from its ravages. On the contrary, the public statements of Government officers, and the replies by the local medical men to the interrogations, show that the conditions under which the people live are deplorable in the extreme.

In his Report on the Blue book for 1863, Mr. E. D. Baynes, the Colonial Secretary, in referring to the diminution of the population of Antigua, alludes to the condition of the people in the following graphic manner: "Upwards of one-half of the labouring popula- "tion live in what are called 'free villages.' In these villages, 80 in number, most of "which were established immediately after the emancipation, some neat and well-ordered "cottages belonging to tradesmen, small shopkeepers, and head workmen are to be seen, "but in the majority of instances, especially in the villages at a distance from St. John, "the plot of land purchased rarely exceeds 150 square feet in extent, and on a portion of "this a wretched hovel is erected, often containing but one room, and that unfloored and "imperfectly ventilated, and in which not unfrequently five or six persons, adults and "children of both sexes, sleep together at night. These evils are considerably aggravated "by the great scarcity of water, the villages being wholly dependent for a supply on the "ponds of the neighbourhood, the water from which, in a dry season, is generally muddy, "foul, and stagnant." . . . . . "Notwithstanding these endeavours on the part of "those in authority to raise the moral and sanitary condition of the people, the annual "returns exhibit the unaccountable but undeniable fact, that instead of an improvement, "there has been a positive retrogression in both these particulars. The labourer seems "insensible of the advantages which would accrue to himself and family from free venti- "lation, cleanliness, and an adequate supply of pure water, and would not willingly "contribute his labour or his money for either of such purposes. It has been found "impossible to induce those residing in the villages to give even a couple of days' work "in cleaning the ponds in the immediate vicinity of their dwellings, hence the ponds "have either to be cleaned at the expense of the general revenue, or from the want of "cleaning get filled and become useless. Experience has fully shown that some legisla- "tion is absolutely necessary for protecting the labourer against the effects of his apathy "and indifference to all matters relating to his sanitary condition; such interposition "seems to be now imperatively called for."

On the 26th August 1873, Governor Sir Henry Irving, in an able and extremely interesting Message to the Legislative Council, thus alludes to the condition of the bulk of the population of the island: "No doubt the poverty of the people, and the privation

" and want resulting from frequently recurring droughts, are fundamental causes of much " of the distress which exists, and of the low moral and social condition of the people. " But it is unquestionable that those results have been largely aggravated by neglect and " want of supervision. The result of allowing large villages of negroes to grow up under " no sort of governance might indeed have been foretold."

Nothing was done by the Legislature to remedy the evils brought to their notice by the Governor, and on 21st August 1879, Governor Berkeley thus alluded to the matter in his address to the Council : " My predecessor in a Message addressed to your Honourable " House in the year 1873, called particular attention, among other things, to the excessive infant mortality prevailing more especially in the country districts, and proposed " certain remedial measures with the view of meeting the evil. No steps, however, were " taken by the Legislature on the occasion, and it being apparent from the recent Report " of the Registrar General that no favourable change has taken place since in this respect, " I intend, with the advice of the Executive Council, to nominate a Commission to inquire " into and report upon a subject so closely connected with the first interests of the country, " and I trust before long to be in a position to lay my suggestions before you in a tangible " form, relying on your co-operation with the endeavours of the Local Government to " remove a reflection that under present circumstances must rest on all classes of the " community."

It would appear that matters remained in the same state notwithstanding these efforts to ameliorate the condition of the people, for the recent interesting reports of the Registrar General show high death-rates, excessive infant mortality, and a state of moral and social degradation amongst the people.

If, as inferred by Dr. Gavin Milroy, yaws could be " engendered, amid poverty and " its ordinary accompaniments of squalor and semi-starvation," why were the people of Antigua free of the disease from pre-emancipation days to the time when Governor Irving held up to the island legislators so sad a picture of the poverty and distress of the labouring classes? There is no necessity, however, to seek far for an answer to such a question, for yaws is a disease, *sui generis*, incapable of being generated *de novo*, and dependent for its spread entirely on contagion.

The earliest recorded outbreak of the disease in Antigua, in recent times, occurred at Betty's Hope Estate, in 1876. The cases were detected and treated by Mr. A. E. Edwards, who was, I understand, in charge of the " estate's practice " at the time. He was good enough to refer to his notes at my request, and he wrote to me as follows :— " With regard to our conversation a few days ago *re* yaws, I may mention that the first " time I met with this disease was in 1876, when I discovered three cases, all of one " family, and all children at Betty's Hope Estate—the parents living in the same house " were not afflicted. I have at different times come across cases in St. John's, the last " about a year ago, a little girl living in one of the outhouses of the rectory. This case " was at once isolated, and put under treatment, with plenty of good animal food, and " soon got all right."

From 1876 to 1883 there is no Government record concerning the disease, but in March of the latter year Dr. McHattie had a case of yaws brought to him in the city of St. John's, and he immediately wrote to the Colonial Secretary as follows:— " I have the " honor to report to his Excellency a case of yaws, in a child, which was brought to me " for treatment this morning from Potter's village. The disease is new to me, but it " answers exactly to the description of that disease, and Dr. Duke, who was familiar with " it in Dominica, says that it is a clearly-marked case of yaws. The mother states that " the child got the disease from a boy from Parham, who had been at Potter's for a short " time, and who was under Dr. Pierez's care."

On the receipt of this letter the Governor, Sir John Glover, G.C.M.G., directed that a circular despatch should be sent to all the medical officers requesting information as to the existence of the disease in their districts, and the following results of this inquiry give a good indication of the condition of the island at that time in regard to yaws.

District No. 1. Consisting of the city of St. John and its suburbs contained, according to the medical officers, no case of the disease; but Dr. Mackie, in his reply to the first interrogation, states that he saw a few cases in St. John's between the years 1882 and 1884.

District No. 2. Consisting of the parish of St. John, exclusive of No. 1 district; Dr. McHattie, the medical officer, reported as follows :—" I have the honor to report . . . . . " that I visited most of the villages in my district, and that I have not seen any case of " yaws excepting at Potter's village, where there are several cases of that disease under " treatment."

District No. 3. The parishes of St. Peter and St. George. There appears to be no report from this district, but there is conclusive evidence that the disease existed there. Dr. McHattie was informed that the child brought to him on the 12th March caught the disease from another child residing at Parham; and Dr. Pierez found a case in Parham on the 7th January.

District No. 4. The parish of St. Philip. Dr. Pierez, the medical officer of this district, who had formerly been stationed in Dominica and Montserrat, and was, therefore, well acquainted with the disease, thus reported :—"In reply to your circular . . . . I have "the honour to inform you that I have made diligent inquiry on the subject, and that I "have discovered four new cases of yaws, one in Parham (during my stay there as acting "medical officer) and the others in my district. They are as follows :—

1. *Ellen Joseph*, six years (child of Wm. Joseph and Sarah Adams), Freetown. "Discovered on 18th March 1883. Yaws of one month duration. No history to be "got.

2. *Lydia George*, 10 months (child of Maria George and Geo. George), Willikies. "Discovered on 19th March. Brother had yaws. Was cured in January 1883.

3. *Catherine Ann Charles*, one year (child of David and Felicia Charles), Seatons. "Discovered on March 26th. Yaws of one week's duration. No history discoverable.

4. *Charles Thomas*, four and a half years (child of Emanuel and Mary Thomas), "Parham. Discovered on 7th January. Yaws of two weeks' duration. No history "discoverable.

"My last note with regard to case 4 runs thus: 24th January. 'Tubercles drying up.' "I left Parham immediately after that date, and can give no more information with "regard to the further progress of the case. The total number of cases of yaws that I "have discovered in my parish (with the exception of the one in Parham) is 18—with "the case in Parham, of course, the number is 19. Of these nearly all are cured, except-"ing the most recent ones which are still under treatment. I have no other cases so far "as I can ascertain in my parish. All my cases have been regularly reported to the "Senior Medical Officer or to his Excellency."

District No. 5. The parish of St. Paul. Dr. S. Bernard Broome reported as follows :—"After visiting the different villages, estates' shops, in district No. 5, and having "made careful inquiries from ministers, estate managers, police, &c., I have not been able "to discover anyone suffering from the disease called yaws. I have always supposed the "island of Antigua to have been remarkably free from this disease, and I cannot recollect "having seen a single case of it in District No. 5, during my residence in it. Trusting I "shall not be thought to presume I would suggest that on the discovery of cases in the "districts, a Board of medical men should be called together to render the diagnosis of such "cases certain, and under his Excellency's direction to take measures for their suppression."

District No. 6. The parish of St. Mary. There appears to have been no report from thsdi strict.

A consideration of these reports shows that the disease which had been first seen in Antigua in 1876 at Betty's Hope, a place towards the north-east of the island, had spread slowly but surely towards the east, the north, and the west.

Nothing, however, appears to have been done by the Government to control the spread of the malady, and there is no document to be discovered referring to the question of yaws from this period until the end of the year 1885, when cases were reported to have been seen in their districts by two of the medical officers.

A case was found in district No. 3 by the medical officer, and he at once attended to the matter, but he reported that it was not possible to isolate the patient. He said, "I "find difficulty in preventing the diseased child from mixing with other children, although "certain instructions have been given to the parents, which, however, I regret to say I "have no power to enforce." And about the same time he reported two fresh cases, which he had placed under treatment, in Pares village.

In the St. Philip's district, which is the farthest part of the island from the capital, the disease appears practically to have become endemic; and, in his report for the December quarter of 1885, Dr. Pierez makes the following significant statement :—"During "the quarter 12 new cases of this loathsome disease [yaws] have come under my immedi-"ate notice, most of whom, I am glad to say, are better. For the whole year I have "attended 22 cases of yaws. This is a disease that was thought not to exist in this island "when I undertook the charge of the Parish. In the year 1882 when I came to the island, "fresh from the yaws horrors of Dominica and Montserrat, I ferreted out two cases of

"the disease. In 1883 I treated 18 cases; in 1884, 14; and in 1885, 22; which "makes a grand total of 65 cases of yaws seen and treated by me in Antigua."

In his report for June 1886, Dr. Pierez states that he has had six cases of yaws under treatment, and he makes the following observations on the sanitary condition of his district:—"I have continually to order the removal of large accumulations of filth "that are heaped up all around the huts, but my orders are seldom or very rarely carried "into effect, though they are generally received very respectfully, as if the natives were "perfectly aware of the fact that dirt and health do not go hand in hand together. I "would strongly recommend the appointment in each parish of an inspector of nuisances, "whose duties would be to keep the villages clean. For, though each sergeant of police "is also inspector of nuisances, it is a matter of no little difficulty for him to attend to "all his multifarious duties. He might be ever so zealous an officer, but he really has no "time to devote to the cleaning of his villages. Anybody who will visit the village of "Willikies will see for himself the force of the suggestion that I have made with regard "to the appointment of a special officer on whom would devolve the duty of seeing the "villages kept properly clean."

In his December report he again draws attention to the deplorable condition of the villages, and says:—"I would here once more again urge upon the Government the "necessity of appointing a village inspector, whose chief duty it would be to see that the "inhabitants keep their premises clean."

In nearly all the medical reports, and in the reports of the Registrar General, the unsatisfactory condition of the villages is alluded to, and the latter officer, in his report for the year 1885, concludes a long description of the state of affairs by stating: "One "wonders how life is sustained in the midst of such surroundings."

During the year 1887 Dr. Pierez reported fresh cases of yaws, and an outbreak of the disease was reported in the St. Paul's district (No. 5), where four years before all the villages were carefully searched by Dr. Broome, with the result that not a single case could be found. In his report for the June quarter Dr. Mackie, the present medical officer, says:—"There are still three cases of yaws in Liberta; I believe there are really more. "The disease was imported from Martinique." In his next quarterly report he says:—"Five new cases of yaws came under my treatment; every child treated by me for that "disease attends a private school in Liberta; I have been unable to persuade their "parents to keep them at home until the disease has been cured."

These facts are extremely interesting, and they illustrate well the way in which the disease is propagated. I shall have occasion to allude later on to this importation of the disease from Martinique, full particulars of which are given by Dr. Mackie in his reply to the 9th interrogation.

This new focus of contagion naturally greatly assisted in the spread of the disease, and St. Paul's district soon became as badly affected as St. Philip's, where (according to Dr. Pierez's reply to the first interrogation) he had treated over 100 cases in a few years. The disease, too, which had at first affected only the poorer negroes, began to spread amongst other sections of the population, for Dr. F. J. Freeland, in replying to the fourth interrogation, states that he has "seen cases among the poorer class of Portuguese; also "in coolies." There are, however, very few coolies in Antigua, but the Portuguese are a numerous and an important section of the people.

No action was taken by the Government either to stay the spread of the disease or to endeavour to improve the sanitary condition of the villages until February, 1890, when a Bill for the creation of local sanitary authorities was introduced into the General Legislative Council of the Leeward Islands. In his address to this body on the 1st February, the Governor, Sir William F. Haynes Smith, alluded at length to the Bill; and as his remarks are instructive, as showing that at last the Government had awakened to the necessity of making an effort to remove the deplorable causes of disease that existed not only in Antigua, but the other islands forming the colony, I give at length that part of his speech referring to the matter:—

"In proposing these measures I also ask you to strengthen and improve the local "control over matters which are essentially those best carried out by local authorities. "I refer to the present superintendence over the towns and villages of the colony, which "sadly lack more attention. There seems to have been no sufficient guard over the "public interest, and I had hoped that the Public Health Bill now laid before you might "have been made applicable to the whole colony. Some of the presidencies hesitate to "empower you to deal with the subject, and it is a matter on which I have been advised "the local legislature cannot now legislate, because some of the provisions affect the Acts "relating to lands. St. Christopher-Nevis has, however, passed the necessary Ordinance,

" and I ask your attention to the measure, which must now be limited to certain " presidencies, but which can hereafter be made of general application.

" The scheme of the Bill is that local authorities should be appointed for the different " towns and villages, and that these local authorities should have the ample powers given " in the various clauses. It is proposed that the local authorities in the larger towns, " though at first nominated until the machinery has been tested, should be subsequently " elected, and employ their own agents and servants, and that they should then levy rates " to defray their own expenditure.

" This Bill will show that it is quite practicable to enact general measures for the " colony permitting the freest and most independent local action, and providing for the " modifications which the varying circumstances of each locality may require. It gives " power to effect great sanitary improvements, and I trust that, in the hands of the local " authorities, it may be made of benefit to the community."

Unfortunately the Bill was not passed, owing, I believe, to the fact that there was some doubt as to whether the authority to legislate on the matter lay with the General Legislative Council of the Colony or with the Legislative Council of the Presidency of Antigua. That some such Act is urgently needed is shown by the fact that Antigua is the unhealthiest island in the colony, the death rate being 7·7 per thousand higher than that of the Leeward Islands generally, as will be seen from the table in the Appendix.

I arrived in Dominica from St. Lucia the 22nd July, intending to leave for Antigua by the first opportunity, but learning that the Governor was expected in Dominica I awaited him in that island, and left for Antigua on the 4th August, and reached my destination on the following day. Governor Haynes Smith and Mr. Evans, the Colonial Secretary of the Leeward Islands, gave me every assistance in their power, as did also the whole medical staff of the island.

As the various separate colonies that were formed into the single colony of the Leeward Islands in 1871 are now closely welded together, the government offices in Antigua, the seat of the government, contain a mass of official documents relating to all the islands of the group. A considerable time, therefore, was taken up in searching through the archives in the Governor's and the Colonial Secretary's offices to find out all the facts possible concerning the history of the disease in the various islands during recent years. The difficulty, however, here, as in the other colonies, was that the reports and other documents referring to public hygiene and medical affairs generally, are interspersed amongst the other archives in such a manner as to render it difficult, and sometimes impossible, to obtain all that has been written on any particular subject. I may, perhaps, be permitted to suggest to your Lordship, in view of the importance of questions relating to public health in these colonies—where the care of the lives of the people is practically thrown on the State—to issue general instructions that all documents referring to medical questions be properly filed in a particular place in each island, and that a special officer be held responsible for their completeness and safe custody. This would materially facilitate reference, and probably prevent important letters and reports relating to the hygiene and sanitary condition of the people being lost sight of. Dr. Gavin Milroy met with the same difficulty in his mission as I did in my endeavour to follow up the history of the disease in the various islands I visited. In allusion to the matter, he made the following observations in his report: " The want of some authentic record of the general " health, and of the prevailing diseases in a colony from one year to another, is a serious " defect which might be easily corrected in future (especially now that so many medical " men have become government officers) with great public advantage. I found it impos- " sible to obtain exact particulars respecting epidemic visitations, even as to their dates, " that had occurred within the last 10 or 12 years. All soon becomes mere conjec- " ture, and the teachings of past experience are positively *nil*. The only island where I " found that any attempt had been made to keep a continuous registration of events " relating to the public health, was in Dominica, the proceedings of whose board of " health have been, much to its credit, regularly, although imperfectly, preserved. They " serve to furnish a considerable amount of valuable information for the last 25 years."

Some years ago a government laboratory was established in Antigua, and Mr. Francis Watts, F.I.C., F.C.S., was appointed government chemist. Mr. Watts has done an immense amount of most valuable work for the island, and he has succeeded in increasing the prosperity of the colony by his advice to the planters on the manuring of their canefields and the manufacture of their sugar. As Mr. Watts had been engaged in bacteriological study, and as he had some necessary apparatus in his laboratory, it seemed

to me that advantage might be taken of the opportunity of doing some original work in regard to the nature and causation of yaws, more especially as very little was known of the pathology of the disease. Such an investigation must of necessity be a long and tedious one, and I could not hope to push the inquiry very far without devoting so much time to the work as would cause too long a prolongation of my mission, and postpone for a considerable period the writing of the report. I felt justified, however, in devoting some time to this pathological work, as any fact elicited would be of value, not only as indicating, perhaps, better and more satisfactory methods of the treatment of the disease, but also as indicating lines of research that might advantageously be followed out by subsequent workers in the same field.

Accordingly, I saw Governor Sir William Haynes Smith, whom I informed of what I proposed to do, and requested the use of the laboratory and the co-operation of Mr. Watts. His Excellency thoroughly approved of the project, and he was good enough to write officially to Mr. Watts instructing him to render me all the assistance possible. Mr. Watts cheerfully complied with the instructions, and we worked together at intervals before my departure for the Virgin Islands on the 21st September, and on my second visit to Antigua, from the 2nd to the 17th of December. The results are given in a joint report, which will be found in the Appendix.

Whilst in the island I visited the public hospital, the poor house, the leper asylum, and the reformatory for boys, in company with the medical officers having charge of them. There were 51 boys at the reformatory, and one of them had *Dermatitis orientalis*, and I learnt afterwards that the disease had spread to other boys. At the leper asylum there were 32 inmates—13 males and 19 females—of whom 29 were natives of the island, one came from St. Kitts, and two were Chinese immigrants. Eighteen of the cases were of the tubercular variety, 13 were anæsthetic, and there was one case of the mixed form. I made a careful examination to see whether in any case the disease was associated with yaws; but, as I have already stated, no such case was found.

On the 19th August I visited the St. Paul's district, and went through Sweets and Liberta villages with Dr. Mackie, the resident medical officer. At Liberta we first visted a wretched hovel, 12 feet long by 10 feet wide, with damp stone walls fully 2 feet thick, and a thatched roof. The floor was simply the earth contaminated with the filth of years. In this hut a man and woman and five children dragged on a miserable and poverty-stricken existence. All had yaws. It was from some of these cases that I obtained material for the culture experiments undertaken by Mr. Watts and myself, and the man permitted me to excise one of the granulation tumours, or so-called tubercles, for examination with the microscope.

We saw several other examples of the disease in children at this village, and most of the residents had had the disease or were recovering from it, many of them having maculæ, indicating the site of former yaws tubercles.

The school referred to by Dr. Mackie in his replies to the interrogations as having borne so large a part in the dissemination of the disease was a hut in the middle of the village, and it appeared to me to be a building in which a school should not have been permitted to be kept.

We also visited a Portuguese shopkeeper whose son had been suffering from the disease for a considerable time. The youth was in a pitiable condition from extensive ulceration and cachexia. The parents were in comfortable circumstances, and from what I could learn they had used every effort to get their child cured, but, unhappily, the case, which was associated with that peculiar manifestation of tuberculosis commonly know as scrofula, was one of those that medical treatment sometimes fails to have any effect on. One of those cases, indeed, that form the *residuum* of the patients in all the yaws hospitals I have visited.

Dr. Mackie informed me that yaws had formerly prevailed extensively in Sweets village, but that few of the villagers had attended at his dispensary with the disease lately. We visited the place, however, and on inquiring of the resident midwife--who appears to be the sanitary authority in these villages—she said there was no person suffering from the disease. But, on pressing her with further questions she said there was one case that had been cured. We went to see this case, and found it to be that of a black boy 10 ears of age, who had the disease in a typical form, and we also found two other cases—oung children—in the same hut. The villagers had flocked around us, and when they saw what was the object of our search they told one on the other. We went to the infected hut in every instance, and in a short time had examined three women, a man, and seven children all suffering from yaws. Besides the 14 cases seen by us we heard of others, and we came to the conclusion that there were about 20 cases of the disease in this small village.

On the 3rd September I went over No. 3 district with Dr. F. J. Freeland, the acting medical officer. At Betty's Hope, where, in 1876, yaws first made its reappearance in Antigua, there were two cases of the disease, the children of a woman occupying a small and dirty unfloored hut on the estate. We saw only one case, however, that of a boy eight years of age, and the woman told us that she had sent the other child away on a message. She also said that the children had caught the disease when they were staying at Willikie's village in St. Philip's. In the same hut were five other children that had been put in charge of the mother of the two yaws patients whilst their parents were working in the fields. The woman in fact kept a village *crèche*, and she seemed quite unconcerned about the possibility of her own children infecting the others she had charge of. The boy we saw was a typical example of yaws, with the encrusted tubercles on the face and limbs and scrotum. He had been formerly under Dr. Freeland's care and was cured—that is, all signs of the disease disappeared; but the disease had broken out again two months afterwards. The mother of the boy who professed to know something of the disease, although she said it was a new sickness in Antigua, asserted that yaws "always "came three times before it went away altogether." The boy was very dirty; and, in explanation of the fact, his mother said "it was bad to wash people when they had the "sickness." The child was not taking any medicine.

Dr. Freeland and I also visited Pears, and Freemans and Parham, but we found no cases, although we heard that persons with the disease were hidden away in these villages.

On the 11th September I went through St. Mary's district (No. 6) with Mr. J. S. Gabriel, the medical officer. Whilst in his house a patient, a black man, came to him from the large village of Ebenezer close by, and I was asked to see him as he had a strange tumour springing from the sole of the foot, the like of which the medical officer had not seen before. The tumour was what is known as "tubboe," that is the yaws granuloma forcing its way through the thick and hard sole of the negro foot. The man was unable to give any satisfactory history of his case. It was an extremely interesting one in two particulars. In the first place it was the first case of yaws that Mr. Gabriel had seen in his district, and, although then he had had no experience of the disease, his attention would at once have been arrested by the typical encrusted tubercles; it was also curious that the first case seen in the district should have gone to the medical officer whilst I was with him. In the second place, the case was noteworthy as showing that the prevailing idea that tubboe is invariably the sequel of yaws is not correct. In this instance the tubboe was the primary manifestation of the disease; for the man assured us that he had not had any skin eruption whatever, and that he was quite well "until the thing came out in "his foot."

We inspected some of the villages, and at Urlings, where there is a district dispensary, we made a house to house visitation, as the medical officer informed me that a skin disease was prevalent in the place. We did not discover any case of yaws, but many of the children were suffering from measles, and a good number of persons had *Dermatitis orientalis*, which they called "Chinese itch." It would appear that this skin disease was introduced into the island by the Chinese labourers brought over some years ago, thereby showing its oriental origin. It is a noteworthy fact that this exotic dermatitis was carried to St. Lucia from India, and to Antigua from China, and this is evidence of its wide distribution in the east. It will doubtless spread all over the West Indies as it manifests highly contagious properties.

On the 12th September I visited St. Philip's district (No. 4), and, accompanied by Dr. Pierez, the medical officer, went to Willikies and other places where yaws had practically become endemic. At Collins we saw a black boy, seven years of age, with a general eruption of encrusted tubercles. He caught the disease at Seaton's village, where he had been staying. He was living on the estate, and there was no attempt made to isolate him from other children.

Seaton's village is situated in an uncultivated part of the island, and most of the huts are small, miserable and dirty. Yaws had been prevalent in the village since the year 1883, as Dr. Pierez has shown in his report. At this place we saw five cases of the disease, all in negro children of ages ranging from 3 to 13 years. They were under the care of the medical officer, to whom persons afflicted with yaws and other diseases came from various parts of the island. Two of the cases were of interest as will be seen from the following particulars:—

1. A black girl, 13 years of age. The only sign of the disease was a tubboe in the sole of the right foot. The girl had had no previous symptoms of yaws until the tubboe appeared, about two weeks before my visit. In this case then, the tubboe was not a sequel, but a primary manifestation of the malady.

2. M. P., a black boy, three years of age. He had yaws two years ago, and since then the disease had been apparently cured, but it had relapsed. He has now dark maculæ showing the site of old tubercles, squamæ about the body and limbs, and tubboes in the soles of both feet.

A brother of this boy contracted the disease first, and he was attended by Dr. Pierez. When he was getting better, M. P., and the sister A. P. became affected. The children associated together, and they slept in the same hut. These brief facts relating to the history of the cases of the three children illustrate very well the way in which the disease is propagated.

Willikie's Village is situated at the north eastern extremity of the island, and it is, I believe, the remotest village from St. John's—the capital of Antigua. No estates are cultivated in the vicinity, and the people eke out a poverty-stricken existence by fishing in the sea which is close by, and, apparently, by keeping pigs, as I saw many about the village wallowing in the filth that existed almost everywhere. The huts were small and dirty even for a negro village; most of them were made of wattle and mud with thatched roofs, and they were unfloored.

We saw in the village six children with yaws; their ages varied from two to seven years. All the cases had the ordinary encrusted tubercles. One, a girl four years of age, had also squamæ and tubboes, and she had only been suffering from the disease for a few months. Another girl, a pitiable object, was also the subject of general tuberculosis. She had enlarged bones and joints, her lungs were affected, and she was much emaciated. Cases of yaws were discovered in Willikies Village by Dr. Pierez, when he arrived in the district from Montserrat in the year 1882.

Unfortunately there is now nothing known of the way in which the disease was re-introduced into the island, nor is the date of its second introduction certain, but it is evident that it is now firmly fixed in the country, and that it is spreading far more than the Government authorities or the people imagine. Indeed, many persons I spoke to were not aware of the existence of yaws in Antigua. Whilst in the island I saw and examined 41 cases of the disease, and heard of the existence of many more, and to say that there were 100 cases in Antigua would, I believe, be well within an accurate estimate, an opinion, it may be mentioned, in which Dr. Pierez concurred. It may be said that the eastern half of the island has become thoroughly affected, and that slowly but surely it is invading the other districts; and, unless something be done to stay its progress, it is to be feared that it will later on spread to all parts of the country.

Barbuda.

Whilst at Antigua I took the opportunity of visiting "the dependency" of Barbuda, a flat island lying about 25 miles north of Antigua, having an area of 62½ square miles, and containing a population of 580, all of whom reside in the village of Codrington.

I left Antigua in a schooner on the 22nd August, and arrived at Barbuda on the 23rd. Remaining two days in the island I returned to Antigua on the 26th. There is no medical officer in Barbuda, but a dispenser is stationed in the place, and he is under the direction of the Senior Medical Officer of Antigua, who occasionally makes visits to the island for the purpose of vaccination. The dispenser accompanied me in my inspection of the village, and at his request I prescribed for several cases of illness. There were two bad cases of anæsthetic leprosy, but no yaws; and the latter disease appears to be unknown to the people.

I saw three cases of *Dermatitis orientalis*, which disease appears to have been introduced into the island recently from Antigua, and it will, doubtless, spread amongst the inhabitants.

The houses of the people are, for the most part, constructed substantially of a limestone found in most parts of the island cropping up from the soil. All the houses are floored, the walls are whitewashed, and they are very clean. I went into many of the houses, and I was much pleased with the scrupulous cleanliness everywhere apparent. In no instance did I see the slightest sign of dirt. The houses are probably the cleanest of their class in the West Indies, and the general healthiness of the people is, no doubt, due in a great measure to this strict observance of the laws of sanitation.

VIII.

History of Yaws in the Virgin Islands.

That portion of the Virgin Islands belonging to Great Britain contains an area of 58 square miles, and forms one of the Presidencies of the Colony of the Leeward Islands; but the Presidency is remote from the seat of government, and the Royal Mail steamers do not call at Road Town, the capital, whilst passing between St. Kitts and St. Thomas. In trade and importance the British Virgin Islands have declined very much in recent years; and, as the sugar estates have been abandoned, and no other cultivation has been taken up, the people are exceedingly poor, and many of them have left, and are leaving, for more prosperous places. In reference to this matter, Mr. President Cameron made the following observations in his report on the Blue Book for the year 1887: "I regret "that I am unable to make any satisfactory report as to the state of prospects of the "Presidency. The majority of the young men continue to quit the islands, there being "no work for them to do. There is no capital to develop whatever resources it may "possess, and there is no possibility of a change in this respect, so long as the present "condition of isolation is maintained."

The following Table will give an idea of the way in which the population has decreased since the early part of the century, when the Presidency was in a most prosperous condition:—

Year	Whites.	Coloured.	Total.
1774 - - - - -	1,200	9,000	10,200
1805 - - - - -	1,300	9,220	10,520
1835 - - - - -	?	?	7,731
1861 - - - - -	476	5,575	6,051
1871 - - - - -	?	?	6,426
1881 - - - - -	52	5,235	5,287
1891 - - - - -	32	4,607	4,639

The decadence of the neighbouring Danish Colony of St. Thomas has accelerated the declining prosperity of the Virgin Islands, inasmuch as in recent years the whole trade of the Presidency has been with St. Thomas, in whose markets the Virgin Islanders sold their cattle and farm produce.

During the time of slavery, yaws existed in the Island of Tortola, and the planters segregated the affected slaves in yaws houses, built on Wickham Cay, in Road Harbour. I was unable to obtain any evidence in the Presidency itself of the existence of the disease in the islands from the period of emancipation until 1888, that is a space of 54 years. But on my return to Dominica, an old lady, whose early life was passed in Tortola, was good enough to write down for me the following important information, which shows that yaws lingered on in the Virgin Islands after slavery as it did in the more important colonies. In the letter from Mrs. Gellion, the lady referred to, the following passages occur: "In 1837 one of the servants was, where I was, taken ill with a breaking out in "her feet, a sort of sore, which on examination proved to be yaws. She was instantly "isolated, and thus I know not if she was cured; but in 1844 I left the island, and on "my return to Tortola in 1846, I found that the disease had spread rapidly, especially "about the northern side of the island. After that I left the island, and as I had no "further communication from there, I cannot give you further information. Mrs. Malone "says that yaws was more especially about Brewer's Bay and Kingstown."

This information which, I believe, can be relied on, brings the history of the disease in the Virgin Islands down to 1846, and as it would appear that no measures were adopted for holding it in check, it doubtless lingered on until the present day. It must be mentioned however, that the President in his report on the Blue Book for the year 1886, stated that: "The disease of yaws which afflicts the inhabitants of so many of the other

" West Indian Islands has, fortunately, no existence here." If this statement be correct then sometime within the 40 years from 1846 to 1886, Tortola became free of yaws; and such a fact, if true, would be very interesting. and an inquiry into the circumstances might lead to results having an important bearing on the various grave questions relating to the arrangements made by the State to control the spread of the disease.

But I am led to believe that the President was wrong in his statement, for in 1888 Mr. Foreman, the newly-appointed medical officer, who had become acquainted with yaws in Dominica, discovered some cases on the north coast of Tortola, at a district called Brewer's Bay, the very place where the disease is said to have been rife in the year 1846. The President at once reported the matter to the Colonial Secretary at Antigua, asking for instructions, and saying that he " visited the district mentioned in company with Dr. " Foreman, and saw the cases, several of which appear to be very bad ones."

Nothing however appears to have been done, and I was unable to obtain any document referring to the disease in the Presidency other than those quoted above. The origin of the cases at Anderson's, Brewer's Bay, is unknown, and there are no recorded facts as to the date of the re-introduction of the disease. Considering, however, that some of the cases seen by Mr. Cameron with the medical officer in May 1888, were " very bad ones," it is probable that the statement in the report on the Blue Book for 1886, written however in 1887, that the disease had no existence in the Presidency was inaccurate.

I left Antigua on the 21st September in the Federal steamer " Tyne " for the Virgin Islands, and landed at Road Town, Tortola, the following day. The Commissioner was good enough to search through documents in his office for anything that might be recorded there in reference to yaws; and Dr. Campbell, the medical officer, kindly made arrangements for my visit to various places in the Presidency.

On the 22nd September I rode with Dr. Campbell to Kingstown, a village to the east of Tortola. Formerly the place was a settlement of liberated Africans, but only two now remain, a man and a woman, both of great age. The huts were of the ordinary West Indian type, that is to say, they were mud and wattle hovels, and they were dirty in the extreme. We found no case of yaws in the village.

In his reply to the interrogations, Dr. Campbell states that, " The disease is not " prevalent throughout these islands, but is limited to one or two cases in two adjacent " districts of the island of Tortola, viz., Brews Bay and Sojer Hill." Both of these places are on the north side of the island, as is also Anderson's Brewer's Bay, and Dr. Campbell and I rode over the district on the 23rd September, and found ten cases, to the surprise of the medical officer, who did not think there were so many.

At Soldier's Hill we saw three children who had been affected some time. One of them was suffering from the so-called " tubboe," which the Virgin Islanders call " dry " tubboe."

At Anderson's Brewer's Bay, in a small and dirty unfloored shed, situated on an almost inaccessible spur of the mountains, we saw John Dawson, a negro about thirty years of age. This was the case referred to by Dr. Campbell in his replies as having been attended by a native " yaws doctor." I made a careful inquiry into the history of the case, and as a result am able to give the following interesting particulars: Dawson had the yaws six months before he was treated by Joe Todman, " the yaws doctor," who undertook to cure him. The disease then manifested itself as an eruption of encrusted tubercles on the body and limbs. The treatment consisted in sea-bathing and the application to the tubercles of the pounded root-bark of the dogwood tree.* The bark, after being pounded, was soaked in sea water, and then the decoction was strained off and applied to the yaws tubercles. In six weeks' time the tubercles dried up under this treatment, and the man believed himself cured; but two months afterwards the disease returned, and his present condition (that is, three months after the supposed cure, and a month after the relapse), is as follows:—He is ill-nourished, and he says he feels weak; he has encrusted tubercles on the back of the scalp and neck, and one encrusted tubercle over the right eye. There are also encrusted tubercles on the front of the neck just below the jaw, one of them being reniform in outline. There are also tubercles on the inner side of the right thigh, one in each popliteal space, and one on the right little toe. He also has " tubboes " and " crabs " on the soles of both feet. The man is in a condition of poverty and distress, as he is unable to do any work.

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* *Piscidia Erythrina, L.*

At Brewer's Bay we saw six cases of the disease, all children, varying 3 to 14 years of age; and, doubtless, had we remained longer we should have seen even more. Two of the cases had very large encrusted tubercles.

On the 24th September we went in a small sailing boat to Virgin Gorda, the largest of the islands after Tortola. It has a population of 593, which shows a considerable decrease since the census of 1881, when the figures were 832. We landed at Spanish Town "in the Valley," the largest settlement in the island. The people appear to be more prosperous than those of Tortola, and the houses are cleaner and better constructed. We neither saw nor heard of any cases of yaws in Virgin Gorda.

The Federal steamer "Tyne" had gone on to St. Thomas to dock, and it had been arranged that Mr. Justice Danavall (who had come to Tortola to preside at a sitting of the Supreme Court of the Leeward Islands), my secretary, and I should join the ship there. Accordingly we left in a small schooner on the 26th September, and arrived in St. Thomas the same day, only to find, however, that the "Tyne" would not be ready to leave until the 30th. Whilst in St. Thomas I learned that the disease was very prevalent in Santa Cruz. I neither saw nor heard of any cases in St. Thomas, but of course I had no special opportunities of inquiring into the matter.

IX.

History of Yaws in Montserrat.

No information concerning the early history of the disease in Montserrat could be obtained in the island, except the following allusion to it in a despatch to the Colonial Secretary from Mr. Neale Porter, the then President, written on the 2nd May, 1881:—

"I may remark that yaws is no new discovery in Montserrat. It existed during slavery, "and nearly every plantation had its yaws house, where the sufferers were looked after "by a special nurse, and the malady was kept within moderate limits by the use of simple "remedies, assisted by sea-bathing. Mr. Johnson has, from the time he arrived here, "had to deal with cases of yaws, and Mr. Pilkington, no doubt, saw a good deal of the "disease in Dominica before he was appointed to this Presidency."

It thus appears that the general history of yaws in Montserrat is in no wise different to that of the other islands. The disease existed in slavery times; and Mr. Johnson, a medical officer who was appointed in 1863, found it then prevalent amongst the people. One may therefore conclude that it lingered on in districts of the island remote from the town from the period of emancipation of the slaves.

No special means were, however, undertaken to control the spread of the disease until the year 1879, when Mr. Neale Porter, noticing the fact of its increasing prevalence, adopted measures for segregating the poorer persons afflicted with it at the poor house. In his report on the Blue Book for the year 1879 he thus alludes to the matter:—

"Although in the character of their food, dwellings, and dress there has been "during the last few years throughout the labouring class a perceptible improvement, I "regret to say that the loathsome and contagious disease, yaws, has gradually developed "itself to a degree that threatens to make the mode of dealing with it a matter of "grave consideration. At present, persons afflicted with yaws are treated at their own "habitations by the district medical officers, but the destitution of some of these poor "people has of late compelled me to sanction their being quartered in one of the "detached buildings of the spacious and healthily-placed poor-house premises. It is not "improbable that ere long this small extent of accommodation will be insufficient, and "that the Government may find it imperative to incur special expense, not only with "regard to yaws patients whose poverty compels them to ask for admission to the poor-"house, but with respect also to persons who at present remain in their own places of "abode, careless of how they, by contact, communicate the disease to others."

This report attracted at once the attention of the Colonial Office, and Lord Kimberley wrote on the 14th December, 1880, a despatch to the Governor of the Leeward Islands, in which the following passage occurs:—

"I observe from this report that the yaws disease is spreading in the island, and it "is desirable that prompt action should be taken with a view to arresting its progress. "I request that you will give the subject your immediate attention, and furnish me with "a report upon it at an early date."

The Governor then called on the President and medical officers of Montserrat for

reports on " the present state of the disease " in the island, and on " the measures they " would suggest for its speedy extinction."

Reports were duly made by the two medical officers, but unfortunately these documents could not be discovered in the Government offices at Antigua or Montserrat. Mr. Neale Porter, however, the present Colonial Secretary of Jamaica, wrote a long and interesting despatch on the whole question, and in the absence of the medical reports it will be advisable to give this letter *in extenso*. It is as follows:

President *Porter* to the Colonial Secretary.

Sir, Montserrat, 13 February, 1881.

With reference to your No. 15, of 4th ult., enclosing the copy of a despatch from the Secretary of State to His Excellency, the Governor, commenting on the remarks on yaws in my Blue Book Report of last year, and asking for reports by the medical officers of this Presidency on the present state of the disease in their respective districts, and statements as to the measures they would suggest for its speedy extinction, I have the honour to forward herewith three reports received by me from Mr. B. Johnson, Medical Officer, District No. 1. These communications are marked A., B., and C., and are dated respectively, January 22, January 26, and February 5th. I also forward a report marked D., accompanied by a numerical list of cases marked E. from Mr. Pilkington, Medical Officer, District No. 2; both papers are dated January 21st.

I also think it well to transmit a report marked F., made to me by this officer on yaws in his district, on the 4th January, in attention to a verbal request of mine; and I may add that towards the end of last year, Mr. Johnson, medical officer, asked me to give him for a few days the services of a person to make minute inquiry respecting yaws cases amongst the people of his district, No. 1. This assistance I afforded him.

Proceeding to remark on the reports of the medical officers, I may state that conversations I have from time to time had with them on the subject of yaws have shown me that Mr. Johnson (much the older man, and with about 15 years' service in this island) takes a far more serious view of the question than does his colleague, Mr. Pilkington. It will be seen that Mr. Johnson, in his report of 22nd January, says the disease appears to be rapidly increasing; he also states that the disease is contagious, and that he has attended many severe cases. Mr. Pilkington (who had been for some time in Dominica before coming to this Presidency) in his report of 4th, as well as in that of 31st January, states that the type of yaws in Montserrat is of a mild character compared with the yaws prevailing in Dominica. This is satisfactory as far as it goes.

In his report of 4th January, Mr. Pilkington, after stating that between 40 and 50 cases have been attended during the month (December 1880) adds, " Your Honour will " see that the disease is not very prevalent in my district," and continues, " in one family " at the north six children are laid up, in another five;" certainly, if this be an unavoidable, it is a very regrettable state of things, and, moreover, there are, doubtless, persons suffering from yaws who, from inability, or disinclination, do not attend when the medical officer makes his periodical visit (once a week) to the district dispensary.

Mr. Pilkington does not, in either of his reports to me, state whether he considers the disease to be contagious or otherwise; but I remember hearing him say, soon after his arrival here, that he was positive yaws was not contagious, and I have reason to know that he has recently reiterated that opinion. From recollection of my short service in Dominica, I am under the impression that the late Dr. Imray was then of opinion that the disease was contagious.

As regards the measures recommended by the medical officers, I consider that Mr. Pilkington's suggestions as to soap, sandals, and messengers to convey medicine, should be at once complied with.

Mr. Johnson's recommendation that yaws houses be provided in some of the villages, is one that I think should have a trial, it would involve the hiring of three or four small houses, and the purchase of a few inexpensive articles of furniture, bedding, &c.; a labourer in each village could be found, on small pay, to attend the patients, and carry out the doctor's orders. As to houses being provided on the estates, that I consider to be out of the question; the principal estates have, no longer, resident labourers. Those they employ build and find their own houses and homes off the estates, and work week by week as a labourer or mechanic does in England, and if an employment does not suit them they go next week to another.

Several months ago I caused to be cleared from bush the partly ruined masonry-

walls of an old Government hospital just out of the town, standing close to the sea, and to the road leading to the poor-house, which is visited every day by medical officer No. 1. My intention was, and is, to convert the old building into a habitable house for yaws patients; this will cost about 70 *l.* or 75 *l.*, and accommodate about eight or ten people, taking such as otherwise would go to the poor-house; and any person sentenced to imprisonment in gaol might (if legal provision were made) be detained there.

In conclusion, I beg to say that I do not at present advocate any compulsory legislation respecting yaws; but I strongly recommend that each medical officer be required to send to me, for transmission to the Governor, a monthly "Yaws Report" of his district, to contain an exact and complete list, giving names, ages, and residences of all persons, whether entitled to gratuitous medical attendance or not, suffering from yaws; the return to state how long the patient has been suffering from the disease, how often seen, and how often prescribed for by the medical officer during the month; the return for each month to be delivered at my office not later than the 7th of the following month.

Were there in the Leeward Islands a principal medical officer for the whole Colony, I would recommend that he should require from the medical officers information as to the character of yaws (or "Crapeaux") prevailing in different parts of the island, and the particular modes of treatment of particular cases.

I have, &c.

The Honourable the Colonial Secretary, Antigua.

(signed) *Neale Porter*,
President.

This letter, with its enclosures, appears to have received the prompt and careful attention of the Government in Antigua, and, on the 19th February, the Colonial Secretary communicated the following decision to Mr. Porter:—

"His Excellency is glad to gather from these reports that the disease is not of a very "virulent character. Prompt measures should, however, be taken for its immediate "extinction. The Governor concurs with you that Dr. Pilkington's suggestions as to "supplying yaws pauper patients with soap and sandals, and as to the employment of "messengers to convey medicine, &c., should be at once carried out, and I am to instruct "you accordingly.

"The Governor does not consider that the finances of Montserrat would justify the "establishment of a general yaws hospital, but he approves your suggestion that prisoners "and paupers should, if possible, be treated out of the gaol or poor-house premises.

"The employment of competent nurses, on the recommendation of the medical "officers, to visit yaws patients, and to see that the medical officers' orders are duly "carried out, would, in all probability, be found most useful."

On the 14th March the President sent on to Antigua further reports on the disease, in one of which Mr. Johnson said: "I am daily discovering fresh cases of the disease; there "is a desire on the part of many to conceal it." . . . "I find there are many cases "which have been neglected, and are likely to be a long time under treatment."

The Governor, on the 26th February, in a despatch to the Secretary of State, gave particulars of the results of the inquiry made in Montserrat, and asked for instructions as to what should be done; and in the meantime the whole of the correspondence was sent on to me in Dominica, with a request that I would report on the matter for the information of the Governor. I carefully considered the various questions, and wrote the following Despatch:—

Dr. *Alford Nicholls* to President *Eldridge*.

Sir,

Dominica, 10 March, 1881.

I have the honour to acknowledge the receipt of your despatch, No. 31, of the 28th ultimo., transmitting to me certain correspondence—which I return herewith—in reference to yaws in Montserrat, and requesting me to report, for the information of His Excellency the Governor, on the various questions raised by President Porter and the two medical officers of Montserrat.

2. On a careful consideration of the facts stated in the correspondence, I can arrive at no other conclusion than that the disease is on the increase in the island.

Mr. Pilkington, it seems, does not hold this belief, but Mr. Johnson, whose long professional practice in so small a community entitles him to speak with great authority on the prevalence of disease in the island, states that the malady appears to be "rapidly

increasing." I observe, also, that Mr. Pilkington addressed circular letters to the managers of the estates in his district requesting them to send all the yaws cases to him; a request which was "cheerfully complied with," and which resulted in many persons suffering from the disease being brought under medical treatment; whilst, on the other hand, President Porter says, "the principal estates have, no longer, resident labourers, &c."

3. The President of Montserrat raises a question as to the contagiousness of yaws, but there is now no doubt as to this important point, for even Dr. Gavin Milroy, who has done so much to strengthen the theory as to the non-contagiousness of leprosy, acknowledges that the disease manifests certain contagious properties. In several cases I have lately produced yaws by inoculation, and if there were no specific virus, the artificial production of the disease would be a matter of impossibility.

4. The fact that six children are affected in one family, and five in another, is of considerable importance, for it points unmistakably to the operation of a common cause, and when that cause is shown to be direct contagion, the state of affairs in Montserrat must be such as to create some alarm for the public health.

5. The term "crapeaux" is new to me, and the description of the affection is not sufficiently minute for me to give any decided opinion as to its nature. Should it, however, prove to be similar to a condition of the foot known in this island, and in Jamaica, as "tubboes," it is unquestionably one of the ways in which yaws manifests itself, as will be seen by reference to Section III. of my Third Report upon the Yaws Hospitals in Dominica.

6. The measures suggested in the correspondence for the extinction of the disease in Montserrat appear to me to be altogether inefficacious; and, in the circumstances of the case, to endeavour to palliate the evil cannot but result in disappointment and much useless expense.

It will be remembered that the efforts made nearly 10 years ago to subdue the ravages of yaws in Dominica were successful for a time only, the malady spreading afterwards to an alarming extent; and it is only now, after the long operation of forcible segregation, that the disease is disappearing from the country.

7. Considering, then, the history of the yaws affairs in Dominica, it would appear that in compulsory legislation lies the surest hope of eradicating the malady from Montserrat.

8. In the event of forcible segregation being decided on, I would strongly advise the establishment of one general hospital, which should be as near as possible to the town, so as to ensure frequent medical attendance, for experience has taught me that the inmates of a yaws hospital require nearly as much care and attention as do the patients usually admitted to general hospitals.

9. There are other important points connected with yaws in Montserrat that need careful consideration before measures are adopted for the eradication of the disease, but I am unable satisfactorily to enter upon them without a personal inquiry into local circumstances.

I have, &c.

His Honour, (signed) *H. A. Alford Nicholls.*
the President of Dominica.

This letter was sent on to Mr. Porter for his information; and, in a despatch to the Colonial Secretary, he made the following observations:—"On the main question of "building a general yaws hospital, and the enacting of compulsory segregation, my view "is that we should not hastily launch into the considerable capital and current expendi- "ture which such a proceeding would entail. The degree to which the disease has "gradually extended is now, no doubt, such as to make it incumbent on the Executive to see that the medical officers combat it by persistent energy, daily careful attention, "and strict personal inquiry throughout their districts, the Government, at the same "time, furnishing them freely with such medicines and other aids as they may require; "and this being done, I am disposed to believe that many cases will be quickly cured, "others, of course, taking more time, and the extent generally of the malady be gradually "lessened, and ultimately restricted within comparatively insignificant limits. The "absolute complete eradication of the disease, and the prevention of the possibility of its "recurrence, may not be achieved; indeed, can hardly be expected. There are in

" England diseases which are always in existence, although medical skill and treatment " (so to speak) keep them under."

Lord Kimberley having received Governor Berkeley's despatch of the 26th February, applied for advice to the Medical Department of the Local Government Board, and on the 6th June His Lordship communicated his instructions to the Governor in a despatch that contained the following paragraphs :—

" I have obtained the opinion of the Medical Department of the Local Government " Board on this subject ; and I gather that the one thing needful in dealing with this " complaint is careful nursing, in the sense of carrying out a few common-place medical " directions with that care and trouble which are necessary for success. The mere " distribution of medicines, soaps, or drugs will not effect this end.

" You will be good enough to provide as early as possible for the application of such " careful treatment, either by the establishment of small village hospitals as Dr. Johnson " suggests, or by the institution of a system of nursing the patients in their own houses.

" You will also, if you find it necessary, pass a law compelling all persons suffering " from, or having children suffering from yaws, to report their cases to the district " medical officer under pain of fine."

Sir George Berkeley had retired from the government of the Leeward Islands before the Secretary of State's despatch reached Antigua, but Sir John Glover, G.C.M.G., who had just assumed charge of affairs as Lieut. Governor sent a copy to President Porter, and requested " that effect may be given as speedily as possible to the instructions therein " contained."

As a matter of fact, however, none of these instructions were ever carried out. The yaws hospital, close to the town of Plymouth, alluded to by Mr. Porter in his letter of the 13th February as capable of accommodating eight or ten people, had been opened and placed under the charge of the medical officer of No. 1 district, but no small village hospitals were established, no nurses were ever appointed, and no compulsory legislation as to the notification of the disease took place.

In the meantime the medical officers had done the best they could to treat the cases under most disadvantageous circumstances, but the unsatisfactory result of the system adopted was alluded to by Dr. Pierez in his December sanitary report. Dr. Pierez, who had succeeded Mr. Pilkington as medical officer of District No. 2, thus referred to the disease :—" With reference to the subject of yaws, I am sorry I cannot speak favourably. " I have certainly noticed an important fact, that yaws in Montserrat does not seem of so " formidable a type as the same disease in Dominica. I have seen a few cases rapidly " improve under constitutional treatment, but at the same time the disease is very " prevalent in the whole island, and as long as the healthy live and mingle with the " diseased, as they now do, I cannot see any chance of the extermination of the " malady."

In January, 1882, Mr. Johnson and Dr. Pierez raised a question concerning vaccination and the spread of yaws, and vaccination was stopped by the medical officers. The question was, at the time, submitted to me, and I shall have to allude to the matter when I come to consider the replies to the seventh interrogation later on in this report. I may remark here, however, that it was decided by the Government that vaccination should be resumed, and that fresh lymph should be obtained from the National Vaccine Association.

In April, Governor Sir John Glover, who had just established what he styled " a yaws encampment " at Soufrière in Dominica, decided that the plan should be tried in Montserrat, and the following letter was addressed to the President on the subject:—

The Acting Colonial Secretary to President *Porter*.

Sir, Montserrat, 16th April, 1882.

I am directed by the Governor to inform you that during his visit to Dominica his attention has been specially directed to the system adopted in dealing with the yaws disease, persons suffering from which have, up to the present time, been collected in a large hospital for treatment. It seemed to His Excellencey that this system was unsatisfactory, and that advantage should be taken of the sulphur springs in the island for endeavouring to eradicate the disease by the establishment of yaws encampments in the neighbourhood of such springs, where the patients could be treated separately, in isolated huts. This project received the cordial concurrence of the medical officers, and the Bishop of Roseau and Mr. Bellot, the proprietor of an estate adjoining the Soufriere, have expressed their willingness to render any assistance in their power in bringing the work to a successful conclusion. Steps have, therefore, been taken for establishing as an

experiment a yaws encampment at Soufriere for the reception and treatment of six patients whom His Excellency has ordered to be removed from the hospital. It appears to His Excellency that a similar experiment ought to be tried in Montserrat, and I am, therefore, to request that you will take immediate steps for establishing such an encampment in a locality were sulphur exists.

You will communicate a copy of this letter to Dr. Johnson, and after consultation with him you will report what has been done in the matter.

I need hardly impress upon Dr. Johnson and yourself the important bearing which this measure has on the welfare of the community, and the importance which His Excellency attaches to its successful working.

I have, &c.,
(signed) *P. Burns*,
Acting Colonial Secretary.

His Honour, President *Porter*.

There appears to have been no further correspondence on this subject. Mr. Porter left Montserrat to assume the office of President of Dominica, and nothing whatever seems to have been done in the matter of the proposed "yaws encampment."

The yaws affairs after that went on as usual, the medical officers treated the cases as before, and the returns show a decreasing number of persons attended; and, on the 7th February, 1883, Mr. Johnson reported that there was only one case of the disease at the hospital, and he advised "the reduction of the staff employed." On the 5th June the Governor called for a report as to whether the number of cases returned in the monthly lists furnished by the medical officers was accurate, and from the replies it appears that the people concealed the disease; and, as there had been no compulsory legislation, the medical officers were unable to report with any accuracy as to the actual facts concerning the prevalence of yaws in the island. Unfortunately, I could obtain only a few of these monthly returns of cases: they had been forwarded to Antigua as they were sent in, and they could not be found in the Colonial Secretary's Office. The few I got were useless for statistical purposes. As will be seen from the following report, Dr. Mapleton had 108 cases of the disease under treatment in May in District 2, but from the way in which he writes it is evident that many of the people were averse to undergoing proper medical treatment; in fact, as the medical officers stated, they had "quite given it up."

"As I explained last month, the yaws report cannot be considered a complete list "of all the cases existing in my district; I can only mention those I have seen. The "attendant for Windward had 67 cases upon his list for May, nine cases have been "added and 37 struck off as cured, leaving 39 cases uncured. The attendant for the "north had 41 names for May; 24 have been added and 44 struck off, leaving 21 upon "the list. I would venture to suggest leaving off the special yaws dispensary at Harris, "as the patients seem to have quite given it up. The yaws messengers have hitherto "been in the habit of making visits to their districts at their own discretion. Now they "have to see me first, and I keep an account of their visits in a book; I cannot however, "decide what they should receive per visit."

The "attendants," or "yaws messengers," or "yaws superintendents," as they are now called, alluded to by Dr. Mapleton, were appointed in 1883, and they received the salary of 10*s*. a month. When I was in Montserrat I found that there were two of these persons employed, one stationed at the north of the island, and the other on the windward or eastern side. Their duties were—(1) To find out yaws patients and to report the cases to the medical officer. (2) To take medicines to the patients. In July, 1883, the number of cases attended by the medical officers had diminished to such an extent that Mr. J. Meade, the acting President, reported that "the disease had been successfully "brought under the control of medical treatment, and that the number of cases had "greatly decreased"; but he alluded to the fact that the people concealed affected persons, and he, moreover, suggested compulsory legislation.

In the reply to this despatch Mr. Meade was directed, with the assistance of the medical officers, to draft an ordinance making proper medical attendance compulsory on yaws patients, and to send on the draft ordinance to the Colonial Secretary for the consideration of the government. There is no record of these instructions having been carried out, and no legislation on the subject was attempted.

In June, 1884, Dr. Mapleton made a report on the disease as it affected his district, but this report could not be found; there is a somewhat curious reference to it, however, in a letter from the Colonial Secretary to the President, dated the 18th July. A passage from this letter reads as follows:—"I am directed by the Administrator to request you

" to call on Mr. Mapleton to report, if, as medical officer in charge of District No. 2, " he considers the yaws patients being seen by a nurse and having local applications " given to them once a week, is all that is necessary for their proper medical treatment; " also to state at what times, and in what form he receives reports from the nurse." In reply Dr. Mapleton wrote: " I do not consider that the yaws patients being seen by " an attendant, and having local applications given them once a week, is all that is " necessary for their proper medical treatment. But, in the absence of legislation, little " or no more can be done for them."

It will be observed that the Colonial Secretary speaks of yaws "nurses"; and Lord Kimberley, in June 1881, had ordered "the institution of a system of nursing the " patients in their own homes," as an alternative scheme to the establishment of small village hospitals. There never had been any of these nurses, however, and the "attendants" or "yaws superintendents" had been appointed by the Governor's direction a year before the Colonial Secretary wrote his despatch.

On the 31st October, Dr. Mapleton addressed a letter to the Governor on the question of the disease, and the following extract is interesting as showing the difficulties under which the medical officers laboured, and the necessity for the compulsory legislation which had been sanctioned by the Secretary of State in June, 1881, and authorised by Mr. Neale Porter in August 1883, when he was administering the Government of the Colony.

" To visit yaws patients in their own houses in an island like this involves a very " great addition to the labours of the medical officers, and they can scarcely be expected " to do it without remuneration. Whereas there would be little extra trouble if the " patients would meet the medical officers at the roadside at certain stations. Searching " for and visiting the yaws patients are almost useless as the people hide their children " and deny that yaws exists in the neighbourhood. My suggestions for legislation are " as follows:—

" 1st. Compulsory notification of the disease.

" 2nd. Enforced regular attendance at certain stations (approved of by the President) " to meet the medical officers at least once a week.

" If these suggestions were adopted I believe that the disease might easily be " stamped out, and that without much expenditure of money."

During the year 1885 the persistent efforts of the medical officers were rewarded with a certain amount of success. As regards District I., the medical officer stated:— "There was a diminution in the number of cases of yaws." And the sanitary report for District II. contains the following reference to the disease:—"The ordinary run of cases " are intestinal worms, ulcerated feet, various forms of dyspepsia, anæmia, Bright's " disease, dropsy, phthisis pulmonalis, palpitation, diarrhœa, febricula and yaws. Yaws " has been brought within reasonable bounds, but it is impossible that it can ever be " stamped out, or even effectually treated without some legislation. Yaws patients " seldom apply to the medical officer, and, if discovered, can rarely be induced to take " any medicine or even to show themselves from time to time."

In January, 1886, the medical officer of District I. reported that: "Yaws is prevalent " and will not be got rid of without legislation." And his colleague reported, as regards District II., that it was decreasing, although he pointed out that "patients suffering " from this disease will rarely take any medicine internally, but readily make use of the " remedies for local application." At the end of the year Mr. Johnson still reported, "Yaws is prevalent." And Mr. M. P. Duke, who had succeeded Dr. Mapleton, who was transferred to St. Kitts, made the following observations on the disease: "This " scourge may be likened to rats, for without legislation it will never be exterminated. " The people pay little heed to it, and, as a rule, do not trouble themselves much about " medical treatment for it. The disease here is, fortunately, not of a very bad type, " and many cases run their course and get well without any skill being requisitioned on " their behalf. If it is hoped that the disease may some day be entirely removed from " our midst the first thing requisite is to compel the people to seek for, and fully obey " medical advice. Fortunately, owing to the mild nature of this complaint in our island, " those who are crippled from yaws here are quite the exception.

" Without compulsion, no satisfactory impression is likely to be made on the disease, " for the people regard it as inevitable as an Englishman does the measles, and treat it " with a levity born of familiarity."

From 1886, to the time of my visit to the island in October 1891, there appears to have been no report on, or document concerning the disease, at least none could be obtained in the island or in the Colonial Secretary's office in Antigua. But the medical officers continued to treat the disease under the difficulties they so often drew the atten-

tion of the Government to, and the small yaws hospital was kept open for the worst cases. Two months before my visit Dr. Branch sent in a return of cases he had under treatment, showing 14 cases in District 1, and 25 in District 2. These 39 cases, added to the 13 I found in the hospital, bring the number of persons under treatment about the period of my visit to 52, but there was no possibility of estimating the number of hidden cases.

I arrived at Montserrat from St. Thomas on the 1st October, and left for Anguilla on the 24th, making a stay in Montserrat of 24 days. Unfortunately, both the medical officers of the island were away on leave, and Mr. J. S. Gabriel, a member of the Antigua medical staff, had been sent just before my visit to take charge of the whole island. This officer, who was unacquainted with the place and the people, could not give me any special information in regard to my inquiry, and being the only medical man in the island his time was fully occupied with his professional work. I accompanied him, however, on several of his visits to the various districts, and with the help of one of the "yaws superintendents" we found out a number of cases of the disease.

On the 7th October I visited the poorhouse and yaws hospital with the medical officer. There is no general hospital in the island; a strange want in an English colony. The poorhouse is situated on a small plateau about a mile to the south of the town of Plymouth; the premises are healthily placed and the buildings commodious, but they are in a state of dilapidation.

In one of the ranges a few lepers were living in rooms the floors of which were falling to pieces. None of these lepers had yaws, but amongst them was a person suffering from lupus of the face, whom Mr. Gabriel transferred to the poorhouse.

The yaws hospital is on the seashore at Kinsale, a village about half a mile to the south of Plymouth. The building lies behind an old redoubt, and it was probably used for military purposes when the island was garrisoned. It is of stone and well adapted for a small yaws hospital. It has two floors, the ground floor being used for the male, and the upper one for the female patients and young children of both sexes.

At the time of my visit there were 13 inmates, three of whom had been in the hospital for over a year. In the male ward were a man and seven children, and in the female ward three women and two children, but at nights the younger boys sleep in the women's ward. The institution was over-crowded. It will be remembered that Mr. Neale Porter calculated that there would be accommodation for from eight to ten patients, and certainly this smaller number should not be exceeded. It appears that there is no dispensary at either the poorhouse or the yaws hospital, the medical officer supplying the necessary medicines from his own residence, which is a considerable distance away. This defect should be remedied at once. A dispensary can be opened at the poorhouse, which is not far from the yaws hospital, and stocked with the necessary drugs and appliances; and a dispenser should be appointed to compound the medicines for both institutions, and he might also act as dresser.

No consecutive reports appear to have been made concerning the yaws hospital, but the master of the poorhouse furnished me with a statement he drew up of the number of admissions, discharges, &c., and from it I have made up the following table showing the work done in the 11 years from the opening of the institution in 1881 to the date of my visit.

	Admitted.	Discharged Cured.	Died.	Re-admissions.
Males - - - -	69	45	2	3
Females - - - -	65	38	3	2
TOTALS - - -	134	83*	5	5

* Thirty-three of the patients were transferred to the poorhouse, but no particulars could be obtained concerning them.

Five deaths in 134 cases treated gives a death rate of 37·3 per thousand; that is considerably higher than the death rates of the Grenada, St. Vincent, and St. Lucia hospitals. Although the hospital has been in existence for 11 years, there is no mention of it whatever in the published Blue Books for the years 1889 and 1890.

On the 8th October I visited Roche's with the medical officer; this place was said to be badly affected with yaws, but we succeeded in finding only two cases. There were

doubtless others hidden away. Both the cases we saw were bad ones. One was a negro boy ill-nourished and crippled with the disease. The other, *J.S.*, a negro about 50 years of age with the granulomata springing from the soles of both feet. He had been ill with yaws on and off for three years, the disease getting better and then relapsing. He asserted, and I was told that he could be believed, that he had had yaws when a boy 10 years of age; he was bathed in the sea frequently and took "doctor's medicine" and got well, and from then until three years ago he had been perfectly healthy. This case is very interesting as showing that the immunity usually given by one attack of yaws is liable to wear out in time

The principal resident in the village, which is situated in a healthy position on the side of the Soufrière mountain about 1,500 feet above the sea, told us that, some years ago, when the people used to live on Roche's sugar estate lower down towards the sea coast, yaws was very prevalent amongst them, but since the villagers had built houses on their "grounds" in the mountain the disease had greatly diminished. The huts were certainly good ones of their class, and each one was isolated and surrounded by patches of cultivated land.

In passing a village on Upper Galway estate a number of persons came to the road-side to consult the medical officer, and amongst them were two negro children suffering from yaws.

On the 16th October we visited Harris, a large village on the windward side of the island. Nine cases of the disease had been collected by the "yaws superintendent," who produced a list containing the names of many more affected persons who had not come, although it was the regular day appointed to give out medicines for the yaws patients.

I examined these nine cases very carefully, and as it has been stated by two of the medical officers that the disease, as observed in Montserrat, is of a milder form than in Dominica, the following particulars that I noted at the time are instructive. All the patients were negroes.

Case I. *Sarah M.*, female; age 51. Been ill a year. Had a general eruption of encrusted tubercles last year. These "dried up," and now she has an encrusted tubercle on the ball of the right thumb, and "crappox" on the sole of the right foot. She has been treating herself with bush tea made of white sage* and body-killer.†

Crappox is the name applied by the people of Montserrat to the yaws granuloma which grows from the sole of the foot. In the other islands it is called *tubboe*, or *tubba*.

Case II. *Elizabeth B.*, female; age 40. Been ill one year and eight months. She had a general eruption of encrusted tubercles, which dried up early this year. She now has dermatitis of the soles of both feet, called "dry crappox" by her and others. She has been taking "weed-tea," made of the white sage and body-killer, twice a day.

Case III. *Jane W.*, female; age 8. Ill six months. She cut her right ankle a month before she got the yaws; the cut did not heal, but formed a sore, and she applied pounded red cedar leaves‡ to it. She associated with people affected with yaws, and took no care to protect herself from the contagion. Yaws tubercles first appeared round the wound, and then they broke out on body and limbs as a general eruption. The site of the sore on the leg is now the "mother yaw," and it is a large mass of coalesced tubercles, covered with a whitish exudation, the application of the poultice of pounded red cedar leaves having prevented the formation of characteristic crusts. There is a general eruption of large encrusted tubercles on the face, body, and limbs. She bathes in the sea once a week, and sometimes she bathes in the river, as do the other yaws cases, and at places below the people wash clothes, bathe, and obtain drinking water.

Case IV. *Hannah W.*, female; age 14. She has been ill two weeks. She had a sore on the right leg, and yaws "came on it." The site of the sore is now a mass of coalesced tubercles, similar in appearance to the "mother yaw" in Case III., *Jane W.* She has squamæ on limbs, and a general eruption of small encrusted tubercleson the face, neck arms, and legs.

Case V. *Emily W.*, female; age 7. She has had the disease since August. She bruised her right leg, a sore resulted, and yaws "came out" on the sore. She now has a general eruption of small encrusted tubercles about the body and limbs.

Case 6. *Eliza P.*, female; age 30. She has had severel rheumatic pains in limbs, with swelling of hands and feet for the last three months. There is now a large

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* *Croton balsamifer*, L. † *Jatropha Curcas*, L.
‡ *Cedrela odorata*, L.

encrusted tubercle on the right knee, and a smaller one at the right commissure of the mouth. There are marculæ and drying tubercles on the legs. She attributes the pain to the yaws.

Case VII. *Rebecca M.*, female; age 16. She has been ill with the disease, and under treatment of the medical officer. She has "crappox" on both soles. She applies syrup and pounded "Spanish needle" * to the feet, and, it is said, will not use the "doctor's medicine", as "it burns her."

Case VIII. *Mary R.*, female; age 26. She has been ill for eight months, and under medical treatment. She now has a reniform encrusted tubercle on the chin, and dermatitis of both feet, with "tubboes." She applies pounded cassava† root to the foot.

Case IX. *Eleanor B.*, female; age 14 months. She has been ill one month, and has encrusted tubercles on the pudenda and perineum.

X.

History of Yaws in St. Christopher and Anguilla.

Before the year 1881 there is no official information to be obtained concerning yaws in St. Christopher; and the senior medical men now practising in the island do not remember having met with cases of the disease previous to the last 10 or 12 years. Dr. W. Munro, however, who was a medical officer in St. Kitts 25 years ago, met with the disease there, as he stated in a letter to a London medical periodical in the year 1879. Whether the disease lingered on from the time of slavery, or whether it was brought from a neighbouring island about the time Dr. Munro detected its existence, it is now impossible to say. I am inclined to believe, however, that yaws was eradicated from St. Kitts previous to the period of emancipation, as happened in the case of Antigua; for the island is a small one, and all the available land was taken up at an early period of the settlement of the colony, and it has been in high cultivation ever since, so that there has been no opportunity of the negroes forming settlements in a mountainous forest-clad interior, away from the supervision of the authorities, as has happened in the larger islands to the south.

The first official allusion to the disease is contained in the report of the medical officer of District No. 6 for the quarter ended 30th June, 1881, and it is as follows;—

"I have been lately consulted for cases of yaws, and, from inquiries that I have "made, I believe that this disease is on the increase in the town of Old Road and the "neighbouring clusters of huts. Cases of this disease scarcely come under the notice "of the district doctor, being left entirely to nature, or treated by the friends or parents "of the sick. I think that I shall be able to go more fully into the subject in my next "report, in order that the Governor (if it should be deemed necessary) may inaugurate "a system on the model of that which has proved so beneficial in the Presidency of "Dominica."

After writing this report Mr. Semper made full inquiries into the matter, with the result that he was able to estimate that there were about 50 persons suffering from yaws in his district, and he found, moreover, that the people were reluctant to report their condition to him. He says: "I have inquired into the alleged prevalence of yaws in "my district, and have found that about 50 persons are suffering there from this disease. "It prevails among the Africans located near Wingfield River, and others in their "immediate neighbourhood, as well as among the Africans inhabiting the cluster of huts "known as Conyers Village. These huts are, for the most part, unusually small and "ill-ventilated, thatched on the sides and roofs, and without any kind of flooring. "They are also overcrowded,, as is the case with the labourers' dwellings throughout "the parish of St. Thomas, where, with a population of 3,210, there are but 449 houses, "whereas, in the next parish, that of St. Ann, there are 894 houses for the accom-"modation of 3,779 persons. Over-crowded and ill-ventilated huts, with the peculiar "habits of the African, go far in accounting for the production and propagation of this "disease. Up to the present time, there has been a decided reluctance on the part of "sufferers to make their condition known to me; but I trust that I shall, in future, be "successful in inducing them to submit to medical treatment, rather than continue to "trust to 'bush teas,' with which they have hitherto been content."

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* *Bidens leucanthus*, W. † The tuberous roots of *Janipha Manihot*, Kth.

In alluding to the facts disclosed in this report Dr. Branch, in his report on the vital statistics of the island wrote as follows :—

" Dr. Semper's interesting account of the prevalence of yaws among the African " labourers of Wingfield Estate seems to me well-deserving of the notice of the Govern- " ment. This loathsome and obstinate malady is certainly contagious, and, as it appears " now to be definitely established in Old Road as a rapidly increasing endemic, it may " soon become, unless stamped out while still confined to its present locality, as " prevalent all over St. Kitts as it used to be throughout Dominica. The over-crowding " of houses, mentioned by Dr. Semper, may possibly be remediable by the passing of a " local law similar to the 'Sanitary Act' in force in England. The establishment of a " yaws hospital, as suggested in Dr. Semper's last quarterly report, would, no doubt, " be as efficacious here as it has proved in Dominica, in arresting the spread of the " disease."

Nothing appears to have been done to isolate the affected persons, and although many reports on the hygiene and sanitation of the island community were subsequently written, there is no reference to yaws in any of them until the report of Dr. Branch for the June quarter of 1886, which contains a reference to the matter in the following words: " Probably there are always some cases of this disease (yaws) in St. Kitts, " especially in Old Road ; but I do not think that there are ever more than 20 at a time " in the whole island. Perhaps it would be difficult to find 10 at present." It would appear from this statement that there had been a considerable diminution of the number of persons found to be affected five years before, when there were 50 cases in District No. 6, chiefly about the town of Old Road, which was reported by Mr. Semper to be very much overcrowded in 1887. It is possible, however, that the medical officers were not aware of the number of persons attacked by the disease, for, as has been shown, the people treated themselves for it, and were desirous of concealing their condition from the doctors ; but, be that as it may, it was soon found that new districts of the island had become affected.

There is a track used by labourers from Old Road across the hills to a place called Phillips on the north side of the island, and the disease was carried to this place, and thence spread along the north and west coast. In June, 1889, Mr. Fretz, the medical officer in charge of Districts 3 and 4, reported that : " A few cases of yaws have recently " come under my notice in the district ; a ward in the hospital, or some fit and proper " place for the segregation and strict treatment of such cases seems necessary." And some six months afterwards Mr. Foreman reported as follows concerning his district, which is at the north-western end of St. Kitts :—" My district during the quarter has " been very healthy ; but I regret to say that this part of the island, which is considered " to be the healthiest, should be contaminated with yaws. However, the number of " cases to my notice is not yet great ; only five or six have come to my notice, and if " measures were taken to isolate them at once the disease would be checked, at least " for some time. Otherwise this loathsome and contagious disease will surely spread, " the effect of which will be the disablement of a number of labourers, and the " deterioration of the agricultural class."

In March, 1890, Dr. Mapleton reported that he had seen a case of yaws in the town of Basseterre, and that it had got well rapidly under treatment. And from this time no further notice appears to have been taken of the disease until I arrived in the island.

This sketch of the history of yaws in St. Kitts is very meagre, but even the few facts stated above were not found out without much trouble. Of all the islands visited by me St. Kitts stands prominently forward as the place wherein most difficulty was experienced in eliciting information that ought to be easily obtainable in the Government offices.

On the 26th October I left Antigua for St. Kitts, *viâ* Anguilla, where I stayed the whole of the next day, and I reached St. Kitts on the 28th, and left for Nevis on the 19th November. But whilst in St. Kitts I found it necessary to return to Anguilla, to complete my inquiry there, so that my actual stay in St. Kitts was less than three weeks.

Whilst in the island I performed some culture experiments, having brought test tubes, with nutrient media from Antigua, and the results, as regrrds the growth of the organism, were the same as those obtained by Mr. Watts and myself in the laboratory of Antigua.

On the 4th November I visited Old Road, with Mr. Boon, the medical officer of the second district, and Dr. Semper met us at the place. Five cases of yaws from the neigh-

bourhood had been collected by the police at the station, and we saw the patients, and examined them there. Two were negroes, between 50 and 60 years of age; the rest were grown children. One of the men had been ill eight months, and the other, who was verging on old age, had been ill a year and seven months. None of these cases came from Old Road, but from a village called Lambert, further on towards Sandy Point. The people stated the disease had been in this place for many years, that all the persons living there had had yaws, and that some of them were affected now.

We then went to an estate at the back of Old Road, called Wingfield, the property of Mr. Walter Boon, who was good enough to accompany us to the negro houses, and to give me some special information about the progress of the disease in the district. We saw six cases of yaws at Wingfield, most of them in children. And we learned that there were cases at Middle Island, and at Godwin's Gut, near to Sandy Point.

Mr. Walter Boon, who is the leading planter in the Old Road District, informed us that 50 per cent. of the people employed by him have had the disease at some time or other, that the labour supply is affected by the ravages of the malady, and that a respectable Portuguese shopkeeper in the town of Old Road had contracted yaws. Mr. Walter Boon appeared to consider the question of the spread of the disease a very serious one, and I certainly have no reason to believe that his statements were in any way exaggerated. He informed me that the local native treatment was to bathe the people in the sea, and to scrape off the growths until the raw skin was reached. This treatment, although barbarous, appeared to be to a certain extent efficacious.

On the 5th November, accompanied by Dr. Mapleton, I drove out to Dieppe Bay, where the medical officer of District V. resides. Eight cases of yaws had been collected at the police station, from the villages of Profit and Parsons, and we examined them all carefully. Amongst them were three children, aged respectively five, seven, and eight years, belonging to one family, at Profit. And another family had two young children affected.

One case, that of a negro girl eight years of age, living at Profit, had had the disease for three years, and had been most of the time under the treatment of an old woman who professed to be able to cure yaws. On inquiring into the matter, I found that the following was the treatment adopted: The patient was bathed occasionally in the sea, the crusts were then rubbed off the tubercles, and the juice of the "tubboe bush" * was applied to the raw surfaces, and then a bush tea was administered. This tea was composed in the following way: Leaves of the "Demerara tamarind," † and of the "better-man," ‡ were infused in a quart of water with some lignum vitæ § chips, and half a cupful was given morning and evening.

On the 12th November I went through districts III. and IV. with Mr. Cleveland, who was in charge of both of them during my visit to the island. At Upper Burryau's estate we saw a black child, two years of age, in a dirty hut under the care of its mother, a young woman about 25 years old. The infant had yaws, and the mother said she had had the disease when she was a child. The boy had the yaws in a typical form. There were encrusted tubercles on the face, round the mouth and implicating the mucous membrane, on the head, neck, limbs, abdomen, and scrotum. The child had been ill for a month, but the mother could give no account of how he had caught the yaws.

We next visited a small negro settlement in Upper Burryau Valley. Here we saw a black girl, five years of age, with yaws tubercles, in process of absorption, in the anal fissure, and with small encrusted tubercles on the face. The child had been ill for a year. The mother told me that she had applied the juice of the "tubboe bush" to the tubercles, and had occasionally bathed the child in a bath in which young shoots of the "barricader" bush ‖ had been crushed.

Further up the valley we came upon a collection of huts in one of which we found four children, all of whom had yaws. One of the children had onychia of the toes of both feet, and another had the chigoe fleas (*Pulex penetrans*) in her feet. The hut was in a filthy condition, the inner room more especially so. The children were alone, their parents having gone to work in the fields.

On the 16th and 17th November I was with the Medical Officer in District 6, and we visited the various villages, the Sandy Point Hospital, and the new Leper Asylum. The latter institution, which I visited twice, is an admirable one, and the 80 lepers there segregated are well-housed and their ordinary wants are well looked after. It appears to me, however, that the dietary scale—a copy of which I append in this report,

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* *Croton balsamifer*, L.

† *Euphorbia hypericifolia*, L.

‡ A specimen of this plant was not obtained.

§ *Guaiacum officinale*, L

‖ *Jatropha curcas*, L.

is deficient in fresh animal food. The institution is simply an asylum, and the inmates receive no special treatment for the disease. There were no cases of yaws discoverable amongst them.

At Lamberts and Conyers we saw four cases of the disease besides the five cases recorded as having been examined on the 4th November at Old Road. The huts of the people were most wretched and dirty places. The sides and roofs were made of thatch, and the soiled earth was the floor. The huts varied in size from 10 by 6 feet to 12 by 8 feet, so that they covered less than 100 square feet. In one of the smaller huts there lived a man, his wife, and six children. The bedding consisted of a bundle of old rags which were put in the sun every day to dry, but rarely or never washed.

In another hut, destitute of furniture, a man was cooking his food on the earthen floor in an iron pot. A few lighted sticks were put on the earth and the pot suspended over the fire thus made. The hut was full of smoke, but the man appeared to be quite contented with it. He said it kept out flies.

After leaving Conyers we drove to Sandy Point. The Hon. R. E. Semper, the medical officer of the district, is the senior member of the medical profession in St. Kitts. He was in practice in the town of Sandy Point when the fortress of Brimstone Hill was garisoned with European troops, and he has continued in practice ever since. His testimony, therefore, in regard to the condition of the people, is valuable. In his reply to one of the interrogations he states:—"I do not remember to have seen a case of "the disease (yaws) at Sandy Point, the principal town in District No. 6." Shortly before my visit Mr. Semper told me that he had discovered a case at Sandy Point, and we got afterwards evidence of two others, and found several at Fig Tree, which is a small village a little to the north of the town.

At this place we visited a small hut belonging to a negro, and found there seven of his children, four of whom had yaws. These were Bethiah 12 years, Joshua, 14 years, Elijah 4 years, and Jeremiah 3 years of age. David, another of the children, 5 years of age, had had the disease, but he is now apparently well. He caught yaws at Mount Idol, a part of the town of Sandy Point, by playing with two children residing there who were suffering from the disease, but who were in no way isolated. About nine months ago the other children caught the disease from David. All the cases had been under native treatment. Indeed, Mr. Semper states:—"The treatment of yaws is, I believe, almost "exclusively in the hands of natives." I inquired into the matter and found that the details of this native treatment were as follows:—A wine glassful of sea-water mixed with the juice of half a lime * was given every other morning; and during the day there was administered a tisane made by infusing the following herbs in boiling water: "stinking weed" † "sweet marjoram," ‡ "tubboe bush," and "betterman."

The next day a negro boy, eight years of age, with yaws, was brought to Mr. Semper's house from Sandy Point for me to see. He had encrusted tubercles on the neck, body, and limbs, and "tubboes" in the soles of both feet.

The inquiry in St. Kitts led to important results. The authorities pooh-poohed the idea of the disease being in the island, and most of the medical officers were under the impression that there were only a few cases amongst a community of Africans residing near Old Road. On visiting the different districts of the island, however, I found cases along the north and south coast lines, the two ends of the island apparently being the only non-affected places. It would appear, from a consideration of the facts I have been able to discover, that the disease first appeared at Old Road, and from thence it spread towards the west. The contagion was then carried across the island to Phillips on the north coast, and from this place it again spread towards the west. This westerly course of the contagion may be simply accidental, but it is worth noting even as a peculiar fact. As the constant trade winds blow from the east towards the west, they may carry microbic spores with them—but, of course, this point cannot be decided without careful and continuous investigation.

Anguilla.

This island lies about 60 miles to the north-west of St. Kitts, of which it is a dependency. It contains an area of 35 square miles, and a population of 3,699, according to the last census, and of this number 123 are whites. Just before my visit the island had passed through a very severe and prolonged drought, which caused famine, and gave

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* *Citrus medica, var acida* Brand. † *Cassia occidentalis*, L.
‡ *Mentha viridis*, L.

rise to much distress and suffering. It is, perhaps, the healthiest island in the West Indies, the annual death rate, calculated on the registration of deaths for the decennial period, 1881–91, being only 13·9 per 1,000, whereas the death rates of Antigua and St. Kitts for the same period were respectively 36·1 and 35.0 per thousand.*

The Federal steamer "Tyne" visits the island once a fortnight, and lies the whole day in Crocus Bay, returning to St. Kitts the next morning. And, as there is no accommodation in the place for strangers, I determined to go by the "Tyne," and return to St. Kitts, making a second visit if I could not accomplish in one day all the work I found to do there.

Accordingly, I went right on from Antigua on the 26th October, and arrived at Anguilla on the following morning. Dr. Nurse, the medical officer, had written to inform me, on the 29th September, that he had found a case that was said to be yaws, but that he was doubtful on the point. I wrote, therefore, requesting him to make arrangements for me to examine the case on my arrival.

Dr. Nurse, and Mr. Mackay, the resident magistrate, came off to the steamer, and both these officers were good enough to render me every assistance in their power during my brief stay in the island.

The case of suspected yaws I found to be a condition of the sole of the foot known in Dominica and other islands as "crabs," and in Montserrat as "dry crappox," and thought to be one of the special manifestions of yaws. The case was that of a negro boy, 13 years of age. The soles of his feet and the palms of his hands were eroded and fissured, the fissures in the soles running right across and extending deeply through the thick hard epidermis to the *Rete Malpighii*; from some of these fissures a serous fluid exuded. The feet were exceedingly tender, and the boy could walk only with difficulty. Neither the boy nor any of his relatives had been away from the island, and they could not account for the disease. The case was one of dermatitis in no way connected with yaws, and was doubtless occasioned by some form of external irritation of the ffected parts.

Dr. Nurse informed me that the diseases prevalent in Anguilla since his recent arrival in the island were diarrhœa and dysentery, and that he had only seen one case of skin disease, namely, a case of pustular eczema. He said, however, that leprosy was common, and that he had already observed over 40 cases. They were both tubercular and anæsthetic. He could not say in what proportion, and he had not seen any mixed cases. Later on Mr. Mackay and the manager of the salt ponds stated to me that they believed there were a good many more cases in the island than Dr. Nurse had estimated.

Mr. Mackay kindly drove me over a considerable portion of the island in order that I might see the country and the conditions under which the people lived. The huts of the poorer inhabitants were small and most wretched in construction, for there are very few trees on the island, and so the available material for building huts is very scanty. They are made of wattles, and thatched with the small leaves of a dwarf palm† that grows, at most, not higher than 30 inches. These frail huts give very little shelter, and they are very dirty inside. The floor is of earth trodden down, and sanitary matters are disregarded. I entered one of these huts with Mr. Mackay. There were six children inside, and two of them, infant twins, in a condition of marasmus, were lying on some dirty rags. The sides and the thatched roof were full of holes, and I never entered a more wretched apology for shelter from wind and rain. It says much for the salubrity of the climate that, with such habitations, the mortality is so small.

As Mr. Mackay and I were driving back to Crocus Bay to catch the "Tyne," a letter was received from the Rev. Dirk Schouten, saying he had "just been told by a "credible informant that there was a woman said to be suffering from yaws. The "symptoms described are such as to indicate that disease." As this woman lived beyond the most distant part we had driven to, and as the steamer would shortly leave, there was no means of seeing the case, so I decided to return to the island by the "Tyne" on her next trip, and I requested Dr. Nurse to have the woman at hand, so that she could be examined.

I reached Anguilla again on the 10th November, and, with Dr. Nurse, saw the case referred to by the Rev. Dirk Schouten, who for a number of years had acted as medical officer of the island, the Government of St. Kitts supplying him with medicines. The woman was a negress about 50 years of age, and she was not suffering from yaws. But she had slight elephantiasis of the dorsum of the left foot, and dermatitis of the soles of

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* *See* table in Appendix.

† *Tiarnax Morrisii*, Windl.

the feet, of the arms, and of the hands, similar in appearance to the squamæ, or "dartres," of yaws. There were conspicuous white patches of considerable area on the legs and arms and back. The skin of these taches was anæsthetic, and I ran a needle several times in different spots without the patient being aware of the fact. The fingers were distorted. There was no ulceration. She had nine children, all of them healthy, and the youngest one seven years old. There was no history of leprosy in her family. Her symptoms had been coming on for several years. The case was an interesting one of anæsthetic leprosy, co-existent with *Elephantiasis arabum*.

Afterwards Mr. Mackay lent me his trap, and Mr. Schouten and I drove out to Long Bay and Maid's Bay, at the east end of the island, and we visited the huts of several persons he thought might be suffering from yaws. One of these persons, a black woman, said she had suffered from "tetter worm." The woman's foot was now nearly well, but very tender, as the epidermis of the sole was thin and soft. Another case was that of a woman suffering from dermatitis of the soles of both feet, the disease known as "crabs" in the other islands. She said she had had the symptoms for years, but that she was now somewhat better. At times the soles had become fissured, and very painful, preventing her from walking. The houses in which these two persons lived were of the better class, and made of boards. They were clean; but the people complained of poverty and the scarcity of food.

The diet of the people consists of corn meal, from maize raised in the island, and imported rice. Fresh fish is abundant, for the sea teems with fishes, and all the men are fishermen. There are salt ponds on the island, and it is surprising that a salt fish industry has not been established by the more enterprising people. The fish is salted and dried in the sun for local consumption, but it is not exported. Since the famine very few green vegetables, and no fruit, have been obtainable; but in favourable seasons yams, sweet potatoes, and pigeon peas are largely cultivated.

I found no case of yaws on the island, and I do not believe the disease ever gained a footing there. There never were any estates in Anguilla requiring a large importation of slaves in order to carry on the work of cultivation and manufacture of sugar and other products raised in the neighbouring and more important islands. Until recent years the proportion of white residents was large; indeed, in 1708, Herman Moll stated that the sole inhabitants were 150 families, or 800 or 900 souls, the descendants of the English who settled there in 1650.

As then there was no importation of slaves from Africa, so yaws was not introduced, and happily the island has remained exempt from the ravages of the disease until now. If yaws had existed in Anguilla it would, without doubt, have become epidemic, or have spread widely during the famine and the resulting misery occasioned by the late drought.

XI.

History of Yaws in Nevis.

The island of Nevis has an area of 50 square miles, and it contains a population of 13,087. It lies close to St. Christopher, to which it has been politically amalgamated since January, 1883.

There is no information whatever to be obtained regarding the history of yaws in the island previous to the year 1886.

Some time during the year 1873 all the official records and documents were destroyed by a fire at the Court House in Charlestown, and most of those preserved from that date to 1883 were removed to the Government Office in St. Kitts by the late President Eldridge. No opportunity was afforded me of seeing these documents, and I cannot say whether any of them contained references to yaws, but whilst I was at Nevis the Magistrate found returns of the cases treated by the district medical officers for the four years ending with 1877, and I made a careful examination of them without, however, being able to find any mention of the disease.

The first reference to the existence of yaws in Nevis that I was able to discover is contained in the report of Mr. Charles R. Edwards on the sanitary condition of his district for the quarter ended the 30th June, 1886. He says: "I would like to draw attention "to the fact that there is an epidemic of yaws in my district. The number of cases is "between 300 and 400. A temporary hospital has been established at my own expense,

" where cases are dressed twice a day, but these arrangements are on too small a scale to " meet the necessities of the case."

The facts brought forward in this communication were commented on by Dr. Branch in his report on the Vital Statistics of the Presidency of St. Kitts-Nevis in the following terms: " A very serious epidemic of yaws seems to have recently broken out at Nevis. " I beg to call particular attention to the Report by Dr. Edwards on this subject . . . . . " Dr. Edwards reports the existence of about 300 [cases] in his district. Such an exten- " sive and apparently sudden outbreak or rapid spread of this contagious disorder in " Nevis demands the attention of the Government."

It would appear from these reports that both the medical officers believed that yaws had become suddenly epidemic in one of the three medical districts in Nevis, but no evidence is brought forward to establish this belief, beyond the discovery of over 300 cases by an energetic officer. It is unfortunate that no inquiry was set on foot by the Government to discover the actual facts relating to this alleged sudden outbreak, for if this had been done at the time, some important facts concerning the progress of the disease in the island would doubtless have been brought to light. From my own inquiries, conducted whilst I was in Nevis, I am led to believe that cases of yaws have existed in the place for many years, that they escaped the observation of the authorities, and that as there was no restriction on the intercourse of the healthy with the diseased, the malady gradually spread until the condition of affairs came under the notice of Mr. Charles R. Edwards, whose restless energy was fortunately not satisfied until he had routed out and examined every case in his district.

The gravity of the matter was at once recognised by Viscount Gormanston, who was then Governor of the Leeward Islands, for his Lordship instructed Mr. Edwards, the medical officer, Mr. Kortright, the superintendent of Public Works, and Mr. George F. James, the inspector of police, " to select a suitable building, or the site for a building, " for a Yaws Hospital."

On behalf of this Committee, Mr. Edwards reported as follows: " At Newcastle " there is a suitable building in good repair, which can be rented for 12 *l.* per annum. It " would be necessary to add out-offices and make small alterations at a cost of 60 *l.* to " 70 *l.* There is a good supply of well water, and it has other advantages in being " central, and in being close to the sea, which latter is very important as the disease is " more amenable to treatment on the sea coast."

This letter was submitted to the Executive Council of St. Kitts-Nevis, which body authorised that the building should be hired, and that the inspector of police should proceed to make the necessary repairs and additions.

The hospital was opened on the 17th January, 1887, and it was conducted very economically by the medical officer, who had entire charge of all the arrangements. The subordinate staff consisted of a nurse, a cook, and a general servant. The following extracts taken from the First Annual Report give some important particulars concerning the hospital and the prevalence of the disease in the island:—

" The number of patients admitted for the year was 168, of whom 22 were re-admis- " sions. The number of patients now in hospital is 22. The number discharged cured " 146. The hospital is capable of holding 24 patients comfortably, but it has sometimes " been necessary to increase this number to 30, and on one occasion 34.

" The money spent for the year, not including rent, was 225 *l.* The daily average " number of patients in hospital was 22, and the cost per head per day 6¾ *d.* (sixpence " three farthings).

" There has not been a single death from yaws in my district since the hospital was " opened; before the opening there were several deaths from this cause in my short " experience. That it has been the means of saving life is therefore unquestionable. " Apart from this, I am quite certain that many of the patients admitted would have died " had they not had the benefit of hospital treatment.

" *On the extent of the disease* (*a*) *in the District.*—When the hospital was first opened " persons suffering from yaws were to be seen commonly everywhere, they now have to " be searched for owing to the marked check which the disease has received.

" (*b.*) *In the Island generally.*—It is with difficulty that I am able to collect cases " from the other districts in consequence of which there are still a great many cases. " There are probably 250 yaws patients still in the island; of these there are about 50 in " my district.

" *The predisposing causes of yaws.*—Of these the most obvious are poverty, and the " want of water in the dry season. The poverty of the labouring classes in my district " is universal, due partly to their lack of industry, and partly to the bad times. Nearly " all the children are under-fed and under-clad. The want of water in the dry season

" renders cleanliness almost impossible, consequently contagion spreads the disease quickly " and extensively in the dry months.

" In a former report I have described the different kinds of disease seen and the " manner in which they are treated."*

On the Government inquiring as to the reasons of the difficulty of collecting cases from the other districts of the island, Mr. Edwards stated that the people were not yet sufficiently acquainted with the hospital, and he expressed the belief that, if they did not go to the hospital of their own accord later on " it would be necessary to make hospital " treatment compulsory as it is in Dominica."

In his Second Annual Report, written on the 17th January, 1889, Mr. C. R. Edwards remarks as follows :—

" It is now two years since the hospital was opened. It was estimated that it would " cost 250 *l.* a year, and the expenses have been kept slightly under the estimate. During " the time 281 patients have been treated as in-patients. No deaths have occurred (from " yaws) either in the district or in the hospital. The effect of the institution is to be seen " in the fact that the disease in my own district is now very seldom seen, whereas before it " was opened there were between 200 and 300 cases. In that part of the island known as " Gingerland there are probably several hundred cases. These come to the hospital " voluntarily, and at present most of the inmates are from this part of the country. It " seems to me that this disease, which in most instances is so easily cured, has the property " of spreading very rapidly from one person to another. That it should be kept in check " is, therefore, a matter of importance. The only means by which this can be effectually " done is by Special Hospital, the necessity for which I think still exists."

In his Third Annual Report for the year ended 17th January, 1890, the medical officer makes the following important statements :—

" It will be seen that there has been a decrease in the number of admissions and " re-admissions, which is due to the fact that patients are now kept in hospital a week " or two after all signs of the disease have disappeared, in this way it is found that it " does not recur so readily.

" I am happy to be able to state that yaws is not nearly so prevalent in this island " as it was when the hospital was opened. Should it continue to diminish at the same " rate, it is not improbable that it may be eradicated in the course of a few years. There " is still a fairly large number of cases hidden away, and it is difficult to bring these " under treatment, because it is not easy to find them, and when found they cannot " always be induced to leave their own homes, but I shall pay more attention to this class " as soon as I see empty beds in the hospital. I regret to have to record one death, the " only one which has occurred in the Institution."

The number of re-admissions of patients discharged cured had been considerable. In the first year there were 31. In the second year 23, and in the third year 16 ; and some of them were re-admitted several times.

It is important to notice that the people began to hide those of their friends that were suffering from yaws, and that when found they could not, in some instances, be prevailed upon to go to the hospital, thus showing the necessity of compulsory legislation in dealing with the disease.

With the assistance of Mr. Edwards I have drawn up from the hospital books the following table showing the work done at the institution for the four years from its opening to the 17th January, 1891 :—

Years.	Number of Cases Admitted.	Number of Cases Discharged Cured.	Death.	Re-admisions.	Percentage of Re-admissions.
1887–88 - -	168	438	- -	31	18·45
1888–89 - -	117		- -	23	19·65
1889–90 - -	93		1	16	17·20
1890–91 - -	88		- -	14	15·90
Totals - -	466	438	1	84	18·02

* This report could not be found in any of the Government Offices, and the medical officer had unfortunately not kept a copy.

The percentage of re-admissions is calculated on the admissions to the hospital, but if it be worked out on the discharges, it would show then 19·18 *per centum* of relapses, which are much higher figures than those of any other island.

The mortality was very low indeed, namely, only one death in 466 cases treated, and this gives a death-rate of 2·1 per thousand, which is less than that of any of the other yaws hospitals.

Altogether 466 persons have been under treatment in the yaws hospital, and considering the number of hidden cases, and the small size of the hospital, this can only be considered as a portion of those persons suffering from the disease, but even this number shows that 3·7 *per centum* of the mean population have passed through the wards of the hospital.

The Total Expenditure has been as follows:—

	£.	s.	d.
1886. Repairs and additions to the hospital buildings, about - -	60	–	–
1887–88. Total Expenditure for the year - - - - -	225	–	–
1888–89 „ „ „ - - - - -	232	8	–
1889–90 „ „ „ - - - - -	219	12	9
1890–91 „ „ „ - - - - -	250	4	9
	£. 987	5	6

This sum of 987 *l.* is only a near approximation to the total expenditure, for it does not include the value of medicines supplied from the district dispensary, and I believe the rent of the hospital building, which is 12 *l.* a year, is only included in the expenditure for the year 1890, so that practically the cost has been at the rate of about 250 *l.* a year. Taking the above figures, however, and dividing them by the number of persons admitted to the hospital it is found that each patient necessitated the expenditure of 2 *l.* 2 *s.* 4 *d.*

I arrived at Nevis from St. Kitts on the 19th November and left for Antigua on the 2nd December. Some delay occurred in the work of my mission, as the Commissioner of St. Kitts-Nevis had not informed the acting magistrate of the latter island of the nature of my visit, and access to the official documents at the Court House was refused to me. As the Commissioner was in Antigua I had to send my secretary to St. Kitts to telegraph to the Colonial Secretary at the seat of the Government of the colony, and until the reply came with instructions to the local officials my work had to be suspended.

On the 20th November, I visited the Yaws Hospital at the village of Newcastle at the northern extremity of the island with Mr. C. R. Edwards. The hospital is situated at the centre of the village, opposite to the police station and magistrate's office. It is surrounded by the houses of the villagers, but it appears that it has not acted as a centre of infection; from what I could ascertain there had not been any case of the residents in the neighbourhood having been affected with the disease. It is an old stone building with two floors. The lower one is level with the ground, and is occupied by the male patients. The upper ward is occupied by the women and children, and a portion is partitioned off for the accommodation of the nurse. A staircase leads from the lower to the upper floors. There is an enclosed paved yard in which are the kitchen, bath room, and latrines. The patients go to the sea to bathe every day.

There were in the institution, when I first visited it, 32 patients, 13 males, and 19 females. The female inmates were from 3 to 16 years of age, and the males from 3 to 15 years; there being also a man 40 years of age. All were negroes. Six of the cases had been re-admitted for relapses of the disease. Of this number two had been re-admitted twice, and two three times. During the four years that the hospital had been opened four of the patients had absconded. All the inmates were clean, and they appeared to be contented and happy, indeed considering the extreme poverty of the lower classes in the island they were probably much better off at the hospital than they were in their own homes. All were in various stages of convalescence, and several were apparently cured. The longest stay of any one inmate was 16 months, but most of the cases had been admitted since September.

The hospital was scrupulously clean and everything appeared to be in excellent order; but I noticed serious defects in regard to the insufficient ventilation, and the

inadequate amount of cubic space available for each patient. The space in the lower ward is 3,705 cubic feet, and in the upper ward, including the nurse's quarters, it is 4,695 cubic feet. With 32 inmates and the nurse, this gives a space of only 254 cubic feet for each person, which is less than half of what it should be. It is true that most of the patients were children; but, still, considering the defective ventilation and the practice of shutting up the houses at nights, which is a characteristic of the negroes in the West Indies, it is clear that the accommodation for the patients has been stretched far beyond its safe limit.

To the north of the hospital and between it and the sea there is an old stone building available for the extension of the institution if it be decided to keep it open.

After visiting the hospital the medical officer and I drove round the island, returning by the Gingerland district. At Windward we met the Rev. W. Cowley, the rector of St. James' parish, who alluded in feeling terms to the poverty of the people owing to the number of estates thrown out of cultivation. He told us that he had known lately of deaths caused by actual want.

On the 22nd November Mr. Edwards and I rode through Cotton Ground, Camp, and Spring Hill, returning by way of the Yaws Hospital, which we visited again. At Cotton Ground there is a large village, and the huts were clean and good of their kind, much superior indeed to those I had seen in the inland villages of St. Kitts. We found no cases of yaws, but the people were not disposed to be communicative on the subject.

On the 28th November the medical officer and I visited the Yaws Hospital a third time for the purpose of inoculating some kittens with the virus of the disease in order to endeavour to add to the knowledge of the incubation period. We found on our arrival that a mulatto had been re-admitted from the New River Estate. The man was about 50 years of age, and in addition to yaws he was suffering from that form of tuberculosis known as scrofula. He was a pitiable object of emaciation and disease. He had much scrofulous ulceration about the body and limbs, and here and there the ulcers were covered with the characteristic yaws crusts.

In driving afterwards through the Gingerland district we saw on two occasions children with yaws walking along the public road.

With the assistance of the intelligent nurse at the Yaws Hospital I found out that the native treatment of the disease consisted in the use both locally and internally of the indigenous "sea-side balsam."* The abundant greenish juice of this plant, which exudes from the cut stems and leaves is dropped on to sugar, which is then eaten by the patients.

On the 30th November I went to the Gingerland district with Dr. Huggins, the medical officer. Notwithstanding the disposition of the people to hide the disease two children were brought to Dr. Huggins' dispensary who were found to be suffering from yaws. They were brothers, and one boy had caught the disease from the other.

The peasants' houses in the Gingerland district were, on the whole, the best in the island. Many of the people raise vegetables and other garden stuff, which are sold in Charlestown and sometimes in St. Kitts; the result is they are comparatively well off.

In the Report on the Yaws Hospital for the year 1889, the medical officer alluded to the "fairly large number of cases hidden away;" and then estimated that there were probably 100 cases in the island, and from my own inquiries I am inclined to believe that there are more than that number of affected persons now. Most of the cases admitted to the hospital have come from the northern half of the island. In the southern half there has never been any organised attempt to grapple with the disease, for the medical officer of the Yaws Hospital has no authority beyond his own district; which, however, is the largest in the island. In January 1888, Mr. Edwards estimated that the cases of yaws in those parts of the island beyond his control were four times as numerous as those within his own district. And in January, 1889, he stated:—"In that part of the island "known as Gingerland there are probably several hundred cases." Unfortunately no estimate of the number of cases has been made since then; but I believe that were an officer armed with legal power to search out every case in the island it would be found that the disease is more prevalent than any one suspects; an opinion, I may remark, in which Mr. Edwards agrees,

* *Croton balsamifer*, L.

XII.

History of Yaws in Dominica.

Dominica was settled at a much later period than the other West India Islands; for, as the Caribs inhabiting it were numerous, fierce, and warlike cannibals, the early colonists made no attempt to gain a lodgment in the island. Towards the middle of the seventeenth century, however, a portion of the island that had been abandoned by the Caribs served as an asylum for criminals and others forced to leave the French colonies of Martinique and Guadaloupe. Later on a few French settlers came to the island, opened up plantations, and developed a trade in timber. In 1692 it is stated that 349 Frenchmen were living in Dominica, and that they cultivated the land with the aid of 23 free coloured people and 338 slaves. In the latter part of the eighteenth century the island had developed into a flourishing colony. Roseau, the capital, was made a free port, and soon became a slave mart and one of the chief commercial towns in the West Indies. To exemplify how important a centre of the slave trade Roseau had grown it may be mentioned that during the four years ending 1787 the imports of slaves into Dominica are put down at 24,092, and the exports of this human merchandise at 19,840.

Dominica is a large mountainous island, containing an area of nearly three times that of Antigua and over four times that of St. Kitts. The greater part of it is still covered with the primeval forest, abounding in game, and containing wild yams and edible fruits, and its many large streams are well stocked with excellent fish. It is, therefore, a country in which uncivilised man can lead a life of ease with a minimum of labour. The Caribs have kept a hold on it to the present day, and from the early time of its settlement the negroes got away from the more civilised parts, and lived in small communities in the woods. Here they were joined by runaway negroes; and after a while the forest camps of these "maroons" became so numerous that the negroes were able, with the assistance of the Caribs, to wage war against the colonists, and they even issued a notice offering a reward for the Governor's head. In 1758 an expedition of 500 men was sent against them, and the maroon war continued with varying success until 1813, when the Governor, Major-General Ainslie, finally defeated the maroons with much bloodshed.

Such circumstances of the history of Dominica are sufficient to explain the secure foothold that yaws was likely to gain on the negro population of the island. There is now no means of ascertaining when the disease was introduced; the old French writers speak of Pyans, or l'Epian, as a disease that prevailed amongst the Caribs; but, as I shall have to show later on, this malady was not yaws, but syphilis, that had been introduced into the West Indies by the Spanish followers of Columbus.

The activity of the slave trade in Dominica is quite sufficient to account for the introduction of yaws into the island; for, as I have shown in Section II. of this Report, the disease was constantly being brought into the West Indies from Africa. Indeed, in reference to this matter, Mason states:—"The introduction of the disease into the West "India Islands is unquestionably from that continent [Africa]. Its origin and establish- "ment in these islands may be distinctly traced with the importation of negroes during "the early part of the slave trade, together with some African diseases. The current of "infection was long kept flowing by the commerce in slaves and the constant arrival of "infected persons among these unfortunate captives." *

It is possible, too, that the disease may have been brought from Martinique or Guadaloupe by the negro slaves of the first French settlers. At all events, as soon as regular plantations were formed and worked by slaves, the owners had to take measures against the spread of the malady by establishing yaws houses for the treatment of the affected negroes.

In Part II. of this report details have been given of the spread of the disease amongst the lower orders of the people of Dominica after the slaves were emancipated. No effort was made by the authorities to stay the rapid spread of the malady for over 30 years after this period, and the havoc made by its ravages are depicted by Dr. Imray in the following words:—"At length the numerous cases that were observed in all parts "of the island attracted notice, and caused considerable anxiety among all classes of the

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* *A Descriptive Account of Frambœsia or Yaws.* By David Mason, M.R.C.S.E. *The Edinburgh Medical and Surgical Journal.* Vol. XXXV. 1831.

" community capable of reflecting on the subject. The prevalence of the distemper, and " its steady increase among our labouring population, had been well known for many " years; but, not being immediately fatal in its consequences, no steps were taken to " arrest its progress. Before restrictive measures were enforced it was scarcely possible " to pass through the towns and villages, or along highways or byways, without " encountering men, women, and children with this loathsome eruption upon them; " some sauntering about idle, others lying in the shade; children playing outside, others " indoors, unable to move from ulceration and debility; many of the adults, though at " first able to work, becoming at last a burden to themselves and the country, and " perhaps bringing poverty and misery on those dependent upon them."

Dr. Imray also points out that the first attempt to stay the progress of the disease was made by the Poor Law Guardians, who attached to the Poor House a small yaws hospital capable of accommodating 20 patients. This institution appears to have been opened on 4th September, 1868; and although it did some good it was altogether incapable of coping with the evil; and the disease became so common that a yaws ward had to be opened in the gaol so as to segregate the "yawsy prisoners." At last the Board of Health, who had been invested by the Legislature with power to take measures to control the spread of contagious diseases, made an attempt to grapple with the question.

The magistrates, wardens and registrars were instructed by the Lieutenant-Governor to make up lists of all those suffering from yaws in their districts for the information of the Board, and it was found by these means that there were at least 650 cases of the disease in the island, and it was said that there were many more cases that had not been discovered.

On the 20th January, 1871, the Board of Health met to decide on the measures that should be taken, and it was resolved that yaws hospitals be erected "in the localities principally affected," and that sanitary rules be enforced to isolate yaws patients as had been done with success when small-pox invaded the island. Later on the sites of six yaws hospitals were fixed, namely, Morne Bruce, St. Joseph, Prince Rupert's, Londonderry, Laplaine and Grand Bay. But this plan was altered and eventually only one additional hospital was opened on the 2nd October at the abandoned Prince Rupert's fortress at the north end of the island. There was already a small yaws hospital at the old garrison buildings at Morne Bruce near to the chief town, and the accommodation at this institution was enlarged so as to adapt it to the new condition of affairs. But there was a difficulty in regard to the water supply, and on the 7th July the Board of Health were compelled to stop admissions to the hospital until the military aqueduct, that used to supply the garrison with water, was properly repaired. And, at the same meeting, the Board decided that "it was expedient to resort to the isolation of patients" in the more remote districts of the island, "within their homes; and to employ nurses " to administer medicines to them therein."

Thus the system adopted by the Board consisted of two essentially different plans. Two hospitals were opened and the patients in them were under the care of medical men; to these hospitals were gathered in all those suffering from the disease that were willing to submit to segregation, for there was no proper legislative machinery for compelling infected persons to undergo hospital treatment.

In addition to these measures the Board not only gave a license to the old women that considered themselves able to cure the disease, but they also paid a dollar a head for each case said to be cured by these "yaws nurses," the cure being certified by unprofessional persons. It came to pass that before long others set up business as yaws doctors so as to get the dollars, and the minutes of the Board of Health show that planters, and even a member of the Legislative Assembly applied for money for curing yaws patients. At one village, on the windward side of the island, 62 persons were said to be cured in this manner, and 62 dollars were paid to the old women besides small sums for native remedies. Although the cases so treated were supposed to be isolated, the Board of Health were unprovided with means to carry out their rules on the subject, and all they were able to do was to distribute white flags to be set up at infected huts.

By the end of the year 249 cases had been admitted to the Morne Bruce Hospital, and of this number two had died, and 178 were discharged cured, leaving 69 cases in the hospital. At the Prince Rupert's Hospital 87 cases had been admitted, and 14 discharged cured, leaving 73 in hospital. Thus at the two institutions during a period of six months 336 cases had been placed under treatment.

The same difficulty that had been experienced at Morne Bruce in regard to the water supply was met with at the Prince Rupert's Hospital, for in the minutes of the

Board of the 12th February, 1872, the following occurs :—" Dr. Sherwood was authorised " to arrange for the conveyance by boat of water from the Indian River. The services " of the patients to carry it when landed on the beach, to be made available as much as ' practicable."

The strain on the finances by the expenditure on the yaws hospitals became more than could be borne without extra taxation. In his address to the Legislative Assembly Mr. Neale Porter, then Administering the Government, said :—" It is right that I should " inform you that should it be found necessary to maintain the yaws hospitals many " months longer on the present scale, a large supplementary vote will be required to " cover the expenditure of the Board of Health in 1872."

On the 8th May the Board decided to close the Prince Rupert's Hospital on economical grounds, but this resolution was not carried out until the end of the year. On the 15th of July Mr. Moir, the President of the island, addressed the following minute to the Board :—" From the several accounts forwarded to the President, it appears " that the yaws patients may be cured of that disease at less cost to the country, when " submitted to out-door treatment, than when continued in hospital, and the expense " is now so seriously drawing upon the pecuniary resources of the island, that the " President, while most anxious that the disease should be stamped out, and most " unwilling to withhold enlightened medical assistance, invites the Board of Health to " consider the practicableness, and, if possible, to adopt the less expensive mode of " treatment of the patients, if such can be done without danger to the community."

The old military hospital at Morne Bruce had been repaired for the purpose of accommodating the yaws patients that were to have been transferred from the institution at Prince Rupert's, but it was never used, for in July the Board had to investigate charges of neglect against the medical officer of the hospital, and the members of the Board decided in August to close both the hospitals. The Prince Rupert's Hospital, however, was not finally closed until the 13th February, 1873, when President Moir, Dr. Sherwood, and the Secretary of the Board of Health visited the place and turned all the patients away. The number of cases of yaws thus cast adrift to disseminate the disease does not appear on the records of the Board, and the hospital books have not been preserved. The Morne Bruce Hospital appears to have been kept up afterwards on a small scale as an adjunct to the poor house, under the superintendance of the Poor Law Guardians. This ended the connection of the Board of Health with the yaws question, except that they paid afterwards several accounts sent in by " nurses " who professed to have cured cases of the disease.

It has been impossible to obtain accurate statistics concerning the cases treated at these hospitals, nor was it possible to obtain any account of the expenditure.

During the two years it would appear that 333 cases were admitted to the Morne Bruce Hospital, and of this number 24 absconded, besides which several were discharged for gross misconduct. There were six deaths : and this gives a death rate of 18 per thousand.

Dr. Milroy states in his report that 182 patients had been admitted to the Prince Rupert's Hospital, from the 2nd October, 1871, to 25th March, 1872. The minutes of the Board of Health do not show how many cases were afterwards admitted, but in a letter from the Chairman to the President of the Island, it is stated that over 600 cases were treated in the hospitals. It may therefore be concluded that about 300 patients were altogether treated in the Prince Rupert's establishment, and that number added to the 333 treated at Morne Bruce brings the total number of patients that received hospital treatment to 633, or thereabouts.

This attempt to rid the island of yaws could not have been expected to have been otherwise than a failure. A certain amount of good was undoubtedly done, but nothing like a clearance of the disease was effected. There were probably something like a thousand cases spread over the island when measures were commenced to stamp out the disease. A little more than half of that number received proper medical treatment, but many cases left the hospitals without being cured. Each affected person would act as a *focus* for the dissemination of the disease; and, in the natural course of events, a " yaws " question " was soon likely to come before the authorities again.

About the middle of the year 1874, reports were circulated to the effect that yaws was again making headway amongst the people, and Dr. Imray—with whom I was then professionally associated—requested me to enquire into the matter and to report the result to the Board of Health. As I was about to make a prolonged tour of the island for the purpose of vaccinating the people, I had facilities for ascertaining the facts of the case. I found the disease in every place I visited, and it appeared from the evidence of residents in the district, to be spreading with rapidity. In many instances I had to refuse to

vaccinate persons who came to me with the yaws excrescences about them. All these facts were, in a letter I addressed to them on the 8th August, laid before the Board of Health, who requested the Government to institute an inquiry through the district magistrates as to the number of affected persons in the island. Mr. Alexander Robinson, a planter, about this time addressed a letter to the Secretary of the Board in which the following passage occurs :—" The head of every household should be made, on pain of a " penalty, to send in to the nearest magistrate or member of the Board, a memo. of the " names of those afflicted in his house, or verbally reporting the same, and at the same " time to say whether he intends sending to the hospital or to keep them at home; if they " are to be kept at home it must be strictly done."

I give this extract, as it is somewhat remarkable that the first suggestion for the compulsory notification of the disease should have come from a non-professional person.

In December, the Board of Health addressed to the Government the following able and important document :—

The Chairman of the Board of Health to President *Eldridge*.

Board of Health, Dominica,
8 December, 1874.

Sir,

The Board of Health have to thank your Honour for the returns you have caused to be furnished of the number of persons affected with yaws throughout the island, as nearly as could be ascertained.

The Board regret to say that these returns more than justify the fears they entertained of the existence and rapid spread of this disease amongst our population, the aggregate number affected being reported to be not less than 447 persons.

To prevent the further spread of the malady, which if allowed to extend unheeded would soon become a positive calamity on the country, it appears absolutely necessary to adopt prompt and decisive measures, and to incur a heavy expense. It is on the latter account chiefly that the Board address your Honour on the present occasion, and the sum required will be so large as probably to demand special provision by the Legislature.

The Board of Health hesitate to incur the responsibility of so serious an outlay of the public money without the knowledge of the Legislature, as the finances of the Colony might be embarrassed by an unexpected expenditure, which they had no opportunity of making provision for.

It is with extreme regret that the Board of Health have again to deal with this formidable disease, after it had been all but extinguished by the measures formerly adopted. It cannot, however, be said that the money expended by the country in their endeavours to eradicate yaws, has been misapplied. The records of the Board show that more than 600 persons were treated and discharged cured. Had the disease then been allowed to take its course unchecked, it is not difficult to imagine the deplorable state the population would have been reduced to by this time.

It was not to be expected that yaws would be entirely eradicated by the treatment of the cases in the various hospitals, and what has contributed more than anything else to favour the reproduction of the disease, was the sudden withdrawal of all check or control over the population in enforcing the isolation of such cases as might again appear from time to time.

It is more than probable that a few instances of the malady escaped notice in the different quarters of the island, and from these centres of infection, the disease has again extended, there being no check to prevent its spread. When the disease will have been mastered it is clear to the Board that stringent repressive measures will have to be continued for a considerable time after the malady has apparently disappeared.

The Board believe that this most desirable object could best be obtained by an organised body of constables, whose duty would chiefly consist in watching over the various districts of the island, to detect the first appearance of yaws, and to see that the law was put in force against those who might conceal the disease. The plan that the Board would suggest can be more fully detailed hereafter. The Board have come to the conclusion that the principle of dealing with the malady as it now exists, most likely to meet with success, is to collect the yaws patients in hospitals for treatment, and to cut off as much as possible all communication with the unaffected.

The nature of the country necessitates the establishing of more than one place for the reception of yaws patients, but the Board believe that the fewer the hospitals the more quickly the disease will be extinguished, and the less the chance of its extending.

The Board do not consider it necessary at present to enter into details of the plan they may consider advisable to adopt for grappling with the disease, until they ascertain

the views of the Legislature as to the funds that will be made available for the above purpose, as well as the preventative measures to be afterwards continued in force.

The Board are of opinion that at least a sum equal to what was formerly expended by the Colony should be again placed at their disposal, for the purpose of finally ridding the island of this pest.

The Board will thank your Honour to be so good as to lay a copy of this communication before the Legislature at your earliest convenience.

I have, &c.
(signed) *John Imray*,
Chairman Board of Health.

His Honour
President *Eldridge*.

This letter was sent to Mr. Edwin D. Baynes, then administering the government of the Leeward Islands, who addressed a despatch to the President of Dominica, in which the following passages occur:—

"It is a matter of urgent importance that the Government should use all the means "within its power not only for arresting the progress of the disease, but also if possible "for exterminating it, and with this object in view, I have to request that you will in my "name appoint a Commission consisting of the medical officers of the island, and such "other gentlemen as you may deem it expedient to associate with them, to report."

"(*a.*) Their opinion as to any special causes which may tend to or promote "its existence and continuance in Dominica, seeing that the disease has been "unknown in the other islands of the Government for the last 30 or 40 years.

"(*b.*) The means which they recommend should be adopted for checking the "spread and perpetuation of this fearful malady.

"(*c.*) Whether the compulsory segregation, as suggested by the Board of "Health, of persons afflicted with the disease is absolutely necessary in order to "prevent its further spread.

"(*d.*) The hygienic and remedial measures which should be adopted for the "immediate suppression and ultimate extiction of the disease.

"I am aware that much credit is due to the medical profession in Dominica for the "prompt and effectual measures taken by them in 1870 and 1871, by which the disease "was, for a time at least, checked, and I feel assured that they will readily and cheerfully "afford the Government the benefit of their advice and assistance in the present emer-"gency.

"As some delay may probably take place before you receive the Report of the Com-"missioners, I shall be prepared to sanction your making an application to the Legislature "for a vote sufficient to enable you, with the advice of your medical staff, and of the "Board of Health, to mitigate the disease and to prevent its spread by all available "means. Should any large sum be required during the year for the purpose it will be "of course necessary that legal provision should be made for the expenditure, as well as "for meeting it by some additional taxation."

A Commission was appointed in accordance with the terms of this despatch, and on it were the five medical men then residing in the island, and three other gentlemen occupying prominent positions in the community.

On the 28th January, 1875, the President brought the matter before the Legislative Assembly, and the following extract from his Address to that body, indicates the importance attached to the question by the Government:—

"The next most important matter for your consideration, gentlemen, affects the "health and sanitary condition of a large number of the people who are suffering from "the disease called the yaws, and it is a matter of urgent importance that the Govern-"ment should use all the means within its power, not only for arresting the progress of "the disease, but also, if possible, for exterminating it.

"I have been instructed by his Excellency the Administrator to issue a Commission "to report on any special causes which may tend to or promote its existence, the means "which should be adopted for checking the spread and perpetuation of this fearful "malady, and the hygienic and the remedial measures which should be adopted for the "immediate suppression and ultimate extinction of the disease. Upon the completion o "the labours of this Commission, the valuable information that I am satisfied will be "collected, will be submitted to you with the view of aiding you in adopting such "measures as you may deem advisable for checking the spread and perpetuation of

" this disease, and providing for the heavy expenditure which will necessarily be " incurred."

On the 1st March the Report of the Yaws Commission was sent in to the President, who laid it before the Legislative Assembly on the 18th of the same month. This report practically was a reiteration of the views expressed by the Board of Health. It contained the following advice and expressions of opinion:—

(1.) That a hospital be established in four districts of the island, and that with a view to economy, one medical officer should have charge of two of these hospitals.

(2.) That a yaws constabulary be formed for the purpose of discovering and conveying to the hospital all persons afflicted with the disease, and that two constables be attached to each hospital.

(3.) " That compulsory legislation is an absolute necessity, without which it " would be in vain to attempt to eradicate yaws from the island."

(4.) That the compulsory law be " very stringent," and that " its require- " ments be rigorously carried into effect."

(5.) That the district medical officer be required to use every effort to improve the sanitary condition of the people, " as it is generally believed that " disregard to cleanliness, both personal and in respect of the dwellings of the " people, contributes much to spread of the disease, if not to its origin."

The Government acted immediately on this advice, and introduced into the Legislative Assembly a measure for dealing with the question, and that body unanimously passed " An Act to make provision for arresting the spread of the disease called yaws, " with the view to its ultimate extinction." This Act, a copy of which is placed in the Appendix, provided amongst other things, for

(1.) A Board, to assist in carrying out the provisions of the Act.

(2.) The division of the island into yaws districts.

(3.) The erection of yaws hospitals in the districts.

(4.) The appointment of yaws constables for each district.

(5.) The compulsory segregation of all yaws patients in the hospitals, except in the case of those persons under medical treatment who were to be isolated in their own homes.

(6.) The imposition of special taxation to defray the expenditure necessitated by the Act.

In 1874 a Medical Aid Act had been passed making provision for the appointment of three district medical officers, who were required, in addition to their other duties, " to " aid and assist the Governor in promoting and improving the sanitary condition of the " people, especially with reference to the disease commonly called yaws." Advantage was taken of this clause to impose the work of attending the yaws hospitals on the district medical officers without extra remuneration, and this gave rise to dissatisfaction, and later on to difficulty.

The hospital at Morne Bruce was removed from the direction of the Poor Law Guardians to that of the new Board, which was styled the Board of Yaws Commissioners, and another yaws hospital was again established at the old Prince Rupert's fortress. This institution was opened on the 12th June, 1876, and placed under the professional care of Mr. Pilkington, the medical officer of the northern district.

On the 6th, July the Governor issued a Proclamation in accordance with the terms of the Yaws Act, dividing the island into three yaws districts, but no constables were appointed, district hospitals were not established, and in fact the Proclamation was entirely disregarded by those having authority in the matter.

In the meantime the Yaws Act had gone on for Her Majesty's assent, and the Governor had reported to the Secretary of State what steps had been taken to carry out its provisions. On the 11th September, Lord Carnarvon informed Governor Berkeley that the Royal Assent had been given to the enactment, and added, " I have to express " my approval at the precautions taken against the spread of this terrible disease, and " my regret that the increasing number of cases render these precautions necessary."

In September the Yaws Commissioners advised the abandonment of that portion of the plan concerning district hospitals, and the adoption of a scheme for creating " a

" general yaws hospital for the island," at Prince Rupert's. This was assented to by the Governor, and the President was authorised to introduce a Bill into the Legislative Assembly to amend the Yaws Act, so as to permit of the change of plan. The Governor reported the decision to the Secretary of State, who applied to Dr. Gavin Milroy for his opinion. The following extracts from Dr. Milroy's reply show that he approved of the scheme for a general hospital :—

" In reply to your letter of the 4th instant, requesting my opinion as to whether " ' there is any objection in principle to the proposed substitution of a general for district " ' hospitals, for persons suffering from the disease called yaws,' I beg to observe that the " determination of this point must largely depend on the conditions and the circumstances " of the country where the distemper is prevalent.

" In a colony like Dominica where there are so few resident medical men, and where " extensive districts are quite unprovided with the means of medical attendance near to " them, it seems to me that general hospitals are probably the most suitable.

" The persistence of a cachectic malady like yaws—indicative of a low and depressed " vitality, and thus affecting the labour power of a population—is an important question " of State Medicine."

In the meantime, rumours that had been in circulation in the island regarding the unsatisfactory condition of affairs at the establishment at Prince Rupert's, and its unsuitableness for a general yaws hospital, reached the Governor's ears, and on the 8th December the Colonial Secretary addressed a despatch to the President of Dominica from which the following are extracts :—

" I am directed by the Governor to request that you will furnish him with a Report " on the condition of the Yaws Hospital at Prince Rupert's, especially in regard to the " following objections which have been urged against the continuance of the Yaws " Hospital in that locality.

" 1st. That the locality is not suited for a general hospital from its distance " from Roseau, and the consequent difficulty of frequent inspection.

" 2nd. That it is supplied with water from tanks which have been polluted by " dipping in them of unclean vessels.

" 3rd. That the supply of water under any circumstances must be limited, " whereas an abundant supply is essential to the proper treatment of the " patients.

" 4th. That there is, and under the present arrangements can be, no medical " treatment of the patients, as the district medical officer under whose care they " are supposed to be, resides at such a distance that he takes six hours to ride " over it.

" Should it be found expedient to disturb the present arrangement under which the " yaws patients are to be treated at the Prince Rupert's Hospital, his Excellency thinks " that it will be imperatively necessary to place the hospital under the immediate care " and supervision of a resident medical officer, and that steps should at once be taken " for providing the institution with a sufficient supply of water for drinking as well as for " sanitary purposes."

In reply to this Despatch, President Eldridge, without visiting the hospital to inquire into the truth of the damaging rumours that were in circulation, replied that the locality was " suitable for a general hospital if a special medical attendant could be procured. " The place is easily isolated, its distance (20 miles from town) I deem rather an advan- " tage with so loathsome a disease, and the old military buildings are easily convertible " into temporary hospitals at comparatively small cost . . . . . The attendance " on patients suffering from a disease of slow development and changes could not require " more than fortnightly visits, with occasional express intermediate ones."

About this time, however, authentic information came to the knowledge of the local government that the district medical officer, who had been required to attend the hospital without extra remuneration, had abandoned the institution entirely, that the patients were riotous, and that the affairs generally were in a most unsatisfactory condition.

I was then residing in the town of Roseau as a private medical practitioner, and the Government begged me to go to Prince Rupert's to inquire into the matter, and to furnish them with a full report. This I consented to do. I inspected the hospital on the 24th January 1877, and sent in my report three days afterwards. This report was laid before the Legislative Assembly, and it is published in the local *Official Gazette* of

the 3rd April 1877. It is unnecessary to give here details of what was found to be the state of the hospital and the patients, as the facts were alluded to afterwards by Lord Carnarvon as "horrible disclosures." At the time of my visit the patients had not been seen by the medical officer for 69 days; and, although his neglect of duty cannot in any way be exculpated, it must be said in his extenuation that he threw up the attendance in a fit of indignation at what he considered to be the unjust imposition on him of unremunerated service, and that he was not aware of the state of the hospital patients as his residence was a day's journey from Prince Ruperts.

In my report I showed that the site was altogether unsuited for a hospital, and asserted that it would never have been chosen but for the expenditure saved by utilising the old military buildings.

The deplorable state of affairs thus brought to the knowledge of the government existed for some time. No medical officer attended the hospital, but the President and the Colonial Engineer went there several times, and both of these officials discharged patients that were said to be cured. Finally the inmates mutinied, and the greater number left of their own accord, and spread themselves about the country. From inquiries made at the time it appeared that the disease was spreading with rapidity, and that the number of cases in the island was not less than 1,000, and between 2 and 3 *per centum* of the prisoners sent into the gaol were found to be suffering from yaws.

The Governor came to Dominica to inquire personally into the various questions, and he made a thorough investigation into all the circumstances. At last I was asked to take the matter in hand, and the following extract from a special report written for the information of Lord Kimberley indicates the terms of my appointment:—"As the "results of negotiations between Mr. Burns [the Auditor General] representing the "Government, and myself, I undertook to direct the yaws affairs, providing that I was "armed with full power" to carry out the plan decided on, and that I should receive "every assistance from the Government." A new Yaws Act was passed by the Assembly, and by it the yaws affairs were placed under the "entire charge, management "and supervision" of an officer who was styled "the Medical Superintendent of Yaws "Hospitals." To this office I was appointed on the 18th April. A copy of the Act, No. 5 of 1877, will be found in the Appendix.

Prior to the appointment of the Medical Superintendent, no reports or statistical tables concerning the work of the two yaws hospitals had been drawn up. After some difficulty, owing to the fact that the books had not been properly kept, the following statistics concerning the Prince Ruperts Hospital were obtained:—

Admitted from 12th June 1876 to 21st April, 1877	133	Discharged	46
Born in hospital	2	Died	3
		Absconded	49
		In hospital on 21st April, 1877	37
	135		135

In regard to the Morne Bruce Hospital it was impossible to obtain any statistics whatever, for there were wide gaps in the record book which was otherwise in a state of confusion, and there were no means of ascertaining the number of patients that were admitted or discharged. The re-admissions, however, appeared to be frequent.

The Poor Law Guardians put in a claim for maintenance, &c., of the patients, and Mr. N. W. Keelan, the medical officer, also applied for remuneration for his services. These claims were allowed by the government, and the sums of 50 *l.* and 244 *l.* 7 *s.* 2 *d.* were respectively paid to Mr. Keelan and the Poor Law Guardians from the yaws fund.

On the 12th March, Governor Berkeley wrote a long despatch to the Earl of Carnarvon in which full details were given of the events that had happened, and of the measures that had been adopted to remedy the various evils that had existed. The following extracts from this despatch show that the second attempt made to stay the spread of the disease in the island was even more abortive than the first:—

"The rumours which had reached me respecting the highly unsatisfactory condition "of the yaws hospital at Prince Ruperts, coupled with the circumstance of its entire "abandonment by the medical officer, rendered it necessary that I should myself "personally investigate into all the circumstances connected with the working of the "Yaws Act, the condition of the hospital, and the conduct of the officials charged with "the care of the patients.

"On the receipt of Dr. Nicholls' report I lost no time in giving the necessary "directions for the improvement of the sanitary state of the hospital by adopting the

" several recommendations made by him in reference to the extension of the buildings, " ventilation, the increase of the water supply, and the establishment of an efficient " system of sewerage. This important work was in progress when I left Dominica, and " the hospital had before my departure been supplied with bedding, clothing and other " appliances necessary for the comfort and due treatment of the patients.

" Considering the large number of persons labouring under the disease, and that an " apparently well founded impression prevails that it is not on the decrease, I cannot " but arrive at the conclusion that the establishment of another yaws hospital is absolutely " necessary, and that provision should be made for the treatment of patients who are " unable to obtain admission to the hospital, and that the hospitals and the yaws patients " throughout the island should be placed under the direct superintendence of a " responsible medical officer, who should as a matter of course be assisted in his duties " by the several district medical officers. This scheme has met with the approval of the " leading men in Dominica, of the medical profession, and of the Yaws Commissioners.

" It is proposed to erect the second hospital at a distance of between four and five " miles from Roseau, so as to admit of easy and frequent visits of inspection from the " authorities."

Governor Berkeley's despatch and my report were referred to Dr. Milroy, who, on the 16th May, wrote to the Colonial Office a letter from which the following remarks are extracted :—

" The statement in Dr. Nicholl's report that the Yaws Hospital at Prince Ruperts, " called by Governor Berkeley the Portsmouth Yaws Hospital, 'was opened on the 12th " day of June 1876,' has suggested to me that possibly the hospital may not be precisely " the same as the one there which I visited on 22nd March 1872, along with " Dr. Sherwood, the then medical officer in charge.

" The impression left on my mind at the time was that the situation of the hospital " in consequence of its difficult accessibility from Roseau, and its long distance of several " miles from the residence of the medical attendant, was anything but desirable, even " for its merely temporary occupation for the purpose for which it was then anticipated " by the authorities that it might be required.

" The number of yaws patients throughout the island at the present time is roughly " estimated at 1,000. At my visit the number was estimated by the authorities at " about 700. Whichever number may be nearest the truth, it is pretty certain that the " disease has anything but decreased during the last five years, and it is obvious that " the attempts which have been hitherto made for its arrest and prevention have " entirely failed. The substitution of a thoroughly wholesome and nutritious dietary, " and the diligent ablution and purification of the skin by the frequent use of fresh " water baths, and the maintenance of perfect cleanliness of the body at all times, " together with the regular adoption of appropriate medicinal and hygienic treatment, " will, I doubt not, be found to be indispensably necessary.

" Dr. Nicholls' Report shows convincingly that the hospital at Prince Ruperts is in " every respect, alike of condition and of arrangements, utterly unsuitable as a central " receptacle for the sick.

" The establishment of another Yaws Hospital to be placed under the direct " superintendence of a responsible medical officer, as recommended by the Governor " and approved by the Yaws Commissioners, appears to me to be urgently required, " and should be carried into effect with the least possible delay.

" In the selection of a site, it will be important to have it not far removed from an " ample supply of fresh and flowing water throughout the year. In the construction of " the hospital, if this has to be done, I would propose that it should consist of at least " two or three substantial sheds well raised off the ground, and provided with wide " verandahs all round. The sheds should be, of course, separate from each other."

On assuming the duties of medical superintendent, I found that the Prince Ruperts Hospital had been much improved, but that the Morne Bruce Hospital was in an unsatisfactory condition, as will be seen from the following extract from my first report, written on the 31st July 1877 :—

" The buildings were without proper doors and windows, the roofs leaked badly, " and the wards were in a very dirty condition. The patients were ill-fed, in some " instances nearly naked, and had not washed themselves for weeks in consequence of " the scarcity of water. The principal medicines administered were decoctions of native " herbs and roots, called tisanes." As an example of the small amount of useful work effected by this hospital, it may be mentioned that the books show 22 admissions from the 1st January to April 1877, and of this number no less than 12 or 54·6 *per centum* left the institution uncured.

Some delay occurred in the establishment of the general hospital near to Roseau, that had been suggested by the Yaws Commissioners, assented to by the Governor, and approved of by the Secretary of State with the advice of Dr. Milroy. The first difficulty was in regard to the site. Two places on the coast, viz., Canefield or Belfast were suggested by the Yaws Commissioners. Dr. Milroy's advice, approved of by the Secretary of State, that the hospital should be placed close to "an ample supply of fresh and "running water," rendered it necessary for one of these places to be selected; as to have placed the hospital close to the Roseau River would have met with much opposition from the inhabitants of the town. Accordingly a site at the south bank of the Canefield River was selected, because it was nearer to Roseau; and, on the whole, healthier than Belfast. This site, selected by Dr. Imray, was approved of by the Commissioners and myself, and the necessary buildings were erected, under the superintendence of the Colonial Engineer, but misfortune seemed still to follow the yaws affairs, for one of the wings fell down as soon as it was put up, and it became necessary, soon after the hospital was opened on the 11th October, to call on the Government to have the buildings thoroughly overhauled, so as to fit them for hospital patients. The hospital at Morne Bruce was closed on the day that the Central Hospital at Canefield was opened, the patients to the number of 50 being removed to the latter institution.

The following table shows the work done in the five months and a half during which the Medical Superintendent had the supervision of the institution at Morne Bruce:—

In hospital on the 27th April 1877	23	Discharged	30
		Absconded	3
Admitted to the 11th October 1877	60	Removed to the Central Hospital on the 11th October 1877	50
	83		83

At the end of the year the Central and Prince Ruperts Hospitals, both of them capable of accommodating over a hundred patients, were in full working order under Mr. Duke and Dr. Elliot, the medical officers of the districts in which the hospitals were established. Both these officers worked under me to my entire satisfaction, and the success that afterwards marked our united efforts to rid the island of the disease was due in a great measure to their ability and zeal.

In January, 1878, I wrote my second report, which showed that from the 21st April, when I took office, to the end of the year 1877, 232 patients had been under treatment at the Prince Ruperts Hospital, 83 patients at the Morne Bruce Hospital, and 218 at the Central Hospital, inclusive of 50 cases transferred from Morne Bruce on the 11th October, when the institution at Canefield was opened. There had been no deaths at Morne Bruce; at Prince Ruperts, however, there were six deaths, and at the Central Hospital three deaths, showing a death rate of 25·9 and 13·7 per thousand respectively. The death rate of the Prince Ruperts Hospital was high; but, as I pointed out in the report, "many of the people are in so debilitated a condition upon their entry into the "hospital that the wonder is so few of them die." Dr. Elliot, the medical officer of this hospital, in a special report on this matter, wrote as follows:—"I have no doubt but "that their lives were prolonged by the care and attention they received."

The discipline at the hospitals had practically put an end to insubordination, and that it was not too severe in the circumstances is seen by the fact that no patients absconded from either of the large hospitals. The rules and regulations that were in force will be found in the Appendix.

From the time that the Government made the change in the system of dealing with the yaws question, in order to ensure better results, and to prevent the possibility of the recurrence of such neglect of the patients as occurred at the Prince Ruperts Hospital, persistent attacks had been made in the public prints and elsewhere on the yaws administration. These attacks, after a time, were concentrated on the Medical Superintendent, and unhappily dysentery, which then prevailed in the island, spread to the patients at the Central Hospital, and materially increased the death rate.* These circumstances caused the few persons responsible for the agitation to redouble the virulency of their attacks. The hospital was said to have been built in a deadly place, and every effort was used to make the name of a yaws hospital a terror to the people. At last the Government were

* During the year 1878 there were 39 deaths in the Roseau Infirmary out of 237 cases of disease admitted to the wards, showing a mortality of 164·5 per thousand, and of the total number of deaths 10, or 25·6 *per centum*, were from dysentery.

compelled to take notice of the matter. I dealt with the subject in a special report, which was published, and from which the following are extracts :—

"All the marshy land of the Canefield Estate lies to the north of the river, and it is "a known scientific fact that malarial poison does not readily find its way across rivers, "its progress being arrested by fresh running water. It will thus be seen that the "hospital is not placed, as it has been said, in the midst of a swamp exhaling quantities "of noxious poisons. Malaria does exist at the mouth of the Canefield River, for no "portion of the littoral of Dominica is free from its influence. It is present in the most "healthy localities of the coast, and in order to ensure to yaws patients perfect immunity "from malaria, it would be necessary to erect the hospitals on the hills at an elevation "exceeding that of Morne Bruce. Were this done, it would be impossible to command "the necessary water supply, and this fact alone precludes the idea of such a "position.

"That the site of the Central Hospital is not so obnoxious to malaria as some would "have it supposed, the mildness of type of the cases of fever which have occurred will "alone testify. Instances of fever of a much worse character have within the last few "months occurred in my practice in Roseau, and there have been several fatal cases in "the town, whilst no deaths from fever have happened at the hospital.

"Fever is prevalent all along the coast line of Dominica, and the town of Portsmouth "and some of the populous villages of the island are in nowise healthier than Canefield. "An interesting fact in connection with the subject is the healthiness enjoyed by the "penal gang whilst working (on and off from June to the beginning of December) in "digging trenches for draining the land, and in performing other arduous work in the "hospital grounds ; only four trivial cases of sickness took place amongst these men, and "about 40 cases occurred during the same time amongst the other prisoners confined in "the gaol. . . .

. . . "The Central Hospital is not altogether free from malaria, but it is constructed "for those who are accustomed to malaria, and who are almost free from its impression. "Dr. Pickford, in his work on hygiene, states that 'the African and the Creole are, in a "'great degree, exempt from, and very rarely are amenable to, those influences which "'generate in Europeans intermittent, remittent, or yellow fever.'

"Thus, it will be seen that the Central Yaws Hospital, although it might not be "suitable for Europeans, is nevertheless not ill-adapted for the purpose for which it was "built."

Dr. Imray also drew up a "*Memorandum upon Yaws for the information of the "Governor and the Board of Yaws Commissioners.*" In this extremely interesting document which was also published, Dr. Imray gave some facts regarding the history of the disease, and explained why, in the opinion of himself and other authorities on the disease, forcible segregation was necessary to control its spread amongst the labouring population. The attacks that were being made on the yaws administration were specially alluded to by Dr. Imray in the following language :—

. . . "Taking into consideration then all the requirements absolutely demanded for "a hospital intended for the reception of patients in large numbers, and which have "already been submitted to the Government by the Superintendent, as the senior member "of the medical profession in the island, and with such knowledge as I may have been "able to gather during a practice of some 40 years, I came to the conclusion that the "portion of land at the mouth of the Canefield River was the most eligible for the large "Central Hospital, and this position I recommended to the inspector, Dr. Nicholls. I "should therefore wish it to be distinctly understood that Dr. Nicholls is not alone "responsible for having selected this locality, whether judiciously chosen or the reverse, "the responsibility, whatever it may be, attaches chiefly to me, and which I willingly "accept. At the same time, it must not be supposed that Dr. Nicholls selected this "locality from my recommendation simply, but from his own judgment, considering it "the best under the conditions that could be chosen. It must not, however, be under-"stood that the land at the mouth of the Canefield River would have been recommended "under ordinary circumstances, and with the selection untrammelled by certain indis-"putable conditions. It should be borne in mind that the disease and the circumstances "attending its treatment are special, and differ materially from the requirements of "hospitals established for the treatment of disease generally. It is indisputable that "more salubrious localities could be found on our mountain slopes and summits, but the "indispensable abundant supply of water could not then be obtained, and other require-"ments fulfilled. . . . Unhappily, several cases of dysentery have lately appeared in the "hospital at Canefield, affecting chiefly the children, but the proportion of fatal cases "has been such as to cause some anxiety. . . .

"I should wish specially to observe upon this point that it is not to be concluded "that because dysentery has appeared in the Canefield Hospital, therefore, an improper "position has been chosen for its establishment. Dysentery always exists in this country, "and may appear epidemically in any part of the island, along its shores all round, or in "the uplands, and more frequently and probably with greater intensity in the low-lying "districts. I have found dysentery to prevail in the town of Roseau when no particular "reasons could be assigned for its appearance, certainly not essentially malaria according "to the ordinary acceptation of the word, that is poison emanating from marshes or "marshy land . . .

"It must not be lost sight of that cases of dysentery are met with in many parts of "the island at present, and that the weak and diseased children brought to the hospital "might have been attacked at their own homes, and have died without any blame being "attached to locality. But when a number of such children are conveyed from various "parts of the island to one spot, and several cases of dysentery occur among them, an "event likely enough to happen if an epidemic influence exist, it is at once rashly "concluded that the locality is at fault. . . .

"It is to be regretted that the measures of the Government for the extinction of yaws "should have been bitterly censured, and the site of the hospital at Canefield altogether "condemned by some in this island, and yet that those who have so acted have proposed "no reasonable or practicable plan of their own, nor suggested any site for a hospital "more eligible than that which has been chosen. It is difficult to understand what object "it is sought to attain by thus opposing and thwarting the measures that had been decided "upon by Government for ridding the country of yaws. The effect that might naturally "be looked for from such proceedings would be to excite a feeling of distrust and hostility "among our people and a disinclination to enter the yaws hospitals, fortunately such a "result has not followed; on the contrary, those of the people who are affected with the "disease eagerly desire admission, and the hospitals, if twice as large, might be readily "filled. I cannot but allude to the groundless and unwarrantable attacks that have been "so persistently made on the Superintendent of the Yaws Hospitals. Having had ample "opportunities of judging of the manner in which this officer performs his duties, I should "be wanting in my duty to the Board of which I am a member were I to fail in bearing "testimony to the ability and energy he has displayed in the performance of his duties in "the face of no ordinary difficulties and discouragement. I sincerely trust that he may "continue his services as superintendent of the yaws hospitals of this island."

Before leaving this subject it may be pointed out that the course of events fully bore out the opinions of Dr. Imray and myself. As soon as the slight epidemic of dysentery disappeared from the coast line of Dominica, where it prevailed as well as at the hospital, the mortality rate became low. On the 15th August the Yaws' Commissioners visited the hospital, and recorded the following particulars in their minutes:—

"The President, accompanied by the Honourable William Macintyre, A. C. Potter, "L. A. Giraud, and F. P. Latouche, Esquires, and Dr. Nicholls (Dr. Imray being unwell) "visited this morning the Central Hospital, and he desires to record the unanimous "opinion of those present of the cleanliness, the order and the marked improvement of "the inmates and in the hospital and the surrounding grounds; the lagoon to the south "of the institution had been filled up, and the vegetation in the grounds clearly indicates "by its healthy verdure the absence of anything like dampness or swampy exhalation."

Later on, when the patients were removed to a new hospital at Morne Bruce, the buildings were disinfected, and they were used as barracks for the labourers of the Canefield Estate, who enjoyed there excellent health.

As the outcome probably of stirring up the hatred of the people against compulsory segregation of yaws patients in special hospitals, an act of incendiarism was committed at Prince Rupert's, whereby the new wing containing the male hospital, the master's quarters, the dispensary, and various offices were burned down on the 20th January. Later on, another wing was erected at the Central Hospital for the accommodation of the patients from the Prince Rupert's Hospital, which was finally closed on the 16th May.

The following table shows the work accomplished at this hospital in the 13 months it was opened after the appointment of the Medical Superintendent of Yaws Hospitals:—

In hospital on 21st April 1877	37	Discharged	219
Born in hospital	1	Died	13
Admitted from 21st April 1877 to 16th May 1878	255	Absconded	1
		Removed to the Central Hospital on 16th May 1878	60
	293		293

The mortality of 13 in 293 cases shows a death-rate of 44·0 per thousand, which is high for a yaws hospital, considering that no epidemic disease prevailed in the district and extended to the inmates of the institution.

In a despatch to Lord Carnarvon, dated 9 February, Governor Berkeley alluded in the following words to the progrsss that had taken place in dealing with the disease :—
" The establishment of yaws hospitals and the segregation of the persons afflicted with " the disease have, up to the present moment, worked most satisfactorily, and the disease " is certainly on the decrease. The Leeward Coast of the Island is now almost entirely " free from it, there are no known cases in Roseau, and, from enquiries which I caused " to be made by the medical officers and the district magistrates, it does not appear that " there are more than 500 cases, principally on the windward sides of the island, not " under treatment in the hospitals. The total number of persons suffering from the " disease may therefore be estimated at from 700 to 800. I concur in the opinion ex- " pressed by Dr. Imray and Dr. Nicholls that the disease may, in the course of two or " three years, be completely stamped out, if the system of separating the sufferers and " subjecting them to hospital treatment is persevered in."

This despatch and other documents bearing on the subject were submitted to Dr. Milroy, who sent in his report to the Colonial Office on the 15th March. Dr. Milroy expressed his entire approval of the changes that had been effected, as will be seen from the following extract from his report :—" The contents of Governor Berkeley's despatch of " 9th February, 1878, must be gratifying to all who feel interest in the hygienic welfare " of Dominica. The abandonment of the hospitals at Morne Bruce and at Prince Rupert's " and the establishment, in a suitable locality, of a Central Hospital at Canefield, under " the direction of Dr. Nicholls, aided by the active co-operation of the Yaws Commis- " sioners, give a fair promise for the efficient administration and execution of proper " sanitary measures, that may lead to the subjugation and possibly the eradication of the " serious malady which has for many years proved so hurtful to the interests of the " Colony."

As it soon became evident that cases of the disease were being hidden in various parts of the island, two yaws constables were appointed during the year, and after a time they became efficient in the performance of their duties, many persons that had been secreting themselves being promptly discovered and brought into the hospital. The duties of the yaws constables were as follows : —

(1.) To collect yaws patients.

(2.) To keep a register of all patients discharged from the hospital that might be residing in their districts and to visit these persons periodically so as to detect at once any relapse of the disease.

(3.) To obtain any information concerning yaws and yaws patients in their districts.

(4.) To arrest any patient that might run away from the hospital.

(5.) To carry out the orders of the medical superintendent in regard to any matter relating to the yaws administration.

(6.) To use every effort to impress on the people "the necessity of cleanly habits in person and surroundings."

Mr. Leslie, the constable of the Northern District, was especially active, and as he brought to bear great intelligence and praiseworthy tact in the performance of his duty he was able to do a great deal of good and valuable work.

He was appointed on the recommendation of the late Dr. Glanville O'Brien Elliott, who was the medical officer of the Prince Rupert's Hospital. Dr. Elliott assisted me with much zeal and ability, and the following extract from one of his official letters will indicate the anxious and arduous nature of the work he had to perform at the Prince Rupert's Hospital. "These deaths were chiefly caused by diseases contracted before " admission into the hospital. In many of these cases it was truly pitiable to see their " wretched condition, especially the children ; they were suffering from dirt, starvation, " and disease ; and it is only surprising that under the circumstances the mortality was " not much higher. I have noticed many cases of children admitted in a very " emaciated condition from want of proper food and cleanliness, who would, I have no doubt, " have died if left in their homes, and who after a few weeks in the hospital became " strong and healthy. I can further say that many have to thank their residence at the " Prince Rupert's Yaws Hospital for a prolongation of their lives, the treatment they

" underwent there, regular hours, cleanliness, with good wholesome food, gave them " stamina to withstand disease on their return to their homes."

Early in the year 1879 " the Third Report of the Medical Superintendent of Yaws " Hospitals " was published.* It was a long document, giving particulars of the work accomplished to the end of the year 1878, and containing a detailed account of the disease with a good deal of statistical medical information. It showed that 606 patients had been under treatment in the central hospital from the 11th October, 1877, to the end of the year 1878, and that of this number 471 were discharged cured, 24 died, and 2 absconded. The following extracts from this report will give an indication of the position of affairs when it was written.

" The dietary of the hospital is a great improvement upon that in ordinary use by " the people, but it might be rendered more nourishing by the substitution of fresh " meat for salted fish and pork, the necessity of economy in the expenditure will not, " however, permit of a more costly diet."

" In the case of children, and those who are in a debilitated condition, a special " dietary is allowed, from which salt food is excluded. Two extra meals are also given " in these cases, one at 7 a.m., consisting of arrowroot and milk, or eggs and milk, " and another at noon which consists of soup made from fresh meat, and to which is " added rice or vermicelli.

" The yaws hospital are excellent schools in which to teach the people better and " healthier habits, and it is often seen that the dirty, indolent, and insolent boy or girl " soon becomes so changed as to be scarcely recognisable, the bright, intelligent look, " and the polite greeting indicating that example and precept are not utterly thrown " away.

" At the Central Hospital none of the patients are allowed to go without exercise. " The grounds are cultivated in farine manioc, sweet potatoes, eddoes, pigeon peas, and " plantains, by the stronger men and women, and the children are made to weed the " land, and to cultivate flowers in several beds which have been set apart for the " purpose. Some of the women act as nurses to the children, and others are employed " at needlework. Several of the men and boys follow the occupation of fishing, a small " boat having been bought for the use of the hospital, and by their exertions fresh fish " is often substituted for salt in the dietary. Some of the basket fish-pots were made " by the patients, and the rope by which these pots are buoyed in the water had " been manufactured out of the indigenous 'dagger bush,'† by several of the male " inmates.

" I cannot close this section of the report without expressing my acknowledgement " for the willing manner in which every member of the present staff has co-operated " with me in my efforts to render the yaws administration as successful as possible, and " I would especially mention the efficient way in which Dr. Duke, the medical officer, has " performed his duties.

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" From a consideration of this report it will be seen that the yaws administration " is now settled upon a satisfactory basis. The hospitals which could not be worked in " an efficient manner have been closed, and a large central hospital has been established. " The account already given of the 15 months' work of this hospital is most reassuring, " and it will doubtless be received by the people with feelings of satisfaction.

" The large number of cases admitted to the hospitals has taken every one by " surprise, for the extent to which the disease prevailed in the country was not properly " known until special yaws constables had thoroughly explored the districts which were " thought to be free from the infection. Then, when patients were brought in by " dozens from their hiding places, the extreme gravity of the question was felt, " and the hope of subduing the disease within the short time estimated was seen to be " futile.

" During the year 1878, 29 patients were admitted to the Central Hospital from the " town of Roseau, and, in two instances, I had to issue warrants for the forcible removal " of the patients before the relations would consent to deliver them up. These facts " will give an idea of the number of infected persons concealed in the country, and of " the difficulties which beset the authorities in dealing with the matter.

" Now that the prevalence of the disease is known to its fullest extent, effectual " measures can be taken to subdue its ravages.

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* *Third Report of the Medical Superintendent of Yaws Hospitals.* " Dominican " Office, Dominica, 1879.
† *Furcroea cubensis.*

" The present organization is working in a satisfactory manner, and I see no reason " why the efforts now being made to rid Dominica of this loathsome malady may not " finally be crowned with success, if these efforts be continued for a sufficient period of " time."

During the year some official correspondence took place in regard to the contagion of yaws and the dietary of the hospital. Dr. Milroy, to whom the third report of the medical superintendent had been submitted, in his observations addressed to the Colonial Office, expressed doubts as to whether the disease was solely propagated by contagion, and said that: " If it be proved that the disease is liable at times to become " developed independently of contagion, it is obvious that it will be in vain to look for " its extinction in a community by means, however stringent, of mere isolation or " segregation of the affected from the rest of the inhabitants."

The dietary, which had been found fault with in my report, was amended by order of Sir Michael Hicks Beach, who had then become Secretary of State, and I replied to Dr. Milroy's assertions regarding contagion in a special despatch. Dr. Milroy having published his letter as an article in a medical periodical, I published my reply in the same manner, and thus the views for and against contagion were laid before the medical profession.*

The satisfactory condition of affairs at the end of the year 1878 did not, unfortunately, continue for long. The decision of the Government to increase the accommodation at the Central Hospital so as to make up for the abandonment of the Prince Rupert's establishment was not carried out; and, owing to an oversight on the part of the Crown Agents, the hospital was left without drugs for a long time. At this juncture of affairs I addressed a despatch to the Governor detailing the unsatisfactory condition of the Central Hospital, and placing on record the fact that I could not hold myself responsible for any disappointment that would result from the failure to stay the ravages of the disease if the Government withheld from me the means and assistance they had promised when I took office. This despatch is important, its existence is only known to officials; but, as it throws a new light on subsequent events, it is desirable that it should appear in this Report.

Dr. *Alford Nicholls* to Governor *Berkeley*.

Sir, Dominica, 30 June, 1879.

I CONCEIVE it to be my duty to draw the attention of your Excellency to the following facts, by which you will see that the yaws affairs are now in an unsatisfactory condition.

2. The original scheme for ridding the island of yaws was to collect large numbers of patients into three or more hospitals, and as the patients became cured to keep the hospitals filled by drafting in fresh cases. This plan was never fully carried out, and only two hospitals, one at Morne Bruce, the other at Prince Rupert's (capable of accommodating together over a hundred patients) were organized.

Soon after I was appointed Superintendent the Prince Rupert's Hospital was enlarged, the Central Hospital was opened, and the Morne Bruce Hospital was closed; and by this arrangement over 200 patients were kept under treatment at one time.

The Central Hospital was planned to take in about 200 persons, but in consequence of lack of funds one of the wings was never erected, and only 120 inmates can be accommodated.

3. During the time that the Central and Prince Rupert's Hospitals were working together, great progress was made in subduing the disease, and at least half the island was nearly freed from infection. A check was given to this satisfactory state of affairs by the unfortunate destruction by fire on 20th January, 1878, of the principal wing of the Prince Rupert's Hospital, for the number of patients under treatment had then to be considerably reduced.

4. The necessity for restoring the lost accommodation for patients was fully recognised, the question was considered by the Yaws Commissioners at several meetings, each of which I attended; and I reported officially on the matter in a letter dated 26th April, 1878, and published for general information.

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* *Observations on Yaws: its alleged Contagiousness, and the Importance of Improved Diet as Preventive of the Disease*, by Gvain Milroy, M.D., F.R.C.P.—*Medical Times and Gazette*, 11 October 1879.

Observations on Yaws. (A Reply to Dr. Gavin Milroy.) By H. A. Alford Nicholls, M.D., C.M. Aberdeen, M.R.C.S. *Medical Times and Gazette*. 3 Jan., 1880, and 10 Jan., 1880.

Finally it was resolved to shut up the Prince Rupert's establishment, and to build another wing at the Central Hospital; but, although it was decided on to erect this new wing without delay, no preparations, as far as I am aware, have as yet been made towards carrying out this much needed extension of accommodation.

The Prince Rupert's Hospital was closed on 16th May, 1878, so that for the last 13 or 14 months the number of patients under treatment has been only about 120; that is, fully 100 less than when the two large hospitals were in operation.

5. At the time that the Prince Rupert's Hospital was closed, the country, as regards yaws, was in the following condition:—The northern district, about a third of the island, was nearly free from the disease; the leeward district, another third of the island, was fast becoming clear; and, in the windward district, the disease was raging unchecked, this locality acting as a focus for spreading infection into the other parts of the island.

6. From this time, until the end of the year, some progress was made, the disease had all but disappeared from the leeward district, and the northern district was thoroughly and repeatedly scoured, and only one or two yaws cases could be found. But I regret to inform your Excellency that of late I have scarcely been able to hold the ground already gained; for, in addition to the decreased accommodation for patients, the Central Hospital has been without medicine for several months.

On 27th November, 1878, I sent to Acting President Fadelle a requisition for medicines; by April the delay in sending out the drugs becoming serious, I represented the matter to President Eldridge in a letter, dated 22nd April, a copy of which I forward to your Excellency. At length the dearth of medicines was so great that the special treatment of the disease came to a standstill, and Dr. Duke informed me that during my absence from the island in May, the hospital might as well have been closed, for there were no medicines to give the inmates. The drugs arrived in June, and I am glad to say that the patients have made much progress during the present month, and I am already commencing to gather in fresh cases to fill the places of those discharged.

7. The present accommodation, however, is not sufficient, if a rapid impression is to be made on the disease in all parts of the island.

On 26th April, 1878, in a letter written for your Excellency's information, I stated as follows: "The destruction of the new wing of the Prince Rupert's Hospital renders it "necessary either to increase the accommodation at the Central Hospital, or to open a "hospital in some other part of the island." And, in considering the proposal of the Yaws Commissioners to re-open the Morne Bruce Hospital, I wrote in the same letter: "If, therefore, a plentiful supply of water cannot be brought to the buildings at Morne "Bruce, proposed to be used as a yaws hospital, the erection of a new wing at the "Central Hospital becomes a matter of urgent necessity." Again, on 29th October, "1878, I concluded a report on the yaws affairs with the following paragraph:—"Extra "accommodation is urgently required at the Central Hospital, for I have been unable as "yet to receive any patients from the windward district, and in this part of the island "there are, I fear, many infected persons."

8. As your Excellency will observe, my opinion has always been that the present accommodation is totally inadequate to carry the yaws question to a rapid and successful solution, and this opinion I have more than once recorded.

In regard to the yaws affairs my position is a very responsible one, for great powers have been placed in my hands, and I think I may say that the carrying out of the scheme for ridding the island of the disease rests almost entirely with me. Under such circumstances I consider it my duty to address your Excellency directly, and to bring to your Excellency's notice the various matters contained in this letter.

If the yaws administration be carried on in the way in which I understood it would be when I took office, there can be no doubt of the successful termination; but, if the present inefficient system is to continue, I would beg that I may not be held responsible for the length of time it will take to rid the island of a disease which has been, and is still, the cause of so much expense, trouble, and anxiety.

I have, &c.
(signed) *H. A. Alford Nicholls,*
Superintendent of Yaws Hospitals.

His Excellency Governor Berkeley, C.M.G

As the result of this despatch the Governor issued imperative orders for the erection of the new wing to the Central Hospital that it had been decided should be built 18 months before; but, for economical reasons, it was decided to erect a smaller building than had been originally planned. The new wing was completed in December, but no patients were moved in until January, 1880.

The Fourth Report of the Medical Superintendent of Yaws Hospitals* gives further information concerning the disease, as well as full particulars of the course of events to the end of the year 1879. The statistics for the year showed that 416 patients had been under treatment in the hospital; of which number 273 were discharged, 16 died, and four absconded. The following extracts from this report show the difficulties the Medical Superintendent had to cope with, and furnish the necessary information to judge of the actual position of affairs at the beginning of the year 1880:—

"During the year 1879 the Medical Aid Act, which had been in operation for five "years, the period limited for its existence, fell through, and a scheme for the creation "of a new medical service was submitted by the Governor to the Legislative Assembly. "The Government measure was, however, thrown out, and in its stead an Act was passed "by the elective members of the Assembly, which the Governor assented to provisionally. "A clause repealing that portion of the Yaws Act, No. 5, of 1877, making provision for "my office, was inserted in the new Act; so that, suddenly and without any warning, "I found that I was no longer superintendent of yaws hospitals. In the Act no "provision was made for the attendance at the Central Yaws Hospital beyond attaching "all the medical work to the duties of one of the district medical officers, thus reverting "to the system which, during the years 1876 and 1877, had been found to work in so "unsatisfactory a manner as to necessitate a complete change in the yaws administration. "In order that I might still retain the grasp of the yaws affairs, His Excellency the "Governor offered me, by telegram, the acting appointment of medical officer of the "district which included the Yaws Hospital. This offer I was compelled to refuse, as it "was impossible for me to undertake the performance of district medical work; but, as "I should have greatly regretted to see the result of two years' hard and anxious work "neutralised, or perhaps swept away altogether, I offered to continue to act as Super-"intendent without pay until provision could be made for the attendance at the hospital. "My offer was accepted by the Government, and on 16th October I began my "gratuitous work, but, to my surprise, I found that I was to lose the services of the "medical officer, Dr. Duke, who had worked the hospital with me during nearly the "whole of the time that it had been established. It thus happened that, although I had "offered to act only as superintendent, I was compelled to perform for an indefinite time "the work of two officers, not only without present remuneration, but without the "expectation of ultimately receiving any. On the 22nd December, Dr. Duke, having been "appointed medical officer of the Canefield district, resumed his duties at the hospital; "but beyond this no change was made, and at the end of the year I still held the "curious position of an unpaid head of a public department, with no legislative authority "for the exercise of my administrative duties. . . . .

"From the tables it is seen that 390 patients were discharged in 1878, and "only 273 in 1879; and the decrease in the number of discharges occasioned a like "decrease in the admissions. It may be well to state, however, that during the whole of "the year 1878 the hospital was much overcrowded, and more especially so at the time of "the closure of the Prince Rupert's Hospital. But, as will be seen on reference to the statistics "of the hospital, the principal cause of the decrease in the number of discharges in 1879 "was the suspension of the special treatment of the patients during the months of March, "April, and May, in consequence of the exhaustion of the drug supply. During the first "half of the year, 114 patients were discharged, and during the second half the number "reached 159; that is, an increase of 40 *per centum* on the discharge of the first half of "the year. These figures are interesting, and they conclusively show the efficacy of the "medicinal treatment adopted at the hospital. . . . . In the communication "addressed by the Board of Health, on 8th December, 1874, to the Government, on the "subject of the rapid spread of yaws amongst the people, it is stated that the number of "persons attacked with the disease was ascertained to be 447; subsequent inquiries "brought the number up to 800, but this was thought to be an over-estimate, and when "the opinion was expressed that a thousand persons were affected, the statement was "received with incredulity. . . . . 1,271 persons have already been treated in "the yaws hospitals, and very few patients have, as yet, been gathered from the windward "district of the island where the disease prevails to a great extent, so it may safely be

* *The Fourth Report of the Medical Superintendent of Yaws Hospitals.* Waterlow and Sons, London. 1880.

"assumed that several hundred cases will have to be treated before the disease will be "held in check throughout the island.

"The number of persons living in Dominica is about 29,000, so that already no less "than 4·4 *per centum* of the population have been treated in the yaws hospitals. These "figures will give one an idea of the enormous extent to which the disease has prevailed, "and of the great good worked by the yaws administration. To have left 1,200 persons "attacked with a serious contagious malady to mix freely with a small agricultural "population, will be admitted by most people to be scarcely possible in any civilised "country; and no stronger argument can be adduced in favour of the wise measures "adopted by the Government than to refer to the number of persons treated in the "yaws hospitals. . . . . .

"The difficulties which occurred during the year 1879 were unlooked for, but they "have been grappled with, and they are not likely to occur again. At the end of the "year 1878 the disease, which had prevailed to an alarming extent everywhere, was "being fast driven from the northern and leeward districts, *i.e.*, about three-fourths of "the island; and during the first half of the year 1879 (notwithstanding the difficulties "which beset the yaws administration), no ground was lost. During the last half of the "year, the struggle was commenced afresh, although obstacles still existed to hamper the "movements of the medical officers; and now, at the end of the year, the disease is "almost eradicated from the leeward and northern districts, operations have been "commenced in the windward district, and the means at the disposal of the medical "superintendent have been increased by the enlargement of the Central Hospital."

The following extract from the Report of President Eldridge in the Blue Book of 1879, is convincing evidence of the good effected to that date by the yaws administration:—

"In addition to these figures [statistics of yaws hospitals], the testimony of inde-"pendent witnesses (not cursory observers), whose duties afford ample opportunities of "judging, give continual evidence of the success that has attended the action of the "Government.

"Dr. Duke, the Medical Officer of the Windward District, in a late report says:—

"'The health of both districts continues in a satisfactory state, and the decrease of "'yaws patients, visible to the most casual observer, is highly gratifying to those inte-"'rested in the welfare of the island.'

"Dr. Elliott, the other district officer, testifies to the disappearance of the disease in "his district.

"The special constables employed by the Board, unite in declaring a large portion "of the island free from the disease.

"These facts, taken with the returns from the medical officer in charge of the "hospital, may fairly be accepted as evidence of the extended good that has been "accomplished. Much more has to be done, and the upkeep of a permanent yaws "hospital containing some 20 beds, will be an essential sequence to the work, or, as in "1871, the few isolated cases that may be scattered here and there will be a fruitful "reproducing source of evil."

During the year 1880 a new medical aid Act was passed, and the medical superintendent was deprived of the professional assistance of Mr. M. P. Duke, who had done such good work as medical officer of the Central Hospital. All the work of that institution was now thrown on the medical superintendent, who by an amalgamation of offices has now also become the medical officer of the public institutions in the island. On making this arrangement, the Governor had promised professional help later on, but no such help was ever given.

The curtailment of the medical staff of so large a hospital, situated nearly an hour's journey from the town, was a serious mistake; and, in a report written on the 19th September, 1882, for the information of the Secretary of State, this question was alluded to by the medical superintendent in the following terms:—"It was impossible for me to "give the attention to the yaws affairs that I had done previous to the year 1880. I did "all I could to carry on the work of the yaws hospital in a satisfactory manner, but I "was conscious, and so I stated to the members of the Government, that sufficient "medical work was not being done; and this I felt the more when a severe epidemic of "whooping cough prevailed in the island and attacked all the weakly children in the "Central Yaws Hospital, causing the annual death rate to rise from 3·1 *per centum* in "1880 to 6·3 *per centum* in 1881. From an economical point of view alone, the saving "in the expenditure on medical attendance was a great mistake; for as I was unable to "give sufficient time to individual cases, the average stay in hospital was longer, and "thus each patient cost more, and fewer patients were admitted than would otherwise "have been the case."

The Yaws Commissioners had hitherto held frequent meetings, but I find in the minutes of the 13th October, the following: "The President, in commenting on the "present satisfactory working of the Yaws Hospital, suggested that monthly meetings "would be sufficient."

In November a circular letter was addressed by the Government to the medical officers, magistrates, and ministers of religion in the island, asking for information in regard to prevalence of the disease, and the progress made towards its extinction. The following are extracts from the replies received :—

Dr. Glanville O'Brien Elliott.—"I beg to state, for the information of His Excellency "the Governor, that from personal observation during my frequent visits to different "localities in this district, I believe yaws to be steadily on the decrease, and that the "progress made towards the extinction of the disease is highly satisfactory. From my "experience during the time I was in charge of the Lasoye district, where the disease was "at one time rampant, but is now nearly extinct, I would strongly advise the "appointment of an active and intelligent man as yaws constable for the leeward coast."

John W., Elliott Esq., Magistrate, Windward District.—"The disease unquestionably "exists to an extent which quite justifies the attention which the Government is "apparently devoting to it; but the yaws subjects are especially cautious to avoid "inspection, and I but rarely have an opportunity of seeing one."

The Very Rev. A. Fort, Vicar-General.—"Je n'ai point d'observations personelles à "faire au sujet de l'epidémie des yaws. Je visite souvent l'etablissement pour mon "ministière seulement persuadé queceux qui sont chargès de lés querir font de leur "mieux."

Rev. J. H. Bridgewater, Wesleyan Missionary.—"In reply to your Despatch of the "9th instant, No. 301, I beg to state, for the information of His Excellency the Governor, "that from 1871 to 1878, when I last resided in Dominica, and when my duties required "me to travel through a large portion of the country, I observed that the yaws was very "prevalent, though towards the close of that residence I was impressed that the disease "was abating at Lasoye and its vicinity. Since my recent missionary appointment, "which took effect only in July last, my opportunities of observation on the subject "have been very limited. Indeed, I have not recognised the yaws anywhere outside of "the wards of the hospital at Canefield."

Rev. J. S. Kelshall, Wesleyan Missionary.—"In reply to your communication, con-"veying His Excellency the Governor's desire to be supplied by me with information "relative to the yaws in the district where I reside, I have the honour to state that, in "my judgment in this part of the island where I reside and exercise my ministry, viz., "from Prince Rupert's to Hatton Garden, the cases of yaws have very greatly diminished.

"Through the indefatigable exertions of the yaws constable for this district, Mr. D. "B. Leslie, the cases of yaws that occur are all discovered and sent to the Yaws Hospital, "so that at the present time there seems to be no case not under the cognizance of the "authorities. The children and young persons I meet with all appear to be healthy, "and there is not at present any child belonging to the four schools under my manage-"ment suffering from the malady. From all the facts that have come under my notice, "I have come to the conclusion that in this yaws district, at least, the measures used "for eradicating the disease have been so far very successful."

Cavendish Boyle, Esq., District Magistrate.—"I fear that I have been able to "discover but little that will be of any service to His Excellency, and I trust that any "expressions I may venture to make use of here will be taken as made with all due "deference, and with a full knowledge of my own inexperience in the matter.

"The disease is most carefully concealed by the people, and it is almost impossible "for an unprofessional person to discover it. There is no doubt that it exists largely "in portions of the island; and the idea of a central hospital is a good one, provided "all the infected cases can be discovered and localised there; but I fear there are many "that escape discovery, and as long as that continues all the efforts to stamp out the "disease will be unavailing. I have no doubt from what I have seen in my district "during the past 12 months, that the spread of the disease has been to a certain extent "kept under, and this especially in the town of Roseau and its more immediate "neighbourhood; but there must be many undiscovered cases, and unless more "constables be employed, and heavier expenses incurred, the disease will never entirely "disappear."

During the year 1880 the number of patients under treatment in the Central Hospital was 477; of this number 335 were discharged cured, 15 died, and 127 remained in hospital on the 31st December. Of the 477 cases, 24 were readmissions, and these figures show that in 5 *per centum* of the patients there were relapses of the disease.

The yaws affairs went on smoothly and without incident during the greater part of the year 1881; three-fourths of the island had been practically cleared of the disease, and patients from the remaining fourth were being rapidly gathered into the hospital. This infected district was at the southern end of the windward side of the island, that is from La Plaine to Grand Bay. Here the disease was still prevalent, for the plan of operations had been, not to pick up a case here and a case there, leaving persons with the disease in the same place, but to thoroughly clear out a district and not to relax efforts until all the yaws cases were in the hospital or under surveillance. The advantages of this method and the extremely satisfactory results of the measures adopted, are well shown in the following letter:—

Dr. *George E. Pierez* to Dr. *Alford Nicholls.*

Sir, Londonderry, 6th November, 1881.

With regard to the disease yaws in the Lasoye district I beg to forward you my opinion on the subject.

I have no doubt whatever that the disease is gradually being overcome, and that eventually, within perhaps a year or 18 months, there will be very few cases to be found there, or none at all. When I first entered upon my duties as medical officer of the quarter, at the beginning of January 1881, I now and then came across a case or two as I rode through some of the villages. But latterly I did not meet with a single patient, that is to say, during the last three or four months. The yaws constable, Mr. Leslie, sent in only three cases to the Central Hospital in September and two in October. He has not seen any other cases up to date.

The good results obtained are doubtless due to the exertions of the yaws officer and the gradual improvement in the habits of the people, who are beginning to believe in the efficacy of isolation in the disease.

I am &c.,

(signed) *George E. Pierez*, M.B.

Medical Officer, Lasoye District.

H. A. Alford Nicholls, Esq. M.D.
Superintendent, Yaws Hospitals.

During the year the finances of the island became embarrassed, and the Governor appointed a commission of inquiry composed of Mr. Goldney, the Attorney General, Mr. Burns, the Auditor General, and Mr. Latouche, the Solicitor General of the Leeward Islands. These gentlemen held their inquiry, and in their report advised the closing of the yaws hospital. This meant the abandonment of all efforts to complete the work of ridding the island of a disease that had caused so much distress and misery amongst the people, that had given rise to such anxiety to the Government, and that had occasioned so large an expenditure of the public funds. My evidence was not sought for by the Commissioners, and I did not see their report, and strange to say this document does not appear to have been filed in any Government office of the colony, and I believe there is no copy in the Colonial Office at Downing Street. The only reference I have been able to discover to it is contained in a letter from President Churchill to the Colonial Secretary, dated 9th November, 1886.

Sir Henry [then Mr.] Burford-Hancock was then administering the Government of the Leeward Islands, and he visited Dominica with the full intention of carrying out the advice of the Finance Commission. During an interview with him, however, I pointed out the shortsighted policy of the abandonment of results brought about by costly expenditure just on the eve of success, and he at once grasped the merits of the question, and asked me whether I could not devise some means of tiding over the difficulty, for it was imperative to reduce expenditure within the limits of the revenue. It was finally decided that the Central Hospital should be closed, and that the patients,

when the number was reduced to 50, should be removed to a smaller hospital at Morne Bruce, the water supply of which was to be perfected. The services of the yaws constables were to be dispensed with; their work being done by the police, and so as not to curtail the means at my disposal for eradicating the disease, it was decided that the district medical officers, who had hitherto done absolutely nothing in their districts in regard to the yaws patients, should, under my direction, assist the Government in controlling the spread of the disease. It was thought that the help of these officers would greatly relieve the hospital, as many of the affected persons could be attended by them in their own homes. This modified system was to be tried for a year; and, if it failed, the Legislative vote under the head of yaws hospitals was to be increased.

The following extract from a letter I addressed to the Administrator explains thoroughly the position of affairs :—" In regard to the yaws affairs I would remark that " the total suppression of the present administration really means abandoning the " results brought about by the expenditure in the past few years of thousands of pounds, " with the almost certain sequence of a rapid spread of the disease to all the parts of the " island now free from yaws. This would be a deplorable result, fraught, as I believe, " with misfortune to the country. To some people in the island the closing of the " yaws hospital would doubtless give satisfaction, but to most thinking persons it would " be viewed with feelings akin to alarm. I am quite aware of the great expense of the " present system, and of the necessity of retrenchment; but I think that not only can " the good work effected by the hospital be prevented from being swept away, but that " extra good work can be done by the modified system we spoke of this morning, " with 500 *l.* a year at my disposal (exclusive of the payment of salaries) I believe I can " do a great amount of good with a small yaws hospital at Morne Bruce. The only " difficulty in the way appears to me to be the water supply, but, as I pointed out, this " is not an insuperable difficulty, for by the thorough repair of the aqueduct, or by the " erection of a hydraulic ram, a sufficient supply of water can be ensured."

The objection to a yaws hospital being placed at Morne Bruce had always been the inadequacy of the water supply. On the 26th April, 1881, the matter was taken up by the Poor Law Board, and the following extracts from the minutes of the meeting indicate the serious nature of the question .—

" That the reports made to this Board on several occasions by the medical officer in " charge of the public institutions show that the water supplied to the Morne Bruce " Hospital is impure and deficient in quality.

" That for some weeks past the supply of water has given out entirely, and that " casks of river water have to be carted up from Roseau for the use of the inmates and " officers of the institution.

" That, in consideration of the facts of the case, this Board is of opinion that, for the " welfare of the inmates of the poor-house it is necessary to take immediate steps to " carry an ample supply of pure water to Morne Bruce by a hydraulic ram, or in some " other manner.

" And that the chairman of the Board be requested to forward a copy of these " resolutions to the Governor, for his Excellency's information."

The Chairman of the Board, who was the President of the island, mentioned afterwards that the Governor had sanctioned an application to the Assembly for the work.

In accordance with instructions from the Administrator admissions to the Central Hospital were stopped, and the colonial engineer set to work to prepare one of the poor-house buildings for the patients when their numbers were reduced to 50.

By Clause V. of the Medical Aid Act of 1880, the district medical officers were required " to aid and assist the Governor in promoting and improving the sanitary " condition of the people, especially with reference to the disease commonly called yaws." But, except when Dr. Elliott and Mr. Duke acted as medical officers of the Prince Rupert's and Central Hospitals, the district medical officers had done nothing to assist the authorities in staying the ravages of the disease. In order, therefore, to place the matter on a proper footing, an Act, entitled, " An Act to Amend the Medical Relief Act, 1880," was passed by the Assembly in December, 1881, authorising the Governor in Council " to make rules defining and regulating the duties to be performed by the medical

" officers." Under the authority of this Act the following rules were passed by the Administrator in Council on the 8th December :—

"The duties of the medical officers shall be such as are defined in the Medical Act, " 1880, and in addition thereto every district medical officer shall within his district " assist the medical officer of the institutions in carrying any measures which from time " to time may be undertaken for the suppression of yaws."

" It shall be the duty of the medical officer for District B, to act as assistant " medical officer for the public institutions, including the yaws hospital."

The effect of these rules would have been, doubtless, to increase the efficiency of the " yaws administration," had they been properly carried out. That a great deal of useful work can be accomplished by attending yaws patients at country dispensaries is amply proved by the history of the Tobago system. The second of the above rules would have enabled the Medical Superintendent, who was also medical officer of the public institutions, occasionally to visit the country districts to ascertain the manner in which the system was working. But, some of the junior medical officers objected strongly to the rules, and Sir John Glover, G.C.M.G., who was then the Governor of the colony, rescinded them in October, 1882. Thus " the modified system " of dealing with the yaws affairs was not carried out, except as regards the closing of the Central Hospital, and the opening of a smaller establishment at Morne Bruce. In other words the Government, just as success was likely to crown their costly efforts to eradicate the disease, practically abandoned their work, and permitted the loathsome malady gradually to spread itself again into the districts from which it had disappeared.

In December, 1881, the yaws constables were dismissed. This was a most unfortunate step, for they had become proficient in their duties, they were well acquainted with the people, and the Medical Superintendent was kept informed by them of all the necessary particulars concerning the affected persons in their districts. In his last report, dated 2nd January, 1882, Constable Leslie said there was only one case of yaws in his extensive district, and he stated that, " The people had learnt that the laws against " yaws are rigidly enforced, and there is now no fighting against the measures, as has " often been done. Each family now declare their own cases with the greatest ease."

On the 26th January, 1882, the Central Hospital was finally closed, and the yaws patients, to the number of 56, were removed to their new quarters at Morne Bruce.

On the 2nd March, President Eldridge made an ineffectual protest against the unfortunate policy of practically abandoning the results brought about by the expenditure of over 10,000 *l.*, as will be seen from the following extract from a letter addressed by him to the Colonial Secretary :—

" The expenditure at the yaws hospital has not, although large, exceeded the tax " raised specially for the purpose, 10,235 *l.* has been received, and 10,066 *l.* has been " expended. Some 30 *l.* of claims remain unpaid beyond the grant, which I pray to be " allowed to pay. The present arrangement has doubtless decreased expenses, but it " must prolong the work of eradicating the disease. Hitherto the effort has been by " large ingatherings to clear whole districts which has been effectually performed. The " present slow drafting of infected cases can ill keep pace with the rapid growth of the " disease. The present situation of the hospital, both on the grounds of segregation and " want of water, may cause grave difficulties."

The dismissal of the constables and the abandonment of the Central Yaws Hospital ended the third and final attempt to eradicate the disease from the island ; for, although the small hospital at Morne Bruce was kept up, the Government well understood, from communications they had received from the Medical Superintendent and others, that the sudden stoppage of the special measures adopted, without employing other adequate measures in lieu thereof, could not but result, sooner or later, in the gradual spread of the disease to those parts of the island from which it had been eradicated.

The buildings of the Prince Rupert's and Central Yaws Hospitals had cost, I believe, nearly two thousand pounds. When the Prince Rupert's Hospital was closed, the buildings were allowed to decay. Those of the Central Hospital had been erected on private lands, and with the exception of the new ward, built in 1879, the buildings afterwards became the property of the owner of the Canefield Estate, who used them as barracks for his labourers. The new ward, which was on a more costly style than the other buildings, was taken down, and afterwards erected in the town of Roseau, and used as a Government school house.

The Central Yaws Hospital had been open for four years and three and a-half months, during which period 1,647 cases of the disease had been under treatment in the wards. The actual work of the hospital will be seen from the following Table :—

Years.	Admitted.	Born Hospital.	Discharged.	Died.	Death-rate per 1,000	Absconded.
1877 (11 Oct. to 31 December) -	218	- -	81	3	13·8	—
1878 - - - - - - -	385	3	390	21	54·1	2
1879 - - - - - - -	307	- -	273	16	52·1	4
1880 - - - - - - -	354	- -	335	15	42·4	—
1881 - - - - - - -	383	- -	390	33	86·2	—
1882 (1st to 26th January - -	- -	- -	34	—	—	—
Totals - - -	1,647	3	1,503	88	53·3	6

The mortality of 53·3 per 1,000, although a very low hospital death-rate, was, on the whole, a high one for a yaws hospital—the patients of which appear ordinarily to enjoy a remarkable immunity from death. It will be noticed that the high rates of mortality were in the years 1878 and 1881. During 1878 dysentery was prevalent in the island, and the disease attacked a large number of the inmates of the hospital, and some of the patients who had been admitted in a cachectic condition died of the disease. On reference to the books I find that there were 11 deaths from dysentery during the year, that is more than half of the total number of deaths. Of the 11 persons that died of this epidemic disease, three were adults and eight were children.

From January to June 1881 the hospital was remarkably healthy, there being only six deaths for the half year. But about June a severe epidemic of whooping-cough prevailed in the island, and the disease attacked every child, and some of the youths, in the hospital, with the result, as can easily be imagined, that there were many deaths.

In reference to the death-rate of this hospital, it is stated as follows in the Third Report of Medical Superintendent : " It must be remembered that all the old standing " cases, to the number of 110, were removed from Morne Bruce and Prince Rupert's to " the Central Hospital." From the case books it appears that many of these old patients were terrible examples of incurable disease and deformity, and all that could be done was to allow them to remain in the hospital until death put an end to their misery.

The new hospital at Morne Bruce, which is still in existence, was established in one of the old barracks that were occupied by European soldiers when the island was garrisoned. The building, which is situated in a very healthy position, is a fine stone one, separated into two equal portions by a mason-work partition, in which is a door of communication. The two wards thus formed are 47 feet long by over 20 feet wide, and they each give accommodation for 25 patients. One ward is used for male and the other for female patients, and each inmate has a breathing space of between 600 and 700 feet. The building, which had a wide open gallery running along the north side, would be well adapted for a hospital if there were an adequate water supply. But nothing was done to insure this supply, which is absolutely necessary for a hospital in which are treated many cases of a loathsome disease like yaws.

The gallery was blown down in the hurricane of September, 1883, and it has never been put back. This is unfortunate, as it served practically as day wards for the patients. During wet weather they now have to remain day and night in the same wards.

In April the Governor visited Dominica, and he informed me that he knew all about the treatment of the disease, as he had met with many cases, and had suffered from it himself whilst on service in Africa. He said that suphur was the thing to cure yaws, and as there were " soufrières," or solfataras, in Dominica, the patients should be encamped there, and drink of, and bathe in, the " hot sulphur waters." He gave orders for the establishment of a " yaws encampment " at the soufrière at the south end of the island,

and the following despatch, addresed to the President, shows the way in which the Governor's experiment was to be carried out:—

The Acting Colonial Secretary to President *Eldridge.*

Sir, Dominica, 15 April 1882.

I AM directed by the Governor to inform you that he considers the present mode of treatment of yaws patients who are collected in a hospital at Morne Bruce to be unsatisfactory, and that he desires that steps should be taken for removing, as an experiment, six of the patients from the hospital to the neighbourhood of the sulphur springs at Soufrière for the purpose of being isolated in separate huts.

With this view His Excellency has instructed Dr. Nicholls and Dr. Williams to select a suitable locality for the establishment of a small encampment of huts, and he has invited the co-operation of the Bishop of Roseau, who has consented that the priest at Soufrière shall render such assistance as may be in his power for the proper management and supervision of the scheme. His Excellency has also obtained the co-operation of Mr. Bellot, the proprietor of the Soufrière estate.

The Governor relies on your cordial assistance in carrying out this most important experiment.

I have, &c.

His Honour, the President. (signed) *P. Burns.*

The Soufrière was visited, in accordance with the Governor's orders, by the President, the Medical Superintendent, and the Medical Officer of the District, in order to select the site for the "encampment." But at once a difficulty occurred. The Medical Superintendent advised that the "sulphur water" should be analysed, in order that it might be known what was its composition before the patients were dosed with it, and the President authorised him to send on samples to London for analysis. This and other suggestions made by the Medical Superintendent, were ill received by the District Medical Officer, who was impatient of any control. He declined to keep a case book or any other record at the encampment, and finally he set at defiance the authority of the Superintendent, who, by the provisions of Act 5. of 1877, was vested with the entire management and supervision of the yaws hospitals. No such difficulty had occurred in 1877, and 1878, when the District Medical Officer had worked under the Superintendent willingly and zealously.

On the 26th April the President wrote to the Medical Superintendent requesting him to decide on the site for the encampment, and on the dimensions of the huts, to draw up a dietary, and to make any suggestions that might occur to him. This was done, but the District Medical Officer disagreed with everything, and there came a dead-lock. The question was eventually referred to the Governor, who gave his decision in the following despatch:—

The Colonial Secretary to President *Eldridge.*

Sir, Antigua, 16 May 1882.

THE Governor has had under his consideration your letter, No. 116, of the 11th instant, and the letters from Dr. Nicholls and Dr. Williams which accompanied it, on the subject of the yaws encampment at Soufrière.

2. His Excellency is of opinion that the site selected for the encampment by yourself and Dr. Nicholls should be adopted.

3. As isolation is a main feature of the experiment, the Governor cannot assent to a double hut as proposed by Dr. Nicholls.

4. It is His Excellency's wish that the direction of the encampment be under the direction of the District Medical Officer on economic grounds, and as the treatment should be nothing more than cleanliness, good diet, isolation, and the effect of sulphurated atmosphere, and washing in and drinking the sulphurated water, the care and direction of the patients may very well be left to the District Medical Officer.

5. You will inform Dr. Nicholls that no Government expense is to be incurred for the analysis of the water.

6. The Governor will be glad if the Medical Superintendent of the yaws hospitals can visit the encampment once a month or once in three weeks, and His Excellency considers that a weekly visit from the District Medical Officer will be sufficient, as the Bishop has kindly promised that the Parish Priest will interest himself in the experiment. It will, therefore, be advisable that one or two of the patients belong to the Catholic Church.

7. You will instruct the District Medical Officer to make a weekly report to the Medical Superintendent, to be by him forwarded to you for the information of the Governor.

I have, &c.
(signed) *Edwin Baynes*,
Colonial Secretary.

His Honor, President Eldridge.

This decision was illogical and unfortunate. On the one hand the District Medical Officer was given, contrary to the terms of the law, "the direction of the encampment," and on the other hand he was ordered to recognise the Superintendent's authority by reporting weekly to him. The Superintendent was also requested to visit the encampment periodically. Thus each officer was placed in a false position; and, as a necessary consequence, the friction that had existed was not removed.

The "experiment" was commenced on the 14th June. For the accommodation of the yaws patients, six rough unfloored huts were constructed like A tents. The breathing space in each hut was only 210 cubic feet; and as the patients were afraid to sleep alone two cases were placed in each hut, thus reducing the available space to 105 cubic feet for each person. These and other defects were reported against by the Medical Superintendent, but nothing was done to remedy them. The reports of this officer were sent by the Governor to the District Medical Officer to be reported on by him, with the result that the friction increased, and an acrimonious correspondence ensued, any further allusion to which would be out of place in this report. Finally, in compliance with the Governor's instructions the Medical Superintendent ceased to have anything whatever to do with the encampment.

About this time the details of the closing of the Central Yaws Hospital, and the other changes in the yaws administration, had been brought to the knowledge of the Secretary of State, who called on the Governor to apply to me for a full report on the subject. The report was written and sent in to the Governor on the 19th September, 1882, but Sir John Glover did not forward the document to the Colonial Office.

The encampment was carried on until November, 1884, when it was closed by order of Governor Sir Charles Lees, K.C.M.G. In a report written by the District Medical Officer on the 10th August, 1883, he showed that altogether 26 cases had been admitted. Four of the six cases taken from the yaws hospitals were returned to that institution as unfit subjects for the experiment. Of the remaining 22 cases, 13 had been discharged as cured, but three of these patients returned with relapses of the disease, showing the proportion of relapses to be 23 *per centum*.

The experiment Sir John Glover wished to try was to isolate the patients and to treat them with the "sulphurated water." As a matter of fact this experiment was really never made. Isolation of each case was not attempted, and the water contained, according to the analysis, appreciable quantities of alum and common salt, and only an infinitesimal quantity of sulphur. By the 14th October five patients had been discharged as cured, and in December three of them were found to have relapses of the diseases. In a report referring to the matter, Mr. Williams stated as follows: "When I discharged my "first three patients I ordered them to come and show themselves to me once a week; "as they did not come, after about two months had elapsed, I searched them out myself "and found, much to my sorrow and astonishment, that they had all got well-developed "tubercles on them again."

On the 10th May, 1887, a boy who had been discharged cured from the yaws encampment, was admitted again suffering from yaws to the Morne Bruce Hospital

After discovering the three cases of relapse of the disease, the District Medical Officer abandoned the treatment solely by the mineral water. He was supplied on his requisition with a quantity of medicines for the encampment. Amongst the medicines were corrosive sublimate, green iodide of mercury, arsenic, iron, and other general and local remedies that had been recommended for use in the treatment of the disease; and in a report written in January, 1883, he said: "Since the middle of December all have been taking "medicines internally."

In one of the reports of the medical officer already alluded to, he showed that the cost of the encampment for food, clothing, and nurses' wages averaged 7 *l.* 10 *s.* a month. The encampment appears to have been abandoned at the end of November, 1884, so that it was established for two years and four months. No reports, however, appear to have been sent in after August, 1883, and I was unable to obtain any statistics subsequent to that date. Up to then, however, the total expenditure, exclusive of medicines, building of huts, &c., was 135 *l.*, so that the 26 patients cost at least 5 *l.* 4 *s.* a head. The dietary of the encampment drawn up by Mr. Williams will be found in the Appendix.

In September, 1882, an inquiry was made as to the condition of the various districts of the island in regard to the prevalence of yaws, and the following extracts from the answers received show that the epidemic had been subdued, and that the disease would probably have been entirely eradicated had the Central Hospital been kept open some time longer.

Mr. W. R. Williams, District Medical Officer.—"The disease is not on the increase "in any part of my district. If it would not be considered premature, I should much "like to bring before the notice of His Excellency, the Governor, and yourself the out-"lines of a plan for the management of the disease, which I think would be more or less "effectual.

"(1.) Let the head of each family be responsible for every case of yaws in "that family. Compel him to report every case as soon as it occurs to the "medical officer of the district or the magistrate, under penalty of a fine or "short imprisonment for neglect of doing so.

"(2.) Let each medical officer have an encampment in his district for the "treatment of the cases in his district.

"(3.) Let there be a hospital connected with the poor-house for chronic "cases of yaws, and where all the old and chronic cases throughout the island "would be sent.

"(4.) If the person with the disease or his friends objects to be taken to the "encampment, allow him to treat himself for the disease, but the case must be "shown to the medical officer once a month under penalty of a fine. Of course "this would not apply to the chronic cases."

Dr. G. O'Brien Elliott, District Medical Officer.—"When I took charge of District "No. 4, in this Presidency (some five years ago), and which comprised the parishes of "St. David, St. Andrew, and St. John, the people suffered frightfully from yaws, in fact, "not to meet people suffering from the disease was the exception, but through the "system of constant supervision and drafting cases when found to the hospitals, the "disease decreased considerably. In fact at Lasoye, where the disease was at one time "rampant, when I left two years ago there were only a few isolated cases. I can only "attribute this to the great care the people received in the hospital, and the constant "supervision of the constable after their leaving the hospital.

"It is my candid opinion, after an experience of five years in this Presidency, that "the working of the yaws hospitals has been highly successful. I think it was a "mistake in doing away with the local constables, and substituting policemen to do the "work.

"In the district that I am at present in charge of, comprising the northern half of "St. Andrew's, the parishes of St. John, St. Peter, and St. Joseph, I am glad to say that "there are very few cases of the disease."

Mr. Q. R. Veitch, District Medical Officer.—"The sixth case was an old man living "close to my residence. His age is 72, and he is in a state of pauperism; this is the "second time the disease has affected him. He is now again almost completely cured. "These are all the cases that have come under my notice, so that I am not in a position "to make any definite statement as to the possible number of cases there may be. "Certainly, however, I can safely state that the disease is not in any degree frequent in "this quarter, and I think if such cases as these are, could more carefully be brought "under medical treatment, the disease would soon disappear, except perhaps in isolated "cases arising '*per se*.'"

Mr. E. A. Faille, District Magistrate.—"Judging not only from information, but "also from what I saw myself, I am of opinion that the disease yaws is on the decrease. "I think that if immediate steps were taken to collect the few remaining cases of yaws "between Point Mulatre on the northern side of Morne Paix-bouche, and the Pegoua or

" Hatton Garden River, the disease might in a short time be eradicated in that part of " the island."

Mr. J. W. Elliot, District Magistrate.—" The yaws was kept in considerable check " during the existence of the hospital, as the district yaws constables were very zealous in " the discharge of their duties, and not only forwarded patients rapidly to Canefield, but, " when from any cause the yaws subjects could not be immediately sent on, they caused " them to be isolated, and thus prevented the spread of the disease."

Early in the year 1883, statements were made that most of the patients were discharged from the hospital uncured, and one of the District Medical Officers in an official letter gravely asserted that over 90 *per centum* of the discharged patients were found to be suffering from the disease after their return home. A careful inquiry into the matter proved the inaccuracy of these statements, and the error of the medical officer was probably due in a measure to the fact that it is the practice of many of the people of Dominica to put themselves and their children through a course of native remedies after they have undergone proper medical treatment. In a report on the whole question, the Medical Superintendent made the following observations in regard to the matter: " Bella John Admi was seen with her father. She also is stated to have " been 'cured at home,' but her father denied that it was so. He said the child came " back cured, and had no yaws again, but that he had given her 'tisanes to refresh her " 'body,' and that he had informed Dr. of the fact. I may here remark that it " is a common practice for the ignorant people to place themselves and their children " through a course of bush decoctions called 'tisanes,' after they have been under " treatment by a medical man, no matter from what disease they have been suffering. " There is now a man at the Roseau Infirmary with dropsy, whose leg I amputated some " years ago, and he believes his present illness is due to the fact that he omitted 'to " 'refresh his body with tisanes' when he left the institution after the operation."

The Medical Superintendent called upon the other medical officers for information in regard to the discharged hospital patients in their districts who had suffered from relapses of the disease, and the replies of these officers gave ample evidence of the satisfactory work accomplished at the hospital. The following are the replies:—

Dr. G. O'B. Elliott, Medical Officer, District C.—" I have now the honour to " forward to you a statement of 20 persons sent up to the Central Yaws Hospital during " the years 1879, 80, and 81, these persons were discharged from the hospital cured, " and are still in perfect health. I must draw your notice to case No. 10. Nicholas " Joseph; this man was suffering very badly from the disease, and successfully evaded the " constables on several occasions. He was at last captured and sent to hospital where " he remained until cured; he now expresses his regret at not availing himself of the " hospital before, and thankfulness for the benefit he derived from the treatment. I am " certain that any person having the least experience of this island some four or five " years ago, when it was the exception to meet with anyone of our labouring population " who was not suffering from yaws in some form, will agree with me that the treatment " carried out has been most successful."

J. A. Foreman, Esq., Medical Officer, District D.—" In reference to your letter of " the 22nd February regarding the yaws patients of Lasoye Quarter discharged from the " Central Yaws Hospital, I have to state that, with but two exceptions, all those who " came under my notice left the hospital cured, and are, at present, free from all " symptoms of yaws."

In September, Mr. Neale Porter, who was administering the Government of the Colony, called on the Medical Superintendent to explain why he had not sent in the report, asked for a year ago by the Secretary of State, on the changes that had been made in the yaws administration. It was then discovered that the report which was dated the 19th September 1882, had not been forwarded by Sir John Glover to the Colonial Office, and the document was at last sent to its destination. On the receipt of the report, the Secretary of State gave instructions to the colonial authorities to take the necessary action to prevent the further spread of the disease.

Lord *Derby* to the Officer Administering the Government of the Leeward Islands.

(Leeward Islands—No. 225.)

Sir, Downing-street, 30 November 1883.

I HAVE the honour to acknowledge the receipt of your Despatch, No. 292 of the 26th ult., transmitting a report by Dr. Nicholls, dated the 19th September, 1882, upon the effect of the policy adopted in Dominica in recent years with a view to the extirpation of yaws.

I entirely concur in the inference suggested by that report, that it would be most unwise to suspend for the future all expenditure for the prevention of this disease.

Although it does not appear necessary to revert to the scale of expenditure which was annually incurred previous to 1881, the greatest vigilance should be exercised with a view to checking any tendency of the disease to spread further; and to that end the hospital at the Morne should be made thoroughly capable of coping with the present average number of cases. This may involve some increase of expenditure during the next two or three years, which the Government should not hesitate to incur.

I have, &c.
(signed) *Derby.*

The Officer Administering the Government
of the Leeward Islands.

Unfortunately, these explicit instructions were not carried out, on the contrary, the expenditure was reduced below the 500 *l.* a year fixed by Sir Henry Burford-Hancock; and, as the medical officer in charge had no yaws constables at his command, and as the district medical officers had been relieved of the duty of assisting him in the yaws affairs, all control over the spread of the disease was virtually at an end.

On the 27th February, 1884, Acting President Churchill, at the request of the Governor of the Windward Islands, wrote a despatch giving some of the details of the measures that had been adopted in the island to arrest the spread of the disease. The following extracts from this letter afford some interesting information:—

"Unfortunately the report which your Excellency has heard that the yaws has "almost entirely disappeared from Dominica is not at all near the truth. The disease "has been kept within limits, and was undoubtedly, in the first instance, arrested by "the measures taken when it was threatening to infest the whole population of the "island. I attribute the failure to obtain entire and complete success to the change of "the original plan.

"You will observe that by the first Act of 1875 it was contemplated to have yaws "hospitals established throughout the island under the charge of the medical officers of "districts, and of other doctors specially appointed for the purpose if found to be "required, which hospitals should be under the close superintendence of the doctors, "and easily accessible to the afflicted persons, and to the police who were required to "search for and bring them in. No attempt whatever was introduced to carry out the "scheme on those principles.

"I should therefore note that unusual obstacles are opposed here to the establish-"ment of many district hospitals for yaws by the fact that the district medical officers "being unsupplied with house accommodation are always in straits for a dwelling, living "with this or that estate's manager, and never permanently settled, and are, moreover, "partly for the reason given above, and partly from the facts that they live in unhealthy "quarters, are scantily paid, and have scarcely any private practice to fall back upon, "always being changed, sometimes in consequence of their death, at other times of "retirement by resignation, or again of transfer to better appointment in other "colonies.

"I am persuaded that the sole effectual plan for the extermination of the yaws in "Dominica would be the establishment of cottage hospitals of this class* under energetic "and humane district medical officers with an asylum where the patients who might be "incurable or chronically affected with the disease with the concomitants of old age and "debility might be cared for until released by death from their sufferings, and "at the same time prevented from becoming centres of contagion in their village "homes."

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* The so-called yaws encampment.

During the balance of the year, and during the year 1885, nothing appears to have been written about the disease. The small hospital at Morne Bruce was doing all the good that was possible; but, as the accommodation was limited, applications for the removal of yaws patients from various parts of the island had to be refused in some instances. Difficulties occurred, too, in getting the police to carry out the duties that had been performed so satisfactorily by the yaws constables. A few patients absconded, and their hiding places were not discovered by the police, with the result that the number of escaping patients was increased.

The expenditure on the yaws hospital was decreased in 1886 to about 380 *l.* in further pursuance of the policy of retrenchment that had resulted in the abandonment of the yaws encampment, and which President Churchill alluded to as, "The necessity "for economising the resources of retrenchment of every item of expenditure which "could by any possibility be dispensed with in order to preserve the balance between "revenue and expenditure in the annual estimates for 1885."

In November, 1883, the Secretary of State had directed an increase for the next two or three years of the annual expenditure on the hospital, then fixed at 500 *l.* This sum, however, was, I believe, never reached, and three years afterwards it was reduced to 380 *l.*, which appears to have been decided on as the permanent annual cost of the yaws hospital, for President Churchill wrote to the Colonial Secretary on 9th November 1886, a despatch concerning the island finances, in which he said: "I am of opinion "that it [the 380 *l.* for the yaws hospital] is a branch of expenditure which cannot be "cut off unless and until a medical service for the whole island should be established "and maintained on an efficient footing, thus enabling the yaws like other diseases not "infectious in character to be treated by the people in their own homes under medical "superintendence."

During the year 1887 the disease undoubtedly began again to spread, and districts that had been for several years absolutely free from yaws became again infected. The matter was alluded to in the local newspapers, and brought up in the Legislative Assembly, when the medical superintendent was bitterly attacked as being responsible for the failure in eradicating the disease from the island. In January, 1888, Dr. B. Bornn who had succeeded the late Dr. Elliott, as medical officer of the northern district, reported having found some hidden cases at Vielle Case and Lasoye, and on the 2nd February he sent in a special report on the subject, in which he stated as follows:—

"Reports of the increase of yaws in my district, especially at Lasoye, reach me "from time to time; but on inquiry by the police, only a few cases are found. I have "explained in previous reports that the police are not able to find this class of patients "who are generally kept in hiding by their relatives. I would suggest that a special "constable, one who knows the quarter and its inhabitants thoroughly, be appointed for "three months to look up these people, and send them to the hospital. Another "difficulty is the getting of them when caught to Roseau. The boats at Vielle Case "and the Lasoye boat will not take them, alleging as an excuse their fear of contagion "of the disease. It would be too risky to send them to Roseau in canoes. The special "constable would or should be charged with their transportation to the yaws hospital, "and he, living in the quarter, and knowing the opportunities for town by sailing boats "boats or otherwise, would be able to ship them with greater facility. Cases occurring "along the Leeward Coast are easily sent to the hospital.

"Number of cases of yaws treated in District B., 1885, 5; 1886, 25; 1887, 17. "Total, 47."

It is seen from this report that Dr. Bornn had attended 47 cases of the disease as dispensary patients; and this, I believe, was the first time that any attempt was made to systematically treat the yaws patients in this manner. Unfortunately, however, the district medical appointments had been purposely kept vacant so as to save the expenditure on the salaries of medical officers, and a large extent of the island was, therefore, without even an occasional visit of a medical man.

On the 6th February, 1889, in reply to a minute of the President, the Medical Superintendent wrote to him, as follows: "My advice with regard to the question is that the "Government should fill up the vacant medical appointments without delay, and then "instruct the district medical officers to direct particular attention to the treatment of "persons suffering from yaws in their districts, the worst cases being sent as now to the "yaws hospital. In Tobago, where the disease has recently become epidemic, much good "has been effected by the compulsory attendance of persons suffering from yaws at the "district dispensaries, where the medical officers supply them gratuitously with medical "advice and medicines.

. . . "Unless the yaws administration be placed on its old costly footing with large

" hospital accommodation, and yaws constables be stationed in various parts of the island, " it is hopeless to expect to do very much."

On the 21st September, 1889, Governor Haynes Smith gave orders that all prisoners " being sent to the gaol and who may be suffering from yaws " should be transferred at once to the yaws hospital. Until then a special ward had been set apart for prisoners suffering from yaws, as was done in Jamaica and other West Indian Colonies during the time of slavery. The following table shows the number of prisoners found suffering from the disease in the Dominica Gaol during every year from 1874 to 1891. The table is of interest, as it indicates to a certain extent the prevalence of the disease amongst the people generally, and the epidemic wave is noticeable as extending from the year 1876 to 1881.

During the year	1874	of 294	prisoners,	6,	or 2·04	per cent.,	were	affected	with yaws.
„	„	1875	„ 292	„	1 „	0·34	„	„	„ „
„	„	1876	„ 454	„	10 „	2·20	„	„	„ „
„	„	1877	„ 477	„	15 „	3·14	„	„	„ „
„	„	1878	„ 397	„	16 „	4·03	„	„	„ „
„	„	1879	„ 323	„	21 „	6·50	„	„	„ „
„	„	1880	„ 271	„	17 „	6·27	„	„	„ „
„	„	1881	„ 192	„	19 „	9·90	„	„	„ „
„	„	1882	„ 229	„	5 „	2·18	„	„	„ „
„	„	1883	„ 239	„	5 „	2·09	„	„	„ „
„	„	1884	„ 335	„	3 „	0·90	„	„	„ „
„	„	1885	„ 239	„	4 „	1·67	„	„	„ „
„	„	1886	„ 235	„	4 „	1·70	„	„	„ „
„	„	1887	„ 225	„	3 „	1·33	„	„	„ „
„	„	1888	„ 315	„	8 „	2·54	„	„	„ „
„	„	1889	„ 475	„	3 „	0·63	„	„	„ „
„	„	1890	„ 571	„	3 „	0·53	„	„	„ „
„	„	1891	„ 494	„	9 „	1·82	„	„	„ „

During the 18 years, out of a total of 6,057 prisoners, 152, or 2·50 per cent, were affected with yaws

Early in 1890 Mr. J. Numa Rat, who had recently been appointed medical officer of the Windward district, sent in his report for the quarter ended 31 December, 1889. This report, which may well be taken as a model by district medical officers throughout the West Indies, gives some details of the successful efforts made by Mr. Numa Rat to place the yaws cases in his district under proper medical treatment. Whatever the difficulties were he overcame them; and the beneficial results he achieved show how much can be done by energetic district medical officers, not only to break down the deeply-rooted prejudices against the treatment of yaws by medical men, but also to keep in check the ravages of the disease. During the year he attended 50 cases of yaws, and the following interesting extracts from his report show the attention he paid to the study of the disease :—

" The physique of the people must have been originally excellent, but their consti-
" tutions have been weakened by the use of a diet consisting almost exclusively of fibrous
" and indigestible roots and by the effects of the disease called yaws, which is endemic
" in the place, and from which, with scarcely an exception, all the inhabitants have
" suffered at some period of their lives. Meat is scarcely ever eaten by them, a little
" salted fish being the only occasional addition to their vegetable food. . . . The
" most serious of the diseases under notice, during the quarter, was yaws. The affection
" is too well-known to need description; and the nature and treatment of any complaint
" are not fit subjects for a general report of this kind. Attention may, however, be drawn
" here to that most serious effect of the yaws poison, viz.: the ulceration of the throat and
" nose, which is one of the later manifestations of the disease, and which is particularly
" common on the Windward Coast. Cases of this nature can only be cured by such con-
" stant and skilled attendance as can only be obtained in a well-appointed hospital; and
" it is desirable that arrangements should be made for ensuring their admission into the
" infirmary at the capital, in preference to less urgent affections. Another subject which
" requires reference in connection with this disease is that of isolation. The present
" system of segregation at a central hospital for the whole island has not been successful

" in eradicating the complaint; and there remains to be tried that of isolation in district " hospitals either alone or concurrently with the central institution."

In his report for the March quarter, 1890, he showed that he had attended 21 cases in January, 18 in February, and 31 in March; that is a total of 70 for the quarter, and 120 cases for the half-year. He continued this excellent work up to the time he was directed by your Lordship to carry on the duties of my local office whilst I was engaged on the work of the Yaws Commission, and when I afterwards went through the Windward district of Dominica I found ample evidence of the excellent work he had accomplished in so short a time.

The following table shows the results of the work of the new Morne Bruce Hospital from the day of its opening on the 26th February, 1882, to the end of 1891; that is, for a period of about 10 years.

Years.	Admissions.	Births in Hospital.	Discharges.	Deaths.	Death-rate per Thousand.	Number of Patients that absconded.
1882 - - - -	123	–	84	2	16·3	1
1883 - - - -	102	–	85	4	39·2	1
1884 - - - -	40	–	51	2	50·0	–
1885 - - - -	85	–	51	–	—	4
1886 - - - -	56	–	88	1	17·9	1
1887 - - - -	92	–	69	2	21·7	–
1888 - - - -	99	–	99	1	10·1	1
1889 - - - -	99	1	86	1	10·0	–
1890 - - - -	57	1	81	6	103·4	–
1891 - - - -	128	1	36	–	—	6
Totals - - -	881	3	830	19	21·5	14

The number of admissions varied considerably year by year, but the figures are not in any way indicative of the prevalence of the disease, they are simply an index of the amount of money that was spent each year on the hospital.

The mortality, too, varied very much in the different years. In 1885 and 1891 there were no deaths, and in 1884 the mortality rate was 50· per thousand, and in 1890 it had risen to 103·4, which is much higher than the death-rate of any other yaws hospital in the West Indies, and 17·2 *per centum* above the death-rate of the Central Hospital during the year that the epidemic of whooping-cough attacked the younger inmates. This high mortality cannot be ascribed to the unhealthiness of the site, inasmuch as the hospital is situated on a fine plateau over 400 feet above the sea and away from all malarial influences. It was due to the prevalence of epidemic diarrhœa that also attacked the inmates of the Poor House, which is contiguous to the Yaws Hospital, and caused very many deaths there. In the year 1889 the deaths at the Poor House were only 28, and in 1890 they had increased to 64, bowel complaints being responsible for a large proportion of the deaths.

The efforts made by the authorities at various times to rid the island of the disease, or at all events to stay its ravages, may be conveniently summarised under the periods during which the efforts were in progress.

The first attempt to eradicate the malady was made by the Board of Health when the disease took an epidemic form in 1870. During this period, which extended from 1871 to 1873, two hospitals existed, one at Morne Bruce, and the other at Prince Rupert's; and, altogether, about 633 yaws patients were under medical attendance. Besides this number many cases were treated by old women and amateur planter-doctors, who received payment from the Board of Health at the rate of a dollar " a cure," the cures being certified by unqualified persons.

No estimate of the expenditure of the public funds on the yaws hospitals, &c., during this period can be obtained, for the Treasurer of Dominica informs me that he can afford " no information concerning the years previous to 1872." But considerable sums were spent; and, as the finances of the island could not bear the strain, the system was suddenly abandoned, and there was thus a complete failure to " stamp out " the disease.

From the end of the year 1872 until the beginning of 1876, a small yaws hospital was attached to the poor-house, and it was under the direction of the Poor Law guardians. It has been already explained that no statistics of the admissions into the hospital during

this time can be obtained, but Mr. W. H. Porter, the Treasurer of Dominica, informs me that 302 *l.* 7 *s.* 5 *d.*, or a little over 100 *l.* a year, has been calculated as the sum expended during the years 1873, 1874, and 1875 on the yaws patients by the guardians.

In 1876, a second attempt to control the spread of the disease was necessitated by its having again appeared in all the districts of the island in an epidemic wave which created much alarm in the public mind. This time the Government took direct control of the measures adopted. A Yaws Suppression Act was passed by the Legislature, and it was proposed to establish special hospitals in the medical districts into which the island had been divided by the Medical Aid Act. Eventually, however, only two hospitals were opened at the old sites at Morne Bruce and Prince Rupert's. This second attempt failed signally. The Prince Rupert's Hospital was terribly neglected; 133 patients were admitted; but, after a time, there was a mutiny amongst them, and many ran away to various parts of the island, thereby increasing the spread of the disease. The Morne Bruce Hospital was also in a very unsatisfactory condition, and no one can tell how many patients were treated in it. This disastrous period lasted, fortunately, less than a year, namely, from June, 1876, to April, 1877.

The actual expenditure during this time cannot be ascertained, as the accounts were carried on to the third period; but, including the costs of the repairs of the old military buildings, and the sum of nearly 300 *l.* paid to the medical officer of the poor-house, and to the Poor Law guardians for the food, &c., supplied to the patients at the Morne Bruce Hospital, it was probably about 1,500 *l.* During this period, too, accurate statistics of the number of patients treated in the two hospitals are unobtainable inasmuch as there is no record of the work done at the institution at Morne Bruce. At the Prince Rupert's Hospital, as it has already been shown, there were 133 patients admitted, and three births. It may, therefore, be estimated that about 200 cases were treated in the two hospitals during the period, and this would bring the cost per head to 7 *l.* 10 *s.*

Then came the third period, or what has been called the "Yaws Administration," extending from the 21st April, 1877, to the 26th January, 1882, that is, nearly five years. Another Yaws Act was passed by the Legislature, and a medical superintendent having entire control of affairs was appointed. After a time the Morne Bruce and Prince Rupert's Hospitals were closed, and a Central hospital was opened, in which altogether 1,647 patients were treated.

The history of this period shows that it was the only real attempt made to eradicate the disease from the island, and the administration, although costly, was perfectly successful as far as it went. Whole districts of the island were absolutely freed of the disease, and just as the remaining infected part was being cleared of the cases of yaws, the system was abandoned. In whatever way the decision of the Government of that time may be looked at, there cannot be seen anything to justify it. Reasons of economy of public expenditure were given, but even a superficial consideration of the matter would have shown that the saving effected by the alteration of the system could not but inevitably entail an annual expenditure on a permanent yaws hospital. The statistics, too, show that the patients cost less per head at this time than they did during any other period. To abandon, then, on the eve of success, the results that had been got only by the sacrifice of large sums of the public money was, in the circumstances, a line of policy that subsequent events have proved to be unwise in the extreme.

During the second and third periods, extending from the beginning of the year 1876, to the 26th January, 1882, that is about six years, the total expenditure was 10,134 *l.* 10 *s.* 10½ *d.*, and in this is included the sum of 1,428 *l.* 15 *s.* 3½ *d.*, the cost of buildings, all of which were afterwards abandoned as hospitals. The total number of patients under treatment during the third period is shown in the following table:—

Number of patients admitted to the Prince Rupert's Hospital - -	293
" " " Morne Bruce Hospital - -	83
" " " Central Hospital - - -	1,647
	2,023

Deducting the sum of 1,500 *l.*, which has been estimated as the expenditure during the second period, from 10,134 *l.* 10 *s.* 10½ *d.*, the total expenditure for the second and third periods, there is left a balance of 8,634 *l.* 10 *s.* 10½ *d*, which represents the cost of combating the disease during the third period. Calculations based on this sum show that 4 *l.* 5 *s.* 4 *d.** was spent on each patient that received hospital treatment, which is nearly 12 *s.* less than the cost per head in the St. Lucia yaws hospitals.

* If, however, the sum of 1,428 *l.* 15 *s.* 3½ *d.*—the expenditure on the buildings—be deducted, the cost of the treatment of each patient was only 3 *l.* 11 *s.* 2 *d.*

The fourth period has extended from January, 1882, to the present date. During this time, as has been already explained, no attempt could be made to rid the island of yaws, or even to effectually control its spread, for the hospital accommodation is small, and the medical officer has no adequate means at his disposal for ascertaining particulars concerning the progress of the disease in the country districts, and with the exception of the recent praiseworthy efforts of Mr. Numa Rat, no systematic attempts have been made to treat the cases according to the Tobago system.

During the 10 years 881 patients have been under treatment in the Morne Bruce Hospital, and the total sum expended, according to the figures furnished to me by the Treasurer, has been 4,427*l.* 12*s.* 0½*d.* This sum, however, includes the cost of medicines to the year 1883 only, a separate vote having been taken for the "medical stores" for all the charitable institutions, the police and the gaol since that time. The figures, however, show that the cost of each patient has been 5*l.* 0*s.* 6*d.*, or 15*s.* 2*d.* more a head than was the case at the Central Hospital.* This increased expenditure is due in a great measure to the inadequate water supply, for as the patients are unable to obtain daily baths, their cure is retarded, and they therefore remain longer under treatment. Practically the Morne Bruce Hospital is now of necessity a permanent institution, and it must be carried on as long as there is a continuation of the West Indian policy of making the general government responsible for the upkeep of hospitals, poor houses, and for the medical attendance on the labouring population. Paupers crippled by yaws must be taken care of; and, for the public safety, they must also be put into special hospitals. But, unless other measures be adopted, it can never be hoped by the present system in force to eradicate yaws from the island. The tenacious hold that the disease has obtained on the peasantry of Dominica is shown by the fact that since the year 1875 no less than 3,104 persons have been under treatment in the yaws hospitals, and calculations from these figures, based on the recent census returns, show that 11·6 *per centum* of the population have passed through the yaws hospitals. The cost to the island finances of the various efforts since 1875 for controlling the spread of the disease amounts to 14,562*l.* 2*s.* 11*d.*, which gives an average annual expenditure for the 16 years of a little over 910*l.* Of this sum, however, about 1,500*l.* has been expended on hospitals that have been abandoned, and 718*l.* 3*s.* 5*d.* is set down in the table furnished to me by the Treasurer for interest on money borrowed to erect these same buildings.

It must be remembered, too, that over 10,000*l.* was expended on the special efforts made between the years 1876 and 1882 to eradicate the disease from the island; and although the epidemic of yaws was subdued, the system adopted was hurriedly abandoned just as the ultimate object for which the heavy expenditure incurred was in view.

I have written at length on the yaws affairs in Dominica for the reason that they have been misunderstood by most persons; and, although I have been the medical superintendent since that office has been created, I did not thoroughly understand much of the government policy until, as Special Yaws Commissioner, I had access to documents that were withheld from me at the time, and which had been put away and forgotten. Inquiries have been made by governments of other West Indian colonies as to the system adopted, and its results in Dominica. And, in every instance, despatches have been written that, from the ignorance of the writers of all the facts here detailed, have been incorrect in statement, wrong in inference, and, therefore, calculated to mislead instead of to instruct.

The history of the yaws affairs in Dominica is an important chapter on state medicine. It is full of suggestive inferences, and it serves to show that, in dealing with such questions as the spread of contagious diseases, ill-considered economy in the present means disappointment and continued expenditure in the future.

I arrived in Dominca from Antigua on the 18th December, 1891, and a considerable time was occupied in searching for documents concerning the history of the disease in the island, and in carefully examining these documents when they where discovered. Afterwards, I visited the various districts in the island in order to make myself acquainted with the present condition of Dominica, as regards the spread of the disease. Having completed this inquiry, I went to reside at St. Aroment, to write the report and to pursue further investigations in regard to the pathology of the disease. I was compelled to leave the town of Roseau, for having practised in it for a number of years, my old patients were unwilling to believe that it was impossible for me to devote some time to ordinary

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* As, however, there was no expenditure for the erection of buildings at Morne Bruce, a more correct comparison would be to take 3*l.* 11*s.* 2*d.* as the cost per head of the patients at the Central Hospital, and these figures would show that under the present less efficient system the expenditure is 1*l.* 9*s.* 4*d.* more for each patient than it was at the Central Hospital.

professional work, and the constant interruptions so interfered with my special work, that I had to leave the town.

On the 9th January, 1892, I visited the yaws hospital with Mr. Numa Rat, the acting medical officer of the public institutions. This hospital has already been described. It has accommodation for 50 patients, but there were only 20 inmates at the time of my visit, namely: 8 males and 12 females. But, of these, 5 of the males, and the same number of the females, were children. On the 23rd January, when I visited the hospital a second time, the number of inmates had been increased to 32, and at my third visit on the 26th January, the numbers were the same. An old man died in the hospital on the 11th March, and by the kind courtesy of the medical officer I was enabled to make a post-mortem examination of this case, and to obtain the necessary material for pathological investigation. At this time the number of inmates had been increased to 56—*i.e.*, 30 males and 26 females.

During the month of January, Mr. Numa Rat, who had obtained some Koch's tuberculin, was kind enough to ask me to engage with him in the investigation of its action upon yaws patients, as it was thought that it might possibly have an important curative effect. Several of the patients were injected by Mr. Numa Rat and myself, every precaution being taken to follow the details of Koch's method of injection. In every instance there was no reaction, although on the second occasion strong injections were used.

On the 11th January, I visited Pointe Michel with Mr. Numa Rat, who was acting as the district medical officer during the absence from the island of Mr. W. R. Williams. The Rev. Father Lelievre informed us that there were very few cases of yaws in the district, and that we would not be able to see any, inasmuch as the people hid those affected with the disease. Miss Steber, a resident at Pointe Michel, also told us that there were some hidden cases about the place. Later on Mr. William Compton, the proprietor of the Malgrétout Estate, who employs labourers from the village of Pointe Michel, imformed me that before the yaws hospitals were opened, the disease was very prevalent all over the district, but that now there were very few cases.

On the 12th January, I visited the village of Soufrière, for the purpose of riding through the windward district with Dr. Kirkpatrick, the acting medical officer. We stayed at Soufrière until the next day, but were unable to hear of any case of the disease, and the police constable stationed in the village made a search for yaws patients, but without success.

When I returned to Roseau, Mr. George F. James, the inspector of police, was good enough to send out special constables to search the district extending from Pointe Michel to Soufrière for cases of yaws, and by these means 14 persons affected with the disease were discovered.

On the 13th January Dr. Kirkpatrick and I visited Grand Bay, and we found that the disease was prevalent in the district. We saw and examined ten cases that had been collected by the rural constable. Between Grand Bay and La Roche the country is sparsely populated, and although we saw no yaws there, doubtless there are cases hidden away. At La Roche we saw three cases on the 15th January.

At Pointe Mulatre, I saw, with Mr. Moulon, the manager of the estate, an old black woman named Veuve Julienne Isidore, a celebrated yaws doctress of the district. She is at least 70 years of age, and she has been engaged for many years in treating the disease. She told me that she had cured "a good many more than 50" persons. It appeared that I had been fortunate enough some years ago to perform a successful operation at the Roseau Infirmary on her only daughter. She brought her daughter to me to express her gratitude for her restored health; and, in earnest of the gratitude the old woman felt, she undertook to give me exact details of her method of curing yaws patients, so as to make me, as she said, "as good a yaws doctor as she was herself." These bush doctors, as a rule, guard the secrecy of their remedies with great care, and I was very glad to get at last a reliable and complete account of the native yaws remedies employed in Dominica. The old woman brought me flowering specimens of all the native plants used in the decoctions, and they were invaluable for the sake of determining their botanical names. The following is the account written out in my note book at the time:—

"She begins with 'the cold tisane,' made in the following manner: three small pieces "(three inches long) of the root of 'Bois Touloulou;'* three of the root of 'Fleuri Noel;'† "three of the root of 'Guéri Vite;'‡ a handful of rice, and three pieces of Guaiac wood, "one inch square, are allowed to soak for 12 hours in half a gallon of water. This tisane

* *Gonzalia spicata, D.C.* † *Palicourea crocea, D.C.* ‡ *Eupatorium odoratum, L.*

"is drank *ad libitum*. All the tisane being consumed, fresh water is poured on the "ingredients to make a second and weaker cold decoction, and this may be drank for 18 "days, when the tisane must be made afresh. This treatment is continued for 40 days, "or until all the yaws have come out.

"Afterwards, the patients are given 'the gros tisane,' which is composed of the "following ingredients:—

"Three pieces of the stem of the 'Seguin,'* of about an inch square each. Three "pieces of the bark of the 'Seaside grape †," four inches by one inch. Three similar "pieces of the bark of the 'Olivier.'‡ Three pieces of the bark of the 'Poirier.'§ Three "pieces of the root of the 'Racine Paque.'‖ Three pieces of the root of the 'Shak-shak.'¶ "Three pieces of Guaiac wood, about one inch square [and if the disease be hard to cure, "there are also added three pieces each of sassafras and sarsaparilla]. The sassafras "and guaiac are bought at the apothecaries' shops, and for sarsaparilla the roots of the "'dagger bush'** are used.

"All these substances are put into four quarts of water, which are boiled down to two "quarts. The tisane is allowed to settle and it is then decanted off. A tablespoonful of "it is given three times a day. The dregs are boiled in a gallon of water, and the weaker "tisane made in this way is given to the patients *ad libitum*. This treatment is continued "also for 40 days or until the yaws are dry. Then purgatives—in the form of salts or "jalap—are given occasionally for two or three weeks, so as to see whether the disease "is cured. If the yaws break out again, the 'gros tisane' is resumed. 'If salt food, or fat "food, or potatoes are taken, the disease will return.'

"Whilst taking the cold tisane, the patients can eat anything, but whilst drinking "the 'gros tisane,' the diet must be bread without salt, fresh meat, bananas or plantains "roasted dry, and fresh fish.

"After the course of the gros tisane is completed, mercury is administered. Six "penny-worth of mercury (10 (?) grains of corrosive sublimate) is put into a bottle of "rum and allowed to remain for 36 hours, when a tablespoonful is given three times a "day for a week, or until salivation is set up. Whilst taking the mercury, the patients "are to drink a simple guaiac tisane, made by soaking three small pieces of the wood in a "gallon of water. When the patients are salivated, gum guaiac is given, 1½*d*. worth (80 "grains) is soaked in rum, and put in the sunlight for three days. Of this a tablespoonful "is given three times a day.

"The old woman acknowledged to me that many cases are not thoroughly cured "under her treatment, but she explained the failure by saying that such persons have eaten "'*saloperie*' during the time of treatment. She further said that indiscretions in diet "during treatment, invariably caused 'crab' yaws. She said also that 'gratelles,' or "'pian caraïb' is the most difficult kind of yaws to cure, and that 'gros pian' is the "easiest. 'Gros pian' is the ordinary encrusted tubercle."

At Boetica, on the 16th January, Mr. Adolphe Severin informed me that there were no yaws cases at the place, and Mr. Meulon, who also made inquiries, could not find any. This was extremely satisfactory, as Boetica had formerly been a hot-bed of the disease.

On the same day we visited Laplaine, and were informed by the Rev. Father Couturier and Mr. Veloss that there were a good many cases of the disease in the district. After some trouble Mr. Veloss succeeded in collecting four cases for me to examine, and he said that the people hid those suffering from yaws, as they objected to their friends being taken to town to the hospital.

At Rosalie, on the 17th January, two cases came to Dr. Kirkpatrick's dispensary. He had been attending them for three months, and had prescribed iron and arsenic. Next day the medical officer and I visited most of the houses in the village, and we found seven cases. At Grand Fond, a village several miles inland, there had been several cases, but they had been taken to the hospital a short time before my visit.

On the 17th January I had to return to town, having completed my investigations concerning the prevalence of the disease in the southern third of the island. I went back to Rosalie on the 30th, with the object of travelling round the northern two-thirds, and did not return to Roseau until the 11th February. Dominica is a very large island, and as it is sparsely populated, and the roads are only for the most part bridle paths, travelling in the remote districts is difficult, tedious, and expensive.

Dr. Cooke, the medical officer of the Lasoye District, was ill and unable to accompany me, but Dr. Kirkpatrick, who had some time before investigated the spread of the

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* *Anthurium macrophyllum*, Endl. † *Coccoloba uvifera*, Jacq. ‡ *Bucida Buceras*, *L.* § *Tecoma Leucoxylon*, Mart. ‖ *Entada polystachya*, *D.C.* ¶ *Crotalaria stipularis*, Desr. ** *Furcræa cubensis*, Haw.

disease in the Castle Bruce District, was good enough, with the sanction of the Commissioner, to ride on with me to Lasoye, where he left me, on the 4th February. In a letter addressed to me on the 14th January, Dr. Cooke said: "I am afraid the information I "can give you will be slight, as all the yaws patients have studiously avoided me since I "came here. I have only seen two cases."

At Lasoye, Mr. Alexander Robinson, who has been performing for some time the the duties of resident Government officer, was able to render me much help Mr. Robinson is a gentleman of high intelligence, and he is endowed with much energy, and his local knowledge, which is probably unique, was willingly placed at my disposal. As I have already had occasion to show, he made the sagacious proposal to the Board of Health, in 1871, that there should be a compulsory notification of the disease in every district of the island.

At Rosalie, on the 31st January, I rode with Mr. W. H. Johnson to Morne Docteur, a flat-topped hill, the summit of which is about 100 feet above the sea level, to the south of the mouth of the Rosalie River. In the old slavery days there was a doctor's residence on this hill, and hence the name. The place is isolated, as the village of Rosalie, and the estates' houses and works are on the north side of the river, and the public road is to the west of the hill. To the north of this hill is a fine non-frequented sandy bay, where good sea bathing could be got, as the surf breaks far out. A small stream of pure water runs into this bay at the foot of Morne Docteur. In the event of a yaws hospital being established in the district, this is perhaps the most eligible site, and Mr. Johnson, the proprietor of the estate, would have no objection to a yaws hospital in this secluded spot. Rosalie is one of the healthiest places in the island, and the fresh sea breezes passing over Morne Docteur would have an excellent tonic effect.

At Castle Bruce, on the 2nd February, I saw 13 cases of the disease that had been collected by the police constables. who informed me that there were no other persons suffering from the disease in the district.

At Salibia, on the 3rd February, I saw one case and heard of another amongst the Caribs. These aboriginal inhabitants of Dominica live in a district of the island reserved to them by the Government, and Salibia is their principal village. There are about 300 of them altogether, and the chief man of the place informed me that the pure Caribs hardly ever got yaws.

On the 4th February, at Melville Hall, a number of cases were collected by the police, and as there was no suitable room to see them in, I examined them under some trees, by the side of the river, and took notes of all of them. Several gentlemen came to watch the proceedings, but the loathsome and hideous appearance of some of the poor people, soon left me free from spectators. The resident police officer, a most intelligent black man, alone remaining to help me. In this manner I was able to obtain valuable notes of 31 cases of yaws.

On the same day, at Wesley, I examined 10 cases at the police station, and I heard that there were three or four more that had hidden themselves.

On the 5th February, at Calalishie, I saw one case, and obtained information of three other persons who had secreted themselves.

On the 8th February, at Blenheim and Thibaud, I saw four cases, and an old man at the latter place gave me the following particulars of the native treatment of yaws by the people of the district: "Five split pieces of coco-nut* root, about about five inches long "and the size of a quill, are put into two quarts of water, which is boiled down to one "quart, and a wineglassful of this tisane is given three times a day for three weeks, or "until the yaws begin to 'dry up.' Then a tisane made of gum guaiac, roots of the "dagger bush, vervain,† shak-shak and racine Pâque, is given for six weeks, and after-"wards the patient is put through a course of corrosive sublimate."

At Thibaud, Mr. Robinson informed me that the people suffering from yaws bathe and wash their clothes, &c., in the stream above the ford, and above the place, moreover, where water is taken by the people for drinking.

At Vielle Case, on the 8th February, I saw and examined four cases of the disease; but there were, from what I learnt, other cases hidden away at the north end of the island.

On the 8th February, I reached the town of Prince Ruperts, and although the authorities of the place were duly informed of my visit, nothing appears to have been done to further the object of my mission. Next day, however, I examined six cases that had been collected by the police, but I was satisfied that there were many more affected persons in the district.

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* *Cocos nucifera*, L. † *Stachytarpha jamaicensis*, V.

On the 9th February I saw three cases at Mount Allen, six at Dublane, and three at Colihaut. And the next day I saw nine cases at Bataly, two at the Grand Savannah, three at Barroui, one at Mero, and nine at St. Joseph.

On the 11th of February I saw two cases at Hillsborough, and then rode on to Roseau, as there was no time to hunt up cases in the neighbourhood of town. Subsequently, Mr. James, the Inspector of Police, was good enough to have the district scoured for me, with the result that only 19 cases were discovered.

This inquiry resulted in my seeing 132 cases of the disease, and obtaining information concerning 43 other cases, making altogether, inclusive of those in the Yaws Hospital, 175 known cases in the island. By adding 75 to these figures as the probable number of secreted cases, one gets 250 cases, which may be put down as the approximate number of persons suffering from yaws at large in Dominica. This is, of course, only a rough estimate, but it is as accurate as the circumstance would permit me to make.

In 1871, the number of cases of yaws in the island was estimated at about 800. In 1876, it was considered to be over 1,000, so that the estimated number of persons at present suffering from the disease shows a marked diminution in the prevalence of yaws. But when the Central Hospital was closed in 1882, there were probably not 100 cases throughout the island, exclusive of the patients in the Yaws Hospital, so that the disease is again spreading in the country, and but for the continued work done at the Morne Bruce Hospital, yaws would doubtless have become as prevalent by now as it was in 1871.

I took notes of all the cases I examined in the various districts of the island, and in this way was able to accumulate some most interesting facts in regard to the attributes of the disease, its contagiousness, and its treatment by the natives of Dominica. These facts will doubtless be considered of peculiar interest by the medical profession, as they show the exact nature of the manifestations of the disease in the patients that fill the wards of the yaws hospitals. For this reason, although my notes will occupy some space, I have considered it advisable to reproduce them in this report. The cases are numbered consecutively according to the order in which I saw and examined the patients. The terms "tubercle," "gratelle," "dartres," &c., have been employed in describing the disease, as they are in common use in Dominica.

Notes on Cases of Yaws seen and examined in Dominica.

Case 1.—*T. I.*, M. B.,* 15, Grand Bay. Has had the disease two years. He has been under native treatment, and is now taking a mixture bought from a druggist in Roseau. The bottle is labelled "The mercurial mixture, a dessertspoonful twice a day." He has been taking the mixture for five weeks, and before that had "gros tisane." He has an ulcer on the left leg.

Case 2.—*O. I.*, M. B., 7, Grand Bay. Brother of Case 1. Had yaws three years. Mother treated him with "gros tisane" made of sarsaparilla, guaiac, olivier root, seguin, and "racine branda." He has tubercular ulceration of left leg, and dartres on body and limbs.

Case 3.—*N. T.*, M. B., 9, Stowe. Three years ill. Treated with "gros tisane" and mercury. He was cured in a year by this treatment, and six months afterwards the disease returned. He has encrusted tubercles on body and limbs.

Case 4.—*J. D.*, M. B., 6, Geneva. Ill three years and six months. He has been under native treatment several times, and "he cannot be cured." "He drank arsenic "for a long time." His grandmother treated him. He has encrusted tubercles at left angle of mouth, and tubboes in both soles of feet.

Case 5.—*W. J. B.*, M. B., 8, Dubuc. He has yaws tubercles, and dirty indolent ulcers on limbs. He has also anæmia and is cachectic. Mr. Numa Rat treated him at one time, and a druggist in Roseau has been giving him "mercury pills."† He has been taking tisanes "all the time."

Case 6.—*M. A.*, M. B., 5, Dubuc. Two years ill. A druggist gave him mercury (corrosive sublimate) and "white powder" a year ago. He now has gratelles and an ulcer on the left leg.

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* Explanation of abbreviations.—M., male; F., female; B., black or negro; C., coloured or mulatto.

† Plummer's pills, five grains each.

Case 7.—*R. T.*, F. B., 8, Dubuc. Three years ill. No treatment. Tubboe in sole of right foot.

Case 8.—*S. T.*, F. B., 23, Dubuc. Sister of Case 7. Four years ill. No treatment. She got better, and after some time the disease recurred.

Case 9.—*B. D.*, M. B., 3, Dubuc. Son of Case 8. Nine months ill. Mother says that the child caught the disease from her. No treatment. Encrusted tubercles on body, limbs, and face. Dartres on body and limbs.

Case 10.—*S. T.*, M. B., 14. Brother of Case 8. He had the disease seven years ago, and he was cured by mercury. The disease broke out again last July, *i.e.*, over aix months ago. He has encrusted tubercles on forehead, and an ulcer on the dorsum of the right foot.

Case 11.—*F. E*, M. B., 10, Belvidere. Eight months ill. His mother gave him sassafras, sarsaparilla, guaiac, and olivier roots. He has drying tubercles about the mouth and left wrist, and gratelles on elbows.

Case 12.—*F. D.*, M. B., 11, Belvidere. Ten months ill. Same treatment as Case 11. Encrusted tubercles round mouth and on both feet.

Case 13.—*M. E.*,, F. B., 6, Belvidere. Sister of Case 11, and caught the disease from him. Same treatment by their mother, L. F.

Case 14.—*E. B.*, M. B., 1½ years., Laplaine. Two months ill. Has been taking "guaiac in water." The child had encrusted tubercles about the lips, on cheek, on chin, and both legs.

Case 15.—*L. B.*, M. C., 5, Laplaine. Half-brother of Case 14. Three years ill. "Crab yaws" on soles of both feet.

Case 16.—*J. St.-J.*, F. B., 3, Laplaine. Two months ill. Encrusted tubercles about mouth, and on abdomen and perineum Gratelles on body and limbs.

Case 17.—*A. V.*, M. C., 4, Laplaine. Six months ill. A general eruption of small encrusted tubercles. Dartres and gratelles on body and limbs.

Case 18.—*F. J.*, M. B., 14, Riviere Cyrique. Three years ill. He got better, and had a relapse. He has now ulcers of both feet. He is under the care of Dr. Kirkpatrick.

Case 19.—*N. J.*, M. B., 8, Riviere Cyrique. Brother of Case 18. Eighteen months ill. Encrusted tubercles about month. Dartres about limbs. He is now under the care of Dr. Kirkpatrick.

Case 20.—*H. L.*, M. C., 7, Rosalie. Five months ill. Encrusted tubercles around mouth and on legs.

Case 21.—*W. N.*, F. B., 6, Rosalie. Tubboe of left foot. Dartres on body and limbs.

Case 22.—*S N.*, M. B., 5, Rosalie. Tubboes, both feet. Dartres. Maculæ on limbs. Enlarged femoral glands.

Case 23.—*O. R. B.*, M. B., 9, Rosalie. Tubboes, both feet. Dartres on body and limbs.

Case 24.—*Y. T.*, M. B., 8, Rosalie. Eighteen months ill. Tubboes and crabs in both feet. Dartres and gratelles on legs and arms.

Case 25.—*A. P.*, M. B., 5, Rosalie. Gratelles on legs and arms; about knees and elbows.

Case 26.—*R. A. J.*, F. B., 18, Morne Jaune. She had the yaws when she was a child; she was treated by an old woman and cured. But the disease has recurred several times since then. She has now encrusted tubercles on the nose and upper lip, and tubercular ulceration on right foot; there are old cicatrices on the same foot, the site of former ulcers. The duration of the present attack is about two years.

Case 27.—*I. H.*, F. B., 9, Senhouse. Five months ill. Encrusted tubercles on third toe of left foot. She caught the disease from an elder sister, who was cured by Mr. Numa Rat.

Case 28.—*C. H.*, M. B., 7, Senhouse. Brother of Case 27. One month ill. Said to have caught the disease from sister (*Case* 27). Small encrusted tubercles on face.

Case 29.—*T. G.*, F. B., 9, Castle Bruce. Three months ill. Encrusted tubercle in anal fissure. One at back of left knee. Dartres on both legs.

Case 30.—*S. L.*, F. B., 5, Castle Bruce. Sister of Case 29. Encrusted tubercles at angles of mouth. Small clean ulcer (the site of a yaw) on right calf of leg.

Case 31.—*S. B.*, F. B., 6, Castle Bruce. Had yaws several years ago, and now has the "yaws cold." She is cachetic, and has ulceration of legs and arms, with enlarged bones and joints; indeed, she is the subject of tuberculosis.

Case 32.—*V. D.*, F. B., 2½, Castle Bruce. Ill four weeks. Sister of Case 31. "Mother yaw" on right great toe, and small encrusted tubercle on body, face, and limbs. Toe evidently had onychia, and the ulceration extended all round the ball. The ulcer is now clean, and the granulations are healthy, except where a fragment of the nail is left. She caught the disease, it is said, from her sister, Case 31.

Case 33.—*A. R.*, M. B., 10, Castle Bruce. Fourteen months ill. Crabs on soles of both feet. No yaws. He is said never to have had yaws.

Case 34.—*W. St. R.*, M. B., 7, Castle Bruce. He had yaws "a long time ago," and his mother gave him "remedies" and cured him. The remedies were the tisanes and calomel. After he got well, he ate "nancy,"* and the yaws came back on him. He has now tubboes on both feet, and gratelles on knees and elbows. The duration of the present attack is one year.

Case 35.—*D. St. R.*, M. B., 12, Castle Bruce. Brother of Case 34. He had the yaws before with his brother, and was cured with the same remedies. But he also ate "nancy," and the yaws came back. He now has tubboes in both feet, and gratelles on knees and elbows, and has also been ill for a year.

Case 36.—*C. S.*, F. B., 8, Castle Bruce. Encrusted tubercles and maculæ on face, legs, and arms. The tubercles are withering.

Case 37.—*H. F.*, M. B., 6, Senhouse. Ill one year. Cachectic and anæmic and anasarcous. Hands and arms on dorsal surface a mass of ulceration with thick yaws crusts. The back of the right thigh is also in a similar condition.

Case 38.—*E. L.*, M. B., 8, Senhouse. One year ill. Has dartres on arms, and gratelles on knees and elbows.

Case 39.—*C. F.*, F. B., 23, Castle Bruce. Two years ill. She had yaws, and now has "dry tubboes" for the yaws have "gone inside." The soles of the feet are in the condition described by the people as "crabs." She is anæmic and has amenorrhœa.

Case 40.—*P. T.*, F., 9. A pure Carib child. Salibia. Ill six months. Encrusted tubercles on both feet. She was staying at Atkinson's estate, where she caught the disease.

Case 41.—*S. L.*, F. B., 24, Melville Hall. One year and ten months ill. Caught the disease from others in the neighbourhood. She has been taking tisanes, and says she is now going to take mercury. "Mother yaw," four inches in diameter, over the right ankle joint. It is withering. Maculæ on face. Dermatitis of soles and palms.

Case 42.—*J. G.*, M. B., 9, Weirs. Nine months ill. Encrusted tubercles on perineum. Dermatitis of soles. He has been drinking "vervain water," a tisane made with vervain.

Case 43.—*P. R.*, M. B., 3, Weirs. One year ill. Encrusted tubercles on scrotum. Has been taking vervain water.

Case 44.—*J. R.*, F. B., 7, Weirs. Sister of Case 43. Attacked at same time a brother. Encrusted tubercles on right foot.

Case 45.—*J. P.*, M. B., 3, Weirs. One and a-half years ill. Shallow clean ulcers on the face, the site of former tubercles. He has been treated with sea bathing, and the crusts of the tubercles have been rubbed off with cloths in the sea-water.

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* Meaning food, such as fruits, &c., considered harmful by the people when taken during the treatment of the disease.

Case 46.—*C. P.*, M. B., 1½, Weirs. Brother of Case 45, and caught the disease the same time. He has the remains of tubercles round the mouth.

Case 47.—*M. P.*, M. B., 7, Weirs. Brother of Cases 45 and 46. Ill six months. Caught the disease from brothers. Small encrusted tubercles on face, large masses formed by coalesced tubercles on both feet. An ointment of verdigris was applied to the tubercles on feet.

Case 48.—*J. R.*, F. B., 7, Marigot. Four months ill. Non-encrusted tubercles on outer right ancle.

Case 49.—*W. T.*, M. B., 56, Marigot. Had yaws 29 years ago, was treated with tisanes and got cured. Last September—that is, four months ago—he got a small sore in his foot and the disease returned; he has now dartres on body and limbs.

Case 50.—*P. C.*, F. B., 5, Marigot. Four months ill. Encrusted tubercles on upper lip and on right elbow. Been treated with sea baths and vervain water.

Case 51.—*J. J.*, F. B., 10, Marigot. Five months ill. Encrusted tubercles on face. Treated with sea baths and vervain water.

Case 52.—*T. J.*, M. B., 6, Marigot. Brother of Case 51. One year ill. Encrusted tubercles over left outer ancle. Dartres and gratelles on face. Has had the same treatment as his sister.

Case 53.—*J. P.*, M. B., 3, Marigot. Five months ill. Encrusted tubercles on face. Onychia of four inner toes of right foot. Encrusted tubercles on right knee. Enlarged femoral glands of right side.

Case 54.—*D. A.*, M.B., 6, Marigot. Four months ill. Encrusted tubercles on face and on perineum. Tubercular ulceration of both legs. He has been having sea baths and been taking vervain water and sour orange.

Case 55.—*E. V.*, F. B., 4½, Hatton Garden. Two months ill. Small encrusted tubercles at angles of mouth. A general eruption of dartres.

Case 56.—*S. V.*, M. B., 7, Hatton Garden. Brother of Case 55. Three months ill. Encrusted tubercles in anal fissure.

Case 57.—*A. A.*, F. B., 2, Marigot. Five months ill. Encrusted tubercles forming a ring round mouth, other tubercles on left ancle. Dartres on arms. Has been bathed every two days in the river, and had vervain water given to her.

Case 58.—*S. D.*, F. B., 14, Melville Hall. She was treated as a young child at the Central Hospital (which was closed over 10 years ago), and remained well until nine months ago, when tubboes appeared on feet. She has also dartres on body and gratelles on knees. She has been taking guaiac tisane and salts.

Case 59.—*M. C.*, M. B., 1½, Melville Hall. Ill one year. Has drying tubercles on face and legs. Maculæ on body. Been treated with vervain tea, three leaves being infused night and morning.

Case 60.—*P. P. L.*, F. B., 25, Melville Hall. Ill one year. Tubboes on both feet. She is the mother of Case 59, and was formerly in the Central Hospital. She remained free from yaws until a year ago when she and the child caught the disease by associating with infected persons.

Case 61.—*J. A.*, F. B., 5, Weirs. Two years ill. Onychia of third and fourth toes of right foot. Cachexia. Has taken vervain and senna tea.

Case 62.—*T. W.*, M. B., 3, Weirs. Ill one month. Encrusted tubercles on left foot. Gratelles on knees. Dartres on face and body and limbs.

Case 63.—*H. R.*, M. B., 3, Marigot. Ill three months. Encrusted tubercles about mouth and both legs, and in anal fissure. Gratelles on thighs. Has been taking vervain tea.

Case 64.—*J. J.*, M. C., 3, Melville Hall. Ill one year. Encrusted tubercles on face and both feet. Anæmia and cachexia. Has been treated with gum guaiacum, shak-shak, and vervain.

Case 65.—*M. B.*, F. B., 12, Hatton Garden. Three months ill. Large encrusted tubercles on face, chin, and in the right nostril. Ulcer on the right leg, the place of infection. Dartres on body and limbs. Been taking vervain and sea water.

Case 66.—*V. J.*, M.B., 1 year and 4 months, Hatton Garden. Six months ill. Encrusted tubercles at right angle of mouth and on chin. Gratelles on limbs. Has had sea bathing and been taking shak-shak root, vervain and sea water.

Case 67.—*A. J.*, M. B, 4, Hatton Garden. Ill one year. Brother of Case 66. Drying tubercles on nose and penis. Maculæ.

Case 68.—*T. D.*, M. B., 7, Hatton Garden. One year ill. Encrusted tubercles on foot. Maculæ on body and limbs.

Case 69.—*G. W.*, M. C., 2, Weirs. Ill one year. Encrusted tubercles on face. Tubercular ulceration round anus. Cachexia.

Case 70.—*W. R.*, F. B., 10, Weirs. Ill two years. Tubboes in soles of both feet. Has been treated with vervain.

Case 71.—*F. R.*, F. B., 1, Marigot. Ill nine months. Drying tubercles on face and round mouth. Large masses in front of both thighs and on pubis. Has been treated with vervain, guaiac and senna.

Case 72.—*F. L.*, M. B., 50, Wesley. Ill five months. He had a sore on his foot and he associated with persons suffering from yaws. Dartres first appeared on his body, and three weeks afterwards tubercles appeared. The encrusted tubercles were very large on face, neck, scalp and hands. He had some on the body, but they are dry. There is dermatitis ("crabs") of the soles of the feet and the palms of the hands. He has had sea baths occasionally, but has taken no internal remedies.

Case 73.—*M. L.*, F. B., 15, Wesley. Ill one year. Onychia of all the toes of both feet except the right great toe.

Case 74.—*L. N.*, M. B., 55, Wesley. Father of Case 73. Large ulcer over left inner ancle. He has had the ulcer for years. Has dartres on body and limbs, which appeared last August. No tubercles.

Case 75.—*A. St. J.*, F. B., 10, Woodford Hill. Ill one year. Ulcer of right leg. A general eruption of dartres and gratelles. She states that the ulcer was the site of the mother yaw. She has been bathing in the sea.

Case 76.—*A. T.*, M. B., 7, Woodford Hill. Brother of case 75. Ill one year. Non-encrusted tubercles on right foot and left leg, and on penis. Dartres on body and limbs.

Case 77.—*D. M.*, F. B., 9, Woodford Hill. Ill six months. Encrusted tubercles on hands, face, buttocks, and on the inner side of left thigh. Has had sea baths.

Case 78.—*M. B.*, F. B., 8, Woodford Hill. Ill about a year. She has an ulcer in front of left leg where yaws formerly existed. She has been treated with vervain and guaiac.

Case 79.—*M. B.*, M. B., 9, Woodford Hill. Fourteen months ill. Drying tubercles about left eye. Dartres on body and limbs. Maculæ.

Case 80.—*R. A.*, F. B., 18, Woodford Hill. Ill 18 months. Encrusted tubercles below left nostril. Tubboe on right foot. Ulcer, site of former yaws over left outer ankle. She has bathed in the sea and has drunk sea water.

Case 81.—*I. L.*, F. B., 11, Woodford Hill. Ill eight months. Onychia of both big toes, and second toe of left foot, also of middle finger of right hand. She has been drinking a tisane made of "zhèbe gras*" and "goudron" (Stockholm tar).

Case 82.—*E. J.*, M. B., 5, Wesley. Ill one year. Encrusted tubercles on both lips. Non-encrusted tubercles on dorsum of left foot. Enlarged femoral glands of left side. He has had given to him a tisane made of guaiac, vervain root, shak-shak root, dagger bush root, guéri vite root, and sea water.

Case 83.—*L. W.*, F. B., 16, Wesley. Ill eight months. Very dirty, and chigoes in both feet. She has dermatitis of both soles.

Case 84.—*H. P.*, F. C., 7, Blenheim. Encrusted tubercles on right elbow. Dartres and gratelles on body and limbs.

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* *Commelyna cayennensis*, Rich.

Case 85.—*J. M.*, M. C., 11, Thibaud. Ill two years. Drying encrusted tubercles on left elbow and buttocks. Maculæ on body and limbs. Gratelles on right elbow and knees. He has been taking a tisane made of gum guaiac, "chassepareil,"* vervain, shak-shak and racine Pâque.

Case 86.—*F. M.*, F. C., 7, Thibaud. Ill 10 months. Tubercles dry. Maculæ on body and limbs. Gratelles on elbows.

Case 87.—*M. G.*, M. C., 60, Polinair. 18 months ill. Encrusted tubercles on legs, arms and face. The tubercles are drying.

Case 88.—*E. A.*, M. B., 34, Penville. Ill three months. He had a small ulcer over the right inner ankle. He was working on the roads at Lasoye, and he slept in the house of a woman at Calabishie, named Elois. Two months afterwards he found he had yaws, and then he discovered that Elois' children were affected with the disease. The ulcer is now covered with tubercles without crusts, and he has encrusted tubercles on face, chin, and neck. There are dartres on body and limbs.

Case 89.—*E. L.*, M. B., 24, Penville. Ill 10 months. There were cases of yaws in the house in which he was living, and in the neighbourhood. He has encrusted tubercles on lower lip. A large one on the inner surface of right forearm near the wrist. Another between the third and fourth fingers running on to dorsum of left hand. Several tubercles on left elbow. A large one behind the neck. Three large masses on back in right lumbar region. Several smaller masses on both legs. Maculæ.

Case 90.— *O. N. G.*, F. B., 13, Penville. Ill one year. Gratelles on elbows. Small drying tubercles on dorsum of left foot.

Case 91.—*O. B.*, F. B., 22, Zicac. Ill 11 months. She was at Lasoye and caught the disease there. She has been taking gum guaiac, sassafras and sarsaparilla, and also vervain tea. She is a very respectable young woman, and is very much distressed at having caught the disease. She now has a few scattered tubercles on body and dartres on limbs. She stated that she was going to take mercury (*i.e.*, corrosive sublimate).

Case 92.—*V. P.*, F. B., 14, Zicac. Ill three months. She is almost covered with dartres, which are very conspicuous, as they are much lighter than the skin. On examining a patch with a powerful lens, flakes of epithelium are seen to be raised from the surface and attached by their bases, and here and there in the patch is seen a minute characteristic gratelle, or abortive tubercle, appearing as a shallow depression covered with the yellow yaws crust. The margins of the depressions are somewhat raised above the level of the surface.

Case 93.—*F. P.*, M. B., 6, Zicac. Brother of case 92. Ill three months before sister. Encrusted tubercles on scalp. Large masses on chin. Gratelles on knees, with small tubercles. Enlarged femoral glands. Tubboes in feet.

Case 94.—*D. M.*, M. B., 8, Zicac. Discharged as cured from the hospital some time ago, by Mr. Numa Rat. Tubboes in feet.

Case 95.—*A. M.*, M. B., 13, Zicac. Ill six months. Onychia of right great toe. Dartres on face and limbs. Gratelles on arms and legs. Has pounded begonia leaves† applied to toe.

Case 96.—*M.*, F. B., 10, Zicac. Ill seven weeks. Caught the disease from Case 94, her sister's child. She lives in the house with her sister. Large encrusted tubercles on inner aspect of right leg, and on both thighs. A similar tubercle on right arm.

Case 97.—*M. T.*, M. B., 10, Mount Allen. Ill eleven months. Encrusted tubercles on chin and on upper lip, implicating nose, and running on to the mucous membrane of the nostril. A large encrusted tubercle on left knee. Dartres and gratelles on body and imbs. He has been taking guaiacum water and sarsaparilla.

Case 98.—*M. B.*, F. B., 4, Mount Allen. Cousin of Case 97, and lives in next hut. Ill three months. Masses of encrusted tubercles about anus and pudenda.

Case 99.—*K. T.*, F. B., 1, Mount Allen. Ill three months. Sister of Case 97. Large moist tubercles on body and limbs. Large mass on dorsal aspect of left wrist. The mass is circular, enclosing apparently sound skin.

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* French patois for native sarsaparilla. *Furcræa cubensis*, Haw.

† *Begonia dominicalis*, A.D.C.

Case 100.—*E. T.*, M. B., 6, Bioche. Ill one year. Gratelles and dartres on limbs. He has been taking mercury.

Case 101.—*B. J. B.*, M. B., 4, Dublane. Ill three months. Large encrusted tubercles on forehead, chin, and scalp. One on the mucous membrane of mouth. Onychia of second toe of right and fourth toe of left foot. No treatment.

Case 102.—*M. A.*, F. B., 10, Bioche. Ill two months. Gratelles on elbows, knees, and dorsa of both feet. She has been taking calomel.

Case 103.—*C. B.*, F. B., 8, Dublane. Was in the yaws hospital some time ago under Mr. Numa Rat, and discharged as cured just before Christmas. Encrusted tubercles on left knee. On face there are circular dartres enclosing sound skin.

Case 104.—*E. S.*, M. B., 6, Dublane. Ill two years. Gratelles on elbows. Tubboes in both feet.

Case 105.—*R. F.*, M. B., 9, Colihaut. Ill three months. Reniform encrusted tubercles below right angle of mouth. Dartres and gratelles on limbs.

Case 106.—*E. T.*, M. B., 11, Stewart. Ill one year. Large encrusted tubercle in front of right ear. Dartres on body and limbs. Has been treated with tisanes and jalap.

Case 107.—*E. D.*, M. B., 10, Colihaut. Ill six months. Dartres, gratelles, and small encrusted tubercles running into each other on face. Dartres and gratelles on body and limbs. The dartrous patches are raised above the level of the skin, and are very striking in appearance, the white patch contrasting with the black skin. Large encrusted tubercle on inner side of right thigh. Tubercular ulceration of left inner ankle. Enlarged femoral glands of same limb. He has been taking guaiacum water.

Case 108.—*S. J. B.*, M. B., 20, Bataly. Ill one year. Dartres on body and limbs. Tubboes. Chigoes in feet.

Case 109.—*E. F.*, M. B., 16, Bataly. Was in the yaws hospital, under Mr. Numa Rat, and discharged about eight months ago. Tubboe in left foot. Dartres and gratelles on both arms and legs. He is taking blue pills and a mixture bought from a druggist in Roseau, and carbolic oil is being applied to the feet.

Case 110.—*E. J. B.*, M. B., 11, Bataly. Brother of Case 108. Ill eight months. Encrusted tubercles, dartres and gratelles on body and limbs. Tubboes in feet.

Case 111.—*E. F.*, F. B., 10, Bataly. Ill eight months. Sister of cases 113 and 116. Tubboe in right heel. She is applying "feuille mal-tête,"* and "frombasin"† to the tubboe. The leaves of the plants are pounded up, and the mass applied as a dressing.

Case 112.—*R. J. B.*, M. B., 14, Bataly. Brother of Cases 108 and 110. Ill one year. Encrusted tubercles on both arms. Tubboes, and dermatitis of soles of both feet.

Case 113.—*A. C.*, M. B., eight, Bataly. Gratelles on elbows. "Mother yaw," without crust, behind left ankle. Encrusted tubercles on right leg.

Case 114.—*B. A.*, M. B., 10., Bataly. Ill one year. Tubboe of left foot. Encrusted tubercles on right leg.

Case 115.—*L. R.*, M. C., 38, Bataly. Tubboe in left foot. Encrusted tubercles on right leg.

Case 116.—*G. M.*, M. B., 5, Bataly. Ill two months. Half brother of Cases 111 and 113. Large drying encrusted tubercles on face, body, limbs, and scrotum. Maculæ. Dartres. Been taking sassafras and guaiacum.

Case 117.—*N. E.*, M. B., 10, Grande Savannah. Ill two years. "The people" told his mother to wait a year before giving him any medicine for the disease. He has dartres and gratelles on limbs. At first a tisane of guaiaca and sarsaparilla was given to him, and afterwards he had occasional doses of jalap, and a tisane composed of a burnt conch shell,§ "liane brillante" root‡, a piece nine inches long, and the "thickness of

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* *Bryophyllum calycinum*, Salisb.

† *Hyptis suaveolens*, Poit.

‡ *Cissus sicyoides*, L.

§ *Strombus gigas*, L.

" two fingers." These were put into a gallon of cold water, and allowed to remain for two days, and on the third day the tisane was strained, and given as a drink. Afterwards jalap was again given.

Case 118.—*L. E.*, M. B., 7, Grande Savannah. Brother of Case 117. Dermatitis of sole. He was taken ill same time as his brother, and received the same treatment.

Case. 119.—*B. T.*, M. B., 8, Barroui. Ill 15 months. Encrusted tubercles on feet, legs, and buttocks. No treatment.

Case 120.—*E. O.*, M. B., 10, Barroui. Ill two months. Encrusted tubercles on right inner ankle. A general eruption of dartres.

Case 121.—*C. C.*, M. B., 10, Barroui. Ill four months. Small encrusted tubercles on scalp, body, limbs, and penis. Tubercular ulceration of right inner ankle.

Case 122.—*E. S.*, F. B., 12, Mero. Ill five months. A mass of tubercles, with moist incrustations on outer surface of middle third of left leg. A general eruption of dartres. She has been taking " l'eau conch " and guaiac.

Case 123.—*S. P.*, F. B., 4, Tarreau. Ill two months. Encrusted tubercles on both legs, on perineum, and small ones on face.

Case 124.—*L. M.*, F. B., 8, Tarreau. Ill six months. Large encrusted tubercles below nose, on right cheek, on both ears, and one on the mucous membrane of lower lip, inside mouth ; this tubercle is surrounded by mucous membrane, and it is the size of a sixpence. It is covered with a yellowish exudation. She has also dartres on limbs and an ulcer on the dorsum of the left foot.

Case 125.—*M. A. H.*, F. B., 12, Tarreau. Ill one year. Tubercular ulceration of left leg and foot. Old cicatrices on dorsum of same foot. Minute tubercles on right elbow. Cicatrices and keloid on both arms about the elbow-joints. Bones of right fore-arm enlarged. She has been taking tisanes.

Case 126.—*S. J.*, M. B., 10, St. Joseph. Ill one month. Dartres on body and limbs. Non-encrusted tubercle in front of inner ankle.

Case 127.—*N. J.*, M. B., 9, St. Joseph. Ill one month. Brother of Case 126. Encrusted tubercles on penis. Dartres on legs. " Mother yaw " below right knee. He and his brother have been taking conch-water and guaiac.

Case 128.—*D. L.*, M. B., 9, St. Joseph. Ill six months. Tubboes in soles of both feet. Encrusted tubercles on penis and left leg. A general eruption of dartres. Treatment : tar water (l'eau goudron) with conch-shell water.

Case 129.—*J. M.*, F. B., 5, St. Joseph. Ill three weeks. Tubboes in soles of both feet. Dartres on body and limbs. Mercurial treatment.

Case 130.—*E. B.*, M. B., 12, St. Joseph. Ill two months. Encrusted tubercles on forehead and neck. Ulcer, with white raised edges, and depressed in centre with yellow slough, on dorsum of left foot. Gratelles on elbow ond knees.

Case 131.—" *Come and Go*" (no other name to be got) ; mother's name, Charlotte David. M. B., 11, Hillsborough. Tubercular ulceration of both feet.

Case 132.—*J. W.*, M. B., 40, Hillsborough. Ill one year. Encrusted tubercles on body and limbs.

The following Table shows the Duration of the Disease in the above 132 cases.

Duration.	Number of Cases.	Percentage.	Duration.	Number of Cases.	Percentage.
1 month - - -	6	4·54	1 year - - -	24	18·18
2 months - -	9	6·82	14 months - -	2	1·51
3 „ - - -	10	7·57	15 „ - - -	1	·75
4 „ - - -	5	3·78	18 „ - - -	6	4·54
5 „ - - -	7	5·30	22 „ - - -	1	·75
6 „ - - -	11	8·33	2 years - - -	10	7·57
7 „ - - -	1	·75	3 „ - - -	5	3·78
8 „ - - -	5	3·78	3½ „ - - -	2	1·51
9 „ - - -	5	3·78	4 „ - - -	1	·75
10 „ - - -	3	2·27	Unknown - -	15	11·36
11 „ - - -	3	2·27			

XIII.

Notes on Yaws in Trinidad.

It was originally intended that my mission should extend to Trinidad; but the local government, having been advised by the Surgeon General of the Colony that there was no necessity for an inquiry, they objected to bear a part in the cost of the mission, with the result that the special investigation of the prevalence of the disease in Trinidad was abandoned.

But, as I have already explained, whilst *en route* from Dominica to Tobago, I had to spend a fortnight in the island, waiting for the departure of the Royal Mail steamer, and being on the spot, I occupied my time in making some inquiries regarding the disease.

Count (better known perhaps as Dr.) L. A. A. de Verteuil, C.M.G., who is at the head of the medical profession in the colony, in his most interesting work on Trinidad,* had made the following observations on yaws:—

"*Yaws, Pians, Frambœsia.*—This is another skin disease to which I am anxious to "call the earnest attention of the Government.

"Yaws is a disease *sui generis*, which is propagated by contagion, and has a "tendency to spread among the people of the same locality, and may easily extend to "remote districts by intercommunication. It is peculiar to the African race, and may "be said to be an importation from Africa, where it widely prevails. The duration of "the disease generally extends over several years, and I even doubt very much whether "its cure is ever spontaneous. When properly treated it lasts from two to four months. "People suffering from yaws do not exactly become disabled, but the disease tells sorely "on their constitution, and they become enfeebled and apathetic; intercourse with them "is carefully avoided by prudent persons. I am, therefore, led to advocate with regard to "yaws, the adoption of the same stringent measures which I have suggested with regard "to leprosy. People suffering from yaws should be forcibly sent to hospitals or "asylums, there to be treated. Except in a few exceptional cases, this measure should "not be extended to persons in good circumstances, as they are anxious to be cured. "As a rule, confinement could not be protracted beyond two or four months, after which "time the patients would be restored to their families and occupations; and the far "greater number of yaws patients being under the age of 15, sequestration could not "be regarded by them as a very great hardship, especially in view of the great benefit "conferred and the advantages resulting to the whole community."

Over 10 years ago, I corresponded with Dr. de Verteuil about yaws, and the following extracts from a letter he addressed to me on the 31st December, 1879, contain important information regarding the spread of the disease and the means that should be taken for its ultimate eradication:—

"The only point to which I have given some attention is the baneful influence it 'may exercise on the well-being of the people and the welfare of the community; also 'because, in my opinion, the disease, if properly dealt with, may be ultimately extirpated.

"Yaws was first observed among the Africans imported as slaves; not a few were "landed suffering from the disease. It may be said to be of African origin, and even "now that the importation of Africans has been discontinued for many years, the disease "is, *cæteris paribus*, more prevalent among the people of that race. Can this prevalence "be traced to the mode of living of the negroes? It must be admitted that yaws is met "with generally in the midst of the poorest of our labouring population; ill-fed, badly "housed, and scarcely clad, squalid poverty is their lot. Yaws can be observed also "among the Indian immigrants or their descendants; but I am not aware that the "disease has been imported by any coolie ship. I have observed a case at El Socono "Estate; a young girl of about eight years, and several cases; three children of the "same family, being five, and three years, and about eight months.

"Are the white people altogether exempt? Not absolutely, but examples are very "rare. I do not believe that the disease is hereditary, but it is highly contagious, and

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Trinidad: its Geography, Natural Resources, Administration, Present Condition and Prospects. By L. A. A. de Verteuil, M.D., Paris. First Edition, 1856. Second Edition, London, 1884.

" individuals affected with yaws are carefully shunned by those who are free During " the time of slavery, any slave attacked with yaws was sequestered and sent into some " hut at a distance from the labourer's houses. He was there placed under treatment, " and when discharged the hut was burnt down.

" The disease is as certainly curable as it is contagious, and the period of treatment " may be said to extend over three months, more or less.

" To my view, this is really the practical side of the question, the one most " important. I am convinced that an energetic Government may, by adopting and " rigidly enforcing proper measures, ultimately eradicate the disease, and within a " comparatively short period; whilst non-interference and *laisser aller* must favour the " spread of a loathsome malady to the great detriment of the whole community.

" Yaws is contagious, and, of course, the surest means of checking its spread is to " prevent intercourse with healthy people. As a necessary consequence, yaws patients " should be searched for, and sent to some hospital or asylum, where they would be kept " under treatment till cured; and as the disease is curable within a comparatively short " time, the patients would not be placed under restraint for more than two or three months, " except a few inveterate cases. The patients being mostly young people, mere children, " could bear restraint the more easily. I therefore cannot imagine why any Govern-- " ment should hesitate in adopting stringent measures with the view of certainly extin- " guishing a disease which has a tendency to spread, and the effect of which is the disable- " ment of a number of labourers, and the deterioration of the agricultural class. We " should not overlook the fact that individuals affected with yaws are shunned by other " people, and no prudent person will ever employ as house-servants man or woman " suffering from the contagious malady."

On the 16th of July, 1879, Dr. Gavin Milroy, in his letter to the Colonial Office regarding yaws in Dominica, made the following observations on the prevalence of the disease in Trinidad:—

" Recently I have had an opportunity of discussing the question of the probable " origination and spread of yaws with one of the ablest of our West Indian practitioners, " who has been instrumental in effecting some valuable hygienic reforms in his own Colony, " viz., Dr. Crane, Surgeon General of Trinidad, now in this country on leave.

" Although the disease is anything but unknown in that island, there is no special " hospital or asylum for patients affected with yaws; they are readily admitted into the " General Hospital in Port of Spain, and into other medical institutions, and no ill effects " have resulted from the practice. My own observations in Demerara, Trinidad, and " Jamaica led me to believe that certainly the disease does not uniformly manifest any " decided contagious property.

" I have addressed a brief series of interrogations to Dr. Crane to elicit in writing his " views on the subject, and I hope to be able to forward a copy of his replies to the " Colonial Office."

These interrogations were replied to by Dr. Crane, on the 18th of July, and the replies were subsequently sent on to the Colonial Office. In his replies Dr. Crane stated that cases of yaws were admitted into the general hospitals at Port of Spain and San Fernando, and that they were not isolated. That yaws were not included in the list of diseases treated in the hospitals prior to his appointment in 1871. That, in 1876, 20 cases of yaws were treated in the Port of Spain Hospital, and three cases in the San Fernando Hospital. That he was not aware of any instance of the disease having been communicated to other inmates, except in the case of a wardsman who reported that he had caught yaws from attending on patients affected with the disease, but that the nature of the eruption in that case was doubtful. That the disease is not confined to particular localities, and that occasional outbreaks are reported. That he was " under the impression that the " disease was disappearing," but that " one of our medical practitioners has recently " expressed a different opinion." That " some believe that the disease spreads by " contagion: but that others attribute it to a want of personal cleanliness and improvished " diet." And that " the origin of the disease has not been investigated with sufficient " care to say how it has arisen."

In one of my papers, entitled " Observations on Yaws," published in the *Medical Times and Gazette*, in 1880, the prevalence of yaws in Trinidad was thus alluded to:— " As regards the unrestricted admission of persons suffering from yaws into the medical " institutions of Trinidad, I can give some information which possibly is unknown to Drs. " Milroy and Crane. A short time ago I spent a month in Trinidad, and I made during " my stay in the island special inquiries into the prevalence and spread of yaws, and I had " conversations on the subject with many of the medical men. Dr. Espinet, for many

" years the Medical Officer of the Leper Asylum, informed me that a case of yaws had " once been admitted, and that the disease spread by contagion to several of the inmates. " From my inquiries, which were carefully conducted, I came to the conclusion that yaws " was spreading in Trinidad to a much greater extent than was generally supposed. " When I was at the islands of the Bocas, between Trinidad and Venezuela, the two " boatmen who rowed me into the Boca Monos were both afflicted with yaws, and Mr. " Morrison, the Revenue Officer, informed me that there were many cases of the disease " in these small islands, as well as in the contiguous portion of Trinidad."

Dr. Crane mentions that 20 cases of yaws were under treatment in the Port of Spain Hospital in 1876. I was unable to obtain copies of the hospital returns in the colony; but a few had been sent to me from the Colonial Office, and I notice by them that for the half-year ending December, 1879, 14 cases of yaws were admitted to this hospital in the six months. In 1886, 31 cases were under treatment in the hospital, of which 11 were cured, 19 were relieved, and one was unrelieved. During the same year 42 cases were admitted to the San Fernando Hospital, of which 13 cases were cured, 28 were relieved, and one was unrelieved; thus there were 73 cases under treatment in the hospitals for that year, and only 24 of the patients were discharged cured.

Two years afterwards, namely, in 1888, in the " Summary of the Principal Diseases " treated in the Colonial Hospitals at Port of Spain and San Fernando," 109 cases of yaws are stated to have been treated in the wards of these two institutions. The medical returns, therefore, show an increasing prevalence of the disease in the island.

On the 24th March 1891, in a letter addressed to Governor Sir William Robinson, K.C.M.G., I asked for some information in regard to yaws in Trinidad. The following reply did not reach me, however, until after I had got to Tobago:—

The Colonial Secretary of Trinidad to Dr. *Alford Nicholls.*

Colonial Secretary's Office, Trinidad,
29 April 1891.

Sir,

Referring to your letter of the 24th ult., the queries enclosed in which have been circulated in Tobago as requested, I am directed to inform you that yaws is not prevalent in Trinidad to any extent, and only affects a few persons of the lowest class who neglect personal cleanliness.

Wherever possible cases are sent to the larger hospitals for treatment, to which they are, as a rule, readily amenable, though the disease is apt to recur. When in hospital the cases are generally kept together, but not specially isolated from other patients, as although the disease is inoculable, like syphilis, it is not contagious in the general sense of the word, and is in no way calculated to spread among people observing habits of cleanliness.

With regard to the concluding paragraphs of your letter, I am to state that there are no reports on yaws beyond replies to departmental inquiries, and that their tenor agrees generally with the observations published in Dr. Tulloch's admirable report.

I am, &c.

Dr. H. A. A. Nicholls, Tobago. (signed) *Henry Fowler.*

On the 30th March, I visited the Colonial Hospital at Port of Spain, and went through the wards with the Resident Medical Officer. I noticed lepers mixed up with the other patients, and I was informed that they were waiting for vacancies at the leper asylum. I also saw a few cases of yaws in the wards, and there was no attempt at isolation, although the Surgeon-General had informed me that he had known of two instances of the disease having been communicated to the other patients.

On the 31st March, I visited the leper asylum, which was under the charge of Dr. Koch during the absence of Dr. Beaven Rake, who had been appointed one of the Leprosy Commissioners to visit the East Indies to inquire into the questions surrounding the prevalence of leprosy there. Dr. Koch went round the wards with me, and he was good enough to give me all the information he could. There were nearly 200 lepers in the asylum, some of them fearful examples of deformity and disease. The tuberculated variety seemed to be less common than the anæsthetic one. I saw in the wards several well marked cases of the mixed form of the disease. One patient was shown to me who had been apparently cured under treatment by Chaulmoogra oil. On his admission he was said to have been a typical example of turbercular leprosy, but all the tubercles had

disappeared under treatment, and he was about to be discharged. The doses of the oil given to him were 30 minims three times a day. Dr. Koch told me that the oil had to be given regularly for many months before any marked benefit was produced.

Several of the lepers were also suffering from yaws, and Dr. Koch had the kindness to get the case papers of two of these patients copied out for me. It would appear from the reports of the asylum by Dr. Beaven Rake and Dr. W. V. M. Koch, that yaws is sometimes met with as an intercurrent disease in lepers.

On examining the reports on the asylum for the four years, 1886, 1888, 1889, and 1890, I find that in 16 instances yaws and leprosy have co-existed; and, as will be seen from the following table, in most cases yaws is associated with the anæsthetic variety of the disease. I was unable to obtain a copy of the report for the year 1887, but it would appear that during the four years 1·8 *per centum* of the inmates suffered from yaws.

TABLE showing the number of cases of YAWS occurring among the LEPERS in the TRINIDAD ASYLUM.

Years.	No. of lepers under treatment.	Cases of Yaws.			Totals.
		In tubercular variety of leprosy.	In anæsthetic variety of leprosy.	In mixed form of leprosy.	
1886 - - -	216	2	5	1	8
1887 * - -	?	?	?	?	?
1888 - - -	214	—	1	—	1
1889 - - -	216	1	3	—	4
1890 - - -	250	—	2	1	3
Totals - -	896	3	11	2	16

In his Report on the asylum for the year 1886, Dr. Beaven Rake makes the following interesting remarks on yaws and leprosy:—

"Eight cases of yaws have occurred during the year. Five of these, however, have "been in new admissions, who brought the disease with them into the asylum, either in "in its incubative or eruptive stage. The other three cases form an interesting illus- "tration of the probable length of incubation in yaws. S., a coolie, aged 36, who had "scarcely been free from yaws since her admission, had another outbreak at the end of "November, 1885. At the beginning of February, 1886, L., another coolie, aged 51, "and D., her son, aged 10, were both found to have yaws. They had both been free "from the disease before. The beds of the two women were not far apart in the ward, "and the boy had often visited his mother there. It seems fair to assume that these "two, mother and son, contracted the disease from the other coolie about the same "time.

"This would make the incubation in these cases about eight weeks. Fox and "Farquhar ('Skin Diseases of India,' p. 9), state that the period of incubation is "thought to be from three to ten weeks. The greater susceptibility of lepers to yaws, "which Dr. Bowerbank affirms on the same page, I cannot substantiate, for though, of "course, reasonable care is taken at the asylum, still one would expect the disease to "spread more than it does, were his statement correct."

It seems to me, however, that Dr. Rake has not accurately stated Dr. Bowerbank's opinion. The paragraph in the work he refers to is as follows:—"Dr. Bowerbank "remarks that the excoriations and wounds connected with scabies, Chinese itch, tick "bites, leprosy, syphilis, small-pox, bucnemia, all render the individual more liable to "the contagion of the disease, but he does not believe that the disease can be taken "except through downright positive contact of the healthy with the diseased. The

* Returns for the year 1887 were not obtainable.

" uncleanly are more liable to take the disease than the cleanly, but the healthy and " cleanly take the disease if they are brought into direct contact with the infected. If " one member of a family become affected, all the members susceptible to the disease are " attacked in turn." *

It appears to me that Dr. Bowerbank merely wished it to be understood that, in his experience, persons suffering from leprosy, and other diseases in which there is a break in the surface of the skin, are more liable to yaws, simply because they present many broken surfaces through which the yaws *virus* may find entry into the system. Not that leprosy itself renders a person suffering from it more susceptible of an attack of yaws.

The following are extracts from the case papers of the two cases of leprosy and yaws, kindly furnished to me by Dr. Koch :—

Case I.—Baggernaut. An Indian immigrant ; 50 years. Admitted to the asylum on the 25th August, 1886, with leprosy of the mixed form.

1 October.—Pustular eruption r. side of nose and round r. eyebrow. Herpes (?) Prescription : Pot. iod., gr. x. ; tr. chinch. co., m. xx. ; aquam ad ℥j., t. d.

6 October.—Teeth very loose. Three removed. (?) Has been taking Hg.

25 October.—Yaws still bad about buttocks.

15 November.—Crusts cut off. Yaws on thighs.

6 December.—Pustular eruption on face like sycosis, probably a form of yaws. To be dressed with mercurial ointment.

13 December.—Ung. sulphur, for face.

29 December.—Yaws thick and troublesome on buttocks. Prescription : Liq. hydrarg. perchlor., m. lx. ; pot. iod., gr. v. ; aq. ad ℥j., t. d. s.

12 January, 1887.—Salivated. Tongue dirty. Gums swollen and painful. Prescription : Potass. chlorat., gr. xx. ; mag. sulph., gr. xxx. ; aq. ad ℥j., t. d. s. Gargar. potass. chlor. for mouth.

19 January.—Teeth loose. Yaws cured. Thin and wasted. Tongue dirty. Breath offensive. Prescription : Tr. ferri. perchlor., m. xv. ; mag. sulph., gr. xx. ; aq. ad ℥j., t. d. s.

2 February.—Yaws dried up. Crusts separating and tongue clean. Can get up.

2 May.—Teeth firm again. Yaws gone.

26 August.—Irritation of skin. Prescription : Mist. alba ℥j., t. d.

29 August.—Yaws quite gone. Has got stout. Teeth firm again. No ulceration. Slight papular eruption of skin.

18 January 1888.—Eczema on arms. Boils on arms.

13 February.—Discharged at own request. Yaws cured.

9 January 1890.—Readmitted in about the same state.

12 February.—Eczema of side.

21 May. Pain at back of heel. Emp. belladon. 6 × 4 to heel.

28 May.—Yaws beginning again. Prescription : Same mixture as ordered on 1st October, 1886. Creolin, vaselin, āā. part. eq., pro app.

4 June.—Yaws spreading. Strong carbolic acid to touch yaws with.

14 August.—Vesicular eruption dorsum of r. foot. Scratches it. Touch with pure creolin.

29 August.—Pain in knees. Lin. camph. to rub.

20 September.—Vesicular eruption under r. arm.

On the 31st March, 1891, when I saw him the yaws showed no sign of cure, and, on the 24th September Dr. Koch wrote to me concerning the case as follows :—" I may " add that the patient, Baggernaut, has not yet got rid of his yaws completely, but has " reminders continually cropping up. A few isolated tubercules make their appearance " and disappear after a few weeks with just a minimum of treatment. He has not been " mercurialised again, but gets occasional doses of mag. sulph. or of arsenic."

This exceedingly interesting and instructive case shows (1) the relapsing nature of the disease ; (2) the complete failure of mercury, even when pushed to full mercurialism, to eradicate the disease from the system ; and (3) the fallacy of the statements made by some medical men that mercury will invariably cure the disease.

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* *On Certain Endemic Skin and Other Diseases of India and Hot Climates generally.* By Tilbury Fox, M.D., F.R.C.P. and T. Farquhar, M.D. (Published under the sanction of the Secretary of State for India in Council.) London. 1876.

Case II.—Khrekhai. Indian immigrant; 40 years. Admitted to the asylum on the 8th May, 1889, with anæsthetic leprosy.

19 June, 1889.—Yaws, face, arms, hands. Prescription: Liq. hydrarg. perchlor., m. lxxx.; pot. iodid., gr. v.; inf. quass., ad ℥j., t. d.

26 June.—Yaws better.

15 July.—Yaws (crusts) picked off eyelid (r.) and ung. hydrarg. directly applied.

30 August.—Yaws still on face and eyelids. Very pasty and anæmic.

13 September.—Very anæmic. No œdema yet. Doubtless ankylostoma. Prescription: Calomel, gr. x.

16 September.—Face greatly swollen. Came on two days ago. Breath very offensive. Ulcers on feet drying up. Have been dressed with ung. hydrarg. Doubtless absorption from these as well as calomel has produced salivation Prescription: Thymol, gr. xxx. mane.

18 September.—Swelling of face going down and breath less offensive. Began thymol again to-day.

25 September.—Swelling gone down, but teeth loose. Continue thymol.

27 September.—Better. Takes thymol without difficulty.

2 October.—More colour in tongue. All swelling has gone from face, which looks healthier. Complains of thymol hurting his throat. Stop thymol.

10 October.—Less anæmic. Improvement in colour of tongue and face.

14 October.—About the same.

The patient had "fever" (probably leprotic) on the 24th March, and pain in the right ear on the 4th August, 1890, and this is the last note on the case paper. It appears therefore, that the yaws disappeared when salivation was established, but the mercurialism did not cure the disease, for he had yaws again when I saw him on the 31st March, 1891

XIV.

Replies to the Interrogations.

I.

Is the disease prevalent throughout the island, or is it limited to particular districts or localities?

Tobago.

John P. Tulloch, M.D., M.A., Colonial Surgeon:—The disease is universally prevalent throughout the Island, and is in no way limited to particular districts or localities. Its prevalence has, however, been much lessened within the last three years. That diminution appears to be more marked in Scarborough and its vicinity than in any other district.

R. W. C. Norman, M.B., Medical Officer, District No. 3:—In answer to this question I can only speak of my own district which comprises Moriah, Mount Thomas, Woodlands, Les Coteaux, Franklyn, Plymouth, Mason Hall, Runnemede, Castara and Parlatuvier, and as far as my observation goes it is pretty generally prevalent all over.

E. Gerald Blanc, M.B., Medical Officer, District No 4:—The disease is prevalent throughout the district, but certainly more so at Speyside and Charlotteville, the two remotest parts of the district and of the Island.

Wm. Allen Purser, L.R.C.S.I., Retired Medical Officer:—The disease is, and shows itself in all part of the Island, but is prevalent on the sea coast and its neighbourhood.

Grenada.

P. F. McLeod, M.D., Medical Officer, Poor House, Gaol and Lunatic Asylum:—The disease is not confined to any particular locality.

G. L. Latour, M.D., Medical Officer, Parish of St. John and St. Mark:—Prevalent throughout the Island.

Edwin F. Hatton, M.B., Medical Officer, Parish of St. David:—The disease appears to be prevalent throughout the Colony except in Carriacou, but is worse in some parts than in others, the degree of prevalence chiefly depending on the care taken to send cases to the hospital, thereby removing centres of contagion. Why the disease does not exist in Carriacou I cannot say, but during a residence of nearly two years I never met with the disease except in two or three children who contracted it in Grenada and afterwards came to Carriacou.

Wm. Lang, M.D., Medical Officer, Parish of St. Andrew:—The disease is not confined to any particular locality, but prevails over the Island.

H J. L. Bennett, M.R.C.S., L.R.C.P., Ed., Medical Officer, Parish of St. Patrick:—The disease is to be found in all the districts of this Island.

Walter Boyd, L.K.Q.C.P.I., L.R.C.S.I., House Surgeon, Colony Hospital:—Yours is distributed generally throughout the Island, but apparently is more frequently met with in the three parishes, St. Andrew's, St. George's, and St. David's, respectively, as judged by the hospital returns. I have known villages particularly infected with the disease, a condition due to the unclean habits of the people and overcrowding of residences, and not to climatic or telluric influence. This I have verified in a marked manner in St. Vincent.

N. Durrant, L.R.C.S.I., L.K.Q.C.P I., Medical Officer, District No. 6 (Carriacon):—Yaws is very uncommon in Carriacon.

St. Vincent.

W. F. Newsam, M.D., Colonial Surgeon:—It is to be found in all parts of this Island more or less, but more especially in the "South Rivers Village," situated in the high lands in the windward quarter about 18 miles from Kingstown (see a return made by me to Mr. Administrator Goldsworthy of cases in this village in 1883), also all along the leeward coast between Lowman's Village and Morne Ronde; Buccament Valley at its upper end usually presenting the great number in the leeward quarter. I have reason to believe though, that fewer cases are now to be found in these localities in the more loathsome form of tubercles freely secreting pus at their bases, and consequently in the more contagious form.

Geo. Finlay, L.R.C.P., L.R.C.S., Medical Officer, District No. 1:—It is prevalent throughout the Island, though much more so in certain districts of it than in others.

W. Bruce Austin, L.R.C.P., Ed., L.F.P.S.G., Medical Officer, District No. 2:—Prevalent throughout the Island.

M. O'Carroll, L.M., L.S., T.C.D., Medical Officer, District No. 3:—I believe it to be amongst the Creoles, but it never comes under the notice of the medical officers, since they are under the impression the disease will wear itself out without medicine. I have known some years ago one village in which there were four hundred cases, but I cannot speak further as to particular districts or localities.

Sandford Arnott, M.D., Retired Colonial Surgeon:—Yaws cases are, in my opinion, throughout the island, but not to an alarming extent in any part of a particular locality.

St. Lucia.

Charles Dennehy, L.R.C.S.I., F.R.C.S.E., Colonial Surgeon:—Yes. Most so in certain localities, small villages, isolated huts on heights, and in places difficult of access.

Herbert Norton, M.R.C.S., L.S.A., Colonial Assistant Surgeon:—It is very prevalent in a certain number of localities.

Otho Galgey, L.K.Q.C.P.I., L.R.C.S.I., Colonial Assistant Surgeon:—The disease is, in my opinion, more prevalent in the inland mountainous localities than in the valleys or near the sea-shore. The persons affected with yaws are generally found in unfrequented and more or less isolated spots, where the conditions of life seem to be lower than in the neighbourhood of towns. In the principal towns of the Island the disease is rarely seen. When sporadic cases occur in the towns, the sufferers are concealed for a time, and then transferred to some out-of-the-way spot on the hills. The black population, as a rule,

seek to conceal any case of yaws when it happens in a family, as they consider it a degradation to suffer from so loathsome a malady.

S. Fitzgerald Procter, M.R.C.S., L.R.C.P.E., Colonial Assistant Surgeon:—Has prevailed in districts in which I have served (2nd and 3rd), chiefly in isolated localities, removed from civilized influence.

T. A. Lestrade, M.B., Colonial Assistant Surgeon:—I believe the disease is prevalent throughout the island, especially at its two extreme limits, north and south, Gros Islet and Vieuxfort, at which places most of the cases are to be found.

Victor Tabone, M.D., Colonial Assistant Surgeon:—I do not think the disease prevalent throughout the Island, but is apparently limited generally to the African localities in the heights of the country.

Antigua.

W. H. Edwards, F.R.C.S., L.R.C.P., Senior Medical Officer:—Limited to particular districts.

Arthur E. Edwards, F.R.C.S., Ed., Medical Officer, District No 1:—Not prevalent.

F. J. Freeland, M.D., Acting Medical Officer, District No. 3:—My experience of yaws is very limited, as for the five years I have been in Antigua I have seen only about 30 or 40 cases at most, so that in my experience the disease cannot be said to be prevalent in Antigua. My cases mainly came from District No. 3, which includes the parishes of St. Peter and St. George; four or five of my cases, however, belonged to other districts, some of these from the parish of St. Philip at the windward side of the island, the next from the parish of St. Paul, or southern district of Antigua. No cases from any of the other districts have ever come under my notice, though I believe the disease is met with in all parts of Antigua.

George E. Pierez, M.D., Medical Officer, District No 4:—Of over 100 cases added as an Appendix to my Thesis on Frambasiœ,* the majority came from my own parish (St. Philip's), particularly from the village of Willikies. A large number also came from Sweets and Liberta (St. Paul's parish), and a few from St. Peter's. I have no knowledge whether the disease prevails in the other parts of the island.

Alfred A. Mackie, M.B., Medical Officer, District No. 5:—My experience has been limited to the city of St. John's, and to St. Paul's parish; in St. John's, from 1882 to 1884, I saw very few cases, not more than half-a dozen altogether, and in St. Paul's, very few cases from 1884 to 1887; after that date cases increased, but the disease could scarcely be said to be prevalent.

J. S. Gabriel, M.R.C.S., Medical Officer, District No. 6:—In reply to your communication, dated 15th July 1891, No. $\frac{2635}{1091}$, concerning the Commission of Enquiry into yaws, I beg to state that the disease is comparatively rare in this district, and that only two cases have been treated by me during a period of nearly ten years. I regret, therefore, that I am unable, from personal observation, to answer the interesting interrogations prepared by Dr. Nicholls.

Virgin Islands.

W. Stewart Campbell, M.D., District Medical Officer:—The disease is not prevalent throughout these islands, but is limited to one or two cases in two adjacent districts of the Island of Tortola, namely Brews Bay, and Soger Hill.

Montserrat.

M. P. Duke, L.K.Q.C.P.I., Medical Officer, District No. 1:—No limitation.

E. W. R. Branch, B.A., M.B., Medical Officer, District No. 2:—Prevalent throughout.

St. Kitts.

W. J. Branch, M.D., Medical Officer of the Public Institutions:—Sporadic cases occur occasionally; perhaps oftenest in Old Road.

G. H. Mapleton, M.B., Medical Officer, District No. 1:—The disease is not

* This Thesis has not been published, and I was not afforded an opportunity of seeing it.

prevalent throughout the island. I have only seen one case in my district in five years. I have seen a few cases from Old Road and Philip's, where it is said to be prevalent.

A. Boon, F.R.C.S., Medical Officer, District No. 2 :—Limited to three localities.

R. A. Cleveland, M.R.C.S., Medical Officer, District No. 3 :—I regret I am unable to give any information concerning the disease called yaws. My time has been so short in the West Indies that I am quite unacquainted with the disease. No cases have as yet come under my direct observation.

J. Foreman, L.K.Q.C.P.I., Medical Officer, District No. 5 :—Limited to particular localities.

R. E. Semper, M.R.C.S., Medical Officer, District No. 6 :—I do not think that there are many cases of yaws in this island. In my district at a settlement of Africans and their descendants, about 60 in number, on Conyers Estate, there have been a few cases of yaws. I also believe that in a settlement of the same people, about 30 or 40 in number, near Old Road, cases of yaws have occurred. I do not remember to have seen a case of the disease in Sandy Point, the principal town in District No. 6.

Nevis.

J. D. Bell, M.R.C.S., Medical Officer, District No. 7 :—The disease is limited to the country districts, there being no cases in the town district.

C. R. Edwards, M.R.C.S., L.R.C.P.E., Medical Officer, District No. 8 :—Although not limited to any particular locality, the disease is most common in those villages farthest away from the town; notably the villages of Brick Hill (or Brick Kiln), Butler's and Rawlin's Village.

P. T. Huggins, M.D., Medical Officer, District No. 9 :—The disease is prevalent throughout the island.

Dominica.

J. Numa Rat, M.R.C.S., Acting Medical Officer of the Public Institutions :—Having had experience of only a portion of Dominica, I am unable to assert, from personal knowledge, that yaws is prevalent throughout the island; but, judging from the cases under my care on the eastern and southern seaboards, from the admissions from different parts into the Yaws Hospital at the capital, and from information with regard to the northern and western districts, I believe the disease to exist, more or less extensively everywhere, it being, however, more common in the country than in the town, and most frequent in damp and isolated localities.

W. Rees Williams, M.R.C.S, Medical Officer, District A. :—Spread all over the island; said to be less prevalent at the extreme north. Proportionately more numerous in villages and hamlets than isolated houses.

John Armstrong, M.A., M.B., Medical Officer, District B :—Referring to the interrogations concerning yaws, proposed by Dr. Nicholls, it would be useless for me to attempt to answer them until I have had time to make the necessary study of the disease in question.

Up to the present I have sent to the Yaws Hospital in Roseau the cases presented to my notice in this district, so my replies at present to the proposed interrogations would be obviously valueless.

J. Kirkpatrick, M.D., Acting Medical Officer, Windward District :—I believe so. I am aware certain localities in my district suffer immunity from the disease, whilst in others the number of cases vary, there being nothing hygrometrically, thermometrically, or geographically strange in these localities to account for an increase or a decrease.

II.

What is the ordinary diet of the people of the island, and under what hygienic conditions do they live?

Tobago.

Dr. *Tulloch* :—The people live chiefly on roots, yams, tanias and potatoes, and fruits, plantains, breadfruit, bananas, mangoes, &c. They eat fresh meat in very small quantities.

Probably the ordinary fairly-well-to-do labourer does not taste beef, mutton, goat, or fowl more frequently than three days in a fortnight. Of the native provisions mentioned above they consume very large quantities. The diet scale of a prisoner at hard labour in gaol includes three and a-half pounds of vegetables daily, and this is certainly not more than the amount used by an adult labourer outside. I have on several occasions, where prisoners have been losing weight rapidly, ordered double rations, and this has invariably been consumed.

The average consumption of salt foods of all kinds, fish, pickled and dry, beef and pork, has been, for the last seven years, at the rate of one ounce per head of the population (taken at 18,000) per diem. In addition, however, indeterminable but probably large quantities of fish are caught locally, and pickled or dried for sale. The fish so treated are cavallio, snapper, and bonito. Fresh fish is used very largely in some districts of the island, as Plymouth, Buccoo Point, Charlottesville, and Speyside.

The hygienic conditions of the people are in most cases very bad. Many, but not the majority, live in palm-board huts with earth floors. Almost all their houses have thatched roofs. Overcrowding is practically invariable, even in the better class houses with shingled roofs. Privies are practically unknown. Diarrhœa and all diseases depending on improper nutrition are extremely common. The people are mostly cleanly in their persons, especially in the Windward District, where streams are numerous. Besides, they all bathe more or less frequently in the sea.

Morally they live like brutes. The illegitimate birth-rate varies between 60 and 80 per cent. in different parishes. Concubinage is the rule, and is not confined to the unmarried of either sex. The men acknowledge no moral restraint whatever. The virginity of the women seldom lasts a year beyond puberty. They live an almost purely animal existence, work as little as possible, and are quite happy so long as they have abundance to eat. They are generally a very temperate lot.

Dr. *Norman*:—The ordinary diet seems to be ground provisions, salt fish, fresh fish; at any rate, very little fresh meat is ever eaten. The people for the most part are cleanly and keep their houses in very good order; but, as a rule, they live in two-room houses, so that there is necessarily a certain amount of overcrowding, but as there are many doors and windows the ventilation is fairly well kept up.

Dr. *Blanc*:—The diet of the people among whom the disease is chiefly to be found consists mainly of vegetable foods, such as sweet potato, cassava, yam, plantain, and the like. The ripe cocoanut is very largely used as an aid to their cookery, and raw sugar and molasses play important parts in their diet.

Salt fish, salt beef, salt pork, are also used by the better class among them, and at Charlotteville and Speyside fish, either fresh or locally cured, forms a large proportion of their diet. Fresh meat is quite a rariety among them, and of this class of food, fresh pork is the article most easily obtained by them.

With regard to the hygienic conditions under which the people live, it may be said that:—

(1.) With the exception of one or two small swampy spots, the district is very healthy.

(2.) The ventilation of their houses is free enough when one considers the slight and open character of most of these buildings.

(3.) In their personal habits the people are filthy and careless, and these characteristics are especially noticeable when they are afflicted with disease such as yaws.

(4.) In most parts of the district the water availaible for drinking purposes is fairly good, except perhaps at the onset of the rainy season.

W. A. Purser, Esq.:—Besides the usual vegetable diet, potatoes, plantains, cassava, &c., there is fish, salt and fresh, and occasionally fresh meat. pork, beef, mutton, &c.

As respects hygienic condition there is a fair amount of washing of the person, but in small and closed houses the air cannot be satisfactory.

Grenada.

Dr. *M'Leod*:—Principally vegetable; occasionally fish and meat.

Dr. *Latour* :—Fresh fish and salt fish, with ground provisions. Along the leeward part of the island, mostly fresh fish. Hygienic conditions fairly good.

Dr. *Hatton* :—The diet of the lower classes of people consists chiefly of plantains, Indian corn, bread fruit, salt fish, rice, cassava, yams, tanias, rarely any meat except a little fat pork ; bread (wheat) is being more generally used every year. Olive oil is used with the salt fish, and tea is made of brown sugar, water, and sometimes lime-leaves ; infants are fed chiefly on arrowroot and corn-starch. Rum is the chief alcoholic beverage.

The hygienic conditions of the houses of the labouring class, and small proprietors, are as bad as they could possibly be ; the houses are greatly overcrowded, as many as eight or nine persons very frequently occupying a house consisting of two rooms, neither of which is larger than 10 feet by 12 ; the bedroom is devoid of fresh air or sunlight, the wooden window-shutter being kept constantly closed, and every crevice that would admit air or light is blocked up. A large four-posted bedstead generally takes up five-sixths of the bedroom, and underneath this bed is the receptacle for all the household belongings. Frequently neither the bedroom nor outer room is floored, and the ground here becomes saturated with all sorts of filth and means of contagion, so that it would only seem necessary to have an ulcer, or abrasion of the skin, to contract yaws, leprosy, or syphilis, once the disease was introduced into the house.

Dr. *Lang* :—The food of the people consists chiefly of vegetables and salted cod-fish, and, as a rule, their abodes are overcrowded, having little or no regard to ventilation or cleanliness.

H. J. L. Bennett, Esq. :—The peasants, who constitute the majority of the inhabitants, feed chiefly on the vegetables and fruits of the country, yams, plantains, peas, bananas, sweet potatoes, bread fruit, maize, sugar-cane, and mangoes, &c., helped out with salt fish, salt beef, or salt pork ; fresh meat is taken only occasionally, while inferior preserved butter and common olive oil are largely used at all times.

The dwellings of the country folk consist generally of small two-roomed wooden houses with thatched roof ; each house accommodates an average of about five persons ; as there is seldom more than one bed, several members of a family have to sleep huddled together on the floor. Fresh air is enjoyed during the day, but at night, and at times of sickness, all wholesome ventilation is prevented, every crevice around the ill-fitting doors and windows being most carefully stopped up with bits of rag, &c.

Privies and closets are found only near the better dwellings ; the poor people trust entirely to oxydisation and natural surface draining for the removal of all kinds of filth ; and it must be admitted that Nature does the work well, and that the amount of sickness actually due to filth contamination is small.

There is plenty of good drinking water to be obtained in nearly every part of the island ; but it often happens, either from ignorance or indolence, that the people use from impure sources with bad results.

W. Boyd, Esq. :— The general dietary of those usually attacked by yaws is composed of salt fish, pork, fresh fish, plantains, tanias, cassava, bread, sugar, tea, and fruits. Their external hygienic conditions are excellent, but the limited size of houses, and usual overcrowding, is, no doubt, a potent factor in intramural absence of health.

N. Durrant, Esq. :—Dietary of people : salt and fresh fish, maize-flour, pigeon peas, sometimes salt beef ; many never taste fresh meat. Hygienic conditions : houses mostly thatched ; walls, wattles plastered with cow-dung, and earthen floors ; a part is partitioned off for the parents ; all other inmates, grown or otherwise, crouch at night in their clothes together on the ground.

Well water mostly brackish ; pond water, which is preferred for drinking, is polluted by cattle and is very dirty, children sometimes bathing in it, and soiled linen washed upon its banks.

St. Vincent.

Dr. *Newsam* :—Vegetable, chiefly consisting of bread fruit, farina, cassava cakes, plantains, yams, tanias, and pigeon peas and beans ; the latter two more rarely than in the Grenadines, where the people eat also abundantly of Indian corn, and where cases of yaws are rare.

In addition to vegetables enumerated small quantities of salt fish and fresh fish are occasionally used. Fresh meat or poultry rarely. Dried rancid whale's flesh is freely sold throughout the island during the whaling season, *i.e.*, from March to June.

G. Finlay, Esq.:—The ordinary diet of the labouring portion of the people is vegetables and fish, salt and fresh; they dwell chiefly in villages densely overgrown by bread fruit trees, excluding light and ventilation.

W. Bruce Austin, Esq.:—Vegetables: potatoes, plantains, &c. The hygienic conditions are fairly good.

Martin O'Carroll, Esq.:—The ordinary diet of the people differs in different districts. In Leeward and the Grenadine Islands, where fresh fish is abundant, they live on nothing else; in this district, where it is scarce, they live on salt fish and fresh meat, at least once a week.

Dr. Arnott:—Vegetables and fish, chiefly salt, the usual daily food of the labourers.

St. Lucia.

Charles Dennehy, Esq.:—Ground provisions, salt fish, often strong-smelling and advanced in decay. Coarse, badly-prepared farine manioc. In towns and villages fairly good American flour bread is largely used, fresh fish daily, and some sort of meat twice a week. A small piece of American fat pork, often rancid, is very generally used as a flavouring for all sorts of dishes. Hygienic conditions bad.

H. Norton, Esq.:—Vegetables and salt fish, and occasionally a piece of meat, but very rarely.

O. Galgey, Esq.:—The ordinary diet of the people of the island, in the hilly parts, consists of salt fish and farine, sometimes with bread fruit, plantain, yam, or tania. On Saturdays and Sundays pork and goat are procurable. Beef is not often eaten, except by persons living close to a town. Near the seaside, fish, either fresh or salted, and farine form the principal articles of diet of the labouring classes. The children are fed on thick arrowroot, or tania soup, &c., in addition to the mother's milk, which, after the first month, the infant receives at irregular intervals. Cow's milk does not form part of the usual diet of infants among the poor classes.

Hygienic conditions are at a discount among the low-class natives. The rooms are small, built close to the ground, and ill ventilated. In addition to this, they are overcrowded. It is not unusual to find the father and mother sleeping on a "four-poster" a size smaller than the room, one or two children on the floor, and the remaining younger children asleep under the bed. All doors, windows, and crevices are hermetically sealed. Under such unsanitary conditions disease must be rife.

S. F. Proctor, Esq.:—Salted fish, fresh fish, meat occasionally, yams, potatoes, manioc, and plantains. Live chiefly in crowded towns and villages, and on estates, and pay little attention to sanitary matters.

Dr. Lestrade:—The ordinary diet of the labouring class in the island is salt fish, when it can be got, and roots, that is, yams, potatoes, and vegetables, such as plantains, &c. The hygienic conditions under which they live are mostly bad, cleanliness being altogether disregarded.

Dr. Tabone:—The ordinary diet of the common class of people consists of salt fish and vegetables, the latter being the common food of the poorest.

Antigua.

W. H. Edwards, Esq.:—The dietary for the most part is very poor, seldom getting fresh animal food. Their dwellings, as a rule, are mere huts, situated generally under trees, seldom getting the beneficent influence of the sun's rays.

A. E. Edwards, Esq.:—Corn meal, salt fish, vegetables, yams, sweet potatoes, &c.

Dr. Freeland:—The ordinary diet of the people of Antigua is salted food, viz., salt cod, herrings, and mackerels; also fresh fish when it can be obtained. Of non-nitrogenous articles of food, the lower classes partake chiefly of corn meal, rice, and sweet potatoes. Fresh meat is comparatively rarely indulged in.

The hygienic conditions under which the lower orders in Antigua live must be said to be decidedly bad. Their houses, as a rule, are little better than hovels, while the numbers accommodated in each house generally far exceeds the hygienic limit. The houses also are generally in a very filthy condition, added to which our lower orders have

a deeply-rooted dread of the evil effects of night air, and, as a result, jealously close all windows and doors during the hours of sleep, causing thereby great vitiation of the atmosphere they breathe.

Dr. Pierez :- Ordinary diet consists of fish (fresh, corned, or salted shell fish), occasionally meat (chiefly mutton), rice, bread, sweet potatoes, yams, corn meal. Most of the labouring classes, especially at Willikies, very unclean in their habits. Houses badly kept, their floors usually of mud.

Dr. Mackie :—The diet is the ordinary diet of the West Indian labourer; bread, ground provisions, a few green vegetables, and salted fish; fresh meat eaten on rare occasions only; as a drink, water sweetened with sugar or molasses is universal. The water is as filthy as possible in St. Paul's parish, most of the labourers using water from ordinary ponds where one may always see cattle and horses watered, and on some occasions even washed in the ponds.

As a rule, there is an absence of anything like hygiene; the people dwell, crowded together, in small one-room huts; at night there is a complete absence of ventilation, and the atmosphere is simply stifling. The huts are so small and so crowded that they cannot be kept clean; the people are also very careless about clean clothing or clean skins; nearly all suffer from the presence of vermin, such as lice, &c. The surroundings of the huts have improved somewhat lately, but are still very unsatisfactory; anyone going out early in the morning may see the villagers, as soon as they open their doors for the day, empty the night-soil a few feet from their huts; when the weather is hot and "steamy" the stench is abominable.

Virgin Islands.

Dr. Campbell :—The ordinary diet of the people of these islands is composed of fish, potatoes, and fruit, and occasionally bread.

The people live under the worst hygienic conditions possible, with the exception that their dwellings are scattered. They are not given to cleanliness. Their houses are, for the most part, very small huts, usually of two rooms, into which are crowded sometimes very large families. No attempt at proper ventilation is made. By day, it is true, the doors and windows are, as a rule, open, but at night every window, door, and, in fact, every crevice which will admit air, is carefully closed up.

Montserrat.

M. P. Duke, Esq. :—Diet and conditions of life similar to the other West India Islands.

Dr. Branch :—Salt fish and fresh vegetables.

St. Kitts.

Dr. Branch :—The labouring classes live chiefly on vegetables, salt fish, fresh fish and salt pork. Many of them sleep in overcrowded and badly-ventilated rooms.

Dr. Mapleton :—The ordinary diet of the lower orders consists of rice, salt fish, bread, fruit, sweet potatoes, salt beef, corn meal, herrings, flour in the form of bread and dumplings, fresh fish, rum, and gin.

The people are extremely dirty in their habits and persons. Their houses are absolutely unventilated at night, or when there is a sick person in them.

A. Boon, Esq. :—Diet mainly vegetable, with salt and fresh fish, and occasionally meat. Hygienic conditions indifferent.

J. Foreman, Esq. :—The labouring classes use fish, especially salt fish, and potatoes. Hygienic conditions generally bad.

R. E. Semper, Esq. :—Vegetables, with fish; occasionally meat.

Nevis.

J. D. Bell, Esq. :- The ordinary diet of the labouring classes, in whom the disease is seen, consists chiefly of salt and fresh fish, corn meal, and sweet potatoes. They live in badly-ventilated, damp dwellings, and are poorly clad.

C. R. Edwards, Esq. :—The ordinary diet of the poorest people, in whom yaws is

most frequently found, is as follows: sprats, boiled bananas, sweet potatoes, boiled corn meal, molasses, bread; occasionally goat's flesh and the flesh of the monkey.

Dr. Huggins:—Diet: American provisions, ground provisions, salt and fresh fish.

Dominica.

J. Numa Rat, Esq.:—In the district formerly under my care infants are given arrowroot, while their mothers are away at work, and children and adults live on tropical vegetables, to which salted fish is occasionally added.

The people live usually in wooden houses, with wooden floors, which are raised only a few inches sometimes, but generally a foot or more, above the ground. These houses are widely scattered on the hillsides and in the valleys, with but a small clearing between them and the forest. The people live very much in the open air during the day, but they sleep at night in overcrowded rooms. Their occupation, with few exceptions, is that of agricultural labourers. Though there is an abundance of water everywhere, personal cleanliness is very much neglected. In some places pool water, or rain collected in puncheons, is drunk, to avoid a short walk to a neighbouring stream. There are no cesspools, and no latrines of any kind. Excreta are discharged indiscriminately at a short distance from the houses. Drunkenness and sexual debauchery are rare vices among them. They occasionally marry, but preference is generally given to permanent concubinage.

The vegetables on which the people mostly live are the plantain (Musa paradisiaca), the tania (Caladium sagittifolium), the sweet potato (Batalas edulis), the yam (Dioscorea sativa), the bread fruit (Artocarpus incisa), the sweet cassava (Manihot Aipi), the flour of the bitter cassava (Manihot utilissima). They occasionally indulge, as on luxuries, on the calaloo (Busella cordifolia), the ochro (Hibiscus esculentus), the pumpkin (Cucurbita pepo), the tomato (Solanum lycopersicon), the pigeon pea (Cajanus flavus), the aguacate or avigato, or avocado pear (Persea gratissima), the christophine (Sechium edule), the Indian corn (Zea mays), the Koosh Koosh (Colocasia esculenta); but, unless these can be procured without much trouble, they prefer to limit themselves to the daily consumption of plain tania, the root of which is easily dug out of the garden by the house, plain boiled, or highly seasoned with the native pepper (capsicum) picked off a neighbouring tree, if there be such at hand. They eat but little salt with their food, but, for this deficiency they make up by an extravagant indulgence in capsicum. It is seldom, as I said, that the bulk of the people add anything to their vegetable fare. When they do, it is generally what is well known in the West Indies as salt fish, dried salted fish imported from North America. There are different kinds of this imported fish, some being large, white and thick, others of inferior quality, small, reddish, and thin. The latter are remarkable for their parchment-like dryness. Fresh fish is also eaten, but the surf prevents fishing for nearly nine months in the year. But, even if it were not so, I believe there is a fatal predilection for salt fish among not only the lower classes, but even among those who could procure fresh fish, if they desired to do so. A cow, or goat or pig, is occasionally slaughtered, or dies a less violent and sudden death, and the wealthier inhabitants regale themselves with the fresh meat, or proceed to salt it for future use.

Fruit trees are not planted in the district. Here and there a mango tree is seen laden with fruit at certain seasons, and the people indulge inordinately in them for the time, lapsing into perfect indifference on the subject when the wild mango trees have ceased to bear. A sweet orange tree is a great rarity, and one hardly ever sees under cultivation any of the numerous tropical fruit trees which would so readily thrive with a little attention

Though coffee and cacao are easily grown in the country, the majority of the people do not use them, but indulge rather in a morning cup of a warm decoction of some aromatic leaf or fruit rind, such as the orange peel. Even those who own large numbers of cacao trees never prepare chocolate for their own use, but drink instead a decoction that involves less trouble.

Labourers proceed to their work in the early morning, after regaling themselves with a cup of orange-peel tea and a small piece of bread, or roasted plantain, and toil in the blazing sun until mid-day, when they go home and ingest an enormous quantity of some tropical vegetable, highly seasoned with capsicum, to which sometimes a piece of salt fish is added. This huge bulk, which it would be difficult to digest even under the most favourable circumstances, is far more than the stomach can cope with, when the body generally has been weakened by exertion and exposure to the sun. Hence the dyspepsia

which is so common among these people, and the conditions resulting from defective nutrition. The evening meal is taken about 6 p.m. It is of the same quantity and quality as the mid-day meal, and is consumed under similar circumstances.

W. R. Williams, Esq. :—Vegetables, salt fish, fresh fish, pork, manioc, and arrowroot. Very small houses, one or two rooms, much overcrowded. The houses kept close at night and during sickness. As a rule, cleanly in their habits.

Dr. Kirkpatrick :—A sufficient quantity of vegetable food insufficiently nutritious. Salt fish enters largely into their dietary. Fresh meat, which, like many other necessary luxuries, may be thought of, but seldom, if ever, seen, and stimulants and condiments, are unconsidered articles only perhaps occasionally consumed.

Hygienic management is decidedly a capital idea, if, forsooth, it could be observed; the precepts of which are wholly disregarded. In the bare face of disinclination to bother with ventilation, cleanliness, dress, exercise, or, indeed, any analeptic principle, must tend to encourage the growth of many loathsome maladies beyond yaws. And the very fact of their extreme poverty, wretched dwellings, huddled up, as they are in so many instances, like a carefully-packed box of herrings, exposure, frequently indecency; in all, the very fuel to stimulate the fire of disease. Soap is an uncalculated item of domestic expenditure, and not in a few instances would be as strange to some as the introduction of a telephone.

Illegitimate children in overflowing tell the tale of woe, misery, and loathsomeness, because, like their parents or guardians, who are ill fed, dirty and careless, the offspring suffers helplessly.

III.

III. Have you observed any connection between the diet of the people and the spread of the disease? If so, give particulars.

Tobago.

Dr. Tulloch :—It is difficult to say to what extent, if any, the diet of the people has to do with the causation or spread of the disease. Personally, I have seen no proof that it is a factor at all. It is true that the four fishing villages referred to above are and have been badly infected with yaws, but it is also to be remembered that these are distinctly uncivilised places, and that the indifference of their inhabitants to the presence of the disorder is probably unequalled in Tobago. Again, Mount St. George is less fish-eating than any other settlement on the island, except some of the inland portions of Sandy Point, and it has been the most severely affected village to come under my notice. Further, the diet of the people is practically identical with that of persons of the same class in the non-urban portions of Barbados and Trinidad. But Barbados, where the medical men say they can discover no yaws, is the island of the West Indies where fish, both salt and fresh, can be obtained most cheaply and readily, and Trinidad is Roman Catholic, and certainly more largely fish-eating than either Barbados or Tobago, and there yaws is rare, at least in the civilised regions.

There can be no doubt, of course, that in affected individuals insufficient food and improper hygienic measures will aggravate the disorder and prolong its course, and, similarly, persons enfeebled by want are more likely to contract this, as to contract most other diseases. Further than that I cannot go.

Dr. Norman :—I can furnish no answer to this question.

Dr. Blanc :—The diet throughout the district is so uniformly the same, while the prevalence of the disease is so universal, that it is not possible to draw any reliable conclusion with reference to a connection between the two. At least I would not feel justified in doing so, except I state that the non-nutritious character of the diet generally does seem to me to make the people more fit subjects for the spread of the disease; and in support of this opinion I may mention the fact that the disease is rarer among the better-class people, who, though of the same race, are more in a position to use a nutritious diet.

Again, there is the fact that at Charlotteville and Speyside, where the diet so largely consists of fish, the disease is very prevalent, more so than in other parts of the district; but here, again, I do not feel competent to venture an opinion, especially in view of the fact, which I shall point out below, that syphilis is also very prevalent in these two places.

W. A. Purser, Esq. :—It is generally believed that fresh fish diet is much connected with the prevalence of the disease. Hence prevalence, as aforesaid, on the sea-coast. I share in the general belief from my experience as Medical Officer of No. 3 District.

Grenada.

Dr. *McLeod* :—No.

Dr. *Latour* :—No connection between diet and spread of disease. Disease known to improve on good diet. Relapses less frequent when patient is kept on good diet.

Dr. *Hatton* :—I have not noticed any connection between the diet and the spread of the disease. In Barbados and Carriacou the diet is pretty much the same as it is here, yet in these places the disease does not prevail, though it probably did prevail in Carriacou at one time, as there are the remains of buildings formerly used for yaws patients on some of the estates, and there is a bay, known as Yaws Bay, where the patients used to bathe.

Dr. *Lang* :—A low diet is certainly conducive to the disease. In Carriacou, where whale beef, preserved by being dried by exposure to the sun's rays, is easily obtained and partaken of largely by the people, I observed the disease to be very obstinate and recovery to be protracted.

H. J. L. Bennett, Esq. :—I have observed no direct connection between diet and yaws ; but as the majority of the people are decidedly "poor livers," it stands to reason that they cannot have such good disease-resisting powers as their better fed neighbours.

W. Boyd, Esq. :—I have observed no connection between the spread of the disease and the diet of the people.

N. Durrant, Esq. :—All eat identically the same food.

St. Vincent.

Dr. *Newsam* :—I cannot say I have observed any marked connection.

G. Finlay, Esq. :—I have personally observed no such connection, though I have been apprised that this disease prevails chiefly in the leeward parts of the island, where there is much more fresh fish consumed than in the other parts.

W. B. Austin, Esq. :—I have observed no connection of this kind.

M. O'Carroll, Esq. :—I cannot say.

Dr. *Arnott* :—I have not noticed any connection whatever between the diet of the people and spread of the disease.

St. Lucia.

C. Dennehy, Esq. :—Judging by appearance of patients, the underfed, unwholesome fed, sickly, weak, and dirty, are the only sufferers.

H. Norton, Esq. :—The very poor diet of the people has a great deal to do with the spread of the disease.

O. Galgey, Esq. :—I have always observed that yaws cases occurred in the badly fed and unwashed portion of the community. There is no doubt in my mind that filth and dirt, combined with unwholesome food, predispose to the disease. I have never seen a a case of yaws in a cleanly, well-fed black native, and no white person has ever come under my notice suffering from the disease.

S. F. Proctor, Esq. :—Appears chiefly to occur among poorer classes and least able to afford meat diet.

Dr. *Lestrade* :—I believe the eating of too much salt fish and supersalted roots add greatly to the spread of the disease, though its chief factor for its spread is want of cleanliness. The particulars are that the people most afflicted are country people, it being rarely found in the towns, and these people mostly eat salted things, and drink bad water, and seldom bathe.

Dr. *Tabone* :—I cannot trace any connection between the diet and the spread of the disease.

ANTIGUA.

W. H. Edwards, Esq. :—Yaws, as a rule, does not break out amongst the well fed. I have never seen a case occur in a cleanly well-fed person accustomed to out-door exercise.

A. E. Edwards, Esq. :—No.

Dr. *Freeland* :—I have never observed any connection between the diet of the people and the spread of yaws.

Dr. *Pierez* :—No.

Dr. *Mackie* :—In this parish the disease has been confined to the labouring class, and they all have, as a rule, the same diet as mentioned above. I do not believe that the diet has much to do with the spread of the disease, although a poorly-fed child will suffer more from the disease than a child well fed and in good health; although hitherto confined to the labouring class, that is a result due to the fact that the children of the upper class have not been exposed to the contagion.

VIRGIN ISLANDS.

Dr. Campbell :—I have not observed any connection between the two.

MONTSERRAT.

M. P. Duke, Esq. :—No.

Dr. Branch :—No.

ST. KITTS.

Dr. *Branch* :—People that are badly fed seem specially prone to the disease.

Dr. *Mapleton* :—I have not observed any connection between the diet of the people and the spread of the disease. I speak now from my previous experience of the disease in Montserrat.

A. Boon, Esq. :—I have not.

J. Foreman, Esq. :—Most cases of yaws are met amongst badly-fed children.

R. E. Semper, Esq. :—I have not.

NEVIS.

C. R. Edwards, Esq. :—I have not observed any connection between the diet of the people and the spread of the disease.

Dr. *Huggins* :—No. Scarcity of good food may have something to do with it.

DOMINICA.

J. N. Rat, Esq. :—The disease appears to be most prevalent where food is scantiest and least nutritious. It is commoner in the country, where fresh meat and fish are rarely eaten and the diet is chiefly vegetable, than in the capital, where there is a fair supply of the former; and in the country it is more frequent among those whose diet is inferior to that of their neighbours.

W. R. Williams, Esq. :—No.

Dr. *Kirkpatrick* :—In the majority of cases treated by me at St. Vincent within a period of over eight years, I observed, where salt fish and meats were withheld, the disease gradually disappeared, and that a mixed diet without condiments and stimulants, together with the qualified use of my treatment referred to in Section XII, cases invariably progressed rapidly to a favourable termination of cure.

IV.

Does the disease attack all classes of the community, or is its prevalence limited to a particular section of the population?

TOBAGO.

Dr. *Tulloch*:—The disease attacks all classes of the community. I have never seen it in a white person; there are only about 70 whites all told in the island; but I have seen it in at least three families who might pass for whites, and who are in "society." In all these cases there were carelessness as to contact with affected persons, a broken surface and cases of yaws in the vicinity.

Dr. *Norman*:—The inhabitants in my district are nearly all of the labouring class, and I have seen yaws in the well-to-do as well as the poorer classes. There are few Europeans in my district, so I cannot say whether they are subject to it or not.

Dr. *Blanc*:—As far as I have observed, the disease does not attack all classes of the community. In this district its prevalence is almost entirely limited to labouring class of the negroes, and even among these the disease is most prevalent among the more indigent and squalid portion. I have never observed the disease among either the white or the "well-to-do" coloured classes of the community, and among those of the negroes who are in more comfortable circumstances, and would not be included in the term "labouring classes," it is comparatively rare.

W. A. Purser, Esq.:—The disease attacks, would attack, all classes subjected to constant and near intercourse with those who have the disease, but is prevalent only with those who are thus subjected.

GRENADA.

Dr. *McLeod*:—Attacks principally the labouring class.

Dr. *Latour*:—Almost entirely confined to the working classes, coolies included. Have known a European affected.

Dr. *Hatton*:—The disease seems to attack the poor and badly fed more frequently than the well fed, but perhaps this is because the poor are more exposed to it, and because of the frequency of ulcers amongst them. I have seen well-to-do white people suffering from the disease, especially children who have been allowed to run about among the negroes in their bare feet.

Dr. *Lang*:—The disease is principally prevalent among the labouring classes owing to want of care and cleanliness, and to a diet insufficiently nutritious.

H. J. L. Bennett, Esq.:—Yaws attacks chiefly the lower orders, the East Indian immigrants being frequent sufferers; in my opinion, healthy and well-fed people of cleanly habits, have not much to fear from the disease; and, as a fact, I have never known a medical man catch it, although doctors must of necessity often be brought into close contact with patients suffering from the complaint.

W. Boyd, Esq.:—The disease is limited to the labouring classes from obvious reasons, though I have on a very few occasions met with it amongst the higher circles of life. I am of opinion that free communication only is required to convey the Frambœsial contagion to any class

N. Durrant, Esq.:—Cases are always directly imported, or contagion always extremely probable from such cases.

ST. VINCENT.

Dr. *Newsam*:—Chiefly the black labouring population, especially those dirtiest in their habits, the poorer fed and the anæmic. Cases are from time to time to be met with among the (poor) whites, Barbadians, and the Portuguese, the low crasis peculiar to these people favouring the development of the disease by contagion or otherwise.

G. Finlay, Esq.:—The disease is limited to the labouring section of the community, and chiefly to the poorest and worst fed among them.

W. B. Austin, Esq.:—The disease attacks all classes of the community, but it is much more prevalent among the coolie section of the population.

M. O'Carroll, Esq. :—I have known it to attack the lower class principally, but I also knew several members of a respectable white family to be attacked by it.

Dr. *Arnott* :—Coolies are very prone to yaws attacks, and the disease lasts a long time and is difficult to eradicate in spite of care and treatment. The negro generally does not suffer in the same ratio as the coolie race from rheumatic pains.

St. Lucia.

C. Dennehy, Esq. :—I have never met with a well fed and cleanly person suffering from the disease. Negroes and coolies, adults slovenly, dirty, sickly, frequently with chronic ulcers, and neglected children are the only sufferers.

H. Norton, Esq. :—The disease attacks all classes, where there is a mixture of black blood.

O. Galgey, Esq. :—The disease attacks those only who, in addition to their own carelessness on sanitary matters, are exposed to the contagion by indiscriminate contact with people suffering from yaws. This remark applies to the low class blacks, and also to a large number of coolies.

S. F. Proctor, Esq. :—I have observed yaws only among the labouring population.

Dr. *Lestrade* :—The labouring class, the negro, is the party most affected, though the disease is not solely confined to this particular class, it being found in all classes in rare instances. The labouring class being subjected more frequently to those factors which occasion the disease, are consequently more affected.

Dr. *Tabone* :—I do not think it affects but the poorer class of people, their hygienic conditions being rather bad.

Antigua.

W. H. Edwards, Esq. :—Limited entirely, I believe, to those who live under insanitary conditions ; especially observable among the lower orders.

A. E. Edwards, Esq. :—Limited to the lower orders.

Dr. *Freeland* :—In my experience the disease is strictly confined to the lower orders, or even the poorest of these. I have seen cases among the poorer classes of Portuguese, also in coolies, but the large majority of cases are among negroes.

Dr. *Pierez* :—Black population usually attacked, then the coloured ; least of all, the white. I have not had more than three or four of the latter (Portuguese of unmixed blood).

Dr. *Mackie* :—In this parish the disease has been confined to the labouring class, and they all have, as a rule, the same diet as mentioned above. I do not believe that the diet has much to do with the spread of the disease, although a poorly-fed child will suffer more from the disease than a child well fed and in good health ; although hitherto confined to the labouring class, that is a result due to the fact that the children of the upper class have not been exposed to the contagion.

Virgin Islands.

Dr. *Campbell* :—Since my arrival here, a little over a year ago, I have only observed four cases, all among the lower class of field labourers.

Montserrat.

M. P. Duke, Esq. :—Chiefly seen in children and poorer classes.

Dr. *Branch* :—Almost invariably limited to the poorer section.

St. Kitts.

Dr. *Branch* :—The poorest people. It seems to be specially common among Africans, and rare among whites, even if poor and badly fed.

Dr. *Mapleton* :—The disease attacks all classes, but chiefly the lower classes.

A. Boon, Esq. :—Limited to blacks. I do not think there are one hundred cases in St. Kitts.

J. Foreman, Esq. :—The disease attacks only the labouring class.

R. E. Semper, Esq. :—I have not heard of the disease attacking any one not of the lower classes of the community.

NEVIS.

J. D. Bell, Esq. : —The disease appears to be limited to the labouring population.

C. R. Edwards, Esq. :—It is very common in the black population. I have never seen it in a white person, although I am informed it may occur in Europeans. It is less common in coloured than in black people, probably because there are more black than coloured, and the former are more prone to fall into destitution, which is a most favourable predisposing cause.

Dr. *Huggins* :—No. I have only seen it in the lower classes.

DOMINICA.

J. Numa Rat, Esq. :—Though liable to contract the disease, the white and coloured portions of the population are rarely attacked in comparison with the negroes, this comparative exemption being due apparently to the better conditions of life of the former rather than to any racial immunity. The classes most commonly affected are those who live in isolated districts, those whose diet is almost entirely vegetable, the uncleanly, those who are subject to injuries and diseases of the skin, and those who are weakened either by illness or insufficient food. With regard to age, infants are very seldom attacked. The affection is commonest between the first and twentieth years of life, and, of this period, the cases between the fifth and tenth years are more than twice as numerous as those at any other portion of it. After the twentieth year the disease becomes less and less frequent.

W. R. Williams, Esq. :—Only the lower classes to any extent.

Dr. *Kirkpatrick* :—I do not believe so. Especially amongst the lower classes and those who ill care themselves.

V.

Have you ever seen yaws and syphilis in the same person? If so, give particulars of the case or cases.

TOBAGO.

Dr. *Tulloch* :—I have never seen primary syphilis and yaws in the same person. The primary sore is not common here, and is specially rare in the outlying districts, where yaws is most common. In Scarborough, where there is much greater chance of inoculation with syphilis, yaws is, now, not at all common.

Dr. *Norman* :— I have not noticed this connection.

Dr. *Blanc* : —I have seen yaws and syphilis in the same person, and, as far as it was possible, I have usually found the syphilis to be of the inherited type, and usually tertiary.

I have not seen any yaws patients with syphilis in the primary or early secondary stages, but have very commonly seen them in the earlier stages of yaws with well-marked papular eruptions, which, however, might have been either syphilitic or the precursors of the yaws tubercles.

These symptoms commonly disappear under treatment, but sometimes give place to a scaly eruption very like psoriasis, and very difficult of cure.

Syphilis, as evinced by severe cachexia, or indurated and enlarged glands, enlargement of bones, nodes, &c., has been a frequent complication in the cases of yaws which have come under my notice.

The following cases are quoted from my Record Book :

A. B. Girl. Aged 17 years. Labourer. First seen on June 2nd 1889.

Condition.—Moist yaws, tubercles on back, thighs, feet, and hands. Papular eruption on hands. Glands of neck indurated. Headache. Sore throat (slight ulceration). Patient was cured.

There was every probability of the syphilis here being acquired, but I could obtain no history to that effect.

C. D. Boy. Aged six years. First seen on 26th March 1890. Had had yaws some time before, which seems to have disappeared spontaneously.

Condition.—Ulcerating yaws tubercle on right shin; pronounced syphilic cachexia; indurated glands, enlarged joints and bones.

5th May 1890. Syphilic ulcer on knee.

In connection with this question I may state that at Charlotteville and Speyside, where yaws was so prevalent, a very large proportion of the people suffer from syphilis, and consequently the two diseases were often to be seen in the same person.

W. A. Purser, Esq.:—I have not seen yaws and syphilis in the same person, but think it likely that syphilis would predispose to yaws.

Grenada.

Dr. McLeod:—No.

Dr. Latour:—Have not had my attention drawn to the fact.

Dr. Hatton:—I believe I have seen yaws in a person who has had syphilis, but I have no case recorded.

Dr. Lang:—The combination of yaws and syphilis is not of uncommon occurrence.

H. J. L. Bennett, Esq.:—I can call to mind only one case in which the two diseases were undoubtedly associated in the same person.

The patient was a young woman who contracted the syphilis first, and then got either a primary or a secondary ulcer inoculated, in an unknown manner, with the yaws.

The diseases were both far advanced when I first saw the case; the patient was sent to hospital where the double complaint worked sad havoc on her face. After leaving the institution she was lost sight of.

W. Boyd, Esq.:—I have on several occasions found yaws and syphilis co-existing, but I cannot at the moment lay my hand on the brief records which I kept of the cases. In one, however, the man had a well-marked and indolent Hunterian chancre, and buboe, when he came under my notice, and at the same time a mild eruption of Frambœsial tubercles, which he stated made their appearance two weeks after the syphilitic sore. His chancre and buboe rapidly disappeared under treatment, but from recurrent eruptions of frambœsia, and subsequent peritonitis, his stay was a prolonged one, and he left the hospital completely broken down in health, though cured apparently of the disease. I frequently meet with a combination of frambœsia and scrofula, and find that the presence of two specific diseases, such as those named, or yaws and syphilis, render the case most intractable.

N. Durrant, Esq.:—No. Though both diseases may exist together, yaws afflicts persons of ages unlikely to contract syphilis, with both parents and elder and younger brothers and sisters in perfect health, showing no sign of hereditary disease of that nature.

St. Vincent.

Dr. Newsam:—I do not recollect.

Geo. Finlay Esq.:—No.

W. B. Austin, Esq.:—No.

Martin O'Carroll, Esq.:—I have not seen yaws and syphilis in the same person. I believe yaws to be a form of syphilis, that is, syphilis contracted generations before appearing as yaws in the present.

Dr. Arnott:—No case or cases have come under my observation.

St. Lucia.

C. Dennehy, Esq. :—Some cases that have presented themselves were so marvellously like rupial and late stages of tertiary syphilis, that diagnoses may be left open, the same treatment being good for either, or both combined.

H. Norton, Esq. :—I have, and have at present two cases in the hospital, which can be seen.

O. Galgey, Esq. :—I see no reason why yaws and syphilis should not occur on the same individual. In such a case I would regard it as a coincidence, as I believe the diseases to be separate and distinct. I met with one case of the kind, but as it occurred years ago, I am not in a position to give particulars.

S. F. Proctor, Esq. :—No.

Dr. Lestrade :—I have had no opportunity of observing it, though I believe there is some connection between the two diseases.

Antigua.

W. H. Edwards, Esq. :—No ; but syphilis predisposes to yaws.

A. E. Edwards, Esq. :—No.

Dr. Freeland :—I have never seen yaws and syphilis in the same person.

Dr. Pierez :—No.

Dr. Mackie :—I have never seen syphilis and yaws in the same person. At English Harbour where syphilis is occasionally seen, and where there is considerable congenital syphilis, I have rarely seen yaws at that place ; greater cleanliness is observed, as the children are frequently bathed in the sea.

Virgin Islands.

Dr. Campbell :—I have not.

Montserrat.

M. P. Duke, Esq. :—No.

Dr. Branch :—No.

St. Kitts.

Dr. Branch :—Nearly every black or coloured person on St. Kitts has, or has had, syphilis in some shape or another, congenital, acquired, or both ; consequently, yaws is almost invariably observed here in persons whose constitutions are tainted with syphilis.

Dr. Mapleton :—I have not seen yaws and syphilis in the same person. Syphilis is very common here, but is rare in Montserrat.

A. Boon, Esq. :—I have not, but my experience of the disease is limited.

J. Foreman, Esq.:—No.

R. E. Semper, Esq. :—No.

Nevis.

J. D. Bell, Esq. :—In some of the few cases I have seen the ulcerations so closely resembled tertiary syphilis, and treatment by mercury and potassium iodide benefiting the patients, there seemed to be some connection with the latter disease, but I could not obtain any evidence or reliable history of syphilis in any case.

C. R. Edwards, Esq. :—I have seen very characteristic yaws tubercles on chronic syphilitic ulcers on the leg.

Dr. Huggins :—Have never noticed it.

Dominica.

J. N. Rat, Esq. :—I have known of only one case of yaws co-existing with inherited syphilis in an infant. The yaws was contracted in the fourth month through ulcers in the buttocks, from a girl who used to look after the child while the mother was away at work. The child died from the effects of syphilis in its eighth month. The yaws tubercles developed normally, and there was nothing in their appearance to indicate that the affection had been modified by the presence of syphilis. The rarity of yaws in infancy, during which inherited syphilis is generally observed, would preclude the probability of the frequent co-existence of the two diseases at that period of life. It might be expected, however, that the two affections would be found concomitant in those in whom the manifestations of transmitted syphilis have been retarded, and in whom the disease does not appear until adolescence or later. I have never met with a case of yaws under such circumstances, and I believe that such a coincidence rarely, if ever, exists, from the fact that deferred inherited syphilis is a rare occurrence in the tropics, where the circumstances of life which produce such a high rate of mortality among infants and children would ensure the extinction in infancy of almost all those who are born with a syphilitic taint, and that, in such instances, yaws would be generally contracted before the symptoms of syphilis were observed.

With regard to acquired syphilis, a few cases have come under my observation in which yaws co-existed with this disease in its tertiary forms; but I have met with only one instance in which yaws accompanied syphilis during the primary and secondary symptoms of the latter. The following is the case :—

A man about 25 years old, who had been six years abroad in a locality in which yaws was unknown, returned to his country, where, six months after, he contracted gonorrhœa and an indurated chancre of the prepuce, for which he consulted me, and for which I put him under mercurial treatment. The chancre was followed by sore throat and roseola, and subsequently by psoriasis and indurated inguinal glands. He was also suffering, at the time he consulted me for the chancre, from a non-specific ulcer of his right inner ankle. He had been two months under the mercurial treatment (corrosive sublimate) which, on account of the tenderness of his gums, had been suspended and renewed, when he noticed an alteration in the appearance of the ulcer on his ankle, to which he drew my attention. The granulations, instead of being red, small, and moderately moist, had become pale and large, and discharged a copious serum-like fluid. A fortnight after this change in the ulcer, the femoral glands of the right side enlarged and formed a doughy, painless mass about the centre of Scarpa's triangle.

Three weeks later the ulcer healed, but the mass of enlarged femoral glands persisted. A week after the healing of the ulcer, a crop of papules appeared over his face, the back of his neck, the backs of his arms and hands, and the front of his legs and feet. These were absent from the rest of his body, including his chest and the fronts of his arms, on which the syphilitic roseola had developed. The greater part of the eruption disappeared in the papular stage, a few only proceeding to that of yaws tubercles. The syphilitic roseola co-existed with the yaws papules and the syphilitic psoriasis with the yaws tubercles; but the eruptions connected with the two diseases occupied different portions of the body.

This case is interesting as showing that mercury, though useful in curing yaws, is not a prophylactic against that affection any more than it is against syphilis.

W. R. Williams, Esq. :—No ; (unless it is the same disease).

Dr. Kirkpatrick :—Yes ; but not at the same time. The yaws had been cured fully three years before the syphilis was contracted, and the latter disease developed no extraordinary symptoms beyond the common. In my opinion the system recognised as usual the generally prescribed treatment; certainly there were no retruse signs of connection

VI.

Have you observed any connection between yaws and tuberculosis? If so, give particulars of cases, stating which disease made its appearance first.

Tobago.

Dr. Tulloch:—I have seen many cases of yaws and lupus in the same individual. I do not recollect seeing the disease complicated with phthisis or tubercular joint affection.

Case I. (*See* Figure I.)

J. R., *ætat* 30 years, a beggar, has had yaws for many years. Has strongly marked superficial lupoid ulceration of face, arms, and legs. Among these patches, and on the healthy skins are studded numerous typical yaws tubercles. Lupus is believed to have begun first. Was under treatment for four weeks, by which time the yaws had disappeared. For her relapse *see* Case IV., under proper head.

Case II.—Mrs. T. and two children, all have typical tubercles on mouth, anus, privates, &c. Have suffered for one year, more or less. One child contracted disease first by cut on toe, then mother, then other child. One child was marked cured in two months, and the mother in three. She disappeared from treatment for five months, and returned with three sores, and child with two. Remained under treatment for three and a-half months, when they were both marked cured again. In six months Mrs. T. returned alone, with well marked lupoid ulcers, and scars all over the body, but chiefly on back and thighs. (Dr. Nicholls saw this case.) She has been, off and on, under treatment ever since then (beginning of 1889), the ulcers healing readily enough, and then the cicatricial tissue breaking down. There can be no doubt that in this case the lupus succeeded the yaws.

Case III.—D. K., *ætat* 17 years, has been incapacitated from moving about for many years by almost universal lupoid ulcerations. Came under treatment on 18th April 1890. Had then 12 large moist yaws tubercles on legs, face, and arms. Disease contracted two months before from a neighbour's child. Remained under treatment, off and on, for nine months, when she died from exhaustion due to extension of the lupoid ulcers. I saw this patient on several occasions, and she was a ghastly object. There can be no doubt that the lupus in this case preceded the yaws.

Dr. Norman:—I have not been here sufficiently long to give any positive answer to this question, but I can say that I have seen yaws in patients who otherwise are perfectly sound in health.

Dr. Blanc:—I have not observed any direct connection between yaws and tuberculosis, but have occasionally seen the disease occurring in children in whom the tubercular diathesis was well marked.

W. A. Purser, Esq.—I have not observed any connection between yaws and tuberculosis, and think there is not any (necessary) connection.

Grenada.

Dr. McLeod.—No.

Dr. Latour.—Cases of tuberculosis are seen to follow yaws, but the relationship between cause and effect seems difficult to trace.

Dr. Hatton.—No.

H. J. L. Bennett, Esq.—No.

W. Boyd, Esq.—I have noticed no generic connection between yaws and tuberculosis, but have treated patients suffering from pulmonary tuberculosis who at the same time had yaws.

N. Durrant, Esq.—As yaws patients are treated alone in a special hospital, I make no physical examination before sending them up. Patients sent from Carriaco do not belong to tuberculous families, and apart from the special disease seemed always in good health.

St. Vincent.

Dr Newsam.—I have frequently observed the two co-existing; the latter, I think, predisposing to development of the former; but I recognise no connection, yaws being to my mind a disease *sui generis*.

G. Finlay, Esq.—No.

W. B. Austin, Esq.—No.

M. O'Carroll, Esq.—No.

Dr. Arnott.—Yes, I have seen such cases; yaws appeared first.

St. Lucia.

C. Dennehy, Esq.—No.

H. Norton, Esq.—I have not seen any cases of such during my over 19 years' experience.

O. Galgey, Esq.—I have never noticed any connection between yaws and tuberculosis.

S. F. Proctor, Esq.—No.

Dr. Lestrade.—No.

Antigua.

W. H. Edwards, Esq.—No.

A. E. Edwards, Esq.—No.

Dr. Freeland.—I have never observed any connection between yaws and tuberculosis.

Dr. Pierez.—No.

Dr. Mackie.—The worst cases of yaws I have ever seen occurred in a child seven years old, who was advanced in phthisis; the eruption covered the whole body. I have not observed any connection between yaws and tuberculosis in other cases. In the case I mention above, tuberculosis preceded the yaws eruption.

Virgin Islands.

Dr. Campbell.—I have not.

Montserrat.

M. P. Duke, Esq.—No.

Dr. Branch.—No.

St. Kitts.

Dr. Branch.—No.

Dr. Mapleton.—I have not observed any connection between yaws and tuberculosis.

A. Boon, Esq.—I have not.

J. Foreman, Esq.—No.

R. E. Semper, Esq.—I have not.

NEVIS.

C. R. Edwards, Esq.—I have never seen yaws and tuberculosis in the same person.

Dr. Huggins.—No.

DOMINICA.

J. N. Rat, Esq.—I have seen several cases in which yaws ulcers have acquired the characteristics of lupus. There is at present in the Yaws Hospital, near Roseau, Dominica, a boy suffering from lupus, which originally developed on the yaws ulcers, for which he was admitted into the institution. Many of the distortions resulting from recurring and spreading ulceration, followed by cicatrization, and attributed to yaws pure and simple, appear to me to be the effects not of yaws only but of tubercular infection of chronic yaws ulcers. I know of no case in which the yaws virus entered the system through a tubercular ulcer of the skin. The ulcer which afforded an entrance to the infection has usually disappeared when the secondary eruption, for which treatment is sought, has developed; and the opportunities for deciding on its nature are, therefore, few. But there is no reason to suppose that a tubercular ulcer would afford less facility for the reception of the yaws virus than any other lesion of the skin.

W. R. Williams, Esq.—No.

Dr. Kirkpatrick.—I have not.

VII.

VII.—Have you met with any cases in which the disease has been spread by vaccination; if so, give full details?

TOBAGO.

Dr. Tulloch.—No; I have seen one case in which it followed vaccination:—V. D.—Illegitimate child at 10 months; sister had yaws. V. D. was one of twelve vaccinated by me on October 8th, 1888, from the arm of a healthy child who had been vaccinated the week before with imported calf lymph. The four marks healed normally, but on December 18th or thereabouts, one of them formed a "boil" and burst, and when brought to me three weeks later, the site of that mark was occupied by a typical tubercle. None of the other eleven children became infected. It is much more probable to suppose that, living in a badly-infected village, Bethel, and with a sister suffering from yaws in the house, the child was directly inoculated by some sufferer after the vesicles had ruptured, than that the lymph was to blame, and that the poison selected this infant alone out of twelve

Dr. Norman.—I have met with no case in which the disease has been spread by vaccination.

Dr. Blanc.—On the 13th November 1888, I vaccinated a little girl, G. B., aged four years. On her return on the 20th, I selected her in preference to others, for the purpose of vaccinating others. She appeared healthy in all respects, and her mother denied the existence of anything like yaws, and on examining the child I found nothing like it. On the 20th, therefore, I vaccinated several children from G. B.'s arm, and on the 27th I saw these children and found all the vaccinations successful, but no sign of yaws in any of them. The vesicles of one child, E. M., were bruised, but showed no sign of yaws. Three weeks after this, E. M. was brought to me, and I found yaws tubercles replacing the vesicles which, I was informed, had never healed. I was informed by E. M.'s mother that G. B. had had yaws previous to her being vaccinated, but the latter's mother continued to deny it. On further inquiry I was not able to find that any of the other children vaccinated from G. B. had contracted yaws.

This is my only experience approaching to anything like spread of yaws by vaccination.

W. A. Purser, Esq.—I have not met with any cases in which the disease yaws has been spread by vaccination. In a late general vaccination, two children were inadvertently vaccinated who had yaws, and the vaccination marks assumed an unhealthy appearance and abnormally spread.

GRENADA.

Dr. Macleod.—No.

Dr. Latour.—No; but it is quite possible, through the medium of flies, for the poison to enter the raw surface of the vesicle.

Dr. Hatton.—No. I have in the past five years vaccinated about 600 children, and I feel sure none of these have contracted yaws within three months of vaccination.

Dr. Lang.—I have not seen any case in which the disease has been spread by vaccination.

H. J. L. Bennett, Esq.—No.

W. Boyd, Esq.—I have never known the disease to have been conveyed by vaccination.

N. Durrant, Esq—Never.

ST. VINCENT.

Dr. Newsam.—None from direct inoculation with diseased lymph. I have known cases developed in the sites of the pocks after vaccination (before they had healed) owing to contagion from other members of the family, who were at the time diseased, and in whose arms the vaccinated children had been borne.

G. Finlay, Esq.—No.

W. B. Austin, Esq.—No.

M. O'Carroll, Esq.—No; but I have no doubt it can.

Dr. Arnott.—Creole mothers and fathers are very particular in this island about the lymph being taken from clean and healthy children free from skin eruption of any sort. In consequence, I have known of no connection between yaws and vaccination.

ST. LUCIA.

C. Dennehy, Esq.—No. The disease, as is proved when there is contact of surface, is beyond all doubt inoculable. It is, therefore, easy to conceive that a child with broken vesicles—frequent occurrence—living in a vicinity of yaws patients, playing with and perhaps nursed by them, may readily contract the disease, but I know of no such case, and of course at the vaccination stations care is taken against such a contingency.

H. Norton, Esq.—No.

O. Galgey, Esq.—I have never met with a case of yaws caused by vaccination. I exercise the greatest caution in selecting a healthy-looking child as a vaccinifer, and take care that no spots or other suspicious signs exist on the body.

S. F. Proctor, Esq.—No.

Dr. Lestrade.—No.

ANTIGUA.

W. H. Edwards, Esq.—No. I have never seen any disease communicated by means of pure vaccine lymph.

A. E. Edwards, Esq.—No.

Dr. Freeland—I have never met with any case in which there was the slightest ground for supposing that the disease was spread by vaccination.

Dr. Pierez.—No.

Dr. Mackie.—No, most of my cases have occurred in children over four years of age ; they had all been vaccinated when under one year of age.

Virgin Islands.

Dr. Campbell.—I have not.

Montserrat.

M. P. Duke, Esq.—No.

Dr. Branch.—No.

St. Kitts.

Dr. Branch.—No.

Dr. Mapleton.—I have seen one case in which a white child contracted yaws either from vaccination or from some negro children immediately after its vaccination. The cicatrix on the arm was the seat of the yaws inoculation. I did not vaccinate the child myself.

A. Boon, Esq.—I have not.

J. Foreman, Esq.—No.

R. E. Semper, Esq.—No.

Nevis.

C. R. Edwards, Esq.—I know of no case of yaws having been spread by vaccination.

Dr. Huggins.—No.

Dominica.

J. N. Rat, Esq.—Cases have come under my notice in which secondary yaws tubercles have developed in recently vaccinated persons, not only on distant parts of their bodies, but also in the immediate neighbourhood, and even on the very sites of the vaccine vesicles, and in which everthing seemed to point to vaccination as a means of spreading the disease. But careful inquiries have generally elicited the fact that the contagion had entered the system through some ulcer or other affection of the skin of one of the lower limbs, and that the development of the yaws tubercle about, and even on the vaccine scar, was a mere coincidence. I know of other cases, however, in which not the secondary yaws tubercle, but the primary, local, fungating, non-encrusted growth which precedes the secondary, general encrusted eruption, has appeared in unhealed vaccine pustules, and has been followed by a crop of tubercles, both in the neighbourhood of the vaccine scars and over other parts of the body. These were truly instances of contagion as a result of vaccination. In some of these the lymph used, having been imported from England, the virus entered through the vaccine pustule, as it does through any lesion of the skin ; but, in those in which arm-to-arm vaccination had been practised, it was doubtful whether it had been conveyed in the lymph or whether the affection had been subsequently contracted from another source. Considering its hereditariness, as some hold, and its admittedly contagious character, it is manifestly impossible to decide, in a yaws-infected locality, by which of these two processes the disease has been introduced into the system. To determine whether vaccine lymph can be the bearer of the yaws virus which exists in the system of the person who supplies that lymph, specially and unusually favourable circumstances are required. While on the one hand, it must be proved that the person

vaccinated had not inherited yaws, and had not been exposed to contagion either for a sufficiently long period previous to the operation or between the latter and the appearance of the disease, on the other hand there must be no doubt that the system of the person who supplied the lymph was infected with yaws at the time of vaccination, and that the vaccine vesicles were then healthy and not infected by contact with yaws virus introduced into them from without his body. I have never met with any case in which all these conditions were fulfilled. I have inquired very closely into the subject, and my experience leads me to believe that yaws is rarely spread by vaccination, either in the sense of the virus being conveyed in the lymph or even in that of the lesion caused by vaccination affording an entrance to the contagion. I know of numbers of children who had never had yaws who were vaccinated by the arm-to-arm method in a yaws district, and who remained free from the disease for years after, though no precaution had been taken to prevent contagion. This is probably to be explained by what I think will be found to be the fact that yaws is more frequently contracted from the contagion present in the soil or in water than by personal contact, and that the yaws virus hardly ever enters the system through any lesion in the upper parts of the body, which are seldom in contact with the ground in comparison with the lower limbs, which are almost always the first parts affected by the disease.

W. R. Williams, Esq.—No.

Dr. Kirkpatrick.—I have on more than one occasion whilst medical officer at St. Vincent. I endeavoured to take every precautionary measure by inquiring prior to the vaccination of any child if, or if not, yaws existed in the house amongst other members of the family. On many occasions the answer was no; an untruth depending in fact upon a delicacy of exposure, and its outcoming social results (vaccination being compulsory), their knowledge of being turned back at a loss of time and money for the day. The proof of the lie disclosed itself by the vaccinated infant appearing on its return for the abstraction of lymph covered with yaws, which in such instances I conscientiously believe, as did the parents, the disease was so communicated from either one of the other children or other person to the recently-vaccinated child, which under this history would place the period of incubation at eight days. On no occasion have I vaccinated a yaw case, nor vaccinated from a coolie to a creole.

VIII.

VIII.—Does your experince teach you that the disease prevails amongst the people more at one time than another? If so, state facts in illustration of any opinion your experience may have led you to form.

Tobago.

Dr. Tulloch.—No. I have seen no cases to lead me to believe that yaws is a respecter of seasons.

Dr. Norman.—My experience has not been sufficiently long to enable me to answer this question.

Dr. Blanc.—I have not found that the disease prevails more at one time than another. But it is undoubtedly far less prevalent now than it was three years ago, before the measures to suppress it were commenced by the Government.

W. A. Purser, Esq.—I have not noticed that the disease prevails at one time more than another. It is likely that it would prevail more in wet than in dry weather.

Grenada.

Dr. McLeod.—No.

Dr. Latour.—The disease prevails more at one time than at another.

Dr. Hatton.—I believe the disease prevails more in the wet season than in the dry. I should think that the books in the Yaws Hospital would be the best guide in this, but allowance would have to be made for the fact that patients do not often go to the hospital immediately the disease appears.

Dr. Lang.—I am not aware that it prevails more at one period of the year than another.

H. J. L. Bennett, Esq.—No.

W. Boyd, Esq.—From casual increases in the number of admissions to hospital, it might appear that atmospheric changes influenced the spread of the disease. I am inclined, however, to attribute these occasional increases in admission more to spasmodic efforts on the part of the police to carry out the instructions of the Yaws Ordinance than to predisposition of season.

N. Durrant, Esq.—All seasons indifferently.

St. Vincent.

Dr. Newsam.—No. I do not think the season in any way affects the disease, except perhaps that the dry season, producing scarcity of water in hilly districts where rain is depended upon, may have something to do in prolonging the disease through want of cleanliness, and so favouring its spread.

G. Finlay, Esq.—No.

W. B. Austin, Esq.—No.

M. O'Carroll, Esq.—No.

Dr. Arnott.—I am not aware of the yaws cases being more prevalent at any one time of the year in preference to another.

St. Lucia.

C. Dennehy, Esq.—No. Hitherto I have not directed attention to this point.

H. Norton, Esq.—No.

O. Galgey, Esq.—I have no data to show that yaws prevails more at one time than another. This disease is endemic in St. Lucia, and is equally prevalent at all seasons.

S. F. Proctor, Esq.—I have seen more of the disease, since from the abandoning of estates the labouring population are poorer than formerly.

Dr. Lestrade.—No.

Antigua.

W. H. Edwards, Esq.—Perhaps more prevalent in the fall of the year.

A. E. Edwards, Esq.—No.

Dr. Freeland.—I have never noticed that the disease is more prevalent at one time than another.

Dr. Pierez.—Most cases seem to crop up in the latter half of the year (August to November). I answer this from memory, not being able to give facts for reasons already stated.

Note.—Dr. Pierez prefaced his replies to the Interrogations with the following statement:—

"I regret to say that I am not able to answer the questions as fully as I should like "to have done, as all notes on yaws cases, collected in this island since 1882, have been "destroyed by me, after having been used for the purposes of my Thesis for the Doctorate. "The questions I am not able to answer fully are Nos. 9, 10, and 11."

Dr. Mackie.—I have not observed any relation between season and the prevalence of the disease since 1887. I have had many cases, but they were fairly distributed through the different seasons.

Virgin Islands.

Dr. Campbell.—I have seen no reason for supposing so.

Montserrat.

M. P. Duke, Esq.—No.

Dr. Branch.—No.

St. Kitts.

Dr. Branch.—No.

Dr. Mapleton.—I have not noticed that the disease prevails among the people more at one time than at another.

A. Boon, Esq.—It does not.

J. Foreman, Esq.—No.

R. E. Semper, Esq.—I have seen so little of the disease that I cannot reply to this question.

Nevis.

C. R. Edwards, Esq.—There is no doubt whatever in my mind that the disease is most common in the season of drought, when villagers have to walk long distances for water. At this time of the year they cannot spare water for bathing purposes; they are also more destitute, and are most susceptible to any form of contagious disease.

Dr. Huggins.—In times of scarcity.

Dominica.

J. N. Rat, Esq.—In all yaw districts, within my experience, the opinion exists that the disease is more prevalent after the rainy season. It is difficult, if not impossible, to decide on the greater or less prevalence of an affection in countries in which, as in Dominica, cases are diligently concealed, and are apparently numerous, or the reverse, in proportion to the zeal with which they are sought for and brought to light. Judging from other places, however, in which such peculiar circumstances do not obtain, I believe that yaws cases are most frequent when a period of rain has been followed by dry and hot weather. Allowing the disease a microbic origin, moisture would have a revivifying influence on those of its germs which are in the soil, and these would subsequently rise with the dust. Fowls are generally attacked with yaws about March, and this month is the commencement of the hot weather and the end of the rainy season. That bacilli are affected by temperature and moisture it is only natural to suppose; and experience has confirmed this, as in the case of the typhoid bacillus, which has been found to perish when exposed to continuous moisture. It is probable that an alternation of moisture and dry heat is favourable, and a continuance of either injurious to the development of the microscopic vegetable growth in the soil whose entrance into the body is the cause of the disease. The limitation of yaws to the tropics, and its special prevalence in damp localities, seem to me to bear out this hypothesis.

W. R. Williams, Esq.—Yes; most diseases, as far as they have been observed, have a rise and fall. It is impossible in an island of this sort, with a scattered population, to tell whether the disease is more prevalent at one time than another without a most careful enumeration of the people both sound and diseased.

Dr. Kirkpatrick.—Yes, during the autumn and winter months. At this time those who are as usual the victims of yaws, devour all sorts of unripe fruits and vegetables. The water, which cannot be otherwise than impure from the excessive rains being impregnated with many deleterious matters, is used for cooking and drinking purposes; this, together with exposure to a wetting by day, no change of clothes, a low temperature at night, sleeping on a filthy floor, must chill the system, rendering it less impregnable to the

onslaught of disease, constituting in truth a plausible etiological nucleus for the many ills that flesh is heir to.

IX.

IX.—*Give the histories of any cases in which you have traced the disease to contagion, and mention, if possible, the incubation period.*

Tobago.

Dr. Tulloch.—The conclusions drawn below are simply from the narratives of parents, patients, &c., subjected to pretty close cross-examination, and are given for what they are worth. I fear I can't give much information as to the incubation period.

1. "Got yaws from people in same house." Duration one month.

2. "Boy sleeping with him." Duration two months.

3 and 4. "Had cut on foot; boy in house with yaws." Duration respectively five and 14 months.

5. Adult. "Had cut finger; child in house with yaws; distribution; two thumbs." Duration two months.

6 and 7. "Both (brother and sister) had bruises in feet. Many children in neighbourhood had yaws." Distribution universal. Duration one year and six months.

8. One of two children brought from same house. Had had cut toe. His brother had had yaws for four years. First tubercle at site of cut on toe.

9. Mother a washerwoman. Direct source unknown. Supposed to be due to contagion from yaws, children bathing at same place where his mother was washing clothes.

10, 11, 12. One child had cut on toe. Many people about had yaws. Then mother and brother were infected from him.

13, 14, 15. Mother and two children. Source of mother's disease unknown. Duration 18 months. Children supposed to be affected by mother. Their duration 14 months.

16, 17. Father and child; father got cut in foot; her sister living in same house had yaws. Duration of his case one year; duration of child's eight months.

18, 19, 20, 21. Four children. Duration one year to three years. Original source unknown of first case; others supposed to be directly affected by contagion.

22. Duration three months. Children in house had yaws one year ago.

23, 24. Two brothers; both had cut toes. Duration of each two months. People in next yard had yaws.

25–30. Mother and five children. Durations from one year to one month. Mother had it first; children subsequently affected.

31. Child two years old. Duration three weeks. Sister has had yaws for 14 months.

It is needless to multiply cases of this nature. That the disease is propagated by contagion is alleged by the people themselves in over 60 per cent. of the cases brought to me. Besides, the unknown or unrecognised sources of contagion are so numerous, as at school, in shop, at the rivers where washing goes on, in the market, and even in the churches, that it surprises me that so large a proportion of cases is attributed by the sufferers to direct contagion.

The length of the period of incubation is a more difficult subject to tackle. The opportunities for the introduction of the virus are so numerous, and the carelessness of the people as to the existence of the disease is so great, that it is hard to say through which channel it has been introduced. It would be difficult to find a negro at any time without an exposed scratch of some kind on his skin, and so the results of inquiries

under this head are unsatisfactory. The case following vaccination which I have detailed would give a duration for this stage of seven to eight weeks.

Dr. Blanc.—I have not been able to trace the exact period of contagion in any case that has come before me. I have always found the people too ignorant to give the necessary information.

They will admit that a neighbour had the disease, for instance, but will deny the probability of having contracted it from that neighbour. In fact, I have never been able to get information which would allow me to form an accurate idea of the length of the incubation period.

The plan of treatment adopted here being by consultation, and not in hospital, it is extremely difficult to obtain information or knowledge that would be statistically reliable.

W. A. Purser, Esq.—If we regard contagion as likely to exist, and existing where persons are much in contact, use the same garments, vessels, and utensils, nearly all the cases of yaws must be considered as springing from contagion.

I consider the period of incubation to be about a fortnight. With this view of contagion, histories, I suppose, will not be required.

Grenada.

Dr. McLeod.—No notes taken of any case.

Dr. Latour.—On estates, among the children of indentured immigrants, contagion often results from pre-existing cases on the plantation, the children never having left the plantation. The conditions under which the cases are met do not permit of the incubation stage being ascertained.

Dr. Hatton.—I have known cases occur from sexual connexion, but no histories are kept, as patients are not treated in the districts, but are, by law, compelled to go to the yaws hospital.

Dr. Lang.—The disease is very contagious, and is generally propagated in this way. The people are very indifferent about it, as there is a superstitious belief prevalent among them that an attack of it in youth ensures a better state of health in after life, and consequently they have little dread of it.

H. J. L. Bennett, Esq.—My experience is too limited to permit of my speaking with authority as to the period of incubation in this disease; it appears to be very indefinite.

W. Boyd, Esq.—I can offer but vague information on the subject of contagion, or term of incubation, inasmuch as the cases which come under my notice are so far advanced in the disease as to render their transport to hospital imperative. The history usually elicited from the patients under my care would demonstrate that the feet, genitals, mouth and hands become affected first, in frequency according to the order given. I can with some degree of accuracy fix the incubation period of two cases which I shall here quote.

Rhamcheram, a coolie, was discharged from the colony hospital cured of anæmia on 12th January, 1891, and was admitted to the yaws hospital on the 24th of the following month, suffering from a mild papillary form of yaws, which commenced on the left ankle where he had an abrasion of the skin. He spent one week at a friend's house, where no yaws existed, and then went to an estate where it is constantly to be found. Two weeks after the yaws made its appearance, thus fixing roughly the time from his first exposure to the contagion to when he contracted it as fourteen days.

Jane William, a creole, æt. 16 years. Was perfectly healthy, and unexposed to any source of contagion, until deflowered by a man in March, 1891. Fourteen days after this she found some tubercles on the vulva and inside of thigh, for which I admitted her to the yaws hospital. These cases clearly bring the period within two weeks.

N. Durrant, Esq.—A child named Johnny Mann came, with his mother, Mrs. Walters, from Grenville, in Grenada, to a village called Grand Bay, in Carriacou, in May, 1889. The mother states she had just recovered from yaws, and that her son was still afflicted with the disease. Her neighbours and the villagers corroborate the latter statement. (Mrs. Walters has since become afflicted with anæsthetic leprosy in a very marked degree, which has appeared since her arrival in the island—she attributes it as a

result of yaws, in common with many I have spoken to.) Johnny Mann used frequently to play about the knees of a healthy young woman, Venus Jones, who was nursing an infant, and whose family history is good, and she developed yaws the next month, June, 1889. Her husband had never had the disease.

Johnny Mann, being shunned, went to play with his half-brother who lived at a considerable distance away—that child, named Nathaniel Joseph, also got yaws in August 1889. Nathaniel Joseph's brothers and sisters, who did not play with Johnny Mann, remained exempt. In neither place had the disease been seen for years.

The common father of J. Mann and N. Joseph is at present absent from the island working, but has never had yaws, if very credible persons speak truly. Venus Jones, and infant, with Nathaniel Joseph, were sent to St. George's the 17th December 1889.

Joseph Cox, aged 16 years, the son of healthy parents, with elder and younger brothers and sisters in perfect health, living a few yards distant from V. Jones and J. Mann, developed the disease in May, 1890, (an apparent incubation period of six months): was sent up also to Grenada by me on 25th August, 1890.

St. Vincent.

Dr. Newsam.—I have no notes by me, but during my practice as a District Medical Officer, I met with many cases where contagion was, undoubtedly, responsible for their development; for instance, where one member of a large family has contracted the disease, as stated in answer to Question VII.—and from whom it has spread to all members in the household. I knew of one case in the Buccament Valley where a planter's son contracted the disease in a severe form from three little coolie boys, who were afflicted, and with whom he was daily in the habit of playing.

G. Finlay, Esq.—I have treated many cases due to contagion, which is the most frequent mode of the propagation of the disease, but I have no record of the histories of these cases.

W. B. Austin, Esq.—H———, a lad of 12 years, white, and of creole origin, was allowed to associate with another lad who was suffering from yaws. H——— has contracted the disease, and is at the present time under my treatment.

M. O'Carroll, Esq.—The case of the white family mentioned in No. IV. was contracted from a coolie child, who was allowed to mix with the children of that family. I do not know the incubation period.

Dr. Arnott.—I am strongly of opinion that most cases occur from contagion, as no precautions are taken to prevent intercourse.

St. Lucia.

C. Dennehy, Esq.—Cannot. It is impossible to obtain any trustworthy information from this class of people; as a rule they are sulky and uncivil, resenting what they consider an unnecessary interference.

H. Norton, Esq.—Never traced any, but know that there are very many cases that have occurred. Periods of incubation various; impossible to state how long.

O. Galgey, Esq.—Yaws as a disease is unknown in India, yet numbers of coolies—indentured and free—have contracted the complaint in this Island. This alone will prove the contagiousness of yaws. Coolies are particularly disposed to suffer from sores on the legs and feet and cutaneous eruptions. Hence the facility of infection from flies and other insects, which have previously settled on a yaws tubercle or ulcer. Many years ago I attended an estate in St. Vincent, on which Indian immigrants were located. Yaws was supposed not to affect the coolies. One day I detected yaws tubercules on one of the black labourers, and a few weeks after one of the coolies showed symptoms of yaws, which spread to several others in a short time. I could only attribute this infection to flies settling on some abrasion or sore, and inoculating the coolie with the yaws virus. Once introduced amongst the coolies, the disease rapidly infected one after the other. The incubation period, as well as I could judge, was from two to four weeks.

S. F. Proctor, Esq.—I have seen no clear case of contagion. Cases occurring simultaneously have lived under similar conditions and would be affected by the same causes.

Dr. Lestrade.—The disease is inoculable and infectious, that is, it can be propagated by bites of flies, &c. In most families two or three members are generally affected, and this could be only by contagion. I have not had the opportunity of observing the period of incubation.

Antigua.

W. H. Edwards, Esq.—My experience of yaws is limited; I know of no case at present in my district. I believe it is most contagious and is readily inoculated. The incubation period is from one to three months.

Dr. Freeland.—I have seen several cases in which the disease has been communicated from one member of a family to the others living in the same house; and also cases occurring among school children in which the disease was apparently spread by contagion from one child. I regret, however, that I have no notes of these cases, nor have I any reliable data by which to fix the incubation period.

Dr. Piercy.—In my thesis, several cases of contagion were given in full, but I am unable to reproduce them here.

Dr. Mackie.—Nearly every case can be traced to contagion. The outbreak which occurred in 1887 started in Liberta, and spread to Sweets. I traced every case, and found the contagion was provided by a boy that had come from Martinique while afflicted with yaws; he was sent to a parish school—a very dirty place—in Liberta; in a short time, nearly every child attending that school contracted the disease; from that one case all the others have resulted. One of the few cases seen by me at English Harbour is a fine healthy child of six years, well-fed, clean, and tidily dressed. I could not understand how the child got the disease, but it was found out afterwards that the child was sometimes sent to spend a day with a cousin in Liberta, and that cousin had a few yaws spots. At Bailey Hill, I saw a young woman of 23 years who got infected on her hands from dressing yaws on a little sister.

Virgin Islands.

Dr. Campbell.—In only one of the four cases I have met with have I been able to trace the disease to contagion, and that only remotely: John Dawson, aged about 36, a labourer, had had the yaws for several months when I first saw him, and he informed me that previous to his contracting the disease he had been living in a house in which one or two of the children had the disease, but from his replies to my questions it was impossible to determine even approximately the time of incubation.

Montserrat.

M. P. Duke, Esq.—None.

St. Kitts.

Dr. Branch.—I have no notes of any such cases.

Dr. Mapleton.—The mother of the child mentioned in Answer VII. contracted the disease on the breast, if I recollect right. The period of incubation could not have been more than a month—probably much less. One of the yaws attendants, together with his wife and family in Montserrat, contracted the disease. There is no positive evidence however that the man contracted the disease from the patients and gave it to the others.

A. Boon, Esq.—All cases I have seen have associated or been in contact with other cases.

J. Foreman, Esq.—At Parson's Village, four children out of five of the same family became affected with the disease. They slept all in the same bed. Yaws broke out first in a little boy of seven years old at the beginning of 1889; then the other children were

affected, one after the other, with the exception of one little girl. The incubation period in these cases was between one and two months.

R. E. Semper, Esq.—I believe the disease to be contagious, but from want of personal experience I cannot reply to the latter part of this question.

Nevis.

C. R. Edwards, Esq.—Histories of one child having caught yaws from another in the same household are exceedingly common. As a matter of fact, a single case of yaws is seldom seen in a house. I do not know the precise period of incubation not having made any inoculations on the lower animals.

Dr. Huggins.—None to give.

Dominica.

J. N. Rat, Esq.—Cases illustrating contagious nature of yaws :—

1. *J. N.*, a Carib woman, aged 35. This woman, who is of pure Carib blood, was living, when about four years old, in a Carib village where there were no cases of yaws, and where there had been none within the memory of any one in the place. It happened that a cousin of hers, of mixed Carib and African blood, who had contracted yaws in a distant African village, came to live with his African wife and two children in the Carib village. J. N., who had a sore on her great toe, and used to spend a great part of the day at this cousin's house, contracted yaws shortly after his arrival, and so did both of his children. No one else in the village caught the disease. She has had seven children, the eldest of whom is 16 ; and none of them have ever had yaws. She was treated with mercury to salivation and tisanes of a bitter bark (here called quina)* and guaiacum.

2. *E. R.*, negress, aged 28. *Present disease.*—Dermatitis of the sole. *Previous history.*—Was suckling a child three months old when she got the yaws. Had no sore or wound anywhere, but the child had yaws about the mouth and infected her below the nipple, just where it meets the areola. The child was about six months old when the yaws appeared upon the mother's breast as a small papule, the summit of which filled with a white fluid about a week after its appearance. It then ulcerated and formed a small sore which lasted about two months. After the one healed, two tubercles appeared over the left sterno-mastoid, coalesced and spread to the size of 3½ inches by 1 inch. They scabbed over as usual. At the same time two others appeared on the chin and spread to about an inch square. These lasted nine months, and the scabs fell off and left maculæ, which are now darker than the adjacent skin. Took guaiacum, sarsaparilla and sassafras in tisane for three months.

3. *W. S.*, negro, aged 35. *Present disease.*—Dermatitis of the sole. *Previous history.*—About the end of August 1881, he arrived in Dominica from Barbados, where he had spent three weeks. Previous to going to Barbados he had been cohabiting 11 years with a woman in Dominica, who contracted yaws about April 1881. The yaws eruption in the woman assumed the squamous form at first, and afterwards a tubercle appeared on one of her feet. At the beginning of June she was taken by him to the hospital, where she remained until his return from Barbados, at the end of August, when she went to stay with him. After staying three weeks with the woman (on his return from Barbados) he noticed a small pimple on the edge of the prepuce. On the top of this pimple a small watery vesicle formed, and the pimple ulcerated and formed an ulcer about the size of a florin. The ulcer was red and clean and was quickly cured by carbolic oil. Before the ulcer healed yaws tubercles broke out on his cheeks in the form of clusters of small vesicles, with a single yellow scab over each cluster. Other tubercles afterwards appeared on his body, these consisting of the ordinary granulation tissue covered with yellow scabs.

4. *J. H.*, African, female, aged 30. *Present condition.*—Recurrent yaws tubercles of the soles attended with chronic exfoliating dermatitis of the same parts. *Previous history.*—She had yaws when about 13 years old, which appeared as a few large tubercles

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* *Exostemma floribundum*, R.S.

and lasted about 12 months. She was infected through an ulcer on the foot. When the yaws began to dry, she was put through a course of mercury (calomel). She had neither relapse nor reminders after that attack. She has had six children, of whom three have had yaws, viz.: the second, fourth and fifth. The eldest child died from bronchitis when about three months old; the others are alive. The fourth (a girl) got yaws when about ten months old. She was then suffering from eczema capitis, through which she became infected. The tubercles appeared all over her body, including her lips. The mother, who was then suckling her, became infected. Six papules appeared on the areola around her left nipple. They were first red, and then became white at their apices. They gradually enlarged and fungated, forming flat dome-shaped tubercles, with thick yellow crusts, which dried and disappeared after after six weeks' duration, leaving the nipple twice its normal width and much smoother than the other. This attack occurred about three years ago.

About 18 months ago, yaws tubercles developed in the soles of the patient's feet in the form of red fungous masses about the colour and size of a ripe cherry, which forced their way through the thickened epidermis. They were attended with dermatitis and exfoliation of the epidermis. They lasted about three weeks, when they shrivelled and disappeared. About six weeks ago fresh tubercles appeared as before. It is from these that she is now suffering.

Incubation.—In determining the incubation period of yaws, observers have generally taken the time elapsing between the moment of contagion and the appearance of the general eruption of tubercles. My experience has led me to divide the clinical history of the disease into four periods, as follows:—

(1.) *The incubation stage.*—Between the moment of the reception of the virus and the development of the initial lesion at the seat of contagion.

(2.) *The primary stage.*—Between the appearance of the local, initial lesion, and that of the general, superficial eruption.

(3.) *The secondary stage.*—Between the commencement and termination of the general superficial eruption.

(4.) *The tertiary stage.*—That of deep-seated lesions, such as exedent ulcers, periostitis, gummata, &c.

Any attempt to estimate the term of incubation of a disease by clinical observation of ordinary cases is so obviously liable to error, that dependence, in this matter, should rather be placed on the teachings of inoculation experiments, which are themselves, however, not entirely free from a similar objection. In places in which yaws is endemic, apart from the possibility of inheritance, it is difficult to decide whether the person inoculated had not been previously infected, or, again, whether the disease had been caused by the virus experimentally introduced, or by subsequent accidental contagion through the wound of inoculation. To be exact, therefore, such experiments must be performed under circumstances which are so seldom obtainable that it is only by observing the results of a very large number of them that any approximately reliable conclusion can be arrived at. A sufficient number of such experiments has not yet been recorded, but from those that have been made it may be deduced that the incubation of the yaws virus averages from three to ten weeks, the former being the most usual duration of that period. Cases have been recorded in which a shorter or longer interval has elapsed between the supposed moment of infection and the earliest cutaneous manifestation of the disease; but allowing the probability of such exceptional instances, there are possible errors, in connection with these observations, in addition to those already cited, which should not be disregarded. Among the cases given in illustration of the contagious nature of yaws, it may be observed that in Case 3 three weeks intervened between the first exposure to the virus and the appearance of the local initial lesion, while in Case 2 two months elapsed between the healing of the local sore and the development of the earliest of the secondary tubercles. In the case of A. S., African, aged ten, it was six weeks after the appearance of the first ulcer that she felt the pains in her shoulders and arms, and eight weeks altogether after that the first yaws tubercle developed.

Cases illustrating incubation period of yaws:—

A child living in a district in which yaws was unknown was vaccinated with lymph taken from the arm of a child who had just arrived from a yaws district. The vesicles healed in the usual way, but, six weeks after vaccination, yaws tubercles developed around the vaccine scars. It was thought evident that the vaccinifer had yaws in her system, though the disease had not yet manifested itself in the skin, and we waited for the appearance of yaws tubercles to confirm this. These expected tubercles, however, never appeared, and

the real source of contagion was found to be a servant-girl in the house, who sometimes nursed the affected child, and who had been to the yaws district where she contracted yaws. She had come back at the same time as the vaccinifer, and the tubercles had then already developed on her legs, buttocks and chest. In this case six weeks at least elapsed (possibly more) between the date of contagion and the first appearance of the eruptions.

A. S., African, aged 10. There are two yaws tubercles over the lower end of the tibia, immediately above the junction of the leg and foot, slightly to the left of the middle line. These are pale condyloma-like growths raised about an eighth of an inch above the skin, secreting a scanty creamy fluid (which is only observable on removing the scabs) and covered with thick, rugged, pale yellow crusts which are slightly depressed at their centres. The tubercles are about the size of a fourpenny-piece each, and they are coalescent. They do not itch.

Previous history.—The patient is one of a family of three children, two of whom have only recently recovered from yaws. About three months ago, a small pimple appeared at the site of the two yaws tubercles on her left leg. It caused considerable itching, in consequence of which she scratched it, and a shallow sore with a red base developed at the spot to the size of a fourpenny-piece. The ulcer thus formed was accompanied by enlarged femoral glands on the same leg. About six weeks after the appearance of the ulcer, the dark brown crust which had developed over it fell off, leaving a very faint scar. (About this time she began to feel the present pains in her shoulders and arms.) A week after this, another pimple appeared a quarter of an inch to the left of the site of the sore. This caused considerable itching which led to scratching, and to the production of one of the present yaws tubercles on the site of the pimple. Another week later the other tubercle developed on the site of the old sore which had also become itchy.

W. R. Williams, Esq.—A mother with yaws was taken with her infant to the Morne Hospital, in 1872. The infant did not get the disease at that time. This infant, now a young woman, contracted the disease this year (1891) through, it is said, sleeping with her little brother, a boy of 12 years, who had the disease.

Dr. Kirkpatrick.—A child at the breast suffering from yaws, encircling the mouth, gave to its mother the disease, her left nipple being sore at the time. The symptoms were perfect, there being neither doubt nor obscurity in the case; and in other cases, especially amongst coolie mothers nursing their infants, where yaws existed in one or both, the disease became fully apparent. I am thoroughly satisfied that the disease can in this way be established, and from the most minute history I could obtain the period of incubation appeared to range from between a few days to as many weeks, the variance depending upon the general state of the system at the time of contact.

X.

X.—Have you met with any cases in which the disease has relapsed after apparent cure? If so, give particulars.

Tobago.

Dr. Tulloch.—These have occurred in about 11 per cent. of my cases. In the earlier cases of my series it is probable that patients were discharged too soon, *i.e.*, as soon as the tubercles or ulcers had been healed. This has been remedied to some extent in the later cases, but it is difficult to make the people attend the station after they are, in their own opinion, cured. Relapses would be fewer if the treatment could be continued for two or three months after apparent cure.

1.—Boy, aged three years. Under treatment for two months, marked cured on 11th November, 1887. Was brought back on 24th July, 1888. Noted: "Relapsed badly "this month. Many moist tubercles."

2.—*C. T.*, aged 21 years. Under treatment for seven weeks; marked cured on 15th November, 1887. Returned on 26th October, 1888, distinctly relapsed or recurred recently.

3.—Child, aged seven years. Under treatment four weeks; marked cured on 1st November, 1887. Returned on 15th November with new crop of tubercles.

4.—*J. R.*, aged 30 years. Under treatment for four weeks; marked cured on 1st November, 1887. Case badly complicated with lupus. Returned on 19th February, 1889 with severe recurrence of yaws tubercles.

5.—*F. D.*, aged eight years. Under treatment for two weeks; marked cured on 25th October, 1887. On 8th November returned. Within last four days tubercles (fresh crop) have appeared on toe, sole of foot and arms. Was cured again after four months' treatment.

6.—*M. C.*, aged 10 years. Under treatment seven weeks; marked cured on 2nd December, 1887. Returned on 20th March, 1888, with numerous large typical tubercles on neck, which had appeared a fortnight before. Was cured again in six weeks. No further relapse.

7.—*H. B.*, aged nine years. Marked cured on 25th October, 1887. On 31st January, 1888, was brought back with large sore round mouth.

8.—*F. S.*, aged four years. Marked cured on 9th December, 1887, after six weeks' treatment. Returned on 13th August, 1889, and noted "threatened relapse." Was marked cured on 13th September of same year.

9.—*C. P.*, aged 30 years. Marked cured on 23rd December, 1887, after four weeks' treatment. Returned on 20th March, 1889. Had relapsed shortly after ceasing treatment, but slightly; had not then returned. Had recovered and been quite well for eight months. Had now low condylomata round nipples. Marked "nearly well" on 17th April.

10.—*C. W.* (nearly white). Under treatment for two months. Large ulcer of leg, tubercle under skin and squamæ over body on distinctly red base. Marked cured on 10th February, 1888. Returned on 16th March. Ulcer had remained quite healed and squamæ had not reappeared, but tubercle had become prominent again. Was marked cured in two months, and has not since relapsed.

11.—*A. G.*, aged four years. Under treatment four weeks. Was marked cured on 17th January, 1888. Returned on 6th November, 1888; relapsed two weeks ago; two sores in toes, pain severe in joints. Cured on 4th December.

12.—*T. G.*, aged six years. Under treatment four weeks. Marked cured, 7th February, 1888. Relapsed on 6th October of same year.

13.—*T. W.*, aged 18 years. Under treatment three months. Cured 27th April, 1888. Relapsed middle of September, 1888. Cured 27th November.

Dr. Norman.—I have not.

Dr. Blane.—I have seen several cases of relapse after apparent cure. I quote some cases:—

M. and *T.*, two sisters. M., aged six years; T., aged three years. First seen on 16th May, 1888. Moist tubercles universally. Both discharged as cured on 20th June, 1888. M. returned on 18th July, 1888, with papular eruption on buttocks and legs, and tubercles on both feet. The disease then progressed for two or three weeks, and then very slowly yielded to treatment, leaving only a scurfy psoriasis-like patch on buttocks on 7th November, 1888. From that time to 5th March, 1890, when she ceased attending, those scurfy patches persisted. T. returned on 23rd January, 1889, and was found bad with yaws. Discharged again as cured on 24th July, 1889. Has not returned since.

J. B., aged two years. First seen on 16th May, 1888. Moist tubercles universally. Discharged as cured on 15th August, 1888. Returned on 21st November, 1888, with tubercles on mouth and neck. Discharged as cured on 19th December, 1888, and has not returned since. I have many such cases recorded.

W. A. Purser, Esq.—I have met with some few cases in which the disease has reappeared after apparent cure, but I have remarked that these cases have soon again recovered.

GRENADA.

Dr. McLeod.—Yes.

Dr. Latour.—Have myself returned several cases to the yaws hospital. Some had been in the hospital for three months and the disease to all appearance cured. As soon

as they returned home and fed on less nutritious food the disease returned. When yaws breaks out a third time, it is usually in the foot, in the form known as "crabs" in Grenada, and "tobo" in St. Vincent. Disease rarely appears a third time on the body.

Dr. Hatton.—Yes, very many, the yaws hospital books will show many readmissions after being discharged apparently cured.

Dr. Lang.—It is not unusual to meet with cases in which the disease reappears after an apparent cure.

H. J. L. Bennett, Esq.—No.

W. Boyd, Esq.—The frequency with which relapses occur after an apparent cure seems to constitute one of the most remarkable features of yaws. I have noticed that when the disease primarily demonstrates its presence by an eruption of fine granular papules which dry up in a few weeks, becoming to all intents and purposes cured without suffering the usual periosteal or rheumatic pain, the case is readmitted for an outbreak of the larger and more characteristic frambasial tubercles.

N. Durrant, Esq.—He* returned reported cured January, 1891, no sign of disease upon his body. He developed yaws in an aggravated form March, 1891. I sent him to St. George's 13th April, 1891. Carriacon patients declare flies carry the disease and inoculate accidental cuts or abrasions.

St. Vincent.

Dr. Newsam.—Numerous cases, of which however I have no particulars by me. Dr. Arnott, who had charge of the temporary yaws asylum at Low Point for some years, tells me he had from time to time cases coming back to him which had been sent out apparently cured I believe with Liveing, Imray, and Bowerbank that in spite of all treatment the disease is very liable to relapse.

G. Finlay, Esq.—I have met with some cases of relapse after apparent cure, but have kept no particulars of them.

W. B. Austin, Esq.—I have met with cases in which a relapse has occurred.

M. O'Caroll, Esq.—No.

Dr. Arnott.—Such cases I have seen more than once.

St. Lucia.

C. Dennehy, Esq.—Yes, several cases have been re-admitted at periods varying from three to twelve months of date of discharge apparently cured. Such cases are known as "rattoon" or "after-yaws."

H. Norton, Esq.—About fifty-six cases, two or three a second relapse.

O. Galgey, Esq.—Many cases have come under my notice from time to time in which yaws has relapsed after apparent cure. It is generally granted by authorities on the disease that a few months after the first attack has apparently come to an end, a second eruption is liable to appear. This is so well known that the term "rattoon" yaws has been applied to it. These cases are frequently met with in this island. I have seen patients who had been twice, and even three times, in the yaws hospital, and yet had the "dregs" of the disease still apparent.

S. F. Proctor, Esq.—No.

Dr. Lestrade.—Yes, very often cases are sent back to Vieux Fort from the yaws asylum reported as cured, and the disease has broken out again in these cases. In the case of a boy, the son of one Isidore Hyacinthe, whom I had the opportunity last year of observing, he was sent back to his home from the asylum cured, yet in a month or two the disease recurred. I believe there are several of these cases.

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* Joseph Cox, whose case is referred to in the reply to the previous interrogation.

ANTIGUA.

W. H. Edwards, Esq.—No, I take it to occur only once in a lifetime.

A. E. Edwards, Esq.—Yes.

Dr. Freeland.—I have never met with a case of relapse after apparent cure.

Dr. Peirez.—Yes, several. I am sorry not to be able to answer more fully.

Dr. Mackie.—Some cases are more intractable than others. I have seen fresh spots break out when the disease seemed to be really cured.

VIRGIN ISLANDS.

Dr. Campbell.—In the above case of John Dawson, after a lengthy trial of various methods of treatment by me with very little success, he was treated by a companion and in a few weeks he was apparently cured; the sores on his hands, feet, and elsewhere had entirely disappeared and the skin to all appearance returned to its normal condition; after leaving off this latter treatment for about a month, however, the disease has broken out as badly as before.

MONTSERRAT.

M. P. Duke, Esq.—Questions X. and XI. are similar that they can be answered together.—Yes. I have seen cases where the patients have been discharged with clear skins, free from all yaws, and after varying intervals the disease has reappeared. So well is this fact known here amongst the natives that they commonly speak of their second attack as the "ratoon yaws."

Dr. Branch.—Yes.

ST. KITTS.

Dr. Branch.—No.

Dr. Mapleton.—The disease almost always elapses after a variable time.

A. Boon, Esq.—I have not.

J. Foreman, Esq.—Yes, whilst medical officer in the islands of Dominica and Tortola, but I do not remember the particulars.

R. E. Semper, Esq.—I cannot say that I have.

NEVIS.

J. D. Bell, Esq.—I have not met with relapses in the few cases I have treated.

C. R. Edwards, Esq.—From 15 to 20 per cent. of the cases cured return with relapses. It has been found that by keeping the patients in hospital at least a month after all signs of the disease have disappeared, they are less likely to return with a relapse.

Dr. Huggins.—By the yaws hospital book some of the cases relapse.

DOMINICA.

J. N. Rat, Esq.—Case illustrating recurrence of yaws after apparent cure:—L. M. Mulatto, aged 16 years.

Present disease.—Two patches of granulation tissue covered by yellow crusts on left leg.

Previous history.—Had yaws when about 14 years old. Had then a rash on his left instep, which became poisoned by yaws virus. This produced tubercles on his legs

below the knees only. He remained about five months in hospital. When he left there was no rash on him. About two months after fresh tubercles broke out on both legs below the knees only. He was given calomel by his mother in a tisane of guaicum and sarsaparilla, twice a day for a fortnight, until he was salivated. The calomel was being given him when a hurricane came on, by which the house in which he lived was broken down, and he was exposed to the inclemency of the weather. About a month after he began taking the calomel the right leg healed; but the turbercles on the other leg continued, enlarged, coalesced, forming two patches, one on the outer ankle, and the other on the upper third of the outside of the leg. The lower one measured 4 in. by 2 in., and the upper 6 in. by 3 in.

Other cases of the recurrence of yaws within the first three years after their supposed cure, both under professional and quack treatment, have come under my notice, but these have been so numerous that I have not thought it necessary to note their particulars. The notes of the above case were not taken for the purpose of illustrating this fact, but to show the persistence, occasionally, of secondary tubercles.

W. R. Williams, Esq.—Some years ago I made a list of cases discharged as cured from the Central Yaws Hospital at Canefield who all had a relapse of the disease. I also had a case that I discharged as cured from the Soufrière Yaws Encampment, who had a relapse in two months. This case had not taken any mercury during treatment.

Dr. Kirkpatrick.—Yes, in many, and a similar treatment was resorted to, the disease disappearing, and I have never known these cases to return a third time.

XI.

Have you met with cases in which the disease has recurred after the patient has recovered from it, and remained perfectly healthy for a long time? If so, give particulars of the cases.

Tobago.

Dr. Tulloch.—Recurrences:

1. *E. P.*, aged four years. Under treatment three months. Cured 27th April, 1888. Recurred February, 1891. Cured in five weeks.

2. *R. B.*, aged three years. Under treatment two months. Cured 18th July, 1890. Relapsed March, 1891.

3. *P. R.*, aged eight years. Now under treatmeat, had yaws five years ago. Disease recurred in January of this year.

Note.—I find that I have notes of lots of cases of long periods between relapses, but I can't find almost any which can be called recurrences, after periods of, say, years. I feel sure, however, that I have been told of such cases on several occasions.

Dr. Norman.—I have not.

Dr. Blanc.—I have not met with cases in which the disease has recurred, after a long period of perfect health, to my own knowledge, but many adults who come for treatment for yaws declare themselves to have had yaws when young, and to have got rid of it and enjoyed years of perfect health.

W. A. Purser, Esq.—I have not met with any cases in which, after the patient has recovered from the disease and remained perfectly healthy for a long time, the disease has recurred.

Grenada.

Dr. M'Leod.—No.

Dr. Hatton.—I have seen adults with yaws who have stated that they had the disease in childhood.

Dr. Lang.—Cases have come under my observation in which the disease has recurred after many years exemption.

H. J. L. Bennett, Esq.—No. I have known instances of patients having been sent out of hospital, to make room for severer cases, before perfectly cured, when the disease has returned with full force within a few weeks.

W. Boyd, Esq.—I have met with a few cases of recurrence of yaws after an interval of some years. In one instance, that of a woman suffering from a mild attack of simple tubercles, who was delivered of a healthy child when in hospital, the disease rapidly underwent resolution, and she left cured. In about one year I readmitted both herself and child, the mother having an ulcerative variety of yaws on the ankles, wrist, and arms, the baby being still free from the disease. Her case became a chronic one, but she was ultimately discharged, the ulcers affecting the deep layers of the skin, losing their specific character, which, by the way, I demonstrated by experimental inoculation.

N. Durrant, Esq.—No.

St. Vincent.

Dr. Newsam.—Yes, after several years, but more in a tertiary form, leading to loss of toes and disease of nasal bones.

G. Finlay, Esq.—No.

W. B. Austin, Esq.—No.

M. O'Carroll, Esq.—No.

Dr. Arnott.—Yes, months after the disappearance of the malady.

St. Lucia.

C. Dennehy, Esq.—I cannot define any such. Adults have come under treatment who alleged they had yaws in early life.

H. Norton, Esq.—No, always returned in a short period.

O. Galgey, Esq.—I have frequently seen coolies complaining of tubboe, crab-yaws, and chronic pains in the joints (the sequelæ of yaws), who had spent months, possibly years, in the yaws hospital. There is a coolie in the Victoria Hospital at present suffering from chronic ulcers on both legs. These ulcers are most intractable, and are, I believe, the result of yaws, for which he was treated for months in the yaws hospital. Many patients improve temporarily under more wholesome food and better sanitary surroundings than they have been accustomed to, but some time after their return to their former mode of life a relapse takes place and the disease is as bad as ever.

S. F. Proctor, Esq.—No.

Dr. Lestrade.—I have not met but I have heard of such cases.

Antigua.

W. H. Edwards, Esq.—No.

A. E. Edwards, Esq.—No.

Dr. Freeland.—I have not met with cases of recurrence after cure.

Dr. Pierez.—I have mentioned one such case in my Thesis.

Dr. Mackie.—I have never seen a case where the disease recurred after complete cure.

Virgin Islands.

Dr. Campbell.—I have not.

MONTSERRAT.

Dr. Branch.—Yes.

ST. KITTS.

Dr. Branch.—No.

Dr. Mapleton.—I don't think I have ever seen a case in which a relapse has occurred after a very long period. It is reported, however, that the yaws attendant referred to in Answer IX. has yaws again, this can easily be ascertained.

A. Boon, Esq.—I have not, nor do I believe that a return of the disease is possible without re-infection.

J. Foreman, Esq.—No.

R. E. Semper, Esq.—I cannot say I have.

NEVIS.

C. R. Edwards, Esq.—I have. No notes on this point have been taken in my hospital case book. I am, therefore, unable to give particulars of cases.

Dr. Huggins.—None.

DOMINICA.

J. N. Rat, Esq.—A second attack of yaws 15 years after the first:—

1. *J. H.*, African, female, aged 30.

Present Condition.—Recurrent yaws tubercles of the soles attended with chronic exfoliating dermatitis of the same parts. With the exception of the pain caused by the condition of her feet, the patient feels in her usual health.

Previous History.—She had yaws when about 13 years old, which appeared as a few large tubercles, and lasted about 12 months. She was infected through an ulcer on the foot. When the yaws began to dry, she was put through a course of mercury (calomel). She had neither relapse nor reminders after that attack. She has had six children, of whom three have had yaws, viz.: the second, fourth and fifth The eldest child died from bronchitis when about three months old; the others are alive. The fourth (a girl) got yaws when about ten months old. She was then suffering from *eczema capitis* through which she became infected. The tubercles appeared all over her body, including her lips. The mother, who was then suckling her, became infected. Six papules appeared on the areola around her left nipple. They were first red, and then became white at their apices. They gradually enlarged and fungated, forming flat dome-shaped tubercles with thick yellow crusts, which dried and disappeared after six weeks' duration, leaving the nipple twice its normal width and much smoother than the other. This attack occurred about three years ago. She has, since then, had two children, now two years and one year old respectively, the younger of whom she is at present suckling. The former contracted yaws through an ulcer in the heel when two years old, the tubercles affecting the whole body, including the lips, and lasting one year. The latter has not had the disease.

About 18 months ago, yaws tubercles developed in the soles of the patient's feet, in the form of red fungous masses about the colour and size of a ripe cherry, which forced their way through the thickened epidermis. They were attended with dermatitis and exfoliation of the epidermis. They lasted about three weeks, when they shrivelled and disappeared. About six weeks ago fresh tubercles appeared as before. It is from these that she is now suffering.

2. *J. P.*, Mulatto, male, aged 20 years.

Present Condition.—The patient is affected with an eruption distributed in patches over various parts of his body. These patches are much lighter than, and are slightly raised above, the adjacent skin, which is dark brown. They consist of closely set minute conical papules, only observable on close inspection by the naked eye, the integument

between them being of the same pallid tint. Their central papules become incrusted after a time, and when the crusts fall off the surrounding papules shrivel, desquamate and subside to the ordinary level of the skin. The central parts of the patches, where the crust existed, become hyperpigmented, the pigmentation extending gradually over the rest of the site of the patch. The eruption neither pains nor itches. The patient has a nodule about the size of a walnut over the extensor aspect of his right arm at the junction of the upper and middle thirds. He has, also, a small ulcer about the size of a threepenny piece, on the inner surface of his left great toe. He feels pain and weakness in his left knee after walking. He never suffers from fever, and experiences no pain when he is at rest. The patient, who is very muscular and well-proportioned, appears otherwise in excellent health.

Previous History.—The patient had yaws when he was about five years old. He contracted it through a sore on the back of the right foot over the metarso-phalangeal joints of the fourth and fifth toes. The yaws appeared as tubercles over various parts of his body and lasted about a year. After that he remained well until nearly two years ago, when he perceived a small swelling at the site of the present nodule on his arm. The swelling gradually enlarged to the size already mentioned. The nodule would sometimes get smaller, but always returned to its normal dimensions which it has never exceeded. When it enlarged it became painful. (It still undergoes the same periodical changes.) Since its appearance other smaller nodules have developed on his left leg below the knee, and, after paining him for some time these have disappeared. About four months ago, he broke his left great toe: and in consequence of this an ulcer formed on it, the remains of which have been mentioned as still existing. About two months after the appearance of the ulcer, the eruption presented itself first on the backs of his hands, and then over the rest of his body.

Remarks.—There is no doubt about the framboesial origin of the patches, these being identical with those which precede or accompany genuine yaws tubercles in undoubted recent cases of first infection. The nodules are framboesial gummata, the tertiary manifestations of the first attack.

W. R. Williams, Esq.—No

Dr. Kirkpatrick.—I have not.

XIII.

What methods have you found most successful in the treament of the disease?

Tobago.

Dr. Tulloch.—Improved hygienic conditions, cleanliness, good food and rest. Locally—Ung. iodoform or Ol. carbolic; mercurial ointments in chronic cases and tubboe, scraping with sharp spoon in these also. Internally—Potass. iodid., liq. hydrarg. perchlor. or Sol. Donovan, arsenic, and sarsaparilla. Tonics, ferruginous generally, or cod liver oil in anæmic or debilitated cases.

Dr. Norman.—In Tobago the method of treatment is one prescribed by the Government, and consists of the local application to the sores of an ointment of iodoform, and internally a mixture consisting of iodide of potassium, Donovan's solution and decoction of sarsaparilla. I have seen very good results from this treatment when systematically carried out, the sores healing up very rapidly.

Dr. Blanc.—The method of treatment which I have hitherto pursued, and which I have found most successful, consists of the internal and external use of certain drugs combined with strict cleanliness. Internally I use iodide of potash, mercury and sarsaparilla. The perchloride is the form of mercury most useful, but when the case seems to necessitate a more tonic form of treatment I substitute Donovan's solution. Externally, I find iodoform most invaluable when applied to the tubercles and ulcers, in the form of an ointment of strength to suit age of patient. I have also found the local use of the ointment of the nitrate of mercury very beneficial, especially in the case of those forms of tubercles occurring in the thick and hardened skin of the sole of the foot, and locally known as "Toboes."

The above is the treatment I invariably adopt find very successful, using in all cases the mercury, iodide, and sarsaparilla internally and the iodoform externally, and aiding these by the use of other drugs whenever the particular circumstances of the case indicate their use.

W. A. Purser, Esq.—I have used invariably the recipes recommended by Dr. Tulloch, the Colonial Surgeon of this island, as follows:—

No. 1.		No. 2.	
Potass Iodid. - - - -	gr. iij	Potass. Iodid. - - - -	gr. v
Liquor Donov. - - - -	♏ x	Liquor Hyd. - - - -	℥ fs
Ext. Sarsa. Co. - - - -	ʒ ij	Ext. Sarsa. - - - -	ʒ ij
Aquæ - - - - -	℥ j	Aquæ - - - - -	℥ j

The former, No. 1, I have used almost exclusively. I have used also for external application an ointment of half a drachm of iodoform powder to the ounce of benzoated lard.

I desire to add s remarks which may be useful to the Special Commissioner on his inquiry.

As Dr. Nicholls is aware, special attention and treatment at the instance of Dr. Tulloch, Colonial Surgeon, have been given to the disease yaws for the last three years. This attention and treatment have been followed by considerable advantage to the patients and increased knowledge to the practitioner.

Treatment in hospital involves great expense, much enforced idleness to the patient, and does not pursue directly an object ever to be held in view, of the teaching people to be cleanly and diligently regular in the use of remedies and means prescribed. These, cleanliness and use of means may be more directly inculcated by dispensary than hospital practice or *régime*.

I value sarsaparilla as a remedy.

A generous diet to combat poverty and disease of blood.

The inculcation of the practice of virtue in the Name of The Lord Jesus.

Grenada.

Dr. McLeod.—Nourishing diet, cleanliness, and a tonic treatment.

Dr. Latour.—Sea bathing, good diet, and mercury applied to the dry form, which resembles ringworm; Gurgon oil produced no marked effect.

Dr. Hatton.—My experience in the treatment of this disease was obtained when I was House-Surgeon of the Colony and Yaws Hospitals. I relied then on good food, sea-bathing, cod-liver oil, iron, especially the syrup of the iodide, arsenic, bitter tonics, the local application of a solution of corrosive sublimate, or an ointment of chrysophanic acid.

Dr. Lang.—The treatment consists of nourishing diet, ferruginous tonics, and sea-bathing, with application of carbolic acid, &c.

H. J. L. Bennett, Esq.—As all cases of yaws have, by law, to be sent to hospital as soon as detected, I have not had much opportunity for treating the disease in the district, but I am inclined to rely chiefly on sea bathing, tonics, good food, frequent change of clothes and bedding, together with antiseptic and astringent applications. The local treatment is very secondary in my opinion.

W. Boyd, Esq.—The treatment I have pursued and find most satisfactory for yaws may be summed up in General Medical, Special Medical, Dietetic, and Hygienic. The general medical treatment in use by me here is represented by the internal administration of Liq. Donovani in medium doses, continued for a lengthened period, the external application of iodol, iodoform, hydrg. oxid. and iod. rub., Gurgun balsam incorporated with these preparations, and iodide of starch. The "Special Medical" embraces those cases of strumous and mixed forms of the disease requiring the exhibition of the preparations of iron, Ol. morrhuæ, iodide of potass., &c. The dietary is in conformity with the hospital regulation extra and general scale, avoiding salt fish and beef as much as possible. Hygienic surroundings and cleanliness are most important factors in the treatment. Free ventilation in wards, strictly enforced cleanliness in habits, embracing frequent baths in the sea if possible, and application of dressings, are most urgently required.

N. Durrant, Esq.—The disease is treated only at the Yaws Hospital.

St. Vincent.

Dr. Newsam.—Exhibition of mercury in some form (chiefly the perchloride) and iodide of potassium in combination with tonics, cod-liver oil, and alternated with iron in some form. Arsenic internally and Gurgon oil externally; syrup of iodide of iron, caustics to indolent ulcers, iodoform.

G. Finlay, Esq.—Mercurial ointments topically, and salts of mercury and potassium iodide internally.

W. B. Austin, Esq.—Removal of patient (if living inland) to sea-coast, daily sea baths, good dietary, arsenic, iron internally, the application externally of a lotion of carbolic acid or carbolic oil.

M. O'Carroll, Esq.—Small doses of mercury, combined with iodide of potash, good nourishing food, and cleanliness. I have known some cases to be cured quickly under this treatment, while others lasted an indefinite period under the same treatment. I have known some cases which resisted all treatment, but, as soon as I vaccinated them, they got well almost immediately.

Dr. Arnott.—Sea-bathing daily, suitable food.

St. Lucia.

C. Dennehy, Esq.—Good food, cleanliness, free ventilation, sea bathing, tonics, alteratives, &c., dressing of sores by ointments and lotions of iodiform, acid carbolic, pot. iod., creolin, &c.

H. Norton, Esq.—My prescriptions are written out in full in my book at the hospital.

O. Galgey, Esq.—I consider that cleanliness and a generous diet rank first in the treatment of yaws cases. The medicines that I have found most beneficial are Fowler's or Donovan's solutions, sulphide of calcium, hyposulphite of soda; preparations of iron for young children, cod-liver oil for others; mercurial preparations (either Plummer's pill, red iodide, or corrosive sublimate) for adults who can bear it. These remedies are exhibited, having due regard to the constitution of the individuals and the different stages and types of the disease. Iodide of potassium appears to me most useful in those cases in which articular pains are frequent and troublesome.

S. F. Proctor, Esq.—I have never had the opportunity of treating a case for any time, nor of treating many cases. The few I have treated at all improved markedly under a general tonic treatment, viz.: iodide of iron, cod-liver oil, better diet, and sea bathing.

Dr. Lestrade.—Cleanliness and good diet; sea-bathing, iod. potass, iron, and mercury internally. Escharotics with antiseptic dressings externally. Regular hours and abstaining from the use of stimulants are the remedies most in vogue, though many other remedies are said to be equally efficacious. I believe that cleanliness and good, generous diet, with iron, are the most reliable.

Antigua.

W. H. Edwards, Esq.—Treatment is very simple if commenced at an early period: cleanliness, improved dietary, out-door exercise, sulphur, cream of tartar and jalap; then mercury and iodide of potassium, arsenic, followed by tonics. No stimulants.

A. E. Edwards, Esq.—Cleanliness, improved diet, &c.

Dr. Freeland.—In the treatment of yaws the methods I have found most useful are, the observance of strict cleanliness; dressing of the tubercles with carbolic acid lotion or carbolic acid ointment: and internal treatment with cod-liver oil, syrup of iodide of iron, and other tonics.

Dr. Pierez.—Internally, Fowler's solution of arsenic in gradually increasing doses. Externally, the red iodide of mercury ointment (5 grains to the ounce). In mild cases, the latter alone has been quite sufficient.

Dr. Mackie.— Absolute cleanliness is the first essential in the treatment of yaws; when possible I have every spot poulticed for 24 hours, and then crusts scraped off until the red papillæ can be seen; then have each spot thoroughly anointed with some mercurial ointment, preferably the ung. hydrarg. ammon., or the ung. hydrarg. nitr. dil., every night and morning, to be thoroughly scrubbed with warm water and strong carbolic soap, and then anointed again. The great trouble is to get parents to take the trouble of following instructions; when they do take the trouble the disease is always curable. Regarding medicines for internal use, I have used preparations of iron and arsenic only; these remedies are used more for the sake of their general effect than for any specific action on the disease. Of course, the diet should be as rich as possible, but that part of the treatment is difficult to carry out, as in many, indeed most cases, the patients or their parents cannot afford anything beyond the usual diet; in such cases I am in the habit of giving children cod-liver oil as a substitute for food.

Virgin Islands.

Dr. Campbell.—Having never seen any case of yaws, or even any literature on the subject previous to my arrival in these Islands a little over a year ago, I was entirely ignorant of any specific treatment, and consequently have treated the disease on general principles, such as cod-liver oil and tonics internally, and local applications, such as iodoform, sulphate and chloride of zinc, and sulphate of copper, and, of course, have en joined the strictest cleanliness and regular sea-bathing.

Montserrat.

M. P. Duke, Esq.—Diet and hygiene.

Dr. Branch.—Cleanliness, good diet, and arsenic.

St. Kitts.

Dr. Branch.—The disease, *per se*, is never fatal here. Some of the cases last a very long time, in spite of treatment, especially if "tubba" be considered a form or sequela of yaws. But, as a rule, the disease yields steadily, though not rapidly, to treatment with quinine, arsenic, iron, cod-liver oil, and such-like medicine administered internally, and to mercurials, iodoform, creolin, and other appropriate external applications. The chief element in its successful treatment seems to me to be an improved diet, especially the addition of fresh meat.

Dr. Mapleton.—After a great many trials, I have found solid nitrate of silver well rubbed in a certain cure for the tubercles; any tubercle can be quite got rid of in a week or ten days. It is true that this is only treating the local manifestation of the disease, but it effectually rids the patient of the most disagreeable part of it, and also lessens his liability to communicate the disease to others. Some cases require cod-liver oil, tonics, and good food. I consider Donovan's solution to be the best medicine I have tried for yaws. I have never seen it do any harm, and often the results are magical. I have seen cases of acute yaws in which a whole crop of large fleshy granulations or tubercles with adherent crusts, spreading over nearly the whole forehead, as well as on other parts of the body, has shrivelled up in a week and almost disappeared. I have not seen such rapid and good results in more chronic cases. If I lived in Montserrat again I think I should try the thermo-cautery instead of the caustic, using cocaine or chloroform.

A. Boon, Esq.—Destroying the yaw with a powerful caustic, and isolating it so that it may not affect the skin elsewhere, *i.e.* re-inoculated. I have found chromic acid an efficient caustic, and a strong solution of hyd. perchlor. a good application after the yaw has been destroyed.

J. Foreman, Esq.—Sulphur, carbolic acid oil externally, tonics, iodide of potassium internally, but no mercury. Nourishing diet.

R. E. Semper, Esq.—I have had but little personal experience in the treatment of this disease. Should any case come under my notice I should adopt the treatment adopted, I believe, by the late Dr. Imray, of Dominica, viz., a light mercurial mixture

combined with tonics in suitable cases, locally. I should use carbolic acid solution or weak nitrate of mercury ointment.

NEVIS.

J. D. Bell, Esq.—Good diet, cleanliness. Treatment externally: red oxide of mercury ointment to the ulcerations. Internally: potassium iodide with perchloride of mercury and tonics.

C. R. Edwards, Esq.—Methods of constitutional treatment: iodide of potassium, the salts of iron, sea-bathing. Methods of local treatment: the application of caustics first and stimulating ointments afterwards.

Dr. Huggins.—Haven't treated any cases for years, as all go to the hospital, where they are given tonics, sea-bathing, and good food.

DOMINICA.

J. N. Rat, Esq.—The methods which I have found most successful in the treatment of yaws may be summarised as follows, according to the stages of the disease:—

Pre-tubercular stage.

1. Daily ablution of the whole body with carbolic soap and warm water.
2. Friction of the skin with a rough towel after the bath.
3. Warm clothing and bedding.
4. Moderate exercise.
5. Avoidance of exposure to wet, heat, and draughts.
6. Pure and sufficient water.
7. A generous diet of fresh meat and vegetables, avoiding acid fruits and condiments, such as vinegar, pepper, mustard, &c., and allowing a free supply of salt with the food.
8. A stimulant diaphoretic, *e.g.* carbonate of ammonium in frequent small doses.
9. Regulation of the bowels, taking care to check diarrhœa as soon as possible, and ensuring a sufficiently free action daily.
10. In anæmic subjects, iron, with which strychnine, phosphorous and cod-liver oil may be combined when necessary.
11. Cure without delay of any concomitant disease and healing of any existing ulcer, whether yaws infected or not, which interferes with the adequate development of the eruption.
12. Avoiding contracting any disease (especially those which involve the skin) which may retard the progress of the disease.
13. Removal from a malarial locality.
14. Residence in a weather-tight, well-ventilated building, free from draughts.
15. Residence in a dry, healthy locality.
16. Avoidance of over crowding of patients.

Tubercular stage.

When the tubercles have fully developed, mercury is to be administered as soon as the tubercles have fully developed, and continued for three weeks after their disappearance. It may be used in any of the forms in which it is employed in syphilis, the most efficacious method in cases in which the skin is intensively involved being that of fumigation, which may alternate with sulphur fumigation or warm sulphur baths. The combination which I generally employ is one of perchloride of mercury gr. $\frac{3}{16}$, tincture of the perchloride of iron m. xv., and liquor strychniæ m. iij., three times a day for an adult, reducing the doses to gr. $\frac{1}{8}$, m. x., and m. ij. respectively for patients between

twelve and twenty, and to gr. $\frac{1}{16}$, m. v., and m. j. respectively for children under twelve. For infants, mercury may be used in the form of inunction, if preferable; but to them gr. $\frac{1}{32}$ of perchloride of mercury and half a minim of liquor strychniæ in twenty drops of syrupus ferri phosphatis can be given three times a day. After the mercurial course iodide of potassium should be given in doses of five grains three times a day an hour before meals for six weeks. If, during the administration of the iodide of potassium, fresh tubercles should appear, the following preparation is to be employed instead, viz.:—hyd. perchlor. gr. $\frac{3}{16}$, pot. iod. gr. x., ammon. carb. gr. v., tr. cinchon. co. ℥ss., aq. ad ℥j., t. d. s. for adults, and proportionately until these disappear. When small, hard, subcutaneous tubercles persist, as they often do about the knees and elbows after the incrusted tubercles have dried, recourse must be had to Donovan's solution internally and inunction of the affected parts of the skin with an ointment consisting of equal parts of ung. hyd. nit. and ung. boracis. The same solution will also be useful in dealing with that obstinate papular eruption which sometimes survives the genuine yaws tubercle.

In cases which have yielded to the mercury and iodine courses arsenic should be administered for a certain period to improve the condition of the skin as much as possible. The recommendations made with regard to the pre-tubercular stage must be followed during the tubercular period with the exception of certain precautions about diet, which should be observed, viz., all fatty admixtures to the food, such as oils and butter, which may become rancid and affect the skin indirectly through the stomach, must be avoided. The diet should be as dry as possible, and should consist of grilled fresh meat or grilled fresh fish and plain boiled vegetables. Great care should be exercised in the selection of fish consumed by yaws patients, as many tropical fishes act very injuriously on the skin, and thus aggravate all cutaneous affections. No shell-fish should be allowed.

During the tubercular stage, patients should be made to drink freely of what is known as decoctions of the woods which have the reputation of purifying the blood, and possibly act beneficially as diuretics by removing effete matter from the body.

Post-tubercular stage.

For the various sequelæ of yaws, iodide of potassium combined with mercury is necessary. The lesions of the tertiary period of yaws must be remedied by mercury and iodide of potassium, assisted by guaiacum and sarsaparilla, the patient's strength being kept up by bark, iron and cod-liver oil. The iodide should be administered at first in doses of five grains. It may be beneficially increased in some cases; but it will be found that more effect can be produced with less injury to the system by a judicious combination of mercury and iodide of potassium than by increased doses of the latter only, which often do permanent harm. For obstinate ulcers, local calomel fumigation is a useful adjunct to the internal remedies employed. Fungating ulcers should be cauterised with caustic potash, and afterwards dressed with an ointment consisting of equal parts of ung. resina and ung. plumb. acet., to each ounce of which a drachm of iodoform should be added. Ozœna is best treated by calomel fumigation of the nares, after syringing them out with a weak lotion of liquor potassa and warm water. An ointment consisting of thirty grains of iodoform and an equal quantity of tannic acid in an ounce of vaseline may be applied to the mucous membrane in the intervals of fumigation. Ulceration of the throat and posterior nares may be similarly treated. To the large masses of fungous granulations which may block the throat, the liq. ferri. perchlor. fort. should be carefully applied three times a day, in the case of an adult, and, in that of a child, a lotion of equal parts of the tartrate of iron and water. Other efficacious applications in these cases are tincture of iodine mixed with glycerine, and aromatic sulphuric acid, with glycerine of tannic acid, in equal parts. For otorrhœa and fungous granulations in the ear, the iodoform and tannic ointment is useful, after syringing with a weak lotion of liquor potassa and warm water. Tubercles in the meatus are to be destroyed gradually, taking care to dry the parts well with a stick of sulphate of copper carefully applied. For the dermatitis of the palms and soles, ung. hyd. nit., pure or dilute, must be rubbed in night and morning. The deep-seated subcutaneous tubercles, known as "tobo," must have the thickened epidermis over them pared off, and should be destroyed by repeated applications of a stick of sulphate of copper or caustic potash, or with chromic acid. For superficial serpiginous ulcerations, ung. hyd. nit., or ung. hyd. co. may be employed. The granulation tissue of deep-seated gummata should be destroyed by cauterization to prevent infection of neighbouring parts. Contractions of the limbs are best treated with warm sulphur baths, colomel fumigation and massage.

In addition to these local remedies, mercury, iodine and chinchona must be regularly administered, as well as the decoctions of the woods, and the system improved by the administration of iron, cod-liver oil, &c. The recommendations as to food, &c., for the pre-tubercular stage must be here observed, a liberal diet being generally indispensable for the cure of the tertiary period of yaws.

W. R. Williams, Esq.—Must continue under observation for three months. Bathing in sulphur water. Three weeks on salines and carbonates. One month on the green iodide of mercury, and a couple of weeks on sarsaparilla or some substitute.

Dr. Kirkpatrick.—Most certainly segregation. Sanatorium principles in so far as we are allowed to carry the various methods out. Dietary as hereinunder with those medicines I have found valuable.

Treatment.

Diet per diem.		*Medicines.*
Meat,	8 ozs.	Gurghun oil, internally and externally.
Vegetables,	12 „	Ichthyol ointment, alternating with resorcin lotion.
Milk,	6 „	
Bread,	12 „	
Sago or tapioca,	2 „	
Drinks.		Iron and arsenic one day. Syrup of the hypophosphites compound the next day. Cod-liver oil off and on.
Barley water, 2 ozs. barley to 5 pints water		
Rice water, 2 ozs. rice to 5 pints water.		
Stimulants.		Catamenia in women and other irregularities, and worms in children, to be attended to.
Brandy. Whiskey. Only under special circumstances.		

I have at St. Vincent and Demerara worked this treatment with the best results. I beg to say complications and concomitants deserve the ordinary run of treatment.

XIII.

XIII.—Are persons afflicted with yaws treated by unqualified persons in the island in which you reside? If so, state any facts connected with this matter that you are acquainted with.

Tobago.

Dr. Tulloch.—No, not to my knowledge, with the exception of tubboe and crab yaws, which they treat by prolonged soaking of the feet in hot water. They profess, occasionally, an acquaintance with local remedies said to possess curative qualities, but I have never known them endeavour to cure the disease unless it interfered with their powers of progression.

Dr. Norman.—I do not know; I may state here that the information I have been able to give in connection with this subject is necessarily very brief and meagre, as I have been here but two months, and that is much too short a time for one to be able to get any definite experience, or form any positive ideas on the subject.

Dr. Blanc.—I am not aware that any persons afflicted with yaws are treated by unqualified persons.

W. A. Purser, Esq.—I have not heard of unqualified practitioners as a class. The older members of a family prescribe or direct for the younger, according to their experience and knowledge. There is a general impression on the mind of the people that the disease is like measles, small-pox, &c., in respect of its being suffered from once only, that the disease must run its course, and is but little, if at all, affected by medical treatment.

Grenada.

Dr. McLeod.—Yes, a common practice among the unqualified was the administration of mercury to produce salivation.

Dr. Latour.—Have seen a case of crabs treated by application of arsenious acid on bread poultice. The crab exfoliates like a marble, but the ulcer left is very difficult to cure. Whether it be the effect of the arsenic on the tissue or the disease itself is difficult to ascertain. I first saw this treatment adopted in St. Vincent, years ago, by unqualified persons. It was known there as the negro's method of treating yaws. It is very painful. I have often thought if, with cocaine, that mode of treatment could not be adopted when the eruption is not diffuse.

Dr. Hatton.—No, I think not, persons suffering from this disease have always been attended gratuitously by the District Medical Officer. If allowed to, most of the people would allow the disease to run its course without any treatment.

Dr. Lang.—No doubt yaws, like other ailments, is treated by unqualified persons with decoctions of bush remedies, though it has not come under my observation.

H. J. L. Bennett, Esq.—I am quite convinced that many cases of yaws are treated by unqualified persons in this island. The people, having a great aversion to compulsory detention in the special hospital, do not consult the regular medical practitioners, as they know that they would be immediately ordered into the Institution; therefore, unless the disease shows itself on the face, or some other conspicuous part of the body, the sufferers conceal their complaint, and seek assistance from those only who will not betray them.

The legislation for the prevention of yaws in Grenada has done a certain amount of good; but, to be thoroughly effective, it should combine some system of house-to-house inspection with compulsory detention and treatment in a special hospital: of course, all the infected islands should work together on the same lines, and the importation of cases would have to be strictly guarded against.

W. Boyd, Esq.—It is a recognised fact that yaws patients, like all others in this island, enjoy the privilege of being treated by empirical druggists and charlatanical "bush doctors," thanks to a lax supervision of the medical registration and druggists' ordinance. Many comic and amusing specifics are used by these "quack medicos." A favourite treatment, as described to me, consists of the patients being fed for some months only on the flesh of the armadillo, mysteriously cooked with herbs, and then being suspended for some hours over pots of some boiling infusion. An ointment sold by the name of "L'unguent Pian" is much in vogue at present; of its component parts I am ignorant however. Were these cases subjected in the early stage of the disease to skilled medical treatment I have no doubt that the necessity of a segregating ordinance would cease.

N. Durrant, Esq.—No. All believe in sea-bathing and contagion.

St. Vincent.

Dr. Newsam.—The country abounds in quacks, and I have no doubt that the cases in the advanced form that come under the District Officer's care for the first time had been previously under the "bush doctor's" hands.

G. Finlay, Esq.—The disease is frequently treated by unqualified persons, one of whose chief methods of treatment is sea-bathing.

W. B. Austin, Esq.—No knowledge of such. Remarks:—I wish to state that I have been residing in the island for only nine months, and have, therefore, not had sufficient opportunity for going into the matter as thoroughly as I should have liked to have done.

M O'Connell, Esq.—I can't say.

Dr. Arnott.—It is quite out of my power to reply to this question.

St. Lucia.

C. Dennehy, Esq.—Yes. So-called "Panseurs." Judging of the class from several who at various times applied to me for employment, as "able to cure yaws," they are, one and all, old, idle, drunken, and ignorant; not one could read or write French or English; each has his own remedies of herbs and tisanes, and all frequently have recourse to arsenic and mercury, which they measure by rule of thumb, and administer haphazard. Copious sweating and avoidance of fresh air and water are their articles for medicinal faith.

H. Norton, Esq.—Yes, and very often badly treated by using too much mercury.

O. Galgey, Esq.—Numbers of unqualified persons treat yaws cases in this island, and the lower classes seem to have great confidence in their remedies. I have never inquired into the particulars of this mode of treatment, as I have not seen any proof of its efficacy.

S. F. Proctor, Esq.—I believe so; but I know no facts. They are reputed able to cure the disease, and I understand use native herbs.

Dr. Lestrade.—Most of the yaw cases when they can escape the asylum, which they generally do, avoid the regular medical man, and have recourse to so-called yaw doctors. In Vieux Fort this is generally the case with them. These doctors have always each their own pet treatments, and affect to cure their patients in some miraculous way or other; when cures do occur, I believe that nature and the bathing, which most of them enforce, coupled with more liberal diet, have more to do with these cures than these doctors.

Dr. Tabone.—I know of unqualified persons treating the disease in my quarter by hearsay; their treatment principally consisting in the administration of infusions of different kinds of roots combined with other doubtful ingredients.

Antigua.

W. H. Edwards, Esq.—Yes, I believe by a large class of people known as "bush-boilers," not only for yaws, but in many other diseases, also for criminal purposes.

A. E. Edwards, Esq.—Yes; so-called bush doctors.

Dr. Freeland.—I have heard of cases being treated by unqualified persons in this island; but no facts connected with this point have ever come under my notice.

Dr. Pierez.—Not that I am aware of. I have often found that, previous to being brought to me, the tubercles were rubbed over with sulphate of copper, or verdigris, by children's parents; but I don't think any of the negroes here pose as "yaws specialists."

Dr. Mackie.—There are "unqualified practitioners" in every village, and I suppose they treat yaws patients as they treat others; but it is almost impossible to prove that they treat yaws or any other diseases.

Virgin Islands.

Dr. Campbell.—In the case of John Dawson, as above mentioned, an unqualified person treated him for several weeks. This man used some vegetable infusion internally; and, locally, applied the juice expressed from the root bark of a tree, called in these islands Dog-wood (this juice is very poisonous). He also made Dawson bathe regularly in the sea. From the reappearance of the disease soon after stopping this treatment, I fear the internal treatment was ineffectual, but the conditions of Dawson's hands and feet before and after the application of the Dog-wood juice testify in my mind that there is some virtue in the juice.

Montserrat.

M. P. Duke, Esq.—Yes. I cannot say that their treatment does either good or harm.

Dr. Branch.—Yes, freely.

St. Kitts.

Dr. Branch.—The doctors are probably consulted in every case, even though the treatment recommended by them may not always be perseveringly pursued.

Dr. Mapleton.—Not to my knowledge.

A. Boon, Esq.—I think so; but of late years the disease has disappeared from my district, and I am not therefore able to speak positively on this point.

J. Foreman, Esq.—Yes, the parents of those affected with yaws take them to the sea. After the bath the patients are rubbed down with moss until they bleed. Then a plant growing on the sea-side, called "Tubboe-bush," is exhibited, and the sores are dressed with the milky juice of this plant.

R. E. Semper, Esq.—The treatment of yaws is, I believe, almost exclusively in the hands of the natives. They use powdered brimstone to the growths. Sour oranges, baked, are applied to the parts. Gunpowder in rum is a favourite remedy taken internally.

Nevis.

C. R. Edwards, Esq.—Yes. They rub the sores with sulphate of copper, and apply iodoform ointment ("Benjamin's Salve"). They also rub the sores and the tubercles with the leaf of the physic nut (*Jatropha curcas*), and the leaves of a shrub popularly known as the "Sea-side Balsam."

Dr. Huggins.—I believe unqualified persons do treat yaws, but not so much as formerly, and it is kept very secret.

Dominica.

J. N. Rat, Esq.—Yaws is often treated in the Windward District of Dominica by non-professional persons.

Course of treatment prescribed for yaws by a skilful "yaws doctor" of Dominica—

The treatment of yaws is divided by this "doctor" into five stages, which may be named:—

(*a.*) The "cold tisane" stage.
(*b.*) The "strong tisane" stage.
(*c.*) The "mercury" stage.
(*d.*) The "Guaiacum" stage.
(*e.*) The "special diet" stage.

(a.) *The Cold Tisane.*—This is prepared from the roots of the native Sarsaparilla, the "Fleuri Noel," the "Chaque chaque," the "Tolulu," and the "Pâques" and Guayacum chips. A certain quantity, three times the size of an ordinary thumb, is put in a vessel into which a sufficient quantity of boiling water is poured to cover all the ingredients completely. These are allowed to soak in the water for an hour, when the latter is poured off into another vessel, and cold water is added to it to bring it up to the quantity required to be drunk during the day. This tisane is thus prepared and drunk to the extent of about two quarts daily, until the eruption has developed fully. When the latter has disappeared, the patient is still kept under observation, and the tisane is continued, because, according to the "yaws doctor," the yaws tubercles re-appear generally three times after intervals of a few days. A week after the last appearance of the eruption the patient begins the next course.

(*b.*) *The Strong Tisane.*—This consists of a concentrated decoction of the roots of the native Sarsaparilla, the "Pou de Bois," the "Seguine," the "Olivier," the "Raisin bord de la mer," and the "Poirier," and Guaiacum chips. A portion of each about three times the size of an ordinary thumb, is boiled in a gallon of water, until the latter is reduced to half a gallon. Three tea cupfuls of this tisane are taken daily, one in the morning, another at midday, and another at night, until the eruption has completely disappeared. The patient is then put through the following course :

(*c.*) *The Mercury.*—Corrosive sublimate is put in a quart of rum, which is allowed to stand a week in the sun. Of this rum a teaspoonful is then taken three times a day, morning, noon and night, until it is finished. This is now followed by the Guaiacum course.

(*d.*) *The Guaiacum.*—Guaiacum resin is put in a pint of rum, which is allowed to stand a week in the sun, and of this a tablespoonful is taken three times a day. When this course is completed, a special diet is begun, the details of which are as follows.

(*e.*) *The Special Diet.*—Salt fish (the salted cod imported into the West Indies from North America) soaked in water until all the salt is extracted, olive oil, the root of the *Manipot utilissima* grated, washed and dried, and known as "farine," the plaintain (*Musa paradisiaca*), the banana (*Musa sapientum*), and the yam (*Dioscorea sativa*), with an occasional allowance of fresh beef, constitute the diet which must be observed for forty days after the Guaiacum course. During this time, as well as throughout the different stages of the disease, the patient must abstain from wine, beer, spirits, tobacco, vinegar, capsicum, black pepper, onions, &c., in fact, from all acid and pungent things. All exciting and debilitating influences must be avoided, sexual intercourse being strictly prohibited.

While the "cold tisane" is being taken, the patient is purged, every fortnight, with Epsom salts or jalap. Bathing in cold water, and exercise in the open air, are also allowed during that time; but hard work, excessive exercise, and prolonged exposure to damp and heat are forbidden, as being injurious, during the disease, and for some time after.

During the Mercury and Guaiacum courses, the patient remains indoors, and is not allowed to bathe.

When the Guaiacum course is over, sea baths are taken daily all through the forty days of special diet.

W. R. Williams, Esq.—Yes. They are, as a rule, very successful.

Dr. Kirkpatrick.—Yes, a lot of old women. I never consult them. It is fair, however, to say their remedies for the disease are perfectly harmless, the yaws taking a departure in due course on their own account.

XV.

Observations on the Replies to the Interrogations.

The interrogations were sent to 48 medical officers, 41 of whom replied, and the majority of these gave answers to all the interrogations.

Those who did not send in any replies were Dr. Orgias, of Grenada; Mr. G. W. Paterson, of St. Vincent; Dr. McHattie, and Mr. J. S. Gabriel, of Antigua; Mr. W. H. Fretz. and Mr. R. A. Cleveland, of St. Kitts; and Dr. Armstrong, of Dominica.

Dr. Orgias, although he did not reply to the interrogations, was good enough to inform me of his experience on several of the questions raised; and, as he has been in charge of a yaws hospital for many years, his testimony is of considerable value. It is to be regretted, however, that he did not seize the opportunity of putting his experience on record as did his colleagues.

There has been no reply whatever from Mr. Fretz; but the following excuses were offered by the other medical officers :—

Mr. Paterson—"I regret that owing to my short practice in the West Indies, I am "unable to give any valuable information concerning the disease yaws."

Dr. McHattie.—"With reference to yaws, I regret that I cannot give any informa- "tion as I have never seen but one case of that disease in this island."

Mr. J. S. Gabriel :—" I beg to state that the disease is comparatively rare in this " district, and that only two cases have been treated by me during a period of nearly ten " years. I regret, therefore, that I am unable, from personal observation, to answer the " interesting interrogations prepared by Dr. Nicholls "

Mr. R. A. Cleveland :—" I regret I am unable to give any information concerning " the disease called ' yaws.' My time has been so short in the West Indies that I am " quite unacquainted with the disease. No cases have as yet come under my direct " observation."

Dr. Armstrong :—" Referring to the interrogations concerning yaws proposed by " Dr. Nicholls, it would be useless for me to attempt to answer them until I have had " time to make the necessary study of the disease in question. Up to the present I have " sent to the Yaws Hospital, in Roseau, the cases presented to my notice in this district ; " so my replies, at present, to the proposed interrogations would be obviously " valueless."

The replies, which have been given *in extenso* in the previous section, show that some of the medical officers have gone very carefully into the various questions, and sent in papers of undoubted value to the government, as well as to the medical profession. The experience of a number of the medical officers was, of necessity, of a limited nature ; for, in some of the districts, there are very few cases of the disease to be seen, and in others, for reasons already explained, those suffering from yaws rarely come under the notice of the medical man. Mr. Austin, of St. Vincent, specially remarks, in his reply to the last interrogation, that he has had little experience of the disease, and the following two prefatory memoranda state the same fact.

Dr. Lestrade, of St. Lucia, states as follows : " I beg to answer to the best of my " knowledge, which is not much, seeing the few opportunities I have had of studying yaw " cases, these, being considered infectious, not being admitted in the hospital, and also " owing to the prejudice of parents or relations of patients, who are reluctant, in most " cases, to show those suffering from the disease to the medical man. In view of the " above, therefore, I beg to be excused if I am unable to answer fully every question put " in the attached minute sent me."

Mr. J. D. Bell, of Nevis, remarks as follows : " I have the honour to enclose " replies to some of the interrogations concerning yaws. The disease is unknown in my " district. My slight experience of the disease is derived from a few cases I have treated " in the other districts of the island."

An excuse of want of experience cannot, however, be brought forward by some medical officers who have contented themselves with sending in monosyllabic replies to most of the questions. And it is much to be regretted that they have adopted this method of showing that they have been at no pains to further the work of the Commission, or to advance the cause of medical science.

1.

Is the disease prevalent throughout the island, or is it limited to particular localities?

The replies to this interrogation show that yaws is universally prevalent in the country districts of Tobago, Grenada, St. Vincent, Montserrat, Nevis, and Dominica ; and that in the other islands it exists in particular districts. In all the islands, however, those places remote from the towns, and therefore less under the supervision of the authorities, are, as it were, the endemic *foci* of yaws. This fact is easily understood when the habits of the negro are considered, and when it is remembered that those who have been least benefited by civilising influences are indifferent to the ravages of the disease, and in many instances rather court its spread amongst their young children.

In those islands in which legislation has rendered medical treatment compulsory, and more especially in the half French islands, such as St. Lucia and Grenada, one seldom sees a case of yaws in the villages, all those afflicted with the disease having been secreted by their friends, in most instances, in the depths of unfrequented valleys, or in almost inaccessible situations in the mountainous interior. Some of these places I have visited, and described in preceding portions of this report.

In St. Vincent and Tobago, and during recent years in Dominica, the disease has been found to be rife in the villages and hamlets ; for, as the compulsory law has of late been relaxed in Dominica, and as hospital treatment is not obligatory in the other two islands, the people feel that they are safe from interference, and that the exhibition of

their utter disregard of the ravages of the disease is not likely to give rise to trouble to themselves.

Only one medical officer, namely, Mr. Numa Rat, of Dominica, has gone beyond generalities. In his reply to this question he briefly remarks that the disease is most frequent in damp localities. As the disease is of microbic origin, one can understand why this should be so.

The places in St. Kitts where the disease is most prevalent are less dry than the other parts of the island, and in Tobago I found most cases in the mountainous and wooded portions of the colony, where the rainfall is necessarily heavier. The disease does not depend entirely, however, on a moist climate for its spread, nor are all the endemic *foci* damp ones. This is exemplified in Antigua, where the disease prevails most at Willikies, which is very badly off for water, whilst in the wooded valley district Mr. Gabriel, the medical officer, has only seen two cases in ten years. These apparently contradictory facts may, however, be explained in the following manner. In Antigua the disease has been re-introduced of late years, and it has, happily, not yet succeeded in spreading itself over the whole island. Were Antigua, as regards the prevalence of yaws, like St. Vincent or Tobago, the disease would, doubtless, fix itself more persistently amongst those people residing in the damper localities.

The conclusions to be drawn from the evidence as to the prevalence of the disease in the Antilles are, that it is found to affect the people in all situations, but that the contagion manifests somewhat increased activity in damp localities.

2.

What is the ordinary diet of the people of the island, and under what hygienic conditions do they live?

The replies to this interrogation show that the diet of the West Indian negroes is mainly of a vegetable nature, but that fish, either fresh or salted, is used as an article of food. Meat is rarely eaten by them, and fowl's eggs and such-like aliments, that could be raised by the people with very little trouble or expense, cannot be said to form part of the food supply at all.

In all the islands large quantities of fish are taken from the sea, and they are either eaten fresh, or dried and salted for future use. But in some of the larger and mountainous islands fishing is only occasionally possible on the rock-bound windward coast, where the Atlantic swell creates a high surf nearly all the year round. In such places fresh fish is but rarely obtainable, and the people, therefore, are obliged to live on vegetables, and on salt fish imported from the continent of North America.

This salted fish usually eaten by the poorer people is a cheap stuff of an inferior quality, and sometimes it is in a semi-putrid condition. As it has to bear several profits before it reaches the consumer, its cost is altogether in excess of its nutrient value, and the amount of money expended annually in this inferior food would be sufficient to enable the people to raise animals of various kinds for slaughter. Apart from the gain to the consumer in a better and cheaper food, the establishment in this way of remunerative pursuits would tend to do away with the poverty of the negro that is everywhere apparent. As regards the salt fish, Dr. Milroy makes the following observations in his report: "That a diet which contains so little of fresh, and so much of salted, "animal food must be comparatively innutritious, scarcely needs discussion. It is "difficult, indeed, to imagine that a healthy chyle and blood can be formed out of such "a material as the dry and hard fibre of salted fish, which forms the main, or only "nitrogenised, constituent in the food of the mass of the people. It may be a *condiment*, "it can scarcely be a *nutriment*; and this, I believe, is the truth of the matter. It "makes tasty and savoury the vegetables with which it is eaten. This is the quality "the negro covets, and which leads him to prefer the inferior and cheaper kinds of fish "to what is better and sounder. No one who has not passed by some of the low "provision stores in the towns can form an idea of the intolerable stench from them. "If you express astonishment at the character of the staple food, you are told that the "people like it, and seem to thrive upon it. There is, however, much fallacy in this. "Just in proportion as men lapse into, or are in, semi-barbarism, their tastes become "depraved, and often revolting. In slavery the negroes were accustomed to this sort of "food, and their descendants do as their fathers did."

The replies to the interrogation show that in none of the islands does fresh meat form a part of the food of the people, except on rare occasions. This deficiency is

certainly not made up in quantity by the imported salt food-, for I find, from careful calculations based on the imports into each island during the years 1888, 1889, and 1890, that the consumption of salted food per head of the population for a whole year varied from 19 lbs. in Tobago to nearly 60 lbs in Antigua. On reference to the interesting table in the third division of this section, it will be seen that the people of those islands in which the disease most prevails really consume less salted foods than those of the other islands, and this fact conclusively shows that salt fish, &c. cannot be the cause of the spread of the disease, as has been stated on several occasions by medical men and others.

Of the vegetables so largely eaten by the negroes, the principal ones are sweet potatoes, yams, plantains, cassava, tanias, maize, and pigeon peas.

The sweet potato, *Ipomæa Batatas*, Lam., is the most widely distributed of all these food products. It grows in all the islands; as well in the hot, dry climate of Carriacou, as in the cool, moist climate of the Dominica hills. It contains a considerable quantity of nutriment, more indeed than most persons imagine, as will be seen from the following analysis of Payen :—

Nitrogenous matter	1·50
Starch	16·05
Sugar	10·20
Cellulose	0·45
Fatty matter	0·30
Other organic matter	1·10
Mineral salts	2·60
Water	67·50
	99·70

The yam, *Dioscorea alata*, L., and other species, is only obtainable in some of the islands at certain seasons; it consists principally of starchy materials.

Plantains, *Musa paradisiaca*, L., and the banana, *Musa sapientum*, L., are grown in great quantities in all the islands that are blessed with an abundant rainfall; and in such places their fruit is the staple food of the people, many indeed of the poorer labourers at times mainly subsisting on them. Fortunately, the fruit contains nearly 9 *per centum* of nitrogenous matter, and it is easy of digestion. Duff, in his account of British Guiana, states that "Ten pounds of dry meal may be obtained from a bunch of plantains of 50 lbs. " weight, containing 8·8 per cent. of nitrogen, and 54·5 per cent. of protein compounds." According to Corenwinder, the composition of ripe bananas is as follows :—

Nitrogenous matter	4·820
Sugar, pectose, organic acid, with traces of starch	19·657
Fatty matter	0·632
Cellulose	0·200
Saline matter	0·791
Water	73·900
	100·000

Cassava is the meal made from the tuberous roots of the *Janipha Manihot*, Kth., and it enters very largely into the diet of the people of Tobago, Grenada, St. Vincent, St. Lucia, and Dominica. It is composed principally of starch, with some woody fibre, and a small proportion of nitrogenous matter.

Tanias are the tuberous rhizomes of the *Colocasia antiquorum*, Sch., and they are cultivated largely in those islands where the cassava plant is grown extensively. Their chief nutrient value lies in the starch cells, which exist in the rhizomes in great abundance.

Corn-meal is the name applied to the meal of the maize, *Zea Mays*, L. It supplies the place in the dietetic substances in the drier islands, such as Antigua, Carriacou, and St. Kitts, that is occupied by the "ground provisions" in the more mountainous and wooded colonies, where there is a heavier rainfall. Maize is grown in varying quantities in all the islands, but the greater quantity consumed is imported from the United States. The meal is made into a kind of porridge called "fungee," or "foufou," and the people are extremely fond of it. Maize, as an alimentary substance, deservedly ranks high. It contains almost the same quantity of nitrogenous and starchy matters as white wheat, and in fatty matters it is nearly four times as rich. The following analyses by Payen show at a glance the respective values of these grains in a dried condition: —

	White Wheat.	Maize.
Nitrogenous matter	12·65	12·50
Starch	74·51	67·55
Dextrine, &c.	6·05	4·00
Cellulose	2·80	5·90
Fatty matter	1·87	8·80
Mineral matter	2·12	1·25
Totals	100·00	100·00

Pigeon peas, *Cajanus indicus*, Spr., are consumed largely in all the islands to the south of Montserrat, and in the Grenadines they are cultivated extensively for exportation to Barbados and other islands. They are a valuable food, containing over 20 *per centum* of nitrogenous matter; that is slightly over that contained in lean beef, which is stated by Pavy to be 19·3 *per centum*.

It is seen by the above particulars that the vegetable foods consumed so largely by the negroes contain all the matters necessary for the nourishment of the body; but, except in the case of the peas, the nitrogenous substances are present in so small a proportion, that enormous quantities of the "ground provisions" would have to be taken to supply enough of these matters for the proper nourishment of the body. According to Moleschott, the "alimentary substances in a dry state required daily for the support of "an ordinary working man of average height and weight" would be as follows:—

	Ozs. Avoir.	*Per Cent.*
Albuminous matter	4·587	20·1
Fatty matter	2·964	13·0
Carbo-hydrates	14·250	62·3
Salts	1·058	4·6
Totals	22·859	100·0

The evil that results from the vegetable diet of the negro may be at once understood if calculations be made in regard to the sweet potato, which is, at times, the main article of diet in some of the islands. This vegetable contains only 1·5 *per centum* of nitrogenous matter; so, in order to obtain the 4·5 ounces of albuminous substances, it would be necessary to ingest 300 ounces of sweet potatoes. But no man can eat nearly 19 pounds of sweet potatoes in a day, so when the diet consists mainly or entirely, as it often has done, of this vegetable, the animal economy suffers by the deprivation of necessary elements, with the inevitable result of debility and disease.

In my Third Report on the Dominica Yaws Hospital, written in 1879, I made the following observations on the food of the people:—

"The food of the people consists mainly of vegetables and salted fish, which is "sometimes eaten half rotten. As regards the supply of good and nourishing vegetables, "no labouring population in any part of the world is better off than the peasantry of "this island. The nitrogenous food, such as meat, fish, &c., is, however, deficient "both in quality and quantity, for the amount of nourishment in the dried salt

" fish is very small in comparison with that in fresh animal food. Occasionally fresh " fish is obtained by the people, and more especially by those living on the leeward " coast of the island; but the number of meals of this food partaken of in a month is, " as a general rule, small. There is, however, an exception in the case of those who " are the possessors of a canoe and a basket fish-pot, but these persons are not ordinary " labourers, for they have their vegetable gardens in the interior, and they rarely work " upon the estates. In many parts of the windward coast fresh fish cannot be caught " on account of the high surf, and in these districts it is found that the disease prevails " to a much greater extent. The people have no dislike to fresh meat; on the contrary, " it is eagerly eaten when it can be obtained, and I have known cases where it has " been devoured in a semi-putrid condition.

" In the country parts of the island the people have no chance of procuring meat, " except when an animal meets with an accidental death, or when a goat or pig is " killed on a festive occasion. On the other hand, salt fish is sold in every village " shop, and, as it may be kept for some time without spoiling, it is always obtainable. " Under these circumstances there is no help for the people but to make salt fish " their principal animal food. It is much to be regretted that cattle, and goats and sheep, " are not reared in greater numbers for the purpose of food. There is not a single stock " estate in the whole island, and the butchers of Roseau have to scour the country " for animals to slaughter, and, when found, the meat is generally sold by engagement " to the principal residents of the town and its environs.

" The labouring population have two principal meals, breakfast and dinner the " former eaten at about 11 a.m., and the latter at sundown. The labourers are in " the field soon after sunrise, and they work till the breakfast hour upon an empty " stomach, only a roasted plantain or a small piece of bread, with, perhaps, some coffee, " being taken early in the morning. When the time for the meal comes round hunger " is usually very keen, and so large a quantity of food is consumed that the stomach " becomes overloaded, and, as a consequence, digestion is but imperfectly carried on. " The people of Dominica are especially liable to affections of the stomach, and to " bowel complaints, and I believe this may be explained, in a great measure, by the " nature of the diet, and the way in which the food is taken. Were it possible to " induce the peasantry to take their food in smaller quantities, and at lesser intervals " of time, I believe much would be gained in point of health."

In an article in the *Medical Times and Gazette*, of the 11th October, 1879, Dr. Milroy thus alludes to the question of diet: —

" The account which Dr. Nicholls has now given of the diet and feeding of the " lower orders must be confessed to be very lamentable, and will, it is to be hoped, " stir up the efforts of the local authorities, and excite the interest of the Imperial " Government to initiate means for the rectification of the existing state of things in " respect of the increased supply to the inhabitants of—

" (*a*) Fresh animal food, along with milk, so necessary an article of food.

" (*b*) Although I have no direct information as to the procurable amount of " fresh fish in Roseau, the impression left on my mind was that the whole extent " of the coast, from Scott's Head to Rupert's Bay, may possibly be found to be a " prolific field of supply of this wholesome article of food. What has been so " successfully done at the Lunatic Asylum of Jamaica may be equally profitable " near to Roseau.

" (*c*) It may be reasonably inferred that, in so fine a climate as that of Dominica, " a larger amount of poultry may readily be reared. Eggs constitute one of the " best articles of food, especially for the young, in all countries, and they are " admirably suited for the dietary of invalids."

For several years the reports of the district medical officers in Dominica used to be sent to me for analysis, and I issued a quarterly "Report on the Medical Administration of the Districts in the Presidency of Dominica." The tables attached to these reports were exceedingly valuable, as showing at a glance the prevalence of the various diseases amongst the people. In these tables the diseases of the digestive system always took the first numerical rank, and this extraordinary preponderance of such disease proves the fact that the people suffer much from dietetic errors. In my Report for the quarter ended 31st March, 1882, I wrote as follows: —

"The large number of cases of diseases of the digestive system is specially noticeable. In the returns from each district the diseases classed under this head are in "excess of all others. As I have pointed out in my reports on the Roseau Infirmary, this "great prevalence of digestive troubles is largely, if not entirely, due to the absence of "fresh animal food in the diet of the people, as well as to the injudicious times of eating, "and to the manner in which the meals are taken. Usually the stomach is left empty for "long periods, and then it is suddenly distended with indigestible salt and farinaceous food. "This is entirely at variance with the physiological requirements of the digestive "apparatus, and it is scarcely to be wondered at, therefore, that digestive ailments take "the first numerical rank in the statistical tables of disease."

And, in the report for the year 1885, the following passage occurs: "Diseases of "the digestive system, as I have shown in former reports, always take the first numerical "rank in the Dominica medical returns. Under this heading 433 cases are classed, and "these figures show that 25·3 per cent. of all diseases attended by the district medical "officers are referable to digestive troubles. It is satisfactory to find, however, that there "appears to be some improvement in this respect, for in the years 1882, 1883, and 1884 "the percentages were, respectively, 28·5, 31·7, and 28."

Whilst I was in Tobago I examined the various reports on the vital statistics of the island, and I was much struck by the extraordinary number of deaths recorded as due to diseases of the digestive system. Indeed, in the report for the year 1889, the Deputy Registrar General drew attention to the matter in the following words: "The greatest mortality "appears from the returns to have been from diseases of the stomach and other organs of "digestion, the number being 114; 77 of which occur in ages from under one year to "under 15."

I have made up the following table from the Tobago reports for the six years 1885—1890, and the information it is able to give at a glance is most instructive in regard to the important question of diet:—

Year.	Total Number of Deaths.	Deaths from Diseases of the Digestive System.	
		Total Number.	Percentage on Total Deaths.
1885 - - -	426	45	10·5
1886 - - -	398	53	13·3
1887 - - -	381	52	13·6
1888 - - -	361	72	19·9
1889 - - -	437	114	26·0
1890 - - -	453	109	24·0
Totals - - -	2,456	445	18·1

This table shows that the percentage of deaths from diseases of the digestive system on the total number of deaths varied from 10·5 to 26·0, and that, during the six years, 181 deaths out of every thousand were due to this class of diseases; and, moreover, to this heavy mortality may be added an amount of misery and suffering due to errors in diet that is scarcely credible.

I have placed in the Appendix copies of the dietaries of the yaws hospitals, and of some of the colonial hospitals, leper asylums, and gaols, for the purpose of comparison. With the exception of the gaol dietaries, which show that the authorities endeavour to punish the prisoners through their digestive systems, the food allowance of the inmates of the various institutions is an immense improvement on the ordinary diet of the people. From these dietaries I have drawn up the following table, which shows at a glance the weekly quantity of the various classes of food given to the inmates of the hospitals, asylums, and gaols:—

ANALYSIS of Dietaries, showing the Quantity in Ounces of the principal Food Substances allowed to each Person Weekly.

INSTITUTION.	Fresh Meat.	Salt Pork.	Fresh Fish.	Salt Fish.	Vegetables.	Wheaten Bread and Biscuits.	Cassava Meal.	Rice, Barley, Cornmeal,
Colonial Hospital, Tobago -	24	–	–	60	220	41	–	24
Colony Hospital, Grenada -	The dietary of this hospital was applied for, but it has not been received.							
Yaws Hospital, Grenada - -	The dietary of this hospital was applied for, but it has not been received.							
Colonial Hospital, St. Vincent -	48	–	–	32	98	126	–	3½
Colonial Hospital, St. Lucia -	17	¾	–	28	34	84	12	49
Yaws Hospital, St. Lucia -	36	¾	–	19	34	84	18	49
Colonial Hospital, Antigua -	22	6	6	6	26	88½	–	30
Leper Asylum, Antigua - -	22	2	12	–	26	88½	–	30
Colonial Hospital, St. Kitts -	30	1¾	–	16	75	116½	–	6
Leper Asylum, St. Kitts - -	24		–	24	60	105	–	20
Roseau Infirmary, D minica -	26	–	16	–	78	56	16	18
Yaws Hospital, Dominica -	26	–	16	–	60	84	40	–
Yaws Encampment, Dominica -	4	–	48	3	104	8	72	–
Gaol, St. Lucia (prisoners not undergoing hard labour).	–	–	–	5¼	24	126	–	25
Gaol, St. Kitts - - -	–	6	–	9	30	58	–	18

The figures for the gaols are startling, and they require no comment from me. Of the charitable institutions, the St. Vincent Hospital dietary is of the highest nutrient value. Although the dietaries of the yaws hospitals show a marked improvement on the ordinary diet of the people, they are by means perfect. It must be said, however, that the patients appear to thrive under them, and that "extras" are allowed in certain cases.

The details that are given by the medical officers in their replies to the interrogation are very painful reading; and, on reference to the accounts of my proceedings in the various islands, it will be seen that in no instance has the sad picture been overdrawn. To bad and insufficient nourishment must now be added the evils of personal uncleanliness, and wretched ill-ventilated hovels, in which such overcrowding exists as to induce a condition of immorality that Dr. Tulloch, of Tobago. is unable to describe as human.

Three medical officers in Tobago and one in Dominica, that is, four out of forty, from whom replies were received, describe the people as cleanly in person. This is, undoubtedly, the case in some instances, but, unfortunately, taken as a whole, the negroes of the West Indies must be described as the reverse of cleanly. My own experience teaches me that this statement is, unfortunately, true. I have known instances in which labourers have not bathed for weeks, and during that time they have worn the same clothes day and night. The result in a tropical climate, in persons whose skins perform some of the excretory functions borne by the kidneys in colder climates, can easily be imagined, and the easy manner in which cutaneous and other diseases are propagated may readily be understood.

In some of the islands where there are no streams, and where the rainfall is low, fresh-water baths are unobtainable by the people. One would have thought that, in the large towns of such places, public baths would have been established by parochial or Government authority. But, except in the French colonies, public bathing establishments are, I believe, undreamt of.

The hygienic condition of the people of Dominica was ably set forth by the late Mr. Theodore Lockhart, the Registrar General of the island, in his report for the year 1873. The following extract from this document, although a long one, may with advantage be transcribed, as it is a true picture even now of the condition of the negro in these colonies :—

"The impression formed upon the mind in respect of the sanitary condition of our "inhabitants in these parts of the country is not altogether reassuring. Though it must "be confessed that, among the adults of both sexes, the robust constitution and the "exuberant vigour of animal life is the rule, it is strikingly in contrast with the puny, "feeble, and morbid condition of the generality of the young children of our labouring "population. The infant members are for the most part sickly, and exhibit the appearance "of neglect, and the results of improper and scanty nourishment. The parents, whose "subsistence depends upon the devotion of so many hours per day to the requirements of "agricultural labour, inevitably deprive their young children of that amount of care and "attention which is indispensably necessary to ensure their healthy growth and develop-"ment, and who are, in many cases, left in their huts under circumstances almost amounting "to temporary abandonment. The general habits of the labourers are not by any means "calculated to secure the continuance of a healthy state, and hence, though, as before "observed, the majority of adults look robust and strong, they succumb rapidly to the "encroachments of disease, and dwindle into miserable wrecks, from the want of sufficient "healthy tone in the system to withstand the attacks of constitutional complaints. The "impurity of the blood from poor nourishment, filthy habits, the custom of sleeping in "an atmosphere vitiated by the breath of a number of individuals cooped up in a narrow "cabin, causes the least scratch to break out in sores and ulcers. . . . . The "houses of the labourers are, as a rule, little better than indifferent hovels, scarcely any "having wooden floors; they are very inefficiently ventilated, and at nights every crack "and cranny is studiously shut up, while the inmates huddle together on the damp mud "floor; in many cases reeking with perspiration."

In the course of my investigations I came across official documents in which the mal-hygiene of the people, and the many preventable causes of disease, have been brought to the earnest attention of the Local Governments by the medical officers. But repeated suggestions for the appointment of sanitary inspectors, and requests for the removal of sanitary evils, urged in language as strong as official usage would permit, have been, in many instances, utterly disregarded. Indeed, I regret to have to point out to your Lordship that these matters, so important for the well-being of the people, do not always receive that attention from the Governments that they imperatively demand. In most of the islands the medical men form a large proportion of the intellectual aristocracy; and by education, by training, and by the pursuit of their profession, they are, perhaps, better able than any other class of the inhabitants to indicate the wants of the people and the needs of government. It is unfortunate, therefore, that the voices of these men are not oftener heard and listened to by those having to do with the legislation of lands in which the settled policy has rendered the Governments responsible for the health of the people.

3.

Have you observed any connection between the diet of the people and the spread of the disease? If so, give particulars.

The replies to this interrogation show, practically, a consensus of opinion that diet is not in any way connected with the prevalence or spread of the disease. The majority of the forty medical officers who sent in replies are positive on the point, and only three express the opinion that a fish diet has something to do with the propagation of yaws. Thus Mr. Purser, of Tobago, states that he shares in the general belief "that fresh fish diet "is much connected with the prevalence of the disease." Dr. Lestrade, of St. Lucia, expresses the opinion that "the eating of too much salt fish and super-salted roots add "greatly to the spread of the disease." And Dr. Kirkpatrick, of Dominica, says he observed, during a period of eight years in St. Vincent, that when "salt fish and meats "were withheld the disease gradually disappeared."

The "belief" that fresh fish is a factor in the spread of the disease is new to me, and it appears to be unsupported by any authority. In all the islands fresh fish enters largely into the diet of the people living along the leeward coasts; and, in those islands where the disease prevails most, the rock-bound windward side is as badly affected with yaws as the leeward. The people of Carriacou live largely on fresh fish, and yet yaws is only seen in that island when it is imported from abroad. The idea, then, that the disease is in any way due to the eating of fresh fish must be dismissed.

The question of salt fish being concerned in the propagation of the malady has been decided in the affirmative by several observers, but no conclusive evidence has been brought forward in support of the theory. Dr. Kirkpatrick asserts that when salted fish

and meats are withheld there is a disappearance of the disease, but then most authorities on yaws have observed that a nutritious diet is a necessary part of the treatment.

Dr. Thomson stated that :—" In a few weeks, we can alter the most malignant form " of yaws by a generous and stimulating diet."*

Dr. Robertson said :—" Generous diet is a point of the highest importance in my " opinion, and no great advantage can be derived from medicines without it."†

Dr. Maxwell observed :—" The diet should also be mild and nutritive, and every- " thing salted or smoked, or difficult of digestion, ought to be abstained from."‡

And Dr. Horton, a physician who practised on the West Coast of Africa in recent times, says :—" The diet should be generous, and composed principally of animal food."§

Although the necessity of a good diet in treating the disease is very properly insisted upon by all those writers who have had experience of yaws, none of them, with the exception of Dr. Milroy, have inferred that the malady is caused by mal-nutrition; nor has it ever been asserted that the disease is due to the taking in of any germ with the food as some authorities have believed to be the case in regard to leprosy.

The experienced medical men in the West Indies who have had much to do with the disease have always held that diet is in no way connected with its spread. These views were expressed very emphatically by Dr. Bowerbank, in 1880. He said :—" I " have never seen or heard anything to induce me to believe that the origin or spread " of the disease was traceable to the use of any particular diet or article of food, such as " salted fish, pork &c., or that the disease could arise from any insufficiency as to the " quantity of food . . . . It has always appeared to me that a well-fed person and " a half-starved person were equally liable to take the disease when exposed to the " efficient cause."‖

Salt fish is a staple food throughout the West Indies, and probably no other animal food is consumed so largely in some of the islands. If there were any connection between the ingestion of this fish and the spread of the disease it would be found that in those islands in which the salt fish is most largely consumed the people would suffer most from yaws. Whilst I was in the various colonies I requested the local governments to supply me with tables showing the quantities of salted foods imported during the years 1888, 1889 and 1890, in order that I might be able to see whether the consumption of such aliments bore any relation to the prevalence of the disease. From the figures thus obtained I have drawn up the following :—

TABLE showing the CONSUMPTION during the years 1888, 1889 and 1890 of SALTED FOODS per head of the population of those Islands comprised within the Inquiry.

Colony or Island.	Average Annual Imports of Salt Fish for the Three Years ended 1890.	Average Annual Imports of Salt Meats (Salt Beef, Salt Pork, &c.) for the Three Years ended 1890.	Population of the Colony or Island at Census of 1891.	Average Annual Consumption of Salt Foods per Head of the Population.
	Lbs.	*Lbs.*	*Lbs.*	*Lbs.* *Oz.*
Tobago - -	282,441	67,112	18,353	19 1
Grenada - -	1,432,814	378,194	53,209	34 1
St. Vincent -	1,086,854	232,825	41,054	32 2
St. Lucia - -	974,139	326,155	42,220	30 13
Dominica - -	484,811	110,966	26,841	22 3
Montserrat - -	314,523	98,480	11,762	35 2
Antigua - -	1,552,408	605,442	36,119	59 12
St. Kitts, Nevis -	1,454,322	600,805	43,963	46 11
Virgin Islands -	2,192	3,562	4,639	1 4
Totals - -	7,584,504	2,423,541	278,160	36 0

* *A Treatise on the Diseases of Negroes as they occur in the Island of Jamaica, with observations on the country remedies.* By James Thomson, M.D. Jamaica. 1820

† *The Pathology of Yaws.* By Dr. Robertson. From *The Jamaica Physical Journal.* No. VI. Nov. & Dec. 1836.

‡ *Observations on Yaws, and its influence in originating Leprosy.* By James Maxwell, M.D., Edinburgh, 1839.

§ *The Diseases of Tropical Climates.* By J. A. B. Horton, M.D., London, 2nd Edition, 1873.

‖ *Observations on Yaws.* By Lewis Quier Bowerbank, M.D., F.R.C.P., Edin. *Medical Times and Gazette.* 3rd April, 1880.

This table is an interesting and important one, but in its consideration the Virgin Islands must be left out, inasmuch as the imports there are in no wise an index of the consumption of salt food. All the inhabitants are born fishermen, and on one of the islands there is a salt pond open to all, so that large quantities of fish and meat are salted by the islanders for their own consumption. Besides which I am informed that smuggling is so frequent that the treasury returns only bear a certain relation to the actual imports.

In regard to the other colonies, an examination of the figures shows that salted foods are consumed most largely in Antigua, one of the islands in which there is the least prevalence of yaws. Whilst in Tobago, where the disease is exceedingly common, the people consume less than a third of the amount of salt food eaten by the population of Antigua. And, again, in Dominica, where yaws has prevailed epidemically within recent years, the importation of salt provisions is comparatively very small.

These facts dispose at once of the question as to the dependence of yaws on a diet of salt fish and pork, indeed there can be no doubt whatever that such aliments have nothing at all to do with the origin or spread of the disease. Salt fish has been much decried by some writers on the disease; but when it is in good condition it is by no means so devoid of nourishment as I was some years ago led to believe, by depending too much on the evidence of Milroy and others who have written on the subject. The people undoubtedly like it, and many Europeans, after a residence in the tropics, become extremely fond of it.

The salt contained in the small portion of fish eaten at a meal by a West Indian negro is really more beneficial than otherwise. In a tropical climate, where perspiration is often profuse, a considerable quantity of chloride of sodium, or salt, is carried off daily by the cutaneous secretions, and this loss of saline matter must be made good. In the case of meat-eaters this loss is largely made up by their food, besides which salt is invariably used by them as a condiment; but, in the case of those who live mainly on fish and vegetables, a larger quantity of salt must be taken with the food, in order that the necessary elements may be supplied to the system. This fact will be seen at a glance by comparing the relative quantities of saline matters in the following analysis from Pavy of lean meat and white fish:—

	Lean Beef.	White Fish.
Nitrogenous matter	19·3	18·1
Fat	3·6	2·9
Saline matter	5·1	1·0
Water	72·0	78·0
	100·0	100·0

It is seen from this table that over five times the quantity of fresh fish would have to be ingested to supply the amount of saline matter afforded by a given quantity of lean beef, and that when salt is added to the fish the nutritious qualities of the two foods are nearly equalised.

In the *Medical Times and Gazette*, of the 3rd January, 1880, I wrote as follows in regard to this staple food of the negro: "Salt fish is the local name given to dried cod-"fish, which contains a certain portion of salt added as an antiseptic preservative. Before "cooking nearly all the salt is removed, and the fibres rendered soft by soaking in water. "and the fish then, although not so nutritious as when fresh, contains a considerable "amount of nutriment, and it is by no means unwholesome."

Dr. Imray, in his Memoir on Yaws, published in Dr. Gavin Milroy's report, thus alludes to the diet: "There is very little to be said in regard to diet. It should be as "nourishing as possible, but no change is absolutely required from the ordinary food of "the people—chiefly vegetable—if it be of good quality and in sufficient quantity. Salt "fish, a common article of diet, is in no way objectionable, provided it does not form a "portion of the diet too frequently. It may be alternated very advantageously with fresh "fish, when such can be procured; and that is generally the case in most parts of this "island. It may be mentioned that the yaws nurses allow only certain kinds of fish to

" be eaten by patients under their care, some species being considered unwholesome if " used as food during an attack of yaws."

It is seen from these facts that salt fish as a food does not deserve the blame that has so often been attached to it. The error in the diet of the negro does not lie in the fact that salt fish is eaten, but that it is used most frequently in too small a quantity, and to the exclusion of all other animal food, so that to supply all the elements for building up the tissues, enormous quantities of vegetable matters have to be taken into the stomach in order to provide the due proportion of nitrogenous matters.

It is to be observed from the table that the total population of those islands comprised within the inquiry in 1891 was 278,160, and that this number of persons consume over ten millions of pounds of salt fish, &c., annually, that is an average of about 36 lbs. for each person, which is equivalent to less than an ounce and two-thirds per day. Assuming that on an average an equal weight of fresh fish is consumed, which is I believe rather in excess of the actual quantity than otherwise, it may be said that the negro eats less than three-and-a-half ounces of animal food a day. It has been calculated by physiologists that man on the average requires the daily ingestion of food that contains about 300 grains of nitrogen and 4,800 grains of carbon, and this would be supplied by two pounds of bread and three-quarter pound of meat, such a proportion of the vegetable and animal foods allowing the least waste. The small quantity of less than three-and-a-half ounces of fish, &c., eaten by the West Indian negro, renders it necessary for him to consume an immense mass of vegetable matter to obtain the requisite amount of nitrogen, without which he could not live.

I have already shown that a good deal of disease and suffering is due to this large daily consumption of vegetables, but it cannot be said that it is responsible for the origin or the spread of yaws. In 1791, Dr. Ludford, or rather Dr. William Wright,* wrote as follows concerning this matter: " It has been supposed that white people in the West " Indies, and the negro servants about their houses, are less susceptible of the yaws than " the field negroes, who live more on vegetables, grain, and farinaceous roots. This " notion is equally groundless, for, if such were exposed to the same causes, the same " effect would as readily take place in the one as in the other."

Since Wright's time, although the diet of the negro has been thought to be connected with the spread of the disease, no one, as far as I know, has ventured to suggest any relationship between vegetarianism and yaws. The negroes in all the islands live mainly on vegetables, and if the spread of the disease were caused by such a diet, then yaws would attack the negroes in all the islands, and not be epidemic in one island, and entirely absent from another, as is now the case.

A careful consideration of all the facts can lead to no other conclusion than that the diet of the people of the West Indies, by giving rise to disorders of the digestive organs, affects the nutrition of the body in a deleterious manner, thereby not only predisposing the system to react to morbid influences, but also modifying the course and termination of any disease that may become established. As regards yaws, however, it appears that diet has no influence whatever in its origination, or in its spread amongst the populations of the various colonies.

4.

Does the disease attack all classes of the community, or is its prevalence limited to a particular section.?

Forty-one replies were received to this interrogation, and they disclose apparently contradictory facts, which are, however, easily reconciled. Each medical officer, of course, gave his experience and not his opinion, and it is scarcely likely to happen that experience arrived at in practice in different islands, and under a diversity of conditions, will show identical results. The majority of the medical officers have found the disease to prevail only amongst the labouring population; and several are particular in stating that the poorest labourers, and those living in a condition of squalor, are alone attacked.

Altogether, 23 out of the 41 medical officers have met with the disease amongst the labouring population only. Sixteen, however, have found that yaws attacks all classes of the population, and nine have met with cases amongst the white residents in the islands. Mr. Boyd, of Grenada, has seen cases amongst the higher circles of life. Dr. Newsam,

* *Dissertatio Medica Inauguralis de Frambœsia.* Edinburgh. 1791. This thesis, which was submitted by Jonathan Anderson Ludford, was really written by Dr. William Wright, and it is given in his *Selection of Papers on Medical and Botanical Subjects*, published in Edinburgh, in 1828.

of St. Vincent, met with the disease from time to time amongst the Portuguese and the poor Barbadian whites who have formed settlements in the colony. Mr. O'Carroll, of the same island, has seen the disease in "several members of a respectable white family." Dr. Pierez and Dr. Freeland have treated cases in Portuguese in Antigua. And Dr. Mapleton, of St. Kitts, in his reply to the seventh interrogation mentions the case of a white child that contracted yaws. And, I may add, that my own experience teaches me that no class of the inhabitants of these islands is exempt from the operation of the contagion, for I have seen cases of the disease amongst persons of English parentage, and amongst Portuguese, East Indians, Chinese and Caribs.

When the disease was first introduced into the West Indies, it was regarded by the planters with the utmost horror and disgust. The affected slaves were so completely isolated that the whites scarcely ever came near to what were called "the negroes in the yaws." In these circumstances it was not possible for the white planters to run any danger from the contagion of the disease, and thus it came to pass that, as only blacks were attacked, the opinion was formed that yaws was peculiar to the African races. Raynal asserted that "All the negroes, as well male as female, who come from Guinea, or "are born in the islands, have yaws once in their lives: it is a disease they must "necessarily pass through."*

In another place Raynal states that the disease is peculiar to the negroes, and this opinion was held for a considerable time afterwards by some of the authors who wrote on the subject. A careful study of the literature of yaws shows that writers copied freely from publications before their time, and in this way errors of observation and mistaken notions of the disease have been perpetuated. English writers, who had no experience whatever of the attributes of the disorder, wrote chapters on yaws which were mere compilations, and which bristled with errors throughout. Even as late as 1888, Sir Erasmus Wilson, in his article on Frambæsia, in Sir Richard Quain's Dictionary of Medicine, asserted that "The disease is peculiar to the African race, both in their native "country and in the West Indies."†

The fact that yaws could be communicated to the white races appears first to have been noticed by Bancroft, in 1769, who stated that whites are sometimes affected, and that the disease is "more violent" in them.‡

Winterbottom next alluded to the matter in 1803. He said: "It has been asserted "by some authors that Europeans are not liable to this complaint, but I have known "several instances of it amongst them." And he then gives details of the case of an European, a slave trader in the Rio Nunez, who contracted the disease in July, 1793.§

Later on, as yaws spread widely amongst the negroes in the West Indies, and as there was thus an increased danger of the whites coming within the operation of the contagion, examples of Europeans contracting the disease began to occur, and the opinion that negroes were alone liable to be infected was abandoned by accurate observers.

Thus, in 1791, Dr. William Wright wrote as follows: "This disorder being so "prevalent amongst the Negroes, many people have entertained an opinion that the seeds "of the malady are lurking in their constitution, and break out at some period without "any exciting cause. This opinion, however, has no foundation in truth, as will be "proved hereafter. Nor is there anything in the habits of Negroes that predisposes "them more to receive the infection of yaws than in the habits of Europeans."

In 1796, John Hunter met with cases amongst European soldiers in Jamaica.‖ In 1799, as I have already stated in section VI. of this report, Lemprière mentioned the fact of a whole ward of European soldiers being affected with the disease. In 1800, Moseley wrote as follows: "The *yaws* naturally is an original African distemper. It "may be communicated to white people, as it is to blacks, by inoculation, and by "accidental contact, when the ulcerous matter is carried into the habit by absorption, as "it is called. I have seen several shocking instances of this sort."¶

In 1801, Chisholm gave the following interesting account of the affection of European soldiers: "The first case of the latter (yaws) was singular, from the subject of "it being a soldier of the Irish Artillery just arrived in the West Indies; from its having "been communicated to him by another soldier at Hilsea Barracks, who had been

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* *A Philosophical and Political History of the Settlements and Trade of the Europeans in the East and West Indies.* Translated from the French of the Abbé Raynal, by J. Justamond, M.A. 3rd. Vol. London. 1776.

† *A Dictionary of Medicine.* By Sir Richard Quain, Bart., M.D., F.R.S. 2 vols. London. 1888.

‡ *An Essay on the Natural History of Guiana, in South America.* By A Gentleman of the Medical Faculty. [E. Bancroft.] London. 1769.

§ *An Account of the Native Africans in the neighbourhood of Sierra Leone.* By Thos. Winterbottom, M.D. 2 vols. London. 1742 and 1803.

‖ *Observations on the Diseases of the Army in Jamaica.* By John Hunter, M.D. London. 1788. 1796.

¶ *A Treatise on Sugar. With Miscellaneous Medical Observations.* By Benjamin Moseley, M.D. 2nd. Edition. London. 1800.

"infected in the West Indies."* These and the other recorded cases of white soldiers being attacked with the disease are interesting and instructive, and they are indication of the fact that the danger of the black troops in St. Lucia becoming affected is one that ought to be guarded against.

In 1817, Williamson mentioned instances of yaws in whites, and he said: "It is "dreadful to imagine the hard fate to which such persons are condemned." He also gave in illustration of the bad effects of mercury in disease, the following sad case of a lady who went out to Jamaica as a governess, and after a time married an overseer who got yaws. The lady herself then became affected. She was salivated and became apparently well. She then returned to England, and soon afterwards was attacked with violent "bone-ache." As she experienced no relief from medical treatment she went again to Jamaica, thinking that she would have a better chance of being cured there. In Jamaica she was treated with calomel, and mercurialised for a second time. She then got from bad to worse. The ulceration extended, the pain increased in severity, "the bones became carious in every ulcer," and she eventually died after lingering in misery for five years."†

Dancer, in 1819, spoke of whites being susceptible of yaws.‡ Thomas, in 1821, mentioned that whites become "tainted" with the disease.§ Robertson, in 1836, alluded to the fact that whites may be attacked;‖ and, in 1839, Maxwell wrote as follows on the subject:—

"Alibert considers the dermoid tissue of negroes to be endowed with an unusual "share of sensibility, and asserts that they are more susceptible of yaws than the whites. "Hillary and Dancer incline to this hypothesis. The latter says that, 'independent of "'the circumstance of their being more exposed to it from contact with others, they seem "'to have a disposition to receive it more readily than white people.'

"It may seem unnecessary to refute an opinion so perfectly gratuitous, but as it "is one of those vague assertions which is copied from one author to another, it is time "that it should be laid aside. . . . Most medical men in the West Indies have "opportunities of knowing that white people contract yaws as readily as blacks, if they "are exposed to similar causes of contagion; so that the assertion of a superior degree "of susceptibility in the negro to receive this disease is without foundation."¶

Coming down to recent times, I find that Bowerbank, in 1873, told Dr. Tilbury Fox that he had witnessed the disease in whites "many times,"** and that Charlouis, in 1881, mentioned that he had seen two cases of yaws in European children.††

Dr. Paulin Orgias, the Colonial Surgeon of Grenada, gave me the following particulars concerning a young white man with yaws he had under his professional care some years ago. The young man, who was cohabiting with a negress, had a general eruption of encrusted yaws' tubercles, which slowly gave way to treatment; but, for a considerable time afterwards he was weakly and liable to attacks of eczema palmaris of a stubborn nature. This so-called eczema was doubtless the condition of the yaws eruption known usually as dartres. The patient was treated with tonics, iodide of potassium and arsenic. Frequent bathing and a very liberal and nourishing diet were enjoined on him. He was economical to an excessive degree, and as he wanted to make and save money he lived on the cheap food of the people. The negress he was cohabiting with was found on examination by Dr. Orgias to have yaws' tubercles in the axilla, and in both popliteal spaces, but the other parts of the body were unaffected. The young man was unaware of her diseased condition, and on learning of it he came to the conclusion that the virus had entered his system through abrasions caused by shaving, the first tubercle having appeared in the submental region, and on the upper part of the neck. He had no eruption on the genitals.

In my own practice in Dominica I have met with several cases of yaws in white persons, and during my visits to the other islands I obtained abundant evidence of the occasional infection of Europeans, who, accidentally or otherwise, brought themselves within the operation of the virus. The following brief histories of the two cases admitted to the yaws hospitals in Dominica, may with advantage be placed on record in this report.

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* *Op. cit.*

† *Medical and Miscellaneous Observations relative to the West Indian Islands.* By John Williamson, M.D. 2 vols. London. 1817.

‡ *The Medical Assistant; or, Jamaica Practice of Physic.* By Thomas Dancer, M.D. 3rd Edition. Jamaica. 1819. (The first edition was published in 1801, and the second in 1809).

§ *The Modern Practice of Physic.* By Robert Thomas, M.D. 7th Edition. London. 1821.

‖ *Op cit.*

¶ *Op cit.*

** *Skin Diseases.* By Tilbury Fox, M.D. 3rd Edition. London. 1873.

†† *Ueber Polypapilloma Tropicum* in *Vierteljahrschr. für Dermatologie und Syphilis.* VIII. 1881.

Case 704.—*E. McG.*, male, 20, Native of St. Barts. A white man. Admitted to the Central Hospital on 3rd May, 1879; and the following clinical notes were then made by Mr. Duke, the medical officer: "Ulceration of left foot. Encrusted tubercles "scattered over body about joints." He had had the yaws for two years, and he contracted the disease by associating with infected persons in the village of Colihaut. He was treated with quinine and iron, sulphide of calcium, and iodide of potassium.

On the 6th September, the cicatricial tissue left by the healing up of yaws' ulcers had become converted into keloid. On the 18th November he was discharged cured after a stay in hospital of six and a-half months.

Case 392.—*B. G.*, male, 27. A white man. Admitted to the Morne Bruce Hospital on the 18th November, 1886, with "encrusted tubercles on face, back, left thumb, right forefinger, penis, and right external malleolus. He cannot say how he contracted the disease. He was treated with confection of sulphur, sulphide of calcium, and iodide of potassium, and discharged on the 14th February, 1887, after a stay in hospital of nearly three months.

The history of yaws in those islands in which there has been East Indian immigration shows that as soon as the coolies mix with the people in infected districts they at once contract the disease, and that it spreads so rapidly amongst them as in some instances to cripple the labour supply.

In St. Vincent and Antigua cases have been observed amongst the Portuguese residents by Drs. Newsam, Pierez, and Freeland. In Antigua I saw a case of yaws in a Portuguese young man, as I have already stated; and in St. Kitts I heard of a respectable Portuguese shopkeeper having become affected.

All these facts prove that there is no racial immunity, but that one class of the population is as susceptible to the operation of the contagion as another. It is true that the great majority of cases occur amongst the negroes, but this is easily explained by the facts that I have already brought forward in regard to the life of these people. The disease has existed amongst them since they were brought from Africa, and by long familiarity with its various manifestations they have come to regard its spread with the utmost indifference. Then, again, their diet, composed mainly of vegetables, with a small quantity of animal food, often of inferior quality, predisposes them to the accession of maladies of all kinds. Besides which, their complete disregard of the rules of hygiene favours the spread amongst them of contagious diseases to an almost unlimited extent. At nights, in the crowded unfloored huts, with every door and window closed, a whole family may be huddled together in a perfect state of nudity, or in the clothes in which they have gone about during the day. Stifling heat, vitiated atmosphere, and prolonged contact with each other and with the earth saturated with the accumulated filth of months, are, perhaps, the conditions most suitable for the propagation of a contagious disease; and one can readily understand why it so often happens that yaws runs through whole families of the negroes, one member after another becoming the subject of the disease until there is no fresh field for the virus to attack.

The reason that yaws does not spread when it attacks a member of the family of a person belonging to the upper ranks of society is due to the fact that proper precautions are taken to guard against the extension of the disease, and to isolate the sufferer in the best way possible. But, in spite of all these precautions, success is not always assured, and cases have come under my notice in which other members of the family have been attacked in turn.

The labouring classes, too, who wear little clothing, and are, therefore, subject to receive abrasions and slight wounds on their bare legs and feet and other exposed parts, have generally, as a necessary consequence, some part of the skin where the surface is broken, and where, therefore, the virus of a contagious disease can be readily inoculated. This fact was noticed by Bancroft, one of the earliest writers on yaws. He says: "None ever receive it whose skins are whole; for which reason the whites are rarely "infected; but the backs of the negroes being often raw by whipping, and suffered to "remain naked, they scarce ever escape it."*

In regard to the slight wounds and their consequences, to which negroes are so subject, I made the following observations in my report on the Roseau Infirmary for the year 1881:—"Under diseases of the integumentary system are classed the ulcers that "are so common in this part of the world, and it is worthy of note that nearly all the "ulcers are seen on the lower extremities. The field labourers are so liable to have "their bare legs and feet injured by the prickles and sharp-edged leaves of tropical "vegetation that it is no wonder to find ulcers so prevalent in the West Indies." And

* *Op. cit.*

again, in the report for 1882, I stated :—" Next in order come diseases of the skin, " under which are classed the large ulcers of the legs so common amongst the labouring " population of the West Indies. It is greatly to be regretted that a knowledge of the " simple treatment of ordinary sores does not exist among the people ; for, as a rule, " the enormous leg ulcers, which sometimes necessitate amputation, are produced from " small wounds by the application of dirty rags and irritating dressings, when cleanliness " and cold water would speedily effect a cure."

The conclusions to be drawn from this part of the inquiry may be stated as follows :—

1. That there is no racial immunity from yaws.

2. That the disease prevails most amongst the labouring population in those islands in which it is endemic.

3. That this prevalence is due mainly to the overcrowding of the poorer people at nights in dirty hovels, and to other hygienic defects favouring the operation of the contagion of the disease.

4. That when people of other races, such as Europeans, Portuguese and Asiatics, live in infected districts under similar conditions to the poorer indigenous inhabitants, they are as liable to contract the disease as are the negroes themselves.

5. That persons of all races in the upper ranks of society are liable to contract the disease by contact with affected persons ; and that, in them, the disease is not less severe than it is in the negroes.

5.

Have you ever seen yaws and syphilis in the same person ? If so, give particulars of the case and cases.

From almost the earliest times of which we have any written account of yaws until the present day, the disease has been confounded with syphilis. Most of the older authorities describe it as lues venerea ; Sydenham writes of it as the venereal disease ; Copland suggested that it should be named syphilis Æthiopica,* and a few medical men of the present day still believe in its Syphilitic nature. John Howard made the curious suggestion that syphilis was the outcome of a combination of yaws and leprosy. He says : " At this distance of time, amidst a contrariety of opinions, there is no saying " anything with certainty ; it is, however, very possible that the African blacks, or as " the last-mentioned author [Leo Africanus] calls them, the Æthiopians, might have " been themselves capable of adding some kind of infection, that of the yaws, for " instance, to the leprosy, and thus by the combination of the two affections, a new " arrangement of symptoms might be produced, essentially different from both, but " having some kind of affinity to each ; and such a combination may, perhaps, have " formed the lues venerea originally."†

Several authors, however, and more especially those who had studied yaws clinically, denied its identity with syphilis. Thus, as far back as 1643, William Piso alluded to yaws in the following language : " Sicuti citius sanatur à solis remediis " indigenis, ita citius contaminat quam illa quæ, *lues gallica* vulgò vocatur et ad incolas " hùc defertur. De quâ dissertationem instituere non est propositi mei, sed de præsenti, " quæ licet in quibusdam conveniat cum illâ ; accidentibus et curatione tamen maximâ " parte differt."‡

In 1776, Raynal wrote : " The yaws have been confounded with the venereal disease, " because the same remedy is proper to both. This opinion, though pretty general, has " less to support it than at first sight it appears to have."§

In 1791, Dr. William Wright stated : " Persons who have the yaws may contract " gonorrhœa and even lues venerea."‖

In 1840, Dr. Levacher wrote as follows : " *Le pian ne s'oppose nullement à la trans-* " *mission de la syphilis, ni la syphilis à celle du pian.* Le pian peut être enfin compliqué " par la syphilis, ou venir, par sa propre présence, aggraver cette dernière maladie. Je

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* *A Dictionary of Practical Medicine.* By James Copland, M.D., F.R.S. 3 vols. London. 1858.
† *Practical Observations on the Venereal Disease.* By John Howard. 2 vols. 2nd Edition. London. 1806.
‡ *De Medicina Brasilium.* Gulielmi Pisonis, M.D. Lugduni Batavorum, 1643.
§ *Op. cit.* ‖ *Op cit.*

" me suis souvent convaincu que les malades atteints de pian, et qui cohabitaient avec " des femmes affectées de syphilis, leur communiquaient le pian et contractaient eux- " mêmes la syphilis; aucun rapprochement d'analogie et d'identité ne peut donc être " valablement admis entre ces deux affections, parfaitement distinctes l'une de autre."*

The death-blow, however, to the theory of the syphilitic nature of yaws was really given by Imray and Milroy in 1873. In his paper on yaws, published in Milroy's report, Imray showed that yaws could not be syphilis, and Milroy gave the great weight of his authority to the belief that yaws is a disease *sui generis*, and unconnected in any way with syphilis. Besides giving this opinion in emphatic terms in his " Report on Leprosy " and Yaws in the West Indies," he alluded to the subject in an article in the *Medical Times and Gazette* of the 4th November, 1876, in the following words: "To what " mischievous practical results the belief in the syphilitic or syphiloid nature of yaws " and some allied affections has given rise will be pointed out in the sequel." And, in the same periodical, he wrote on the 23rd November, 1878, as follows: " It [yaws] is " essentially and altogether distinct from syphilis, contrary to the opinion of Dr. Copland " and many other writers, English and French, although it may certainly in some cases " be associated and co-existent with the disease; and then the twofold morbid influences " will most seriously aggravate and intensify the deterioration of the general health.

" The rightful determination of this question has, of course, most important " bearings on the practical *treatment of yaws*. An immense amount of mischief has " unquestionably arisen from the belief that it is of syphilitic origin, and that mercurial " preparations must be the proper remedy for its cure and removal. Unfortunately, " this belief, which must have been primarily due to medical opinion, and for which, " therefore, the latter must be held responsible, has become generally accepted among " the uneducated inhabitants of the West India colonies; and hence all the popular " nostrums, which are sold in the shops of chemists and other traders, for the cure of " yaws, consist mainly of this most pernicious drug when indiscriminately resorted to."

Notwithstanding all these authoritative expressions of opinion, a few of the West Indian practitioners still hold to the theory of the syphilitic nature of yaws; and in order, if possible, to set the question finally at rest, I thought it well to obtain details of the experience on the matter of the medical officers of the various colonies comprised within the scope of the mission.

So as to obtain as much information as possible, I made some inquiries in the French colony of Martinique, lying between Dominica and St Lucia, and my friend M. le docteur Guérin was good enough to write to me on the subject. The following extract from his letter, dated the 21st April, 1892, is of considerable interest:—

" Le pian a, à mon avis, une origine syphilitique. Il est éminemment contagieux. " Le pian et la lèpre ont, à mon avis, la même origine.

" Pendant vingt années que j'ai dirigé l'hôpital civil de Fort-de-France, j'ai fait des " efforts constants pour obtenir de l'administration l'isolement des lépreux et des gens " atteints de pian. Je n'ai pas obtenu de l'administration la création d'une léproserie. " L'incurie qu'on a mise à prendre cette mesure serait de l'inhumanité inexcusable, si la " théorie de non-contagiosité n'avait pas été soutenue par des médecins d'une grande " autorité.

" Le pian est assez rare de nos jours à la Martinique, il s'observe le plus souvent " chez les immigrants indiens ou africains, ou leurs descendants immédiats; il est " excessivement contagieux.

" Du temps de l'esclavage les sujets atteints du pian étaient isolés. Son traitement " consiste dans l'administration des mercuriaux (liqueur de Van Swieten, &c.) cautérisa- " tion avec une solution mercurielle concentrée; azotate acide de mercure 4 grammes, " eau distillée 30 grammes.

" Les manifestations extérieures disparaissent rapidement, mais reviennent si le " traitement n'est pas complet, et la récidive peut avoir lieu malgré le traitement " complet.

" J'ai suivi des malades attients de syphilis contre lesquels un traitement sérieux " n'avait pas été fait, qui sont devenus lépreux après une dizaine d'années.

" Un de ces cas de lèpre consécutive à une syphilis bien constatée, a été présentée " par moi, en 1883, à Paris, à M. le Docteur Besnier, médecin de l'Hôpital St. Louis, dont " l'autorité est incontestable.

" La lépre anesthétique a été reconnue par le savant professeur chez le malade. " Aujourd'hui, à la suite d'un long traitement mercuriel et dépuratif (iodure de " potassium), le malade est guéri.

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* *Guide Médicale des Antilles.* Par M. G. Levacher. 2nd Edition. Paris. 1840.

" Beaucoup de médicaments préconises ont été essayés à la Martinique (*Hydrocotyle asiatica*), etc., toujours infructueusement.

" J'ai obtenu bien rarement des guérisons de la lépre sous l'influence d'un régime, " de soins hygiénique, et des mercuriaux (liqueur de Donovan). J'ai vu l'etat de mes " malades bien modifié par le traitement et surtout par les soins hygieniques mais ils ne " guérissaient pas."

It would appear from this letter that Dr. Guèrin believes in the identity of origin of leprosy, syphilis, and yaws, and it is interesting to note that yaws still exists in Martinique, and that it attacks the East Indian immigrants as it does in St. Lucia and other English colonies. Dr. Rochas, in 1879, stated that the disease is no longer seen in Martinique. He said : " à la Martinique, celui-ci [chancre induré] est resté, et le " pian a disparu."* Dr. Guèrin's testimony brings the prevalence of yaws in Martinique down to the present time, and if more evidence were required to correct the error Dr. Rochas has made, it is found in the fact that yaws was introduced from this French colony into Antigua in the year 1887. And I find that in November, 1880, that is a year after Dr. Rochas wrote, a negress, 30 years of age, suffering from yaws, came over to Dominica from Martinique. She had ulcers on the left leg and a general eruption of encrusted tubercles. She contracted the disease in Martinique, and was ill in that island for a year before she came to Dominica. She was admitted to the Central Yaws Hospital on the 30th November, and was discharged cured on the 17th January in the following year.

A few French physicians still believe in the identity of yaws and syphilis, but Dr. Rochas, as well as Dr. Rochard, who wrote on yaws also in 1879,† believes, as did Levacher in 1840, that the two diseases are in no way connected.

Forty replies were received to the interrogation, and five of them are so worded as to lead to the conclusion that the writers believe yaws to be a modification of syphilis. Mr. O'Carroll, of St. Vincent, expresses the opinion that the disease is syphilis contracted generations before, and appearing as yaws at the present day. Mr. Dennehy, of St. Lucia, emphasizes the likeness of yaws tubercles to syphilitic rupia. Mr. Bell, of Nevis, could " not obtain any reliable history of syphilis in any case." And the two other medical officers simply give unqualified expressions of opinion as to the possible identity of yaws and syphilis.

The remaining thirty-five medical officers show by their replies that three of them have given no attention to the matter. That twenty-one have not seen yaws and syphilis co-existent; and that eleven have met with cases of the two diseases in the same person. Of these eleven observers six give no particulars of their cases, and only three, namely, Dr. Blanc of Tobago, Mr. Boyd of Grenada, and Mr. Numa Rat of Dominica, enter at all into details.

It appears that yaws, when complicated with syphilis, is seen most often when the latter disease has arrived at its tertiary stage, that cases of yaws with inherited syphilis are not uncommon, and that it is extremely rare to see primary syphilis in a person suffering from yaws. Indeed only two cases are recorded by Messrs. Boyd and Numa Rat, but they are of great interest. In both instances, however, syphilis appeared first, as it did in the case mentioned by Mr. Bennet, of Grenada. Dr. Ross, of Jamaica, in Milroy's Report, also mentions the case of a woman admitted to the public hospital with primary syphilis, who afterwards developed characteristic yaws on the inner side of the thigh. Dr. Ross remarked, " In this case, the syphilis disappeared rapidly under the " usual treatment, but the yaws took a much longer time." In Mr. Boyd's case, too, the syphilis readily yielded to treatment, whilst the yaws became aggravated and persisted for a lengthened period. It would appear that there is no case recorded in which a person has contracted syphilis whilst suffering from yaws. Indeed, under present conditions, it is scarcely likely that the medical officers will meet with such cases, except, perhaps, in Tobago. For, in the other islands, as a rule, the only yaws cases that come under medical treatment are those that are segregated in the hospitals where infection with syphilis is impossible. It is extremely rare, too, for the labouring classes in the West Indies to apply for medical aid in the treatment of primary syphilis. The lesion, indeed, is either overlooked or made light of, for the people are ignorant of its consequences, and are unwilling to bring to the notice of a medical officer what they would consider so trifling a thing as a little hard lump or a slight sore. Thus, in my own practice in Dominica, I have rarely met with primary syphilis, but the secondary and tertiary stages

* *Frambœsia.* Par M. le Dr. Victor Rochas. In *Dictionnaire Encyclopédique des Sciences Médicales.* Paris 1879.

† *Pian.* Par M. le. Dr. J. Rochard. In *Dictionnaire de Médicine et de Chirurgie.* Paris. 1879.

are fairly common both in hospital wards and amongst private patients. I have never seen syphilis in its earliest manifestations combined with yaws; and, I am, therefore, very glad to be able to include in this report notes taken by Mr. Boyd and Mr. Numa Rat of the two cases they met with.

A number of cases of yaws concomitant with tertiary syphilis have come under my notice not only in hospital practice in Dominica, but during my mission to the other islands. Some of these latter cases have been alluded to in former sections of this report, and I have already made brief allusion to the possibilities of errors of diagnosis. Syphilis is, and has been for generations, existent in all the West Indian islands, and in some of them it now prevails extensively; indeed, in St. Kitts, Dr. Branch goes so far as to state that nearly the whole of the population is syphilised. In these circumstances, allowing that yaws and syphilis are two distinct diseases, it is inevitable that a certain proportion of cases will be met with in which they will be found intercurrent in the same individual. This fact has, I believe, not been sufficiently recognised by medical men, and it has thus come to pass that in many instances symptoms due to aggravated syphilis have been set down as later manifestations of yaws. It has also happened that persons presenting these equivocal spmptoms alone have been wrongly declared to be suffering from the sequelæ of yaws, the syphilitic origin of the cases being entirely ignored. Severe periostitis, osseous nodes, gummata, and ulcerations of various degrees of severity, more especially those occurring about the palate and fauces, all tertiary forms of syphilis, have been declared to be the results of yaws simply because the patient was, or had been suffering from that disease.

These errors of diagnosis were clearly seen by some of the older writers. Thus, in 1819, Thomson wrote as follows: "If there should be any tendency in the constitution to "hereditary disease, it is universally excited into action. The patient shortly after the "eruption ceases begins to complain of stiffness of all the joints. He loses flesh, the "bones swell, the voice becomes gutteral, there are patches over all his skin, the feet "swell, and repeated attacks cause them to remain so permanently, the bones are swelled "and deformed, and, finally, some ulcer breaks out and the patient is rendered an object "for life. These and many others, are called the effects of ill-cured yaws, but I am "convinced, with little foundation. Symptoms of a similar nature begin to show them-"selves in many Negro children at, or before the age of puberty; previously we could "not wish to see finer livelier children. . . By most people in this country these "symptoms are called venereal, arising from rotten parents as they are termed." . . . "They will be found to be leprous affections in varied forms."*

Thomson thus clearly saw that yaws was not responsible for the train of symptoms he described, but he erred in considering them to be of a leprous nature. This error in his time was, however, a common one, for intractable ulceration giving rise to great destruction of tissue and the result of syphilis or tuberculosis was then often set down as a manifestation of leprosy. Such cases are met with at the present day, and in some of the islands I have seen them declared to be forms of leprosy, although the characteristic manifestations of that disease were entirely wanting.

Mason, in 1831, made the following important observations on these so-called results of yaws:—

"It most commonly happens too, in course of time, that the bones become more or "less affected, sometimes with simple enlargement of the bones of the legs and forearm; "at other times, ulcers extend to the periosteum, and the subjacent bone soon becomes "extensively carious. These affections of the bones, although they accompany, do not "terminate with the yaws. They often continue for years after the eruption of yaws has "wholly disappeared, and in some malignant cases gradually increase until the death of "the miserable sufferer. Another train of symptoms is sometimes, though less frequently, "conjoined. The membranes of the nasal passages ulcerate and corrode the adjacent "bones, which grow carious; and frightful incurable ulcers are established in the nose, "palate, and throat.

"Taking into consideration the origin and close connection of all these formidable "symptoms with the well-known disease of yaws, it is not wonderful that they should "have been so frequently considered and described as a part and remnant of that disease. "But I would observe first, that these unusual symptoms, exclusive of the degenerated "state of the yaw tubercles, are characteristic of diseases among Negroes who have never "undergone the yaws, or who have been affected with that disease in early life, long "before the commencement of the foregoing train of symptoms. In the first instance it

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Observations and Experiments on the Nature of the Morbid Poison called Yaws. By James Thomson, M.D. *The Edinburgh Medical and Surgical Journal.* Vol XV., 1819.

"is manifest that they could have no connection with the yaws; and in the last, it is "perhaps going too far to attribute a series of symptoms and effects, as the relicts of a "disease that to all appearance had been long cured."*

As an example of the errors of diagnosis between syphilis and yaws the following may be cited from Robertson.† An English lad, 15 years of age, had for some months been suffering from an ulcer on the outer ankle, and he consulted a medical man who pronounced the ulcer to be yaws. Later on the youth was attacked with stubborn ulceration of the throat, bone ache, and enlargement of the tibiæ, probably due to periostitis. He was treated for yaws in the way then in vogue. That is, he was frequently made to undergo courses of mercury. Temporary benefit alone resulted, the disease always relapsing. Eventually iodide of potassium was prescribed by Dr. Robertson, and the youth rapidly recovered under the influence of the drug.

This was undoubtedly a case of syphilis and not yaws. Indeed, Dr. Robertson says: "If any kind of eruption appeared at any time it was unobserved."

It is customary in some of the West India islands, now-a-days, for a train of symptoms, similar to those observed in the case of this English lad, to be pronounced to be yaws if the patient has suffered, or is even suspected to have suffered, from yaws at any former period. The "dregs" of yaws are said to be in his system, and the disease is thought not to have been properly treated in the first instance. The belief in some of the islands, that medical men are unable to cure yaws, is due in a great measure to the fact that any ulcerative disease—whether due to simple causes, or to syphilis, or to tuberculosis—breaking out in a patient who has been treated in a yaws hospital, it may be even years before, is said to be the re-appearance of the disease in the form of "dregs" or "sequels." In the half French colonies the case is often declared to be one of "pian manqué," and, sometimes, in the English islands it is called "ratoon yaws," although this term is usually applied to relapses of the disease.

It appears that the only syphilitic eruption brought forward in express terms in the replies to the interrogation as bearing a resemblance to that of yaws is rupia. In only a single case, of the several thousands of yaws patients that have come under my notice, has this resemblance been striking; and, even in this case a careful examination established the diagnosis without difficulty. Rupia is seldom seen except in cases of neglected syphilis, and then at the end of the secondary, or during the tertiary stages of the disease. It is essentially a circumscribed cutaneous ulceration. In its typical form it proceeds from a bulla; but, more often than not, it results from the ulceration of papules. A secretion is formed which rapidly dries and causes each sore to be covered with a crust, under which the ulceration goes on and increases in circumference. The secretion from this larger surface dries in its turn, thereby adding another layer to the crust, and in this way the crusts become elevated, conical, and stratified, like, as authors have said, unto a limpet shell. Rupia, moreover, always leaves round scars, which often become of the characteristic copper colour.

Now the encrusted yaws tubercles are different in every essential particular. They are practically the primary manifestations of the disease, and the history of the case will not disclose any fact or any train of symptoms that will enable the inquirer to recognise an attack of syphilis. The eruption in yaws is essentially non-ulcerating, except in cachectic individuals when the disease is on the decline. The crust also is not laminated, nor is it conical. It is simply a cap formed by the inspissated secretion to protect the granulation tumour, which—at all events in the early stages—is invariably found beneath. By age the rupial crust tends to increase in height, the reverse is the case after the framboesial crust has attained its full development, for it then tends to become thinner, and as the granuloma is absorbed it gradually peels off in a thin flake, from the circumference to the centre. In the typical disease, the site of the yaws tubercle is represented by a macule and not by a scar. Many cases of yaws recover without a single scar, whereas no case of rupia terminates in recovery without the loss of tissue by ulceration being indicated by representative scars.

Tulloch has mentioned in his Third Report on yaws, that he has seen "a moist yaws "tubercle" bear "a striking likeness to a syphilitic mucoid condyloma." Now condylomata, which are sometimes called syphilitic or mucous tubercles, are simply hypertrophied papillæ, and they are, therefore, by some authors, denominated warts, verrucæ and papillomata. Hutchinson says:—"I know of no means by which to distinguish warts "due to syphilis from those in connection with other causes. In the case of the condy-"loma, the diagnosis is usually easy, for nothing resembling it is ever produced, excepting "in syphilis."‡ Hamilton says:—"In the whole of the warts, the type of structure is

* *Op. cit.* † *Op. cit.* ‡ *Syphilis.* By Johnathan Hutchinson, F.R.S., LL.D., London, 1889.

" the same, and is based upon that of a papilla, the distinctive features between a simple " papilla and a wart being essentially one of degree. The papillary vessels are enlarged " and dilated. the connective tissue around these vessels is also increased in quantity, while " the epidermis is much thickened. . . . . Condylomata and veneral warts have " essentially the same structure, only, the epithelium is much more abundant and more " actively divided. Prickle cells are beautifully seen in some of these."*

Condylomata usually form in syphilis about the anus and genitals; but, in rare instances, they are found in the axilla, between the toes, and in various other places. They are smooth and red, but sometimes of a greyish colour on account of their epidermal covering; they are, moreover, nearly always ulcerated. When seated on the muco-cutaneous surfaces they are usually small and pendulous, and when found in other situations they are, more often than not, flat and somewhat raised, appearing like an elevated portion of the skin the surface of which has ulcerated. They may be covered with a crust formed by purulent secretion, and these crusts may be moist or dry. They are thus somewhat like a yaws tubercle, but the resemblance is more fancied than real. The ordinary pendulous condyloma is easily diagnosed, for yaws tubercles are never pendulous, they are always broader at the bases than at the summits. In the case where several flat condylomata have coalesced and formed a papillomatous mass, they may, indeed, bear some resemblance to the yaws granuloma; but careful examination of the tumour, and an enquiry into the history of the case, will always enable the diagnosis to be made out satisfactorily. If the microscope be called into requisition the difference will be easily seen between the syphilitic papilloma and the yaws granuloma, besides which the bacillus of syphilis has never been found in the latter growth.

An important point in regard to the question as to whether yaws and syphilis are distinct diseases, is the fact that the granulomata which could only be secondary or tertiary symptoms of syphilis if they were part of that disease, are essentially the primary manifestations of yaws, and more often than not the only manifestations of that disease. Besides which, yaws, which is propagated solely by contagion, attacks young children most frequently; and, even in adults, lesions seldom occur on the genital organs. There is no variation in yaws, no imitation of every other form of skin disease as in syphilis. The typical yaws granuloma is the same in the child as in the adult, in the neglected disease, as in the case under proper medical care. It is the same when it first appears as when it comes on in successive crops with long intervals of complete quiescence between. Beside all this, syphilis is well known to the medical men in the West Indies, indeed in some of the islands it is very prevalent. It is treated in all its stages and in all its types by every practitioner who has had some little experience in these colonies, and were yaws but a modification of syphilis, the fact would have been determined beyond cavil long ago by the able men who have for years been rich in experience of the two diseases.

Imray, one of the ablest medical men that ever practised in the West Indies, alluded to the question in the following unanswerable language:—

" It is admitted as a fact that secondary syphilitic eruptions may be conveyed from " one person to another, and retain their distinctive forms. But such instances are " acknowledged to be rare, and are noticed as remarkable by those who have met with " them. M. Cazenave admits the rarity of such instances, and says ' it is impossible to " ' deny its occurrence (contagiousness of secondary symptoms), but that certain local " ' circumstances are indispensable to such result: these are a humid or moist secreting " ' surface and prolonged contact.' "†

" Yaws, on the contrary, is a disorder well known to be highly contagious, using the " word in its strict sense of transmission from person to person of the poison, by " inoculation or imbibition. It is also *essentially primary*, that is, it cannot be considered " as the result of previous disease of a different form. It has one primary form, and " runs one regular and certain course, unless affected by constitutional peculiarity, or " complicated by previous disease in the system, or aggravated by neglect. Syphilis " prevails in most of its forms, both primary and secondary, in these countries, very " much as elsewhere, but I have never met with an instance, nor have I heard of one " where the characteristic eruption of yaws has occurred as the result of a primary " syphilitic sore, in short, as a secondary symptom of syphilis. If syphilis and frambœsia " exist side by side, as it were, among the same people, and that for a long period, " perhaps two centuries, it is surely very remarkable that they should remain separate " if identical in nature and origin, that we never find the one occurring as a sequel of " the other, that the one can always be readily diagnosed from the other. It must also

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* *A Text Book of Pathology.* By D. J. Hamilton, M.B., F.R.S.E. Vol. I. London, 1889.
† The Modern Treatment of Syphilitic Diseases. By Langston Parker, F.R.C.S. 4th Edn., London, 1860.

" be remembered that the Negro races are quite as susceptible of the action of the " syphilitic poison, and suffer from it the same disastrous consequences as the white " races."

The conclusions that must be drawn from this special branch of the inquiry are as follows: —

1. That the experience of the great majority of the medical officers shows that yaws and syphilis are in no way connected with each other.

2. That the two diseases may be intercurrent in the same individual.

3. That syphilis, when concomitant with yaws, yields readily to treatment, and is apparently unaffected in its course by that disease; whereas yaws, in the same connection, becomes aggravated and oftentimes results in a condition of deplorable cachexia.

6.

Have you observed any connection between yaws and tuberculosis? If so, give particulars of cases, stating which disease made its appearance first.

Thirty-eight replies were received to this interrogation, 29 were in the negative, seven in the affirmative, and two were indefinite, as the writers of them apparently did not feel justified from their experience in coming to any conclusion on the question.

It is evident from the way in which some of the replies have been drawn up that the writers considered the term tuberculosis to refer to the pulmonary manifestation of the disease alone, and not to scrofula and lupus, which have now been determined to be the results of the infection of the system, or of particular tissues with the tubercle bacillus. The limited sense in which the word tuberculosis has been taken by some of the medical officers probably accounts for the small amount of information this interrogation has elicited.

Dr. Tulloch gives notes of three interesting cases, one of which I saw with him, of yaws and lupus, and he has furnished a photograph of one of the patients (Fig. 1), which many medical men will be able to recognise as a typical representation of a number of cases that have come before them. In two of the three cases lupus was the primary disease, and the persons became afterwards affected with yaws; and, in the remaining case, lupus was the secondary affection. It will be noticed that in the three cases the yaws was of a stubborn and relapsing type, and that both diseases appear to have aggravated each other.

Drs. Latour and Arnott have both met with cases of tuberculosis following yaws, The worst case of yaws ever seen by Dr. Mackie in Antigua was in a tuberculous child, and Mr. Numa Rat has met with several cases in which yaws ulcers have acquired the characteristics of lupus, and he makes the important observation that " many of the " distortions resulting from recurring and spreading ulceration " usually attributed to yaws are due in reality to tubercular infection.

Tuberculosis in its various forms is common in the West Indies, far commoner indeed than many medical men are willing to allow. Indeed, considering the diet of the people and the conditions of mal-hygiene under which they live, it is to be expected that there will be predisposition to the prevalence more or less of what has been described as diathetic diseases.

Dr. Gee has pointed out that " Whatever lessens health and strength tends to beget scrofula "*; and most writers on scrofula or struma, have emphasised the fact that it is apparently the outcome of mal-nutrition. In my report on the medical administration of the districts in the Island of Dominica for the year 1882, the fact is shown that of 1,943 cases treated by the district medical officers, 58, or 3 *per centum* were classed as scrofulous. And, in 1891, the late Dr. Armstrong, one of the district medical officers in Dominica, pointed out that " Scrofula is frequently present amongst the inhabitants " of the district, and its influence, as it affects the health of the people, increasing the " list of sick and modifying the type of disease, may be easily traced."†

It is a curious fact that lupus appears to be endemic in a portion of the windward district of Dominica, at all events most of the hospital cases that have come under my notice were from that part of the island. That lupus is endemic in some localities was

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* *Scrofula.* By Samuel Gee, M.D. In Quain's *Dictionary of Medicine.* London, 1888.

† *On Scrofula in Dominica.* By John Armstrong, M.A., M.B., T.C.D. *The Leeward Islands Medical Journal.* London, 1891.

observed by Cohnheim, who suggested contagion as the cause in the following words:—
" Although we are unacquainted with any facts going to show the contagiousness of
" *lupus*, its endemic occurrence in certain districts unmistakably points to a definite virus,
" possibly miasmatic in character."*

Tuberculosis, in its varied manifestations, is not infrequently seen concomitant with yaws, with the result that both diseases have been modified, and the anomalous symptoms thus produced have been thought to be due to yaws alone. Tilbury Fox very properly observes that " The strumuous habit of body often modifies the more common diseases of
" the skin." And the following description he gives of scrofuloderma is applicable in almost every particular to some of the cases of so-called intractable yaws: —

" As regards the skin, scrofula is generally characterised by the appearance at the
" outset of indolent, dull red, soft, tubercular formations, that rapidly suppurate, and
" are soon covered over with darkish scabs, from beneath which oozes an unhealthy pus.
" Ulceration to a greater or less degree takes place, with the formation of exuberant
" granulations at times, and the healing is accompanied by distinct scarring. The whole
" disease is of the most chronic character. One can scarcely mistake the strumous
" ulceration for any other disease; it may spread and cover a large extent of surface, and
" in this case the ulcerated surface is half covered by darkish irregular crusts, whilst the
" ulcers discharge a thin disagreeable dark pus, and granulations are flabby and pallid,
" bleeding freely on being touched; the edges of the ulcers are livid, and various attempts
" at repair are made."

In the Sandy Point Hospital in St. Kitts I saw with Mr. Semper a poor white man, 50 years of age, who was suffering from intractable lupoid ulceration of the right foot and left arm. He had been in the island for several years, and had worked as a labourer. For the same disease he had been in the Basseterre Hospital, and he left apparently cured, but shortly afterwards the ulceration broke out again, and, as he said, " Nothing
" did it good." The ulceration, spreading here and healing there, with dark dirty crusts on portions, and a dusky red colour at the elevated edges, was identical with that condition which sometimes supervenes on yaws in cachectic individuals. And yet this man in the St. Kitts' Hospital had never had yaws. There are certain cases, too, when persons who have recovered from yaws, after an interval of health are attacked with this kind of tuberculosis, of which the cutaneous ulceration is the outcome. The ulcers may possibly heal, but they will invariably break out again, and a permanent cure seems impossible. This tendency to relapse has been pointed out by Hutchinson, who says: " In spite of
" the best treatment lupus always tends to relapse."

The fact of these serious symptoms coming on in persons who have been suffering from yaws was well known to some of the older writers on the disease, who were sagacious enough to notice that there was something more than could be explained by the original disease. Thus, in 1827, Rankine wrote as follows:—

" In consequence from absorption from these ulcers severe pains of the limbs, nodes
" of the bones, and gummatous swellings of the joints follow. But although this com-
" plaint has been communicated by, and mistaken for the yaws, it will not communicate
" the specific disease, but only ulcers partaking of its phagedenic nature, and probably
" following the same course of morbid symptoms."†

Mason, in 1831, thus alluded to the scrofulous complications of yaws:—The yaws
" is essentially of a slow, chronic and debilitating nature, as has been already shown, even in
" its mildest form, and these effects are considerably augmented by neglecting the means
" which might counteract or diminish their influence, such as food and cleanliness, and
" under these unfavourable circumstances scrofulous affections are sometimes brought
" into premature and exasperated operation. In these cases scrofulous ulcers make their
" appearance in different parts."

Dr. Bowerbank, in Dr. Milroy's report, states as follows:—" In persons predisposed
" to leprosy, scrofula, syphilis, &c., when attacked by yaws, its course is often irregular
" and protracted; in fact, the system appears unable to cast off the disease; efforts are
" made and repeated at long intervals, but sometimes unsuccessfully, till at last the latent
" disease becomes roused into action, and a most destructive ulcerative process takes
" place, crippling and deforming the body, and at last destroying life."

Dr. Tulloch, in his Tobago report, also refers to this important question in the following words:—" When strumous weakly children are affected, and, as is too often the
" case, are neglected by their parents, death frequently supervenes on extensive ulcera-

* *Lectures on General Pathology.* By Julius Cohnheim. New Sydenham Society's Translation. 3 vols. London. 1889.

† *Practical Observations on the Yaws.* By James Rankine, M.D. *The Edinburgh Medical and Surgical Journal.* XVIII. 1827.

" tion and exhaustion, or, the child, weakened by the malady, may readily succumb to " some other disorder."

Mr. Numa Rat, in his sanitary report on his district in Dominica for the quarter ending the 31st March, 1890, writes as follows :—" The ulceration and constitutional state, " induced by yaws, are, in many cases, so very similar to those which result from " scrofula that the former, in its later manifestations, may be mistaken for the latter, at " first sight ; but the disease of the glands, which is generally present in scrofula, is " usually absent in the other affection. In some cases the two diseases may be found " co-existent."

In his recent Essay on Yaws, the same writer thus alludes to this ulcerative affection of the throat :—

" Destructive ulceration of the nares, pharynx, and soft palate is one of the later " manifestations of yaws. The affection generally begins as a tubercle at one of the " parts above mentioned. When it originates in the nose, the early symptoms are those " of ozœna ; and the ulceration spreads from this organ to the palate and pharynx. It " often, however, avoids the nares and commences in the soft palate. The ulceration of " the tubercle extends, thence destroying the uvula and velum palati, and the septum " nasi, and deeply scoring the pharynx."

" This ulceration may occur 20 years after the last traces of the secondary symptoms, " even though the disease had lasted a short time only, and had been apparently " effectually expelled from the system, though the patient may be robust and in " apparently good health. . . . . There is a severe form of this ulceration which " resembles that of exedent lapus in its destructiveness. It begins from within the nares " or throat, and involves all the tissues of the nose and palate, occasionally destroying " the upper lip also."*

It would appear from these paragraphs that Mr. Numa Rat considers this form of ulceration to be due entirely to yaws, but in other portions of his paper he describes the nature of the yaws ulcers " occurring in scrofulous subjects" ; as, for instance, in regard to chronic ulcers devoid of the characteristic yaws crust, he says :—" As they " generally occur in the scrofulous, they usually present the appearances common to that " disease." And, again, in regard to ulcers about the face he says :—" These generally " occur in the scrofulous, and have a tendency to spread superficially. They sometimes " invade the mucous membrane of the nose."

In order to ascertain the frequency of the appearance of scrofula in persons suffering from yaws, I have made a careful examination of the case-books of the yaws hospitals in Dominica, with the following results :—At the Central Yaws Hospital, of 1,647 cases, the number of patients with symptoms of scrofula was found to be 80, or 4·9 *per centum*. And at the Morne Bruce Hospital, of 750 cases under treatment, 39, or 5·2 *per centum*, were found to be suffering in the same manner. So that of the large number of 2,397 persons suffering from yaws, 5 *per centum* were the subjects of some form of tuberculosis.

Pulmonary phthisis is not met with so frequently as a complication of yaws as the other forms of tuberculosis, but I have witnessed several cases ; and, as a rule, the patients die soon. I noticed, in the Grenada Hospital returns, that a death in the Yaws Hospital was recorded as due to phthisis ; and, a man having died in the Morne Bruce Hospital, of diarrhœa, whilst I was writing this report, the medical officer kindly afforded me the opportunity of making a post-mortem examination. I found minute nodules of tubercle in the lungs that could only be made out by the microscope, and thus, in this instance, the tubercular disease was in its earliest stage, and was due in all probability to recent inhalation of the bacillus.

Phthisis, and the other forms of tuberculosis are by no means infrequent in the West Indies ; and, considering the overcrowding at nights in the small and dirty huts in which all ventilating openings are scrupulously closed, the prevalence of the disease amongst the people is easily understood, for a tuberculous person living in such a hovel would probably infect most of those sleeping in the same place. Bollinger has calculated that one phthisical person may give forth 20 millions of the tubercle bacillus in a day, and these micro-organisms are so tenacious of life that after remaining in a dried state for months they can manifest their full virulence when sown on a suitable soil.

It is difficult, and almost impossible, in some cases, to decide at once whether these " tertiary " yaws symptoms, as they have been called, are due to syphilis or tuberculosis. And the diagnosis is more especially difficult in those instances in which there is extensive ulceration of the face, the nose, or the parts at the back of the mouth. The same

* *Yaws : Its Nature and Treatment.* By J. Numa Rat. London, 1891.

destruction of tissue may result from either disease; and, as it is often impossible to obtain any reliable history of the case from the negroes, the patient will have to be kept under observation for a time before a satisfactory solution of the difficulty of diagnosis can be arrived at.

Hutchinson, in alluding to this matter, states:—"Both conditions admit of repair, "and may be followed by sound scars, but the lupus process is so very much slower "than that of syphilis, that the mere chronicity of the case may generally be allowed "to constitute the diagnosis. Lupus is a growth followed slowly by ulceration, and yet "more slowly by healing; the syphilitic process is an inflammation, often attended by "acute, almost phagedænic ulceration, but which, when once arrested, may heal very "quickly. Syphilis may destroy as much in a month as lupus will do in years. With "lupus there is never acute inflammation, never much pain, nor any great redness, "whilst with syphilis there are usually swelling, great redness, and often severe pain. "Lupus always creeps on the surface of the parts, whilst syphilis may begin in their "substance. . . . . There are cases, however, in which it [lupus] is restricted to "the throat, and these it is exceedingly difficult to identify with confience."*

In the main the diagnostic details laid down by Hutchinson may be relied on, but there are cases where they will fail, inasmuch as the well-known greater virulency of tuberculous diseases in hot climates at times manifests itself by the rapid spread of lupoid ulceration.

Then again, it is possible that tuberculosis may be concomitant with syphilis and yaws, each disease modifying and masking the other two. In the *British Medical Journal* of the 4th January, 1890, Dr. Stephen Mackenzie gave some interesting notes concerning a case that was regarded as syphilis *and* lupus; and most medical men, who have had much experience of syphilis, have met with examples of the disease in tuberculous patients.

In cases where persons suffering from lupus, scrofulous ulceration, and other forms of tuberculosis, become infected with yaws, there is no difficulty in regard to diagnosing the co-existence of the two diseases. For, when the *contagium* of yaws comes in contact with any ulcerated surface, the disease, in most instances, is likely to be developed unless the person be immune. But in those cases in which extensive and intractable ulceration comes on during a prolonged attack of yaws, or after all manifestations of the disease have disappeared, the dependence of that ulceration on the yaws virus cannot be proved. Indeed the evidence all points to the fact, that this ulceration is not the effect of yaws, and that the cause must be looked for elsewhere. Tuberculosis, in all its forms, is endemic in the islands in which yaws prevails, and it is a well-known fact that the former disease may remain latent in the system for considerable periods, and that the *foci* will be roused into action by the accession of an acute disease. This fact was impressed on the profession by Dr. Burdon Sanderson at the International Congress of Hygiene and Demography held in London, in 1891, and it is quite sufficient to account for the appearance of symptoms of tuberculosis during the progress of such a disease as yaws. When yaws and tuberculosis are concomitant, one disease appears to increase the virulency, and to mask the symptoms of the other. And I have met with cases in which there was an alternation of the preponderance of the symptoms of either malady. Thus, at one period the ulcers would almost entirely heal up, and a fresh crop of yaws tubercles would appear. After a time, however, the ulcers would break open again and spread with rapidity, the yaws granulomata meanwhile entirely disappearing by absorption, without leaving any ulcers behind them. Such cases are seen occasionally in all yaws hospitals, and recovery scarcely ever results. Indeed, in most instances the patients are carried off by diarrhœa or dysentery.

When extensive ulceration attacks the surfaces of the limbs, the bones and joints are nearly always affected, and then there is no difficulty in regard to the diagnosis. The patients frequently are obliged to remain on one side, or in a cramped position owing to the ulceration, and in these instances contraction of the flexors may result, and in neglected cases may even give rise to terrible deformity. When the yaws hospitals were first opened in Dominica, such cases were of frequent occurrence in the wards, for the search for persons suffering from the disease brought to light some fearful examples of yaws and tuberculosis. These wretched cripples had been hidden away in hovels in unfrequented places, and some of them had lain, surrounded by dirt, in their huts for considerable periods. I have seen cases in which the hands and feet and the whole of the buttocks were honeycombed by the chigoe flea, *Pulex penetrans*, L., and the unhappy sufferers were unable even to turn from one side to the other. Milroy, in his

* *Op. cit.*

report, thus records his experience of such cases in the first yaws hospital established in Dominica :—

" It was not till I reached Dominica that I fully understood the gravity of the disease of " yaws in its advanced and aggravated forms. When, on my first visit to the hospital at " Morne Bruce, near Roseau, I witnessed in many of the patients extensive ulceration of " the legs and feet, which had led to the loss of several of the toes, or to stiffened wrist and " elbow-joints, with other disabling marks of long-suffering, the sight was most distressing. " Some of the younger children were in a deplorable condition, the victims evidently of " starvation and neglect, emaciated to the bone, the limbs seamed with old scars and fresh " sores, unable to turn themselves in bed, and requiring to be lifted up to be fed or dressed. " As almost all the cases, both in this hospital and in that at Prince Rupert's, were of " long standing, the primary pustulo-tubercular cutaneous eruption was to be seen in " comparatively few of the patients; the dry white scurfiness of the surface ('pian-" 'dartre') was much more common. On admission, the skin was always begrimed " with dirt; and as no little difficulty had been found in providing suitable baths in " the extemporised hospitals, the state of the skin in most of them was still anything but " satisfactory."

As the hospitals have now been in operation in Dominica for many years such cases are becoming rare. I find that of the 750 patients admitted to the Morne Bruce Hospital in recent years, only seven, or less than one in a hundred, were suffering from contraction of the flexors. And this fact, I believe, shows that ulceration leading on to such a condition of distortion of the limbs is not a consequence of yaws, but that it is due to some accidental circumstance.

The conclusions to be drawn from this branch of the inquiry are as follows: —

1. That yaws and tuberculosis, in one or other of its forms, are sometimes present in the same individual.

2. That the concurrence of these two diseases leads to the formation of anomalous symptoms that are liable to give rise to errors in diagnosis.

3. That the condition of disease produced is of an aggravated type, and of a relapsing nature, and that very few of the patients become permanently cured.

Yaws and Leprosy.

On the 18th December, 1890, in answer to a communication from Baron Ferdinand de Rothschild, the Chairman of the Executive Committee of the National Leprosy Fund, I offered to inquire into the spread of leprosy in the various islands visited by me, if the Secretary of State for the Colonies would accord the necessary sanction. Permission, however, was not given, for reasons explained in the following paragraph from the *Journal of the Leprosy Investigation Committee*, No. 3, July, 1891 :—

" Dr. H. A. Alford Nicholls, of Dominica, who is investigating, on the part of the " Government, the disease of 'yaws' in the Windward and Leeward Islands, has offered " to combine with his inquiry the subject of leprosy; but the necessary sanction of the " Colonial Office has not been granted, on the grounds that an investigation into leprosy " should include the whole of the British West Indies, and that, before entering upon " anything of the kind, it is advisable to await the Report of the Leprosy Commission to " India."

During the progress of my mission, however, as I have already stated, I met with cases of leprosy associated with yaws; and, as some authors have expressed their convictions that the two diseases are identical in origin, it is necessary that the question should be briefly discussed in this report. Moreover, as leprosy bears in many points a striking analogy to tuberculosis and syphilis, it may be convenient to consider the subject here, although no interrogation concerning the question was submitted to the medical officers. The analogy between syphilis, tuberculosis, and leprosy, is well expressed in the following words of Dr. Sansom: " It must be acknowledged that the closest " resemblances are to be found between tubercle, syphilis, and leprosy. All these " disorders are of microbic origin, they are capable of varying degrees of intensity, and " possess the power of renewing their ravages after varying periods of dormancy. They " produce growths that are strikingly similar in pathological characters, and they either

" are or have been universal in their distribution apart from considerations of climate, " race, and habits of life."*

It must be confessed that these attributes are, except in one particular, also common to yaws, and the fact of this close affinity was duly brought forward by Dr. Sansom in his thoughtful lectures.

The particular in which yaws does not agree with the general characteristics of its three congeners is that it is essentially a disease of the tropics, whereas tuberculosis, syphilis, and leprosy prevail as well in cold as in hot regions.

During the time of the slave trade, when there was a constant re-importation of yaws into all those countries to which the slaves were distributed, the disease was met with in North America as well as in the West Indies, according to the statements of some of the older authorities. But when the slave trade was put an end to, yaws died out in those countries of the new world that lie to the north and south of the tropics ; for I have been unable to discover any evidence of its presence in the United States, where there is a large negro population. Hirsch makes the following statement as regards its limitation to the tropics in South America :—" The disease is, therefore, an exquisitely tropical one, or, in other words, it is dependent for its origin and continuance upon tropical climate. This is so " strikingly the case that, while every province of Brazil is a seat of the malady, it is " quite unknown in the Argentine Republic, notably in Monte Video and Buenos Ayres " (with a temperature like that of Portugal), notwithstanding the large negro popu- " lation."†

Several of the earliest writers on yaws imagined the disease to be identical with Tsara'ath, the leprosy of the Jews, as described in the 13th chapter of Leviticus It is evident from a careful perusal of the Scriptures that several diseases were included under the generic term leprosy, not all of which subjected the sufferers to the law of exclusion. Thus, Gehazi remained in the service of Elisha, and was even permitted to speak to the king, after leprosy had been inflicted on him " and his seed for ever." And Naaman, although suffering from " leprosy," was not an outcast from social life, as represented by his family and servants. In the Mosaic account of the symptoms by which leprosy could be recognised, there is an absence of all allusion to the chief attributes of the disease known by that name in modern times. The chief symptoms of the plagues called by the Hebrews Tsara'ath, and translated into the word leprosy in the authorised version of the Bible, were as follows :—

1. The hair being turned white.

2. The skin turning to a white colour.

3. A cutaneous eruption, " a rising [or swelling] a scab, or bright spot."

4. Ulcers, " when . . . the plague in sight be deeper than the skin of his " flesh."

5. Fungous growths, " if there be quick raw flesh in the rising."

It is evident that one of the diseases included under the term leprosy was of an inflammatory nature, for in the 24th verse of the same chapter of Leviticus are the words " if there be any flesh in the skin whereof there is a hot burning, and the quick flesh " that burneth have a white bright spot, somewhat reddish or white." This passage doubtless refers to a circumscribed inflammation of the skin that has gone on to form a slough, or a suppurating surface, such, indeed, as a boil or a carbuncle. However, in this instance, as in the others, the description is altogether too vague for any one to identify it with any disease of the present age. The older writers, however, did not hesitate to make comparisons that the scientific knowledge of the present generation proves to have been devoid of any show of reason. And, as one author often copied from another without acknowledgment, errors of statement were thereby handed down from the earliest writers through succeeding generations even to recent times. This curious and interesting fact is exemplified in the case of the attempt to identify yaws with leprosy.

Ali Abbas, one of the renowned Arabian physicians of the 10th century, wrote as follows in his Theoria, cap. 16, lib. 8 : " Lepra albedo est quæ in exterioribus fit Cutis : " Et aliquando in quibusdam sine aliis est membris : Nonnunquam verò in toto fit corpore " interdum ut totius fit corporis color albus.—quæ in membro est, si ex mala fit frigida " complexione, hæc sunt Signa ; quum membrum in quo est, album est colore, itidem-

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* *The Milroy Lectures on Phthisis.* By Dr. A. Sansom. *The British Medical Journal*, 1st March, 1890.

† *Handbook of Geographical and Historical Pathology.* By Dr. August Hirsch. New Sydenham Society's Translation. Vol. II. London. 1885.

"que ejus pili; et si cutis phlebotomo vel certe acu pungitur, sanguis ab eo non "egriditur, sed humiditas alba."

In this description of leprosy the Mosaic account is closely followed, the whiteness of the skin and the turning of the hair to a white colour are given due prominence to, but to the scriptural account is added a new symptom, namely:—that if the white skin of the affected member be pricked, a white discharge exudes instead of blood. Now none of these symptoms are ever found in cases of yaws, and yet strange to say they have been fixed on by writers as characteristic of that disease.

The earliest author who gave a particular account of yaws was Dr. John Hume, who wrote an anonymous account of the disease in the *Edinburgh Medical Essays* of 1744. He identified yaws with the leprosy of the Jews, and alludes to the whitening of the hairs in the following language: "That the black hair that grows out of the parts now "covered with the *yaws*, change gradually white: I do not mean, appear white by the "*ichor* of the *yaws* drying upon it, as all the skin does towards the end of the distemper, "but the substance of the hair itself is changed from black to transparent white, like the "hairs of an old man."* Hume had probably copied from Winterbottom, who in his work, published two years previously, had said, "when these eruptions appear upon any "part of the body covered with hair, it is gradually turned from black to white."†

Fifteen years after Hume wrote, namely, in 1759, Hillary published his work on the diseases he met with in Barbados. He not only perpetuated the errors of Winterbottom and Hume, but he actually copied some of the latter's expressions verbatim. He said: "The black hairs which grow out of the places where yaws are, gradually turn to be "perfectly white, like the hair of an old man."‡ Wright, in 1791, was the first to correct this error. He wrote as follows on the subject: "Dr. Hillary and others have alleged "that where the yaws break out, the hair of that part turns white. But such authors "have either been misinformed in this circumstance, or have confounded the yaws with "lepra, when actually the change of colour occurs."† In 1820, Thomson said: "It has "been represented that the hairs near the yaws turn white, and remain so permanently: "This I can positively deny."† Mason, in 1831,† and Maxwell, in 1839,† also pointed out the error; but, notwithstanding this, succeeding authors, even down to the time of the writer of the Article on Yaws in Vol. XXIV of the *Encyclopædia Britannica*, published in 1888, continued erroneously to attribute to the disease the chief diagnostic sign of the leprosy of the Scriptures. It should be said, however, that those authors who had had considerable experience of the disease have not fallen into this error, which appears to have been handed down only by those who compiled an account of the disease from the writings of others, such as Moseley in 1800†, Bateman in 1817§, Good in 1825‖, Lagneau in 1826¶, Kerr in 1835**, and Joseph Frank in 1839.††

The idea, which had originated in the first half of the eighteenth century, that yaws was the same as the leprosy of the Scriptures, was carried down to the early part of the present century, for I find that Adams, in 1807‡‡, and Bateman, in 1817, expressed belief in their identity. It must be mentioned, too, that one of the latest writers on skin diseases makes the following statement: "Frambæsia, Yaws, or Pian, designated by Alibert, "Mycosis Framboesioides, was described by Haly Abbas in the tenth century."§§

Now, as I have already pointed out, Ali Abbas alluded to the eastern "leprosy" in almost the very words Moses used in the 13th chapter of Leviticus; and, therefore, to state that Ali Abbas described yaws, is simply to perpetuate the old error of identifying the disease with the Hebrew Tsara'ath. Later still, Numa Rat, in his Essay published in 1891, says, "It is possible, therefore, that yaws prevailed amongst the Hebrews during "their migration from Egypt."

I have already alluded to the curious idea of Howard that syphilis was a disease evolved by the combination of yaws and leprosy. Two years before Howard wrote, however, Macé published a work in which he expressed the opinion that yaws was produced by a complication of syphilis and leprosy.‖‖ But these ideas were simply speculative ones,

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* *A Description of the African Distemper called the Yaws. Edinburgh Medical Essays.* Vol. VI. Edinburgh. 1744.
† *Op. cit.*
‡ *Observations on the Changes of the Air, and the Concomitant Epidemical Diseases in the Island of Barbadoes.* By William Hillary, M.D. London. 1759.
§ *A Practical Synopsis of Cutaneous Diseases.* By Thomas Bateman, M.D., F.L.S. 4th Edition. London. 1817.
‖ *The Study of Medicine.* By John Mason Good, M.D., F.R.S. 2nd Edition. 5 vols. London. 1825.
¶ *Pian.* Par M. le Dr. Lagneau. In *Dictionnaire de Médecine.* Paris. 1826.
** *Yaws.* By W. Kerr, M.D. *The Cyclopædia of Practical Medicine.* London. 1835.
†† *Pathologie Interne.* Par M. le Dr. Joseph Frank. 2 vols. Paris. 1839.
‡‡ *Observations on Morbid Poisons, Syphilis, &c.* By Joseph Adams, M.D. London. 1807.
§§ *Frambæsia.* By James Christie, A.M., M.D. In *A Treatise on Diseases of the Skin.* By T. McCall Anderson, M.D. London. 1887.
‖‖ *Dissertation sur le Yaws, Pian ou Frambæsia.* Par M. le Dr. P. M. Macé. Paris. 1804.

arrived at by authors having no intimate knowledge of the disease. Thomson, however, in 1819, in his paper in the *Edinburgh Medical and Surgical Journal*, stated that many of the so-called cases of ill-cured yaws were leprosy.

It has been already shown that at that time it was customary for some medical men, as it is with a few even at the present day, to consider cases of intractable ulceration causing great loss of tissue, as due to leprotic disease. And it is not surprising, therefore, that in 1889, Maxwell published a book in which he tried to prove that yaws had an influence in producing leprosy. In this work he says: "The most direct and satisfactory way to "establish the opinion that yaws is the source from which leprosy originates will be to "select a few cases bearing upon this point out of an abundant collection in my "possession." He then proceeds to give details of the following six cases: —

Case I.—A negro had yaws, and got well of the disease, except that he had an ulcer of the foot caused by the destruction of a tubboe with corrosive sublimate. The ulcer healed up in two years; and three months afterwards he was attacked with a train of symptoms that were undoubtedly due to neglected syphilis in a cachectic individual. There is no mention, it is true, of the primary lesion, but then that is often overlooked even nowadays. He had headache, aggravated at night by fever, and loss of colour. The skin was "dry and scurfy, and became spotted with livid blotches. After suffering "for some weeks the nose began to swell, and the speech became nasal. On examina- "tion ulcers were discovered in the nose and throat, with rugged edges, giving out an "intolerable fœtor, and the pains and fever moderated. The ulceration in the nose and "throat made rapid progress, destroying the soft parts, and corroding the bones of the "palate and nose." The ulceration spread over the face afterwards, causing terrible destruction. Then came nodes on the bones, after the ulceration cicatrized.

Case II.—This was also a case of syphilis contracted several years after an attack of yaws. Maxwell himself says in regard to it, "The most prominent symptoms in this "case bear a strong identity to those of syphilis, and it would require some diagnostic "tact to discriminate the difference."

Case III.—This was evidently a case of scrofulous ulceration, coming on two years after he recovered from a long and severe attack of yaws.

Case IV.—This was a case of elephantiasis of the foot and leg in a young man who had had yaws when a boy Maxwell confounded elephantiasis with leprosy.

Case V.—This was a case of elephantiasis in the left foot of a negress who had had yaws when a girl.

Case VI.—This case was, perhaps, leprosy in a young man who had had yaws as a child.

Five of these cases, therefore, that Maxwell depended on to establish a connection between yaws and leprosy are seen to have no connection whatever with the latter disease; and the sixth case, if one of leprosy, appears to have simply been an instance of the disease occurring in a young man who had recovered from an attack of yaws in childhood.*

Joseph Frank, in 1839, described yaws as a species of leprosy endemic in Africa, in America, and the East Indies. He, however, brings forward no evidence in support of his theory, and his ideas on the subject were evidently very confused, for he declares the Aleppo Bouton, or Mal d'Alep, as well as other diseases, to be also varieties of leprosy.

The Leprosy Committee of the Royal College of Physicians submitted a series of questions to the medical officers in the West Indies, and the replies were published in the report of the College published in 1867. The ninth question was as follows:—Have you any reason to believe that leprosy is in any way dependent on, or connected with, syphilis, yaws, or any other disease? The following replies to this question were received.

Jamaica—"I believe leprosy to be a disease *sui generis*. I have little doubt that "yaws and leprosy may run their course together, as also leprosy and syphilis."—(*Dr. Bowerbank.*)

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* Maxwell spoke of Arabian [Elephantiasis or Barbados leg] and Grecian leprosy as different types of the same disease; and he also considered extensive ulceration, due to lupus and other forms of tuberculosis, to be leprosy, an error that is made at the present day in St. Lucia and St. Vincent.

Dominica.—No. I had occasion formerly to see much of the yaws; I hold that disease to be different in its nature from leprosy.—(*Dr. Imray.*)

St. Vincent. I think it is connected with scrofula, but not with any other disease. I look upon leprosy as a form of scrofulous disease.—(*Dr. Checkley.*)

Barbadoes.—"I believe it is a disease *sui generis*. The yaws, once so prevalent in "the West Indies, is fast disappearing from Barbadoes."—(*Dr. Goding.*)

"I will not say that syphilis can produce *true* leprosy; but that it can produce a "disease so closely resembling it as to deceive the most careful observer, I fully believe. "It is most common in the offspring of syphilitic patients."—(*Dr. Stevenson.*)

Tobago.—Yes. I look upon leprosy, syphilis and yaws, as cognate.—(*Mr. Purser.*)

Trinidad.—I have not; but syphilis and yaws may co-exist with it.

Guiana.—"Leprosy is a disease *sui generis*, independent of any other disease."—(*Dr. Reid.*)

"I believe it to be specifically distinct from any other disease."—(*Dr. Pollard.*)

"I firmly believe leprosy to be connected with syphilis, yea, even to be an offspring "of it; imperfectly-cured syphilis in parents causes the disease to break out in the "progeny in the second, third, or fourth generations."—(*Dr. Van Holst.*)

In their remarks on these replies, in the report, the College of Physicians make scarcely any reference to yaws, and they express no opinion as to the nature of the disease, or its connection, if any, with leprosy. Recent writers, however, have declared that there is no such connection. Thus, in 1873, Dr. Bowerbank's opinion, given in Milroy's report, is emphatic on the point. In 1881, Mr. Hillis stated as follows:—"Several inmates of the General Leper Asylum have been attacked with yaws during "their sojourn in that institution, the latter disease running its usual course, apparently "uninfluenced by the leprous malady."*

In 1887, Dr. Beaven Rake, in his report on the Trinidad Leper Asylum for 1886, said, "I cannot substantiate the greater susceptibility of lepers to yaws." In his third report written in 1890, Dr. Tulloch, of Tobago, writes as follows concerning the alleged capability of yaws developing into leprosy: "I have never seen such a case in my "experience, nor heard of one occurring in the practice of other medical men in this "island. Terrible deformities, closely simulating those caused by leprosy, have certainly "resulted from neglected yaws occurring in syphilitic and scrofulous cases, and in the "old days of treatment by mercurialism, these were doubtless more frequently met with "than now; but leprosy as a direct result of yaws has never occurred within our "knowledge."

Mr. Durrant, of Carriacou, in his reply to the eighth interrogation, alludes to the fact that one of his patients who had recovered from yaws early in the year 1889 was soon afterwards afflicted with leprosy, and, on the principle of *post hoc propter hoc*, she and her friends concluded that the leprosy was the outcome of the yaws. As Mr. Durrant simply mentions the facts of the case, without expressing any opinion on the question, I conclude that he believes in the possibility of some connection between the two diseases.

As related in previous sections of this report, I met with cases of yaws concomitant with leprosy in St. Vincent and in the Grenadines, and although the former disease did not appear to be aggravated by the latter, it was undoubtedly rendered more stubborn, and the lepers, from what they told me, were unable to get rid of the yaws, the symptoms abating at one time and reappearing at another. This was also the case in regard to the two lepers attacked with yaws that I examined in the Trinidad asylum, and whose clinical histories, through the kindness of Dr. Koch, I have been able to publish in this report. The yaws, in both instances, was of an obstinate and relapsing type, and the disease was moreover not permanently influenced by mercury pushed to ptyalism.

In most of the islands I visited, particulars regarding the number of persons affected with leprosy were sought to be obtained in taking the census. It is of course impossible to obtain accurate statistics on such a subject by means of census papers, for owing to the fact that strenuous efforts are always made to conceal the existence of leprosy in

* *Leprosy in British Guiana.* An Account of West Indian Leprosy. By John D. Hillis, F.R.C.S. London. 1881.

respectable families, only those cases that are known to the public are likely to be included in the figures of the census returns.

I have drawn up the following table from the census reports; the figures, are, however, only approximate, and all they can be expected to do so is to indicate those islands in which leprosy most prevails.

Islands.	Populations.	No. of cases of Leprosy, according to the Census Returns of 1891.	No. of persons affected with Leprosy in every 10,000 of the Population.
Grenada - - - -	53,209	21	4·0
St. Vincent - - -	41,054	62	15·1
St. Lucia - - -	42,220	32	7·6
Dominica - - -	26,841	1	0·4
Antigua - - - -	36,119	45	12·5
Barbuda - - - -	580	3	51·7
Montserrat - - -	11,762	9	7·7
St. Kitts - - - -	30,876	98	31·7
Nevis - - - -	13,087	5	3·8
Anguilla - - - -	3,699	8	21·6
Virgin Islands - - -	4,639	3	6·5
Totals - - -	264,086	287	10·9

Although these figures are only approximate, they are really valuable as showing that in those islands where yaws prevails most, the proportion of the population affected with leprosy as shown by the census returns is small, and this fact tends to indicate that the two diseases do not stand to each other in the relation of cause and effect. In a note in the last journal of the Leprosy Investigation Committee, Drs. Beaven Rake and Buckmaster, two of the Leprosy Commissioners, describe the condition of British Gurhwal between the years 1867–72 as "markedly leprous."* At this period there were from 20 to 30 lepers per 10,000 of the population of the district. Assuming, therefore, that 20 lepers per 10,000 of a population indicates a markedly leprous country, it is found from the above table that only three islands, namely, St. Kitts, Anguilla, and Barbuda, can be so denominated. In Anguilla and Barbuda there is no yaws, and there appears never to have been any case of the disease amongst the people. And, in St. Kitts, although yaws is spreading, owing to the neglect of proper precautions, the malady cannot be said to be very prevalent.

The table shows that, according to the census returns, there are 10·9 lepers in every 10,000 of the population of the Leeward and Windward Islands, and the only islands in which the prevalence of leprosy is shown to be below the general average are Grenada, St. Lucia, Dominica, Montserrat, Nevis, and the Virgin Islands. Now, in all these islands yaws is endemic, and it is a curious fact that, with the exception of the last-mentioned, they are the only islands in which yaws hospitals exist. The census returns, therefore, disclose the fact that in the Antilles the cases of yaws and leprosy appear to bear, as regards numbers, an inverse ratio to each other.

The literature of the question—which I have considered advisable to notice at length—in spite of the ingenious efforts of several of the authors, fails to connect leprosy with yaws, and my own observations lead me to believe that the two diseases, beyond an analogy of attributes in certain particulars, are distinct in origin, in course, and in termination.

* *Journal of the Leprosy Investigation Committee.* No. 4. London. 1891.

The following conclusions may be drawn from the evidence addued on the subject:—

1. That whereas leprosy is met with in all regions, yaws is confined to the tropics.

2. That whilst leprosy is apparently hereditary, and does not manifest contagious properties in the ordinary manner, yaws is not hereditary, and the propagation of the disease by contagion can be demonstrated in a large number of cases.

3. That leprosy, as far as present knowledge goes, tends to a fatal termination in spite of treatment, and yaws, in the great majority of instances, is a curable disease.

4. That yaws and leprosy may exist, as easily recognisable maladies in the same individual, although the leprotic cachexia renders it difficult for the system to cope with and throw off the symptoms produced by the yaws infection.

7.

Have you met with any cases in which the disease has been spread by vaccination? If so, give full details.

Although there is not in the West Indies, as in the mother country, a crusade against vaccination, yet a few persons believe in the tenets of the "Anti-Vaccination League," and yaws, as well as other constitutional diseases, have been declared to be propagated by means of vaccination. Such ideas always find most credence amongst ignorant people incapable of inquiring into scientific facts bearing on the subject, or of appreciating properly the nature of the evidence on the question. Some years ago it was brought to my knowledge that the people of a certain district in Dominica, in which island vaccination is not compulsory, were unwilling to permit their children to be vaccinated, because they believed the operation was the means of propagating yaws. Several cases that had come under my own observation led me to the conclusion that it would be advisable to set the matter, if possible, at rest, by obtaining the results of the experience of the West Indian medical officers on the question; accordingly this seventh interrogation was submitted to them, and 39 replies were received.

Of these 39 medical officers, only two in Dominica, namely, Mr. Numa Rat and Dr. Kirkpatrick, appear to have reason to believe that yaws may be communicated by vaccination. Mr. O'Carroll, of St. Vincent, has never met with an instance, but he says he has no doubt that the disease can be so communicated. But a mere expression of opinion, unsupported by evidence, is of no weight whatever in scientific questions.

Dr. Mapleton, of St. Kitts, mentions a case of a white child in Montserrat by whom yaws was contracted "either from vaccination or from some negro children immediately "after its vaccination." In this case no evidence is brought forward to show that there was even a presumption that the disease was propagated by vaccination, and it cannot therefore be seriously considered. Thus the evidence regarding the possibility of the spread of yaws by vaccination is narrowed down to that brought forward by the two Dominica medical officers. This evidence I shall consider later on.

Three of the four medical officers in Tobago refer to the fact that yaws may occur after vaccination before the sores are healed, and some most interesting particulars are brought forward to show that in these instances the vaccination lesions were the spots through which the yaws virus found entry after the operation was performed. They were not, therefore, cases of vaccination yaws, but of yaws infection subsequent to vaccination.

Dr. Tulloch's case is clear. From a healthy child vaccinated with imported calf lymph, 12 other children were vaccinated on the 8th October, 1888. All these 12 children passed safely through vaccinia, so that by the 25th day, that is on the 2nd November, the scabs must have fallen off, and the recovery from the vaccination would have been complete. In one of the children, however, a boil which subsequently developed into yaws appeared at one of the scars on the 18th December, that is, 70 days after the vaccination. Had the yaws been due to the vaccination, this would make the incubation stage about 10 weeks, a period that inoculation experiments, as I shall have to show, proves to be altogether too long.

Yaws was rife in the neighbourhood at the time, and even the patient's sister was

suffering from the disease. The danger, therefore, that the child V. D. ran from infection was great, and the circumstances of the case all tend to show that the yaws was contracted in the ordinary manner.

The case brought forward by Dr. Blanc of Tobago is one of peculiar interest. The child was attacked with yaws soon after being vaccinated, the disease proved of a stubborn and relapsing type, and the mother firmly believes that it was caused by vaccination. I visited the mother's hut with Dr. Blanc, and we saw the child and her mother, and made minute inquiries into all the circumstances, and the following notes were written at my request by Dr. Blanc. They give the history of the case in fuller detail than does his reply to the interrogation.

"Elvira McPherson, a legitimate child, a negro, born of parents in fair position. "Father is a carpenter and earns fairly good wages. Family live in a comfortable house.

"I vaccinated this child on 20th November, 1888, when she was four years of age. "I obtained the lymph from the arm of one Georgiana Benjamin, a well-nourished "healthy looking child (coloured), aged four years, who at the time did not seem to me "to have yaws.

"Elvira McPherson returned to me on the 27th November, when I found two well- "developed and good vaccine vesicles, from which I obtained lymph to vaccinate several "children.

"I was not then keeping any regular record of yaws cases, and so the subsequent "history of this case up to 19th November, 1889, depends on information obtained from "the child's mother.

"After I took lymph from the vesicles on 27th November, they became sore and "refused to heal up, and in two weeks afterwards when the child was brought to me "I found two well-developed yaws tubercles occupying the site of the vaccine vesicles.

"I put the child under treatment, and six weeks afterwards she was cured "(apparently) and discharged. During this time no other tubercles or eruptions "appeared on her.

"Her mother declares that Georgiana Benjamin had one yaws tubercle at the time "I used lymph from her, and other witnesses support this statement, but Georgiana's "mother denied it. This child, however, did to my knowledge develop yaws tubercles "subsequently, not in the site of the vesicles but in the body.

"Elvira McPherson continued in good health until September, 1889, when a yaws "tubercle appeared at the back of her heel. She was brought to me and put under "treatment on 19th November, 1889. She attended the consultation room regularly "until 29th January, 1890, when, seeing her heel nearly well, the mother discontinued "attendance. But she returned again on the 16th April, 1890, having still the same "tubercle on the heel. From this time she attended very irregularly, and my record "book shows long gaps of absence at various times up to the present, when she still "attends the consultation room.

"On the 7th May, 1890, the tubercle on heel had disappeared, leaving only the usual "discoloured mark on the skin.

"On the 23rd July, 1890, she returned for treatment, having then one tubercle on "second toe of left foot, and one on chin. These soon resolved and disappeared, and so "did the child, after an attendance on the 6th August, 1890.

"On the 5th November, 1890, she returned again, with one tubercle on the neck and "one on the front aspect of the elbow of right arm.

"She was again, after this, lost to sight, and reappeared on 4th March of this year, "showing the discoloured spots of tubercles on neck and arm, and one moist tubercle "between second and third toe of left foot. She is now [24th April, 1891] still under "treatment for this last tubercle.

"As seen to day the marks in the site of the vaccine vesicles—two in number—are "large, smooth, and glistening, and with a slight feeling of induration to the touch. "They are both on same level as surrounding skin and are each surrounded by a ring of "dark discolouration.

"The upper mark is egg-shaped, and measures $1\frac{3}{8}$ inches by $\frac{6}{8}$ inch.

"The lower mark is oval, and measures 1 inch by $\frac{11}{16}$ inch.

"The child is well nourished and shows no signs of syphilitic or other cachexia. "Her mother quite admits the possibility of the child having come in contact with 'yaws "'people' during the period immediately subsequent to my taking lymph from her "vaccine vesicles, when the said vesicles had become sore. She also declares that there "had never to her knowledge been any yaws in her family nor her husband's.

"It may be advisable also to state that Elvira's sister, vaccinated on the same day as "herself, and, I believe, from the same arm, did not contract yaws."

The particulars of this interesting case by no means show that yaws was caused by vaccination. Several children were vaccinated with lymph taken from a child—Georgiana, whom the mother declared to be healthy, and who, after an examination by Dr. Blanc, was found to be devoid of any appearance of skin eruption. When the vesicles of all the children matured nothing was found wrong, and several other children were vaccinated from a vesicle on the arm of one of them—Elvira. Two weeks afterwards, Elvira was found to have yaws "occupying the site of the vaccine vesicles." Subsequently Georgiana was found to have yaws, and according to the declaration of Elvira's mother and others, the yaws existed when Elvira and other children were vaccinated from her. But, against this is the evidence of Dr. Blanc himself, who examined the child, and of the child's mother who persistently denied the fact. Of the several children vaccinated from Georgiana only one, namely Elvira, was attacked afterwards with yaws; and of the several children vaccinated from Elvira *none* were attacked with the disease; and this is, perhaps, the most important evidence in the case. For, if Elvira was invaccinated with yaws from Georgiana, why did not Georgiana infect the other children vaccinated from her? And, again, if Elvira had vaccination yaws, why was the disease not transmitted by her lymph to the other children vaccinated from her? To my mind the case was not one of vaccination yaws, but of the infection of the system with the yaws virus subsequent to vaccination, and through one of the vaccination sores; and the mother even admitted to Dr. Blanc and myself the possibility of such infection, as there were many cases of yaws in the neighbourhood.

The seven medical officers in Grenada are emphatic on the question. Yaws has been very prevalent in the island, and yet in no instance has there been any evidence to show that the disease is propagated by vaccination. Dr. Hatton has vaccinated about 600 children, and he feels sure that none of them have contracted yaws within three months of the operation.

In St. Vincent, Dr. Newsam has seen yaws develop in the "sites of the pocks before "they had healed, owing to contagion from other members of the family who were at the "time" suffering from the disease. There is nothing strange in this. Indeed, it explains many of the so-called cases of vaccination yaws. Any lesion of the skin, whether due to disease or accident, may become inoculated with the yaws virus. Sores are often produced on the feet of persons bathing in the sea by the prick of a spine of a sea-urchin (*Echinus sp.*), and I have seen these sores become infected with yaws. There is really as much reason in such cases to declare the attack of yaws to be due to the sea-urchin, as there is to pronounce the infection of a vaccination sore to be caused by the vaccine lymph.

Whilst in St. Vincent, some correspondence that took place during the year 1889, concerning vaccination and yaws, was submitted to me by Captain Maling, the Administrator of the colony. Dr. Kirkpatrick, now a district medical officer in Dominica, was then in charge of a district in St. Vincent, and he stated in his report for the last quarter of the year 1888, that yaws was spreading rapidly, and that "vaccination under the "circumstances is rendered nugatory and valueless—even dangerous." Administrator Llewelyn called on him for a further report, which was sent in on the 11th February, 1889. The vaccination question was not even alluded to in it, but Dr. Kirkpatrick appended to his report copies of letters he had received from the town wardens of Layou and Barrouallie, in reply to communications he had addressed to them. The following extracts from these letters contain references to vaccination and yaws:—

Messrs. Ed. Phillips and R. D. S. Paynter, Town Wardens of Layou: "From "observation we are very much inclined to think that vaccination has had, and still has, "much to do with the spread of this loathsome disease."

Messrs. J. N. Mandeville and J. Deane, Town Wardens of Barrouallie: "We "believe vaccination is dangerous at the present where lymph has to be taken from one "patient to another."

I asked Captain Maling to communicate with these gentlemen, in order to ascertain from them the evidence on which they had based their statements that yaws is spread by vaccination, and the following replies were received:—

Ed. Phillips: "I beg to acknowledge your Honor's letter of 28th May last covering "extract of a letter signed by Mr. Paynter and myself, then town wardens, to Dr. Kirk-"patrick at the doctor's request.

"That statement was my own opinion given to Dr. Kirkpatrick from many years' "observation of the existence and progress of yaws in this town and vicinity, especially "amongst the infant population.

"I would respectfully suggest that the Government issue a Commission of inquiry "to persons who would be willing to investigate the existence and spread of this loath-"some disease."

J. S. Deane: "I was very doubtful when I wrote the letter to Dr. Kirkpatrick that "there was great risk in vaccination from the lymph of the children of the villages, and "perhaps accounted for the prevalence of yaws. I have, however, no direct evidence to "offer that vaccination was dangerous on account of yaws."

These replies show that the writers had simply formed an opinion on the matter, apparently from something said or written by Dr. Kirkpatrick, but that they were quite unable to bring forward any evidence on the subject, although yaws prevails very extensively in their districts.

In his reply to the interrogation Dr. Kirkpatrick says he has seen the disease propagated by vaccination "on more than one occasion" whilst he was medical officer in St. Vincent. But he does not give any history of the cases, nor any particulars to enable one to judge if there were any element of error in statement or fact. He mentions a case in which an infant that he vaccinated was "covered with yaws eight days after-"wards." This fact rather tends to disprove the idea that the vaccination was at fault, for I have never seen a case in which there was so rapid a development of a general eruption. It goes rather to show that the virus of the disease had found an entry into the system and that the incubation period was about to terminate at the time of the vaccination. The late Dr. Seaton pointed out that vaccination, like teething or other irritation, may hasten the evolution of a constitutional eruption.

I have had two similar cases to these in my own practice. During the year 1873–74 I vaccinated over 2,000 persons in the southern two-thirds of Dominica. There never had been any systematic vaccination in the island, which was not then mapped out into medical districts as it is now. As there was no compulsory law, the children had to be sought out in many instances in negro settlements in places remote from the chief town, and very difficult of access. In these circumstances arm to arm vaccination was out of the question, and the only way to accomplish the work was to use the vaccine bottle. I took every care possible. The lymph drawn by a capillary tube from perfect vesicles on children with no sign of disease was examined carefully with a powerful lens, and all cloudy tubes were rejected. The clear lymph was blown into the vaccine bottle, and it was afterwards mixed with an equal quantity of pure glycerine as a preservative, according to the plan recommended to me by the late Professor Harvey of the University of Aberdeen. Over 2,000 cases were vaccinated from lymph prepared in this way, and in only two cases did yaws appear at the sites of the vesicles, although the disease was prevalent then in every district of the island. These two cases belonged to one family at the windward side of the island. On the eighth day I found on examination that there were yaws tubercles occupying the places where I had inserted the vaccine lymph. A careful inquiry elicited the fact that the children before they were vaccinated were suspected to have caught yaws from other members of the family living in the house who were suffering from the disease, and that the circumstance was hidden from me because it was feared I would not vaccinate the children. In these cases then, which might easily have been mistaken for instances of vaccination yaws—if there be such a thing—the disease was already established in the system, and it simply impressed itself on the vaccinia, as it does sometimes on other diseases as I shall have occasion later on to show. The tubercles at the vaccination spots were well developed, and there was not sufficient time for them to have been the result of the invaccination of the disease, which must have been incubating at the time of the vaccination. Afterwards I met with a few cases in which the vaccination sores became infected with the yaws virus. The sores did not heal up and several weeks afterwards yaws tubercles appeared on them.

In St. Lucia, the experience of the medical staff is against the theory of the propagation of yaws by vaccination. And it is worthy of remark that Mr. Dennehy points out the possibility of vaccination sores becoming inoculated with the yaws virus.

The medical officers of Antigua and the Virgin Islands have never seen any case in which yaws was communicated by vaccine lymph, and the present medical staff of Montserrat also unhesitatingly state that they have never met with the disease as the result of vaccination. There is, however, the case mentioned by Dr. Mapleton of St. Kitts, as regards which, as I have already shown, no evidence whatever is advanced to establish even reasonable suspicion that yaws was due to vaccination

In January, 1821, the question was raised in Montserrat, by the late Mr. Burdett Johnson and by Dr. Pierez, as to whether vaccination should be carried on owing to the prevalence of yaws. Mr. Johnson, on the 21st of January, wrote to President Neale Porter as follows:—

"I respectfully submit that discretion should be exercised with regard to vacci-"nation in the neighbourhood of yaws; the sores produced by the operation, and

" unprotected by clothing (as they generally are amongst the peasantry) would be readily " inoculated with the yaws virus by flies, and in this way the loathsome and formidable " disease would be extended; it appears to me undesirable to vaccinate in those localities " affected with yaws."

And Dr. Pierez wrote as follows:—

" With reference to the vaccination of cases in my districts I beg to state that I had " intended commencing it immediately after the Christmas season, but that a question " suggested to me by the medical officer of District No. 1, has deterred me for a while, " viz.: – that it would not be advisable to vaccinate just now, lest the disease yaws be " spread through its agency. I consider the question a very important one, in the present " condition of the country."

It will be observed that the language of Dr. Pierez is indefinite; and so when I returned to Antigua I wrote to him on the subject, and the following extract from his reply shows that he took the same view of the matter as his colleague Mr. Johnson:

" With reference to my report to President Porter about vaccination and yaws, you " are quite right in saying it would be difficult to know my meaning. I meant that " there would have been risk lest the sores resulting from the vaccination should form " the entrance points for the yaws virus. I may add that my colleague, the late Mr. B. " Johnson of Montserrat, fully agreed with what I had said, and was on the point of " writing to the President in a similar strain, when I suddenly left for Antigua."

The question raised as to the propagation of the disease in Montserrat by vaccination, was submitted to me at the time by the Government, and I wrote the following letter on the subject:—

Dr. *Alford Nicholls* to President *Eldridge*.

Sir, Dominica, 3 March 1882.

I HAVE the honour to acknowledge the receipt of your letter conveying to me the Governor's request for my opinion in regard to the desirableness of vaccinating in the districts affected with yaws in the Presidency of Montserrat, and in reply thereto I have to make the following remarks.

2. From the copy of Dr. Johnson's letter to the President of Montserrat I conclude that the question of the propagation of yaws through the vaccine virus has not been raised, but it may be well for me to state that I do not believe it possible to transmit the disease by the simple inoculation of vaccine, if due care can be taken to exclude blood cells and other bodies foreign to the lymph.

3. But the inoculation is followed by a pustule which often becomes an open sore; and, if the " contagium " of yaws come in contact with this sore, in the majority of instances an attack of the loathsome disease will result.

4. In my Fourth Report on the Dominica Hospitals I have pointed out the fact that the yaws possesses the property of impressing its own character on other skin diseases and on any cutaneous wound, and I have frequently seen the broken vesicles of chicken-pox developing into yaws tubercles. Moreover, when vaccinating some years ago on the windward side of the island, I was surprised to find two of the pustules produced by the operation covered with yaws crusts after the lapse of eight days. And, within the last year, the following case has been brought under my notice.

A child was vaccinated in Roseau by one of the district medical officers, and the pustules, instead of drying up, became converted into sores, which remained without much change for many weeks. The child was then brought to me, and I found it to be suffering from unmistakable yaws.

5. The conclusion I have drawn from these and other facts that have come to my knowledge is, that a vaccinated person may contract yaws if the broken pustule come within the influence of the " virus " or " contagium " of that disease.

6. Dr. Johnson states, at the commencement of his letter, that discretion should be used with regard to vaccination in the vicinity of yaws; and, at the end of his letter, he expresses the opinion that it is desirable to stop all vaccination in the affected districts.

There can be no doubt as to the necessity of the exercise of the greatest care and discretion in vaccinating in districts affected with yaws, but I am unable to recommend to the Government the adoption of Dr. Johnson's advice in regard to the suspension of vaccination; for, in the event of small-pox finding an entry into Montserrat, the mortality that would doubtless be produced amongst the unvaccinated persons would be a greater evil than the affection of several children with yaws; a disease that is curable, and that is not nearly so destructible as small-pox.

7. All difficulty can be overcome, however, by the following simple precautions:—

Soon after vaccination, let a piece of lint saturated with carbolised oil (one part of pure carbolic acid to nineteen parts of olive oil) be laid over the seat of the operation, and let it be kept in proper position by a bandage extending from near the elbow to the shoulder joint. This application can be changed every three or four days, or oftener, if necessary, and the arms operated on should be kept dressed in this manner until the sores have healed up, and consequently all danger of the inoculation of yaws is passed.

8. It is necessary that the medical officers, managers of estates, &c., should impress upon the people the necessity of protecting the vaccination sores, and should this be found insufficient for the object in view, it might be advisable to pass an ordinance for inflicting some small penalty on all persons removing the bandage from a vaccinated arm.

I have, &c.
(signed) *H. A. Alford Nicholls,*
Superintendent, Yaws Hospitals.

His Honour, President Eldridge.

In Dominica it was in contemplation to make vaccination compulsory, and a Bill to that end was introduced by the Government into the Legislative Assembly in, I believe, the year 1874. The measure, however, was abandoned, owing to the strong opposition of the elective members, who considered that yaws might be spread by vaccination. In the year 1877 the re-introduction of the Bill was under the consideration of the Government, and the opinion of Dr. Imray was sought. In a letter addressed to the Colonial Secretary on the 30th November, 1877, Dr. Imray made the following important observations:—

"The condition of our people at the present time in regard to vaccination is most "unsatisfactory. Were that terrible disease, small-pox, unhappily to find its way into "the island and extend, I fear the results would be disastrous. It is true that a measure, "whereby vaccination was made compulsory, was not passed through the Legislature by "the Government in consequence of the prevalence of yaws in the country, but it did not "follow, on that account, that vaccination should be suspended throughout the island, "which, I believe, has very much been the case for some time past. I am decidedly of "opinion that the district medical officers should now be called upon by the Government "to spread this protection against small-pox as widely and as speedily as possible amongst "the labouring population."

A statement had appeared in the "Lancet," in the year 1876, on the authority of the late Mr. N. W. Keelan, of Dominica, that yaws could be stamped out by vaccination. Mr. Keelan held, as far as I recollect, that vaccinated persons were protected from yaws as they were from small-pox, and that by vaccinating every person yaws could be eradicated from the island. Mr. O'Carroll, of St. Vincent, evidently holds the same belief, for he states, in his reply to the 12th Interrogation, as follows: "I have known some cases "which resisted all treatment, but as soon as I vaccinated them they got well almost "immediately."

When the yaws hospitals in Dominica were placed under my superintendence, I made some inquiries into this matter, and found that vaccination apparently had no influence whatever on yaws. This will be seen from the following statistics of the hospitals, every case of admission having been examined for vaccination scars from the time of my appointment to October, 1878, a period of about 18 months:—

Hospitals.	Number of Patients Examined.	Number of Patients Vaccinated.	Number of Patients Unvaccinated.	Percentage of Vaccinated Persons with Yaws.
Morne Bruce - - - -	85	35	50	41·2
Prince Rupert's - - -	236	85	151	36·0
Central - - - - -	500	194	306	38·8
Totals - - -	821	314	507	38·2

At first sight these figures would seem to show that there was some immunity from yaws in vaccinated persons, for of 821 patients admitted to the hospital only 314, or 38·2 per cent., had been vaccinated. But it must be remembered that there is no compulsory

vaccination in Dominica; and that, after I had made a vaccination tour in 1874, there had been scarcely any attempt to afford the people this protection against small-pox. I was satisfied, therefore, that the figures simply showed the extent to which vaccination had been carried out, and that they in no way indicated that vaccinated persons were less liable to yaws. Compulsory vaccination in other islands has not been followed by a decrease in the prevalence of the disease, and it may, therefore, be inferred that the late Mr. Keelan made his assertions on insufficient information. It may be remarked in connection with this matter that, as long ago as 1820, Thomson wrote as follows: "I have "repeatedly ordered yawey children to be vaccinated in every state of the disease, and "they went through the different stages in the usual time. The sores did not appear to "differ in any respect with regard to their time of healing." In 1831 Mason, too, found by experience that "the vaccine disease has no apparent influence on the yaws." And in 1886 Dr. Van Harlingen asserted that "Frambæsia does not seem to interfere with the "occurrence of, or modify, other diseases, such as the acute febrile diseases, syphilis, "vaccinia, &c." *

In his reply to the interrogation, Mr. Numa Rat speaks of "the primary, local, "fungating, non-encrusted growth" appearing "in unhealed vaccine pustules," and he says:—"These were truly instances of contagion as a result of vaccination." Besides which, in his Essay on Yaws, already referred to, he makes the following observations on the subject:—

"Vaccination is another means by which the virus may be transmitted. When "syphilis is thus contracted the contagion is supposed to have been conveyed in the "blood, accidentally mixed with the vaccine lymph. But the blood in yaws has not "been proved to be infectious. Cases frequently occur in which after vaccination yaws "tubercles develop around the sites of the vaccine pustules. It is doubtful whether the "yaws virus in such instances was introduced with the lymph, or was subsequently con-"tracted through the sores caused by the operation. In some cases of this kind there is "no history of exposure to yaws infection after vaccination, and this would lead one to "suppose that the disease had been conveyed with the lymph; but it is always difficult "to prove the entire absence of all sources of contagion, and especially so in the usually "overcrowded houses of the poor. With vaccination as a means of communicating the "disease, it is evident that yaws might soon become epidemic in a community in "which it is endemic, unless precautions were taken either to isolate the vaccinated "entirely or to protect the wounded part against subsequent contagion. These measures "would, of course, not be effective if the yaws virus is transmissible in the vaccine "lymph."

In this paragraph, as well as in his reply to the interrogation, there is no positive evidence that yaws has been conveyed purely and simply by vaccination. Indeed, Mr. Numa Rat states that in some of the cases, notwithstanding the fact that the vaccine lymph came from England, yaws appeared on the unhealed sores. Now, as yaws is unknown in England, the English lymph could not have been contaminated by yaws virus, and it is clear that the appearance of the granulomata at the site of vaccination was due either to an infection of the system beforehand, or to the entry of the virus afterwards, through the vaccination sore. Invaccination of yaws is entirely out of the question in these cases.

Mr. Numa Rat very properly insists on the precautions that should be taken before one can say that yaws has been propagated by vaccination, and he makes the important statement that he has "never met with any case in which all these conditions were ful-"filled." It is evident from the way he has written that he believes in the possibility of infection by vaccination, but a belief in such a case, no matter by whom held, cannot stand in the place of scientifically accurate evidence. And no such evidence has been brought forward during this inquiry to establish the fact that yaws can be conveyed from one person to another by vaccination.

During the last 20 years medical men have been busily vaccinating in all the islands, and so the operation must have been performed many thousands of times. If vaccination had had any influence on the spread of the disease, the fact would have been made out satisfactorily before now; at all events, the replies to the interrogation would have contained some unequivocal instances of the invaccination of yaws. If there be any such danger it is evidently so infinitesimal that it may be disregarded, considering the protection vaccination affords against small-pox, which, in its natural state, has been described truly as "one of the most loathsome and terrible of human diseases."†

* Article on *Frambæsia*. By Arthur Van Harlingen, M.D. In *A Reference Handbook of the Medical Sciences*. New York. 1886.

† *The Truth about Vaccination*. By Ernest Hart. London. 1880.

8.

Does your experience teach you that the disease prevails amongst the people more at one time than another? If so, state facts in illustration of any opinion your experience may have led you to form.

Thirty-nine medical officers replied to this interrogation, but two of them state that they have not had sufficient experience to give a definite answer, and one explains that he has directed no attention to the matter. Of the remaining 36 medical officers, no less than 27 say that they have not noticed the disease to prevail more at one time than another.

Three medical officers have observed that the prevalence does vary considerably, but they are unable to offer any definite explanation of the circumstance.

Dr. Latour, of Grenada, merely states the fact of this unequal prevalence. Mr. Boyd, of the same island, whilst suggesting that atmospheric changes may influence the spread of the disease, inclines to the belief that the occasional increase in the number of admissions to the yaws hospital is due rather to the spasmodic efforts of the police in carrying out the provisions of the compulsory law. And Mr. Williams, of Dominica, merely asserts that most maladies have a rise and fall.

Mr. C. R. Edwards, of Nevis, has found the disease commoner during periods of droughts, and accounts for the fact by the scarcity of water, which tends to increase destitution, and to give rise to personal uncleanliness—all important factors in the spread of contagious and other diseases.

Dr. Huggins, of Nevis, believe that yaws prevails more in seasons of scarcity. And the remaining four medical officers find that the disease is commoner at the time of, or immediately after, the rainy season,—that is during the last months of the year.

Of the four medical officers who have observed this fact, two only, namely, Mr. Numa Rat and Dr. Kirkpatrick, of Dominica, bring forward any theory in explanation of the circumstances. Dr. Kirkpatrick assumes that the ingestion of unripe fruits and vegetables, and the use of impure water, together with insanitary conditions, are all causes that bring about an increased prevalence of the disease during the autumn and winter months.

Mr. Numa Rat alone appears to me to have offered any satisfactory explanation of the undoubted fact that in certain instances yaws is more prevalent during, and immediately after, the rainy season than at other times. He, like other medical men conversant with the light thrown by bacteriology on the causation and spread of certain diseases, concludes that the manifestations of yaws indicate a microbic origin, possibly a bacillus; and, reasoning by analogy, he assumes that the development of the micro-organism would be aided by temperature and moisture. He also alludes to the fact that a disease of fowls, called "yaws"—which he thinks is identical with yaws in man—is most prevalent after the rainy season. The identity of these diseases is, however, not established. Yaws in fowls is an inflammatory eruption due, probably, to the presence of the chigœ insect (*Pulex penetrans*); and epidemic fowls yaws occurs in places and in islands where no cases of framboesia are to be found.

My own experience gained in directing the yaws affairs in Dominica taught me that the disease was more prevalent at one time than another, and that the increase in the number of cases was greatest after the heavy rains, when the ground was saturated with water, and when the moisture in the atmosphere was so great as to favour the growth of mildew on unused boots and shoes, and other things in the driest room of a house.

My attention was first directed to the matter in July, 1879. At that time the Lasoye district of the island, in which yaws had prevailed very extensively, had been cleared of the cases of the disease; and, for a lengthened period, except for the appearance of an occasional case at intervals, the people had enjoyed a remarkable freedom from yaws. To my surprise, therefore, Mr. Leslie, the energetic special constable, reported to me on the 28th July, that "during the latter part of the present month the yaws had all on a "sudden sprang up from almost every corner of Lasoye." Now there had been very dry weather in May, the rainfall taken in Roseau registering only 1·80 inches. The rainy season began in June, and the fall of rain was very heavy indeed, 17·94 inches being registered in June, and 9·87 inches in July, so that when the increased prevalence of yaws occurred the earth was saturated with water, and the atmosphere was very heavily laden with moisture. Afterwards similar outbreaks of the disease occurred in the island, and I noticed that they invariably took place some time after prolonged rainy weather.

It has been shown in the section of this report dealing with the history of yaws in Dominica, that after the closing of the Central Hospital, no efforts were made to scour

the country for cases of the disease, for the yaws constables had been dismissed, and the hospital accommodation was limited. It resulted, therefore, that most of the patients at the Morne Bruce Hospital entered of their own accord, or were brought in by their friends, and thus the number of admissions may be taken to represent approximately the prevalence of yaws in the island.

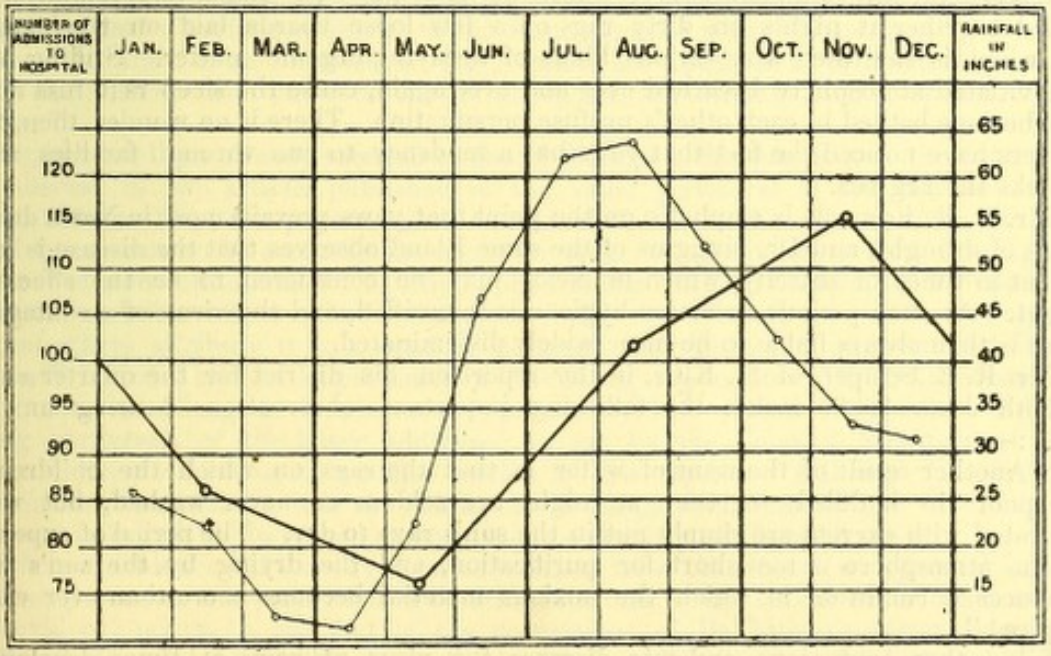
During the five years from the 1st July, 1882, to the 30th June, 1887, the number of patients admitted to the hospital was 381; and a careful examination of the case book, shows that, of this number, 87 were admitted from January to March, 76 from April to June, 102 from July to September, and 116 from October to December.

The rainfall recorded in Roseau for each month during the six years 1882–87 is seen in the following table:—

Months.	1882.	1883.	1884.	1885.	1886.	1887.	Totals.
January - - -	4·42	4·85	4·93	5·77	2·03	5·14	27·14
February - - -	3·05	6·94	4·50	1·11	2·52	5·00	23·12
March - - -	3·99	1.61	2·76	2·41	1·90	0·66	13·33
April - - - -	0·75	4·48	0·15	2·20	3·69	1·35	12·62
May - - - -	3·12	5·27	4·71	0·48	5·28	4·50	23·36
June - - - -	10·00	9·56	7·03	2·38	9·07	9·27	47·31
July - - - -	10·79	11·66	6·48	7·40	14·20	11·73	62·26
August - - -	6·12	12·18	7·95	7·79	17·90	11·44	63·38
September - - -	8·10	13·13	6·97	6·15	9·49	9·84	53·68
October - - -	4.44	10·48	4 75	8·37	8·32	6·27	42·63
November - - -	2·98	7·89	8·21	2·82	9·46	2·55	33·91
December - - -	5·66	10·83	3·72	4·66	3·78	3·55	32·20
Totals - - -	63·42	98·88	62·16	51·54	87·64	71·3 0	434·94

It is thus seen that the correspondence between a high rainfall and an increased prevalence of yaws, found to be the case in regard to the outbreak of the disease at Lasoye, in 1879, also existed in regard to the inquiry spread over a period of five years.

Diagram showing the Correspondence between the Rainfall and the prevalence of Yaws in Dominica.



Explanation of the Diagram.

The thick line indicates the variation in the number of admissions to the yaws hospital during the four quarters of the year. The figures show the sum of the admissions for each quarter of the year for five years, beginning with July, 1882, and ending with June, 1887.

The thin line indicates the variation in the rainfall. The figures show the sum of the monthly rainfall for the six years, 1882–87.

Dry weather would appear to insure, after an interval, a diminution of the number of fresh cases of the disease, and a prolonged and heavy fall of rain is followed, also after a time, by a greatly increased number of affected persons.

This remarkable correspondence of the wave of admissions into the hospital with that of the rainfall curve is graphically shown in the diagram on page 239.

No positively accurate information concerning the prevalence of yaws can be obtained without compulsory registration of the disease; and, in most instances, hospital statistics are liable to be misleading, on account of the increase in the number of admissions being caused by spasmodic efforts on the part of those charged with the carrying out of the provisions of the Yaws Acts in force in the various islands. This element of error was minimised in the case of the Dominica Hospital during the period under consideration, and the indication by the number of patients then admitted that yaws prevails most after heavy rains, agrees with the observations of Mr. W. H. Edwards and Dr. Pierez, in Antigua, and of Mr. Numa Rat and Dr. Kirkpatrick, in Dominica.

Yaws is, undoubtedly, a disease of microbic origin, the virus being, in all probability, as will be shown later on in this report, a micrococcus that has been found by Mr. Watts and myself to be present in the crusts and secretions of the eruption of the disease. The crusts fall off naturally when the granulomata are absorbed, or they are accidentally detached at other times, and the secretions are often permitted to drop about the floors of the huts by the people, who pay little heed to such matters. The crusts, &c., then become desiccated and pulverised, mingling with the dust and dirt which are always present in the negroes' hovels.

In this condition micro-organisms would lie dormant for a considerable time, but when the atmosphere is saturated with moisture, they, like other and higher forms of vegetable life, display activity, and if they come in contact with a wound, a sore, or an abrasion of the skin, they are likely to infect the individual, and thus produce an attack of the disease.

During fine weather the people of the West Indies practically live in the open air, and there is not, therefore, nearly so much chance of infection as during the rainy season, when the children and the sickly, who are most commonly attacked with yaws, keep within doors, and thus are for a longer time exposed to the contagion of the disease in those huts in which there has been a previous case. The condition of life under which the people live has been already fully explained. And probably in no other place is there so much chance for the propagation of disease due to micro-organisms as in the closely-shut hut of a poor negro, where he and his wife and several children are huddled together at nights on dirty rags on a few loose boards laid on the earthen floor, which is saturated with various kinds of decaying organic matter. Stifling heat, and a vitiated atmosphere breathed over and over again, cause the sleepers to toss about and to become bathed in each other's profuse perspiration. There is no wonder, then, that observers have noticed the fact that yaws has a tendency to run through families, when it attacks the negroes.

Mr. C. R. Edwards is emphatic on the point that yaws prevails most in Nevis during seasons of drought, and Dr. Huggins of the same island observes that the disease is most frequent in times of scarcity, which in Nevis may be considered to be the effects of drought. At such periods defective hygiene is intensified, and the virus of a contagious disease is then always liable to be more widely disseminated.

Mr. R. E. Semper, of St. Kitts, in the report on his district for the quarter ended the 30th June 1882, makes the following important observations bearing on this matter:—

"Another result of the want of water is, that the rags on which the children of "the poor lie huddled together at night are seldom or never washed, but when "saturated with excreta are simply put in the sun's rays to dry. The period of exposure "to the atmosphere is too short for purification, and the drying by the sun's heat "produces a condition in which the noxious material becomes more than ever easily "respired."

Like other contagious endemic diseases, the virus of yaws at times develops a character of such virulency as to occasion so wide-spread a prevalence of the malady that it may be said to constitute an epidemic. This tendency was noticed on the West Coast of Africa by the late Surgeon Major Horton who alluded to the matter in the following words:—"Yaws is a contagious disease; it is sometimes epidemically current "in places where it is endemic, affecting whole families." And Mr. Numa Rat in his essay thus alludes to the Dominica epidemic:—"It (yaws) sometimes assumes propor- "tions as an epidemic, which cannot be disregarded. In consequence of the severity of "an epidemic of yaws in Dominica, in 1871, the government of that island established

"two yaws hospitals to segregate those already affected, and thus protect the rest of the "community.

The outbreak of the disease in Grenada after I left the island, and when the medical officers imagined that yaws was nearly eradicated from the country districts, may be regarded as what the older physicians called the taking on by the malady of an epidemic constitution. Cases were, undoubtedly, hidden away in various districts of the island; and, in the absence of compulsory notification, they could not all be known to the authorities, but this would not account for the sudden finding out of numerous infected places. Indeed, the circumstance can only be explained by the rules known to govern epidemic diseases. This property of yaws to break out in an epidemic form renders it all the more necessary for the local authorities to grapple with the disease whilst it exists in its ordinary endemic condition; and it also proves the unwisdom of relaxing the efforts taken to control its spread, even when it appears to have been brought under complete subjection.

9.

Give the Histories of any cases in which you have traced the disease to contagion, and mention, if possible, the incubation period.

Thirty-six medical officers sent in replies to this interrogation; five of them, however, were unable to afford any information whatever. Mr. Proctor, of St. Lucia, is the only medical officer who appears to question the fact that yaws is propagated by contagion, the remaining 30 replies indicating that the writers are satisfied in their own minds of the contagious properties manifested by the disease.

The question as to the non-contagiousness of yaws was advanced by Milroy in his report, in 1873; and, in his paper published in the "Medical Times and Gazette," of the 11th October, 1879, he thus alludes to the matter: "Although yaws appears to be, "under certain conditions, contagious or communicable to healthy persons by contact "with the diseased, it has always seemed to me very problematical whether contagion is "the chief or sole cause, as is frequently held in the West Indies, of the extension and "propagation of the malady among a community; at best the idea must still be regarded "as only an unverified hypothesis. A like belief in respect of leprosy, formerly so very "generally accepted, has been shown to be erroneous; and to this may be added the "'oriental sores' of various countries in the East, together with the 'parangi' disease of "Ceylon, and the 'coko' disease of Figi, which are considered to be analogous or "allied maladies to the yaws of the West Indies, and are admitted to arise at times "*de novo*."

The fact has been already referred to that I discussed the question of the contagion of the disease in two articles published in the same periodical of the 3rd and 10th January, 1880, and in these papers I gave extracts from the works of 18 authors who had declared the disease to be a contagious one. In order to obtain more facts bearing on the subject of non-contagion, Dr. Milroy applied to the Surgeon General of Trinidad for information, and this officer stated "that some believe the disease spreads by contagion, "but that others attribute it to a want of personal cleanliness and impoverished diet." Whilst in Trinidad I had an opportunity of discussing the matter with Dr. Leonard S. Crane, C.M.G., the Surgeon General; and, practically, his opinion is expressed in the following paragraph of the letter addressed to me by the Colonial Secretary of the colony, and given *in extenso* in another section of this report: "Although the disease "is inoculable, like syphilis, it is not contagious in the general sense of the word, and it "is in no way calculated to spread among people observing habits of cleanliness."

Sufficient evidence has already been adduced to show that the view expressed in the concluding portion of this paragraph is an erroneous one. But, on the other hand, some of the evidence points to the fact of the correctness of Dr. Milroy's observation that "the disease does not uniformly, or on all occasions, exhibit any very marked or decided "contagious properties."

In Trinidad, and elsewhere, cases of yaws have been admitted to general hospitals, leper asylums, and other institutions; and, although in a few instances the disease has spread by contagion, a general infection of the inmates has only once been recorded, namely, the case cited by Lemprière, where all the soldiers in an ulcer ward of a military hospital were attacked with yaws.

Dr. Bowerbank, in a paper published in the "Medical Times and Gazette" of the 3rd April, 1880, said, "I believe that yaws is due solely to contagion;" and later on he

observes that, "For years past, in the absence of any proper provision for the reception "of yaws patients, sheer necessity has taught the people of Jamaica that a few cases of "the disease may be treated in the same ward or room with other patients suffering "from other diseases without the disease extending itself; but in these cases great "vigilance is requisite on the part of those in charge."

It should be observed, however, that Dr. Bowerbank strongly condemned the treatment of yaws patients in general hospitals. He said, in the same article, "From all "I know and have seen of yaws, I certainly do not think any Government is justified in "running the risk they certainly do, in placing yaws patients in any of the public "institutions to mingle and communicate with the other inmates."

Most medical men who have had experience of the disease in countries where yaws is endemic are aware of cases in which certain members of a household have been infected whilst others have escaped, although all the inmates of the house have been equally brought within the focus of the contagion. This fact can only be explained by a peculiar idiosyncrasy affording immunity to some persons. Horton observed the existence of such immunity in Africa. He said, "Some constitutions are proof against "the disease, viz., those of sanguine temperament, who live principally on animal diet "and are very clean in their habits." This explanation, however, will not account for immunity in most instances, for there are very few persons belonging to the labouring class in the West Indies who live principally on animal food, and the evidence of the medical officers shows that cleanliness is the exception rather than the rule. It cannot be said, too, that all the other patients in a hospital ward in which a case of yaws has been admitted are the possessors of constitutions proof against the *contagium* of the disease; and this proposition is proved by the related facts concerning some of those instances in which the malady has been extended. As, for example, in the case recorded by Bowerbank in which a yawsy negro at the old Parochial Asylum of Kingston, Jamaica, wilfully gave a rag soaked in his yaws secretion to a Chinaman to dress his ulcers with, and the Chinaman became in consequence rapidly infected by the contagion of the disease.

This instance and other facts on record tend to show that yaws is ordinarily propagated by the inoculation of a broken surface, and that the mere contact of the virus with the sound skin is insufficient to produce the disease. That this is so is, I believe, proved by the fact that the nurses and other attendants in yaws hospitals are rarely affected, and that there is no instance of a medical man having caught the disease. In the pursuit of my professional duties I have often soiled my hands with yaws secretions, and I have always felt that an immediate and a thorough washing with carbolic soap and water would remove any chance of infection. Two instances, however, have occurred in Dominica in which hospital nurses have been inoculated through a slight sore, and Dr. Mapleton, of St. Kitts, in his reply to this interrogation, relates the case of the infection of one of the Montserrat yaws attendants, together with his wife and family.

Adams, in 1817; Dancer, in 1819; Thomson, in 1820; and Levacher, in 1840, expressed opinions that an abrasion was not necessary for the entry of the virus. Indeed, Thomson says, "I am inclined greatly to the opinion of Dr. Adams that, when "the air is highly impregnated with the diseased miasmata, actual contact is not "required. On many estates I have known it spread in a singularly rapid manner, and "attack negroes who, from their dread of it, had avoided every possible medium of "communication."

Dr. Lestrade, of St. Lucia, in his reply to the interrogation, expresses the opinion that yaws is infectious; and Mr. Dennehy, the Colonial Surgeon of the same colony, although he says nothing of the matter in his reply, on the 12th April, 1879, addressed a minute to Administrator Llewelyn, in which he asserted that the disease was "con-"tagious and infectious."

Assuming the disease to be due to a micro-organism, the inhalation of the microbe with the dust from the floor and walls of the negroes' huts would account for the spread of the disease in certain cases in which the origin cannot otherwise be satisfactorily explained. And, as I shall have occasion to show later on, I have found the micrococcus that I believe to be the microbe of the disease to be abundant in the lungs of a person that died in the yaws hospital at Dominica. It is possible that the microbe finds an entry into the system in other ways than through a break in the skin. It may be inhaled, or it may be ingested with solid or fluid nourishment. But, if the disease be capable of propagation in this manner, the instances must be very few indeed, for otherwise the medical officers, nurses, and attendants at yaws hospitals would not enjoy their present immunity from infection.

The examples showing the operation of contagion by contact are so numerous that this method of propagation must be taken as established beyond doubt. And it is also clear that the disease at times manifests such contagious properties that it spreads rapidly, and affects all those who are brought into intimate relation with infected persons. This is seen in those cases where, when one member of a family is attacked, all the other inmates of the house become subject to the disease. Thus Canon Branch, of St. Vincent, finds by experience that "as one child is attacked it goes through the family;" and other evidence of a similar nature has already been noticed in this report. The following case, transcribed from my Dominica case books, is a perfect illustration of the truth of such statements:—

"A man, J. F., and his wife, Mrs. F., lived at Lasoye, at the north-east end of the "island, with their three children, viz., N., 18 months old, M., four years old, and J., "five years old. At Colihaut, on the western side of the island, lived the woman's father, "F. A., and J. C., her child by a former marriage, aged 14 years.

"The youngest child, N., caught yaws, and a month afterwards the mother, Mrs. "F., became affected. In order to prevent them being conveyed to the hospital, the "woman's husband sent them to her father, F. A., at Colihaut. But soon after his wife "and child had left one of the remaining two children, J., developed the disease, then "J. F. himself became affected, and finally the last child got yaws.

"Soon after Mrs. F. and her youngest child, N., reached Colihaut yaws broke out "on J. C. The infected houses were then discovered by the yaws constables, and the "man and his wife and the four children were sent to the hospital, and later on the old "man, F. A., was brought in, he also having become a sufferer from the disease."

Only ten of the thirty-six medical officers who have replied to the interrogation give any information as to the incubation period, and the conclusions arrived at by them show a wide discrepancy. The older writers on the disease calculated that the period was from seven to twelve weeks. Recent authors, however, have expressed the opinion that this period has been over-estimated. Thus, Horton states that it is from three weeks to two months; and Imray relates a case in which it appeared to have been three weeks.

It is to be inferred from the replies to the interrogation that the length of time during which the disease incubates may be from a few days to six months. The information on the subject given in the replies may be tabulated as follows:—

A few days to as many weeks	Dr. Kirkpatrick.
14 days	Mr. Purser and Mr. Boyd.
2 to 4 weeks	Mr. Galgey.
Less than 4 weeks	Dr. Mapleton.
3 to 10 weeks	Mr. Numa Rat.
4 to 8 weeks	Mr. Foreman.
4 to 12 weeks	Mr. W. H. Edwards.
4 to 26 weeks	Mr. Durrant.
7 to 8 weeks	Dr. Tulloch.

In some of the replies, however, particulars of cases are not given to enable one to judge as to the correctness or otherwise of the conclusions arrived at by the writers; and in none of the cases cited does it appear to me that all the elements of error have been eliminated. In every instance it has been assumed that the patient was infected as soon as he or she came within the focus of the contagion. Now experience teaches that persons affected with yaws may, in most instances, be associated with healthy individuals who will not contract the disease unless they have some break in the skin whereby inoculation can take place. And, again, the inoculation may not be direct, but by means of microbes that have lain dormant in dust or some other vehicle, by which they may be carried to a wound or abrasion, there to be revivified and to affect the system. This was probably the way in which the case of James Cox, alluded to by Mr. Durrant, occurred, for an incubation period of six months, as suggested by him, is, according to my experience, entirely out of the question.

The case of W. S., related by Mr. Numa Rat, is a clear one of infection within three weeks of the time when that was possible. Mr. Rat very properly states, however, that the determination of the incubation period by clinical observation is so liable to error, that dependence should be placed on the teaching of inoculation experiments.

I have been unable to find in the literature of the disease any satisfactory accounts of inoculations performed with a view of increasing the knowledge of the malady. It is recorded that during the days of slavery it was the practice of many of the negroes to inoculate their children, in order to give immunity from the disease in after life, it being then considered that one attack of yaws protected the person from infection ever afterwards.

Some of the older writers also state that in many instances the slaves inoculated themselves to escape labour for a lengthened period. But, at that time, medical men were not given much chance of studying the disease, and there is no satisfactory record of the train of symptoms immediately following these inoculations.

In 1879, and 1880, I was afforded an opportunity at the Central Hospital of performing some inoculation experiments with the yaws virus; and the notes on the cases, which have never been published, throw so much light on some of the questions concerning the disease that they may with advantage be embodied in this report.

In order to prevent any misapprehension, it may be as well to state that in every instance the full consent of the patients, and in the case of children, of the legal guardians, was first obtained; and, so far from there being any reluctance to undergo the operation, I was rather embarrassed by the number of persons that volunteered. The following are the histories of the cases:—

Case I.—M. P., aged one year, negro, healthy. Admitted into the hospital with his mother, who had yaws, and who begged me to "give" the disease to her child.

16 December, 1879.—The child was inoculated on the left arm with secretion obtained from the summit of a yaws tubercle immediately after the removal of the crust. In this case, as well as in the succeeding cases, the epidermis was scratched away without drawing blood, and the virus was rubbed into the abraded surface. In fact, the same plan was adopted as is usually employed in vaccinations.

24 December.—The place of inoculation is quite healed, and it is indistinguishable from the surrounding skin.

29 December.—No sign of disease.

29 January, 1880.—The child was brought to me to-day with a small encrusted tubercle at the site of the inoculation. Unfortunately, he was not examined after the 29th December, as it was thought the inoculation had failed. Thus there was no exact record of the day on which the tubercle first showed signs of growth; but from careful inquiry I was able to discover that a "pimple" began to appear on the 30th December, which fixed the incubation period at exactly 14 days.

5 March.—The tubercle has disappeared by absorption, leaving a dark macule. There are "dartres" about the body and limbs.

4 April.—Discharged cured with mother.

Case II.—A. B., aged 42 years, negress. Inoculated on left arm on the 16th December, 1879. Inoculation failed.

8 February, 1880.—Inoculated again.

18 ,, ,, A small yaws tubercle appearing at the site of the inoculation.

17 March.—The tubercle has been absorbed; and, as there was no further sign of eruption, she was discharged.

Case III.—A. V., aged 30 years, negress. Admitted 1st May, 1880, to take care of one of her children affected with yaws.

Four years and four months ago she was attacked with yaws. She was treated for a year and the disease disappeared. The treatment was as follows: her husband bought "pills pian" frequently at a druggist's shop in Roseau; she took these pills and they salivated her. After undergoing this treatment for a year the yaws disappeared, and she remained for another year in very delicate health, the result, doubtless, of excessive mercurialism. Then the eruption "came out" again, and she underwent the "grand "traitment" with the "gros tisane." She was again freely salivated. She says she spat "a lot every day." After submitting to this treatment for "three times forty days" she was cured, and she has remained so for a year.

3 May, 1880.—She was inoculated on the left arm from a tubercle on knee of Case No. 1035.

9 May.—Point of inoculation slightly elevated, and the epidermis is splitting away from it in lines radiating from the centre, as is often the case in the "dartres" and "gratelles" of yaws.

17 May.—No change in inoculated spot; fever came on this morning, and she complains of severe headache.

19 May.—She still has fever; diarrhœa.

21 ,, Fever, which has been continuous since the 17th, has left her to-day. The elevation of the inoculated spot, which persisted for some time, has disappeared. The skin is smooth at the place, but there is a light-coloured macula, as is often left by yaws tubercles.

Case IV.—R. V., aged 10 years, negro; son of preceding case; healthy. Admitted 1st May, 1880. The mother says the child was attacked with yaws at the same time as she, and that he underwent similar treatment.

3 May, 1880.—Inoculated [from tubercle on knee of Case 1035].

15 ,, Inoculated spot has healed up, and is indistinguishable from the surrounding skin. The boy has fever, and complains of headache.

17 May.—Headache gone, but he still has fever; refuses his food.

19 ,, Two small tubercles have appeared near inoculated spot, and a tubercle has developed below the left knee. The fever has gone.

Case V.—A. D., aged five years, negro. Admitted into the hospital on the 9th October, 1880, with an ulcer over the left internal malleolus. There is no cutaneous eruption, but his friends state that the ulcer was caused by a yaws tubercle.

24 October.—Inoculated on the left arm.

24 November.—There has been no sign of yaws since the inoculation, the abrasion of which healed up perfectly, as would an ordinary scratch.

4 December.—Child feverish, and looks ill. "Dartres" have appeared on body and limbs.

3 January, 1881.—A general eruption of small encrusted tubercles. The ulcer has much granulation tissue, which may be specific or simply the result of inflammation.

28 February.—Discharged cured.

Case VI.—L. B., aged eight years, negro. Admitted on the 13th October, 1880, with "gratelles" over both legs, buttocks, and elbows. The gratelles under a lens are seen to be simply very small encrusted tubercles. He has been in his present condition for six months.

24 October.—Inoculated on left arm from the crust covering the tubercle of another patient.

24 November.—A small flat tubercle has developed at the inoculated spot.

24 February, 1881.—No fresh tubercles appeared. Patient discharged cured.

Case VII.—A. B., aged 13 years, negro. Admitted on the 31st March, 1879, with "dartres, and onychial ulceration of right great toe." He was discharged from the hospital as cured on the 17th July; that is, after a stay of three and a half months.

20 October, 1880.—Re-admitted with an ulcer on the left leg, which he has had since the beginning of September. From the time of his discharge until then he had been otherwise perfectly well.

24 October.—Inoculated on left arm from a yaws crust.

24 November.—Inoculated spot healed at once, as would an ordinary scratch, and the site is indistinguishable from the surrounding skin.

4 December.—Slight fever.

20 ,, Yaws crusts have appeared on ulcer.

17 January, 1881.—An eruption of "dartres."

23 February.—Discharged cured. A dark macule has appeared at the site of inoculation.

Case VIII.—O. P., aged 13, negress. Admitted into the hospital on the 8th November 1880, with an ulcer in front of the left ankle joint, said to have resulted from an attack of yaws, but there is no cutaneous eruption.

12 November.—Inoculated on left arm.

14 December.—Induration and slight swelling at inoculated spot, but the surface of the skin, which has healed, is unbroken.

21 December.—A small tubercle has appeared at the inoculated spot. The exuberant granulations that have formed on the ulcer are covered with yaws crusts.

10 January, 1881.—In the same condition.

21 ,, ,, The tubercle is decreasing in size.

31 ,, ,, The tubercle has nearly disappeared by absorption. The ulcer is healing rapidly. The skin is furfuraceous.

12 February.—A tubercle has appeared on knee.

2 March.—Discharged cured.

Inoculations were performed nine times in these eight cases, and the operation failed only once, namely, in the first inoculation in Case II. It is to be regretted that the notes are not fuller; but the investigation was carried on at a time when I was very hard-worked, and as the hospital was situated at some distance from Roseau, where I resided and had other official duties to perform, I could visit the institution only at intervals of

several days, and then the volume of work was so great that there was little time to devote to scientific investigation of the disease. In my absence there was no one present on whose observations I could rely in such a matter, and thus a proper record of the temperatures, so as to determine the reactionary period, could not be taken. But, notwithstanding all these drawbacks, the information gained is valuable and interesting. A consideration of the cases shows the following facts :—

Firstly.—That there was an entire absence of what has been described as the "local "initial lesion," or "the primary stage of the disease," which Mr. Numa Rat states to be "as characteristic of the affection as the chancre is of syphilis." Dr. James Christie, in his article on Yaws, published in Dr. McCall Anderson's work in 1887, states as follows :—

"Yaws may be propagated by inoculation; . . . . . when so induced the "wound inflames, and is thereafter covered with a brownish scab, beneath which there is "a small sore, depressed in its centre, with raised and inverted edges giving out ichor. "The primary ulcer becomes unhealthy and fungates, and the general eruption appears "after an interval of from seven to 15 days."

And Mr. Numa Rat, in his essay published in 1891, says, "When fully developed, "the initial cutaneous lesion of yaws consists of a papule which, at the end of about "seven days, developes a pale yellow fluid at its apical third. After about seven days "more, the fluid dries, and, on the removal of the scab thus formed, an ulcer is revealed, "with perpendicular edges, and a clean base lined with granulation tissue."

Now, in none of the inoculated cases was there any sore or ulcer; and in only one, namely, Case III., does there appear to have been any local irritation soon after the operation. In two cases, namely, IV. and V., the slight inoculation wounds healed up at once, and no lesion appeared at the spots, the signs of the disease developing elsewhere. In four cases, namely, I., II., VI., and VIII., small encrusted tubercles or yaws granulomata, exhibiting no sign of ulceration, appeared at the inoculated points, and they were identical in appearance with the ordinary local manifestation of the disease.

In Case VII., although no local sign was apparent, it is evident that the introduction of the virus caused irritation, with consequent proliferation of the pigment cells, as is seen to be the case by microscopic examination in an ordinary tubercle. For, although the inoculation abrasion healed up at once, the reactionary fever which followed showed that the virus affected the system, and the macule, which was afterwards produced at the place of abrasion, indicated that irritation had taken place there.

Secondly.—That there was an incubation period varying from 10 to 41 days; that is, practically, from two to six weeks. It will be noticed, however, that in only two cases, namely, I. and II., were the inoculations performed in healthy individuals, and in these instances the shorter incubation period was observed. In Case VII. the patient was suffering from yaws at the time of the inoculation, and in Cases III., IV., V., VI., and VIII. previous attacks of yaws had rendered the patients more or less immune. The variation in the periods of incubation in these cases, therefore, may be considered to indicate the degree of immunity enjoyed by the individual; and even in two of these cases, namely, III. and IV., where there had been the lapse of a year since the patients had been cured, the disease was reproduced in a very mild form by inoculation after what must be considered as the ordinary period of incubation, that is, about a fortnight.

Thirdly.—That the reactionary fever, whilst severe in some cases, was so slight in others as to escape observation. In Cases I., II., VI., and VIII. no marked reaction was observed; but, as I have observed already, the cases were not closely watched, and it is quite possible that malaise and an elevated temperature existed even in these instances. In Cases V. and VII. the constitutional disturbance, although not severe, was sufficient to attract unskilled attention; and in Cases III. and IV. there were continuous and severe febrile symptoms with headache for four days, and in Case III. there was diarrhœa.

Fourthly.—That the disease produced by inoculation was mild in character, and very amenable to treatment. In Cases I., II., III., VI., and VIII. tubercles appeared at the sites of inoculation, and in Case IV. it is evident that local irritation was going on, although it did not proceed to the production of a granuloma. A general eruption of "dartres" occurred in four instances, and in two cases tubercles formed elsewhere than at the sites of inoculation; in Case V., indeed, the eruption of tubercles was a general one.

These cases of inoculation advance considerably the knowledge of the incubation period of the disease, and they certainly establish the fact that the virus may operate within a much shorter time than was thought to be the case by the older authors, and than has been asserted by recent writers, and by some of the medical officers who have replied to the interrogation. In a case detailed in my third report on the Dominica Yaws Hospitals, in 1879, the incubation period was shown to be about thirteen days, and this period has been verified by the inoculations I was fortunate enough to be able to perform.

The conclusions that must be drawn from this part of the inquiry are as follows:—

1. That yaws is propagated solely by contagion.

2. That the contagion of yaws varies considerably in intensity. For whilst at times it is so virulent as to cause the disease to prevail in epidemic forms, at other times affected persons may, under proper precautions, be associated with healthy individuals without undue risk.

3. That, as there are no present known means of determining the extent of the virulence of the virus of the disease in particular cases, the association of persons suffering from yaws with other patients in asylums and hospitals is unjustifiable, and cannot be too strongly condemned.

4. That the observations of experienced medical men tend to show that certain individuals are ordinarily immune without having undergone an attack of the disease.

5. That there is no evidence to establish the truth of the assertion that the virus of the disease can operate through the atmosphere.

6. That the incubation period extends ordinarily from ten to fifteen days, but that, in persons who are more or less immune, and who are capable of being infected with the disease in a modified form, this period may be extended to six weeks.

7. That there is reason to believe the microbe of the disease is tenacious of life, and that it may lie dormant outside the body, and be capable of exercising its virulence when it is afterwards brought into contact with a broken surface of the skin.

10.

Have you met with any cases in which the disease has relapsed after apparent cure? If so, give particulars.

The determination of the question as to whether the disease, having been properly treated, is liable to relapse after an apparent cure is of considerable importance. In several of the islands, and more especially in those in which there are yaws hospitals, some of the patients discharged by the medical officers as cured have returned for treatment after varying intervals with the disease as bad as ever.

Most of the older authorities on yaws state that one attack of the disease protects the person who has undergone it from a fresh attack ever afterwards.

This statement has become widely disseminated, and many of the people firmly believe in its truth. Dr. Imray referred to the matter in his paper published in Dr. Milroy's report. He said: "This opinion of one attack, when thorough recovery takes "place, effectually preserving from a second has been generally entertained and acted "upon since the disease has existed in these colonies." This popular idea has resulted in the general belief that relapses or a second attack of the disease are positive proof of the fact that the treatment in the first instance was improper, and that, therefore, the medical man who attended to the case had no knowledge of the disease. As a certain number of the cases discharged from every yaws hospital is found to suffer from relapses, the erroneous popular notion concerning immunity has caused the people to consider that the hospital treatment is all wrong; and this fact explains, in many instances, the strong objection on the part of infected persons in Grenada, St. Lucia, and Dominica to enter the walls of the special institutions established under the authority of the Yaws Acts. I shall have occasion later on to allude to the question of native treatment, which many persons of intelligence in the islands consider more efficacious than that of the properly

qualified medical man, but I would here remark that the yaws doctor or doctress is careful to prescribe a severe and complicated regimen, and one, too, that the people cannot possibly follow out. If the disease relapse after it has been pronounced by the old woman to be cured, she readily admits that the person has not been properly treated; it is a case, she says, of "pian manqué." But she then explains with sorrow or indignation that the fault lies not with her but with the patient, who did not follow out her directions implicitly. He ate fruit on one day, or he ate one kind of fish when he was told to eat another, &c., &c., and thus the "yaws missed," and the friends or relations turn round and abuse the poor patient, whilst the yaws doctress departs with increased reputation for knowledge of the disease. In bad cases, where a second course of native treatment does no good, the patient is declared to be "obeahed," and that, in the opinion of the people, is capable of explaining any anomalous circumstance, for the belief in "obeah," or African witchcraft, is almost universal amongst the native population.

Unhappily, these ideas concerning the medical treatment of the disease have been taken up by many persons of intelligence, some of whom, having risen from the lower ranks of the island populations, are tinctured with native beliefs. A few of them, who write for the local newspapers or pose as local politicians, leave no efforts unturned to cast discredit on the treatment of the patients in the yaws hospitals, and on the work performed by the hospital staff. It has thus happened that the Government measures undertaken for the arrest of the spread of the disease have often been thwarted by those who should have assisted in carrying them out, and that the onerous work of the medical officers, performed under the enervating influence of a tropical climate, and often in the face of no ordinary difficulties, has been subjected to much unjust and unreasoning criticism.

One verbal and 40 written replies were received to this interrogation. The verbal reply was from Dr. Orgias, the Colonial Surgeon of Grenada, who informed me that, according to his experience, the disease was peculiarly liable to relapses, which occur most frequently amongst the East Indian immigrants, who are very susceptible to the contagion.

Of these 41 replies, one was indefinite; and, of the remainder, 31, or over 75 *per centum*, were to the effect that the disease is one of a relapsing nature.

It is to be observed that, of the nine medical officers who have not met with cases of relapse, none have been in charge of a yaws hospital, and that, therefore, their experience of the disease must be limited, as persons suffering from yaws do not often apply for treatment to the district medical officer. Indeed, several of the writers state in their replies to the interrogations that their experience is small. Thus Dr. Freeland, of Antigua, mentions in his reply that he had never met with a case of relapse of the disease after apparent cure; but, when I accompanied him to Betty Hope's Estate in that island, we saw a case of relapse in one of the cases he had treated some time before.

On the other hand, many of the medical officers who have answered the question in the affirmative show by their replies that relapses have been met with so frequently as to render them a distinctive character of the disease.

Dr. Tulloch, of Tobago, who is justly considered to be one of the chief living authorities on the disease, states that in no less than 11 *per centum* of his cases relapses occur after apparent recovery. In Grenada, Dr. Orgias finds the disease peculiarly liable to relapse; Dr. Hatton has met with many cases. Dr. Lang finds relapses not unusual, and Mr. Boyd considers them a marked feature of the disease. In St. Vincent, Dr. Newsam finds yaws very liable to relapse. In St. Lucia, Mr. Norton has met with 56 instances, and Dr. Lestrade has seen such cases very often. Dr. Picrez, of Antigua, has had several cases in his practice in that island. Dr. Mapleton, of St. Kitts, who had much experience of yaws in Montserrat, found that the disease almost always relapses. Mr. C. R. Edwards, the medical officer in charge of the Nevis Yaws Hospital, found that the disease relapsed in from 15 to 20 per centum of his cases, and abundant evidence of the relapsing nature of yaws is furnished by the medical officers in Dominica.

The first author, I believe, who drew attention to this character of yaws was Grainger, who stated, in 1764, that relapses were "always more difficult to remove than "the first disease."* Collins, too, in 1803, said that they were "infinitely more difficult "to cure than the disorder at its first appearance."† But neither of these authors enters into any particular consideration of the subject, and Mr. Collins evidently thought that relapses were due to the improper administration of mercury. Later on, namely, in 1820,

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* *An Essay on the More Common West India Diseases.* By James Grainger, M.D. London. 1764.

† *Practical Rules for the Management and Medical Treatment of Negro Slaves in the Sugar Colonies.* By a "Professional Planter." [Mr. Collins, of St. Vincent.] London. 1803.

Thomson apparently directed some attention to the matter, for he states as follows in his Treatise on the Diseases of Negroes:—"I have a patient at present whom I have known "for nearly five years, and she has had six distinct attacks during that time . . . . "such cases are by no means of rare occurrence."

The character of the disease does not, however, appear to have been noticed by authors who followed Thomson, and it is not until we come to the writings of the present day that the relapsing nature of yaws is duly set forth. In 1879, I drew attention to the matter in my third report on the Dominica Yaws Hospitals; in 1880, Dr. Liveing stated that "the affection is very liable to relapse." * And, in 1885, Hirsch asserted that "Its course is made especially protracted by the not unfrequent recurrences." †

Since the yaws hospitals have been established in Dominica, there has always been some trouble about relapses. They were found to occur in patients discharged from the hospitals when the Board of Health had charge of them 20 years ago, and I found a reference to the subject in the minutes of a meeting of that body held in September, 1872. In all the hospitals established in the island since that time, cases of relapse have occurred, and I observed that the disease occasionally manifested a relapsing character in the islands in which it prevails.

The following notes from my hospital case books give an idea of the relapsing nature of the malady.

Case 395.—V. S., aged 16, Negro. Admitted to the Central Hospital on the 2nd July, 1878, with extensive ulceration at the back of the left ankle, the former site of the "mother yaw." The ulcer is foul and deep, with thick everted edges. There are yaws tubercles round the ulcer. Encrusted tubercles are scattered about the buttocks and legs, and there are some papules, "pian gratelles," on the face. He has been ill for five months.

He was first treated at the hospital with sulphide of calcium; and afterwards, as there was some cachexia, a mixture of quassia and iron was prescribed. He was fed well with eggs and milk and fresh meat and fish. And the leg was elevated and the ulcer poulticed with linseed meal. On the 5th August he was much better in general health, and the granulations of the ulcer were nearly level with the skin, but a fresh crop of encrusted tubercles appeared on the arms and body.

18 August. Another crop of tubercles, principally on arms and buttocks.

26 August. Yaws "drying up." Healthy granulations of ulcer level with the skin. Ordered iodide of potash mixture.

4 November. Since last record he apparently recovered completely, but there is now a relapse. He has a general eruption of small tubercles. Ordered sulphide of calcium again.

11 November. Tubercles disappearing by resolution.

20 November. A fresh crop of tubercles has appeared. Ulcer broken open again.

From the date of the last note no fresh tubercles appeared, but the ulcer showed no signs of healing for a long time. He was discharged cured on the 26th July, after a stay of a little over a year in the hospital.

Case 654.—A. L., aged 7, Negress. Admitted to the hospital on the 17th February, 1879, with encrusted tubercles on the hands and feet. Squamous and papular eruptions ("pian dartres" and "pian gratelles") about body and limbs; and "tubboes" in the soles of both feet. She was attacked with yaws a year ago, and was sent to an old yaws doctress to be treated. The treatment consisted in the administration of guaiacum, native sarsaparilla, and mercury. After a short time she was salivated and the yaws disappeared, when she was sent back to her mother as cured. But within a few weeks the disease returned as bad as ever, and her mother brought her to the hospital, as she had lost faith in the skill of the old woman.

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* *A Handbook on Diseases of the Skin.* By Robert Liveing, M.D. 2nd Edition. London. 1880.

† *Handbook of Geographical and Historical Pathology.* By Dr. August Hirsch. New Sydenham Society's Translation. 2 vols. London. 1885.

This case is interesting as showing how the disease relapses after its manifestations disappear under the influence of mercury.

Case 692.—N. T., aged 9, Negro. Admitted to Prince Rupert's Hospital on the 13th October, 1877, with a yaws tubercle on the calf of the right leg. He was treated by Dr. Elliott with confection of sulphur and iodide of potassium, and discharged as cured on the 24th November; that is after a stay of six weeks.

A month or two after his discharge, the disease reappeared, and he was sent to the Central Hospital on the 21st August, 1878. He was then found to have a large encrusted tubercle over the inferior angle of the left scapula, and another similar one over the left calf. There were dark maculæ over the body and limbs, marking the sites of absorbed tubercles. He was at first treated with sulphide of calcium, but shortly after his admission he was attacked with dysentery, which was then epidemic all along the coast, and had invaded the hospital. During the progress of the dysentery the yaws disappeared entirely, and on his recovery from the former complaint, his skin was perfectly clear, even the maculæ having disappeared. But, as he was in a condition of debility, he was transferred to the Roseau Infirmary, from which institution he was discharged in a short time, apparently in vigorous health.

After his return home he remained well until the 29th March, 1879, when he fell whilst he was carrying an iron bucket, and cut his right leg. About a week afterwards, according to the account given, yaws appeared on the wound. His brother had yaws at the time, and they both associated freely. He was readmitted to the Central Hospital on the 19th April, when he was found to have large encrusted tubercles on the front of the right leg, and squamæ ("pian dartres") on the body and limbs. He remained in the hospital until the 29th October, when he was discharged cured.

This interesting case not only illustrates the relapsing nature of the disease, but it also shows how the sudden onset of an intercurrent affection causes all the symptoms of yaws rapidly to disappear, sometimes to break out again later on. Several of the early writers on the disease noticed this fact, and alluded to the disappearance of the symptoms as the "repulsion" of the disease. Measles and small-pox were found in certain instances to have the effect of "repelling" yaws. Maxwell relates the following interesting case of the relapse of the disease in a child who suffered from an intercurrent attack of measles:—

"A child on Fort Stewart estate, who was covered with a profuse eruption of yaws "of three months' duration, was seized with measles. During the eruption fever the "excrescences underwent no change, neither was much alteration observed during the "progress of the rubeolous affection; but, upon the decline of the measles, the yaws "dried up and disappeared, without leaving the least vestige of the disease, except the "faint-coloured blotches on the seat of the former yaws. The child continued in a very "debilitated state for two months, when an evident reaction took place, and, as the "health improved, a numerous crop of yaws reappeared, at first of a subdued character, "but which spread out into full-sized excrescences as it gained strength."

There can be no doubt from the experience gained in the Dominica yaws hospitals that any profound impression made on the system by an intercurrent attack of acute disease, or even by a sudden chill giving rise to congestion or inflammation of some internal organ, has oftentimes the effect of producing in a very brief period the absorption of the granulation tumours that form the chief characteristic of yaws. In certain instances the symptoms disappear never to return; and in other cases a relapse occurs at varying intervals. What is the limit of time during which such relapses are possible is exceedingly difficult to determine, for, as I shall have to show in the succeeding section of this report, second infections of the system occur in those who have lost the immunity given by the earlier attack of yaws. The inoculation experiments already detailed show that the disease is capable of being produced artificially in those who have already suffered from yaws, thereby proving incontestably that the old and commonly accepted ideas in regard to immunity cannot be maintained.

In the replies to the interrogation, 17 cases of relapse are given in which the disease returned in periods varying from two weeks to 20 months. An analysis of the cases discloses the following facts:—

In	4	instances	the	disease	relapsed	in	less	than	a	month.
„	1	instance	„	„	„	„	from	1	to	2 months.
„	5	instances	„	„	„	„	„	3	„ 6	„
„	5	„	„	„	„	„	„	6	„ 12	„
„	2	„	„	„	„	„	„	12	„ 20	„

My own experience leads me to form the opinion that actual relapses of the disease occur only within six months after the apparent cure; and when patients have again been attacked with yaws after that period, I have always found that they have been so placed as to run ample risks of re-infection. This subject received some attention in my fourth report on the Dominica Yaws Hospitals. The following extract gives the conclusions I then arrived at, and increased experience does not cause me to alter them:—

"From the time of the opening of the Central Hospital, to the end of the year [1879] "under consideration, a period of about two years and three months, 744 patients have "been discharged, 36 of whom, or about 4·8 *per centum*, have been re-admitted. These "figures are interesting, for on perusal of the histories of the five cases of re-admission "given in Appendix B., it will be seen that the second attack of the disease can scarcely "be ascribed to anything but a second infection. In these five cases there was absolute "freedom from the symptoms of the disease for a considerable time.

"And, in some of the cases of re-admission from the Prince Rupert's Hospital, the "patients were free from all symptoms of yaws for over a year; in one instance, indeed "(Case 726), two years elapsed between the time of discharge and the second appearance "of the disease. Whatever doubt there may be as to the cause of the second infection, "when the dates of discharge and re-admission are separated by a period of two or three "months only, the re-appearance of the disease in an individual who has enjoyed perfect "immunity from the symptoms for eight, or even 12, or 24 months, cannot be explained "satisfactorily except by the theory of a second infection. And when it is remembered "that in these cases of re-admission, association with persons affected with yaws is in "nearly every instance proved to have taken place for a greater or less period after the "discharge from the hospital, the second attack can scarcely be wondered at, for suffi-"cient evidence has now been accumulated to refute the theory that one attack is an "absolute protection against a second attack of the disease."

The percentage of relapes in the various islands, as indicated by the hospital statistics, varies considerably. The following table shows at a glance the information I have been able to gather on this important subject.

TABLE showing the percentage of relapses of the disease in Tobago, St. Lucia, Montserrat, Nevis, and Dominica.

Island.	Period.	Institution.	Percentage of Relapses.	REMARKS.
Tobago - - -	1887–88 -	Dispensary - - -	12·1	From Dr. Tulloch's 2nd report.
St. Lucia - -	1888–90 -	Yaws Hospital -	9·7	Mr. Norton's statement.
Montserrat -	1881–91 -	" " - -	3·8	Probably under estimated.
Nevis - - -	1887–91 -	" " - -	18·1	Varied from 19·6 to 15·9.
Dominica - - -	1878 - -	Prince Rupert's Hospital	9·4	
" - - -	" - -	Central Hospital - -	3·6	
" - - -	1879 - -	" " - -	4·6	
" - - -	1880 - -	" " - -	5·0	
" - - -	1881 - -	" " - -	3·9	
" - - -	1882–83 -	Yaws encampment -	23·0	From Mr. Williams' report.
" - - -	1882–90 -	Morne Bruce Hospital -	3·7	

It was not possible to obtain, except in Nevis, accurate statistics concerning the percentage of second relapses of the disease, although several of the medical officers mention having met with such cases. Out of 750 cases admitted to the Morne Bruce Hospital, in Dominica, there were two examples of second relapses of the disease, showing a percentage of 0·3, and several cases are alluded to in my reports on the Central Hospital.

With the assistance of Mr. C. R. Edwards, I made a thorough examination of the admission book of the Nevis Yaws Hospital, and the list obtained therefrom of the re-admissions gave some interesting information, which is set forth in the following table:—

Year.	Number of Patients admitted to the Hospital.	Number of Re-admissions.	Percentage of Re-admissions.	Number of Cases Re-admitted.		
				Twice.	Thrice.	Four Times.
1887–88 - -	168	31	18·45	4	1	—
1888–89 - -	117	23	19·65	4	—	—
1889–90 - -	93	16	17·20	4	1	—
1890–91 - -	88	14	15·91	4	1	2
Totals - -	466	14	18·0	16 (3·4 *p.c.*)	3 (0·6 *p.c.*)	2 (0·4 *p.c.*)

The facts disclosed by this table conclusively establish the relapsing nature of the disease; and they also show that relapses may occur as often as four times in the same individual.

It has been already pointed out that these cases of re-admission have given rise to much adverse criticism in the various islands in which yaws hospitals have been established, and it is to be regretted that in several instances even medical men have joined in the outcry against their colleagues who have attended the cases that have relapsed. Various statements damaging to the professional reputation of the hospital surgeons had been assiduously circulated in several of the islands. The correspondence in the Appendix, concerning native remedies in St. Lucia, indicates the amount of harm done in that island by the propagation of such statements.

With a view to diminish the number of cases of relapse after the patients are discharged, and thus to a certain extent to silence those agitating against the proper medical treatment of yaws, it has been suggested by several medical officers and others that all the patients should be retained in convalescent wards of the hospital for several months after every sign of the disease has disappeared. I see no reason, however, for the adoption of this plan; and I cannot advise your Lordship to sanction the greatly increased expenditure that would be entailed by the erection of suitable convalescent wards at the hospitals, and by the cost of feeding and clothing all the patients for three months after the large majority of them are perfectly cured. If the whereabouts of the discharged patients be ascertained, and they be compelled to submit to a thorough examination by the district medical officer once or twice within six months of the time of their dismissal, all cases of relapse will be discovered, and they can then be placed under further treatment. Those of the medical officers of the yaws hospitals who are sensitive to the abuse and adverse criticism that have been so often heaped on them on account of their relapsed cases, can now regard it all with equanimity; for the scientific evidence I have been able to adduce establishes beyond cavil that yaws is a relapsing disease, and that a certain number of cases, no matter what may be the nature of the treatment, are certain to develop later symptoms of the malady within six months of apparent cure.

II.

Have you met with any cases in which the disease has recurred after the patient has recovered from it, and remained perfectly healthy for a long time? If so give particulars of the cases.

The early authorities on yaws taught that one attack of the disease invariably established in the system a complete immunity from further attacks, and this expression of opinion being accepted by the people as an undeniable fact, all cases in which the malady reappeared after a long period of health were explained by the theory that the

first attack was ill-treated, and that the second one was simply the late manifestation of the repelled disease. The following extracts from the older writers show with what unanimity this idea of complete immunity was received.

In 1764, Grainger wrote:—"It is lucky this disease attacks the negroes but once; "for it is both tedious and difficult to cure."

In 1791, Wright thus alluded to the question:—"When a person once passes safely "through the yaws, he cannot again be infected by any means whatsoever. This fact is "so well established, that a negro is valued one-third part more by his having had the "yaws."

In 1803, Collins stated:—"Most negroes are attacked once, and none more than "once."

And in the same year Winterbottom asserted:—"It never affected the same individual "twice."

As, however, the West Indian practitioners gained more experience and knowledge of the disease they became less dogmatic in their assertions concerning the question of immunity. Thus, in 1820, Thomson, who had evidently not met with a case of re-infection was inclined to the old belief, but he nevertheless brings forward evidence to show that second attacks are possible. He says:—

"The yaws affect the same persons only once during life, the susceptibility being for "ever afterwards destroyed. I have, however, the authority of my venerable friend, Dr. "Quier, for saying, that in some rare instances he has known the disease to occur twice, "and at very long intervals. In one case of a carpenter negro on Thetford Estate, in the "parish of St. John, 20 years intervened between the first and second attack. It is "impossible not to place implicit confidence in the assertion of so discriminating an "observer; and, from the acknowledged anomalies that exist in other morbid poisons, "there is no reason to doubt their taking place in the present one."

In 1839, Maxwell pointed out in vigorous language the errors of the early writers in regard to immunity, but he imagined that the re-appearance of the disease after a long period of perfect health was due to a deferred manifestation of the original infection. He stated as follows in his work on yaws:—

"An opinion has received a currency from a very early period, and prevails to the "present day, that yaws attacks a person only once during life. Each succeeding "author has copied his predecessor with great fidelity, and has perpetuated an error "which an attentive observation to the progress of the disease would have rectified . . . "Dr. Owen only saw two cases where yaws occurred in the same individual, and that at "an interval of 20 years. I am convinced that yaws can only be communicated once by "inoculation, so as to produce the usual phenomena of the disease; but I could show by "numerous well authenticated cases, contrary to the opinion of these authors, more "explicitly expressed by Dr. Owen, that it re-appears in the same individual much more "frequently than is supposed; and that whenever it does recur at a subsequent period of "life it assumes the characteristic features of the original disease, so as not to be "mistaken."

Bowerbank appears to have been the first authority that brought to the notice of the medical profession the fact that in certain instances immunity disappeared, and that several distinct attacks of the disease might occur in the same individual. Dr. Bowerbank wrote a long and elaborate account of yaws, in order that it might appear in Dr. Tilbury Fox's work on Skin Diseases. Unfortunately this paper has never been published, but Dr. Tilbury Fox quoted freely from it, and Dr. Gavin Milroy was afforded the advantage of its perusal. Dr. Fox alludes to the remarks on immunity in the manuscript as follows:—"Dr. Bowerbank speaks of persons having two and even more attacks, so that the "idea that one attack guards the attacked from others is not apparently true: but there "is a long interval between the attacks seemingly."

The fact that yaws occasionally attacks persons more than once appears to have been observed in Dominica by the late Mr. Theodore Lockhart; for, in his report on the Vital Statistics of the Island for the year 1872, the following paragraph occurs:—"Instances "are known where the disease has reappeared in the same person, after having been "previously cured."

In 1881, Charlouis said:—"I can confidently vouch for the fact that frambœsia may "attack the same person more than once; and the truth of that may be proved not only "by inquiring into the history of cases, but also by inoculation."

Since Charlouis wrote, Hirsch, Van Harlingen, and Christie mention the fact that the immunity given by one attack may disappear after a time; but, unfortunately, the works of those who have written on yaws are not known to many of the medical officers in the West Indian islands, and during my mission several of my professional brethren lamented

to me that they had been unable to find anything in their books relating to the disease, and that they were entirely dependent on their own observations for their knowledge of its symptoms and treatment.

Thirty-seven written replies were received to the interrogation, and Dr. Orgias, of Grenada, informed me that, according to his experience, the old theories as to one attack of yaws giving in all instances complete immunity from a second attack were quite incorrect, for he had seen a good number of cases in which persons had become infected a second time, many years of perfect health having elapsed between the first and second attacks of the disease.

Several of the medical officers have not discriminated between a relapse of the disease after apparent cure and a recurrence after complete recovery, and thus their replies are shorn of the value they might otherwise have possessed. In two instances, moreover, the replies are couched in such indefinite language as to render them useless for statistical purposes.

Twenty medical officers answer the interrogation in the negative, and fourteen have met with cases in which the disease has recurred after the patients have recovered, and remained perfectly healthy for a long time. In three of the replies there is reference to adults being re-infected, although they had passed safely through an attack of yaws in childhood, and in all the instances of recurrence cited, the interval between the two attacks has been long.

Mr. Numa Rat gives interesting histories of two cases of recurrences after intervals of fifteen and twenty years respectively from the time of the first attacks of the disease, and he believes them to be what he calls tertiary manifestations of the malady, assuming that the virus of yaws, like that of syphilis, after remaining quiescent in the system for a number of years, may reveal its presence by a train of tertiary symptoms. I have already shown that many of the so-called tertiary symptoms are simply those due to syphilis and tuberculosis, but I shall have occasion later on to treat more fully of this matter.

It is not surprising that there has been so wide a diversity of opinion in regard to immunity, for until the last few years nothing whatever was known of its origin, and even now pathologists are divided on the question into two opposing schools, the one explaining immunity by phagocytosis and the other by the action of antitoxines or defensive proteids. The experience gained in succeeding generations by the practice of vaccination shows that an immune person does not always remain so, and that although in some instances the protection afforded by vaccinia may last through the life of the individual, in other cases it disappears after a few years. At the remarkable discussion on immunity at the International Congress of Hygiene and Demography, held in London last year, Stabsarzt Dr. Behring stated as follows :—" According to my former observations " with diphtheria, I found reason to believe that the healing action possessed by the blood " of animals rendered immune is not permanent, but becomes less by time." As in diphtheria, so in yaws and other diseases, immunity is not always permanent; indeed, if all persons who had passed through an attack of yaws were placed, after a certain interval, under such conditions as to insure the certain entry of the virus, the results would doubtless show a large percentage of re-infections. My own inoculation experiments prove that the disease may be reproduced even in patients who have not long recovered from an attack of the malady. Thus in the case of A. V., a slight infection of the system was produced by the insertion of the virus, as was evidenced by the reactionary fever, and the local signs at the inoculated spot. The immunity afforded by the earlier attack of yaws had not entirely disappeared, and in consequence of this partial refractoriness only a mild attack of the disease of an ephemeral character was produced by the inoculation.

In the brief notes I have given of the 132 cases of the disease I examined during my tour through the island of Dominica there are five instances recorded in which there were re-infections after long intervals. Three of the persons were not under medical treatment during the first attacks, and the two other cases were discharged cured from the Central Yaws Hospital, which was closed 11 years ago. From the time of their discharge from the hospital until within a few months of the time of the examination by me they had been in excellent health, and when I saw them they had both had the ordinary encrusted granulomata. These two cases alone, therefore, negative the theory as to these re-infections being the so-called tertiary form of yaws. For, after an interval of over 10 years they were attacked afresh with a disease the local manifestations of which were identical with those observed in the first attack.

The three following cases from my hospital records may also with advantage be cited :—

Case 653.—Central Hospital. A. T., aged 12, negress. Admitted on the 7th February 1879, with a large yaws tubercle over the left tendo Achilles. She had yaws during infancy, and was cured by native remedies. Three weeks ago she pricked her leg with a bamboo; a sore resulted, and shortly before she came to the hospital the yaw appeared on the sore. She was living at the time in a house with persons who were suffering from yaws. This interesting case not only shows that the immunity produced by an attack during infancy may be lost before puberty, but it also shows that the incubation period was less than three weeks.

Case 267.—Morne Bruce Hospital. A. H., 38, negress. Admitted on the 13th January, 1885, with encrusted tubercles on the face and on the outer side of the left foot. Dartres on arms and knees. She was formerly in the Central Yaws Hospital, and left there cured in September, 1881. From that time until November, 1884—that is a period of three years and two months—she had no sign of a return of the disease, and she remainded in perfect health during the whole time. For some time before the second attack she was living in a small hut with two children, both of whom were suffering from yaws, and she believes she was re-infected by them.

Case 733.—Morne Bruce Hospital. S. J., 13, negress. Admitted on the 11th August, 1890, with encrusted tubercles on both hands and legs. She was formerly in the hospital, and was discharged cured on the 6th November, 1887. She remained perfectly healthy, without any sign of eruption on the skin until July, 1890, that is for a period of two years and eight months, when a yaws tubercle appeared on the right wrist, on a small ulcer, produced by the prick of a lime prickle.

Other cases, similar to these, might be given, but it is unnecessary to bring forward further evidence, for the statements of the authors already alluded to, the teaching of the inoculation experiments, and the detailed experience of those medical officers who have cited cases in support of their affirmative reply to the interrogation, place beyond all question of doubt the truth of the following propositions, viz.: –

1. That one attack of yaws does not always give immunity from a second attack.

2. That the immunity afforded by an attack of the disease is, in many instances if not in all, lessened by the lapse of time.

3. That the immunity in some persons totally disappears after several years.

4. That the manifestations of the second attacks of the disease do not vary in any essential particulars from those of the first attacks.

12.

What Methods have you found most successful in the treatment of the disease?

Forty replies were received to this interrogation, and Dr. Orgias in his "Annual "Report on the Hospitals and Asylums in the Colony of Grenada for 1882," gave his views of the treatment of the disease in the following words: "The treatment of yaws "is still buried in obscurity. There is no specific or peculiar treatment to this com- "plaint. I am of opinion that at the present stage of our knowledge, remedial agents "possess very little, if any, curative effect on the disease, particularly in its early stages. "I endorse to a certain extent the prevailing views of the *vox populi* here, that the "disease should be allowed to run its course without medicines, till it has attained the "period of decline, taking during that time the necessary precautions to support the "system by wholesome regimen, frequent ablutions, and general cleanliness. The use "of mercury, vaunted as a specific by many, I consider highly objectionable; there is "no doubt that for a time it seems to remove the disease, but I have invariably found it "to return with increased severity, and frequently to the detriment of the general "health. I am of opinion that the soundest principle of treatment is that which has "for its object the general improvement of the patient's health, and that that object "can only be secured by a wholesome and nutritious diet, combined with tonic medicines "and proper precautions to secure strict hygienic rules."

Mr. Norton, of St. Lucia, refers in his reply to the prescription book at the yaws hospital in that island; and on my visit to the hospital I examined the book and found that sulphide of calcium was usually given to the patients on their entry, and that afterwards they had administered to them a mixture containing corrosive sublimate. The local applications to the ulcers and tubercles were of an antiseptic and astringent

nature, the ointments being made with iodoform, sulphate of zinc and carbolic and boracic acids, and the lotions containing corrosive sublimate, sulphate of copper, and nitrate of silver.

Whilst in St. Vincent I noticed from the prescription book of the old Yaws Asylum in that island that the mixture commonly in use in the treatment of the disease contained corrosive sublimate, iodide of potassium, cinchona and sarsaparilla.

The treatment as recommended by the medical officers in their replies to the interrogation may be considered under three heads, namely, hygienic, general and local.

Hygienic Treatment.

Most of the medical officers very properly insist on the necessity of good diet, cleanliness, and a close observance of the laws of hygiene generally. In previous sections of this report the life led by the lower orders of the people has been detailed, and a deplorable account of misery and squalor had necessarily to be given.

In many instances the constitutions of those suffering from the disease are so debilitated from want of proper nourishment, and by the operation of insanitary surroundings, that there can be little hope of curing grave constitutional disease outside the walls of a hospital. Thus Dr. Mackie states that he is often obliged to supply cod-liver oil to children as a food. And Dr. Arnott of St. Vincent, and Mr. Duke of Montserrat, both of whom have had much experience of the disease when in charge of yaws hospitals, evidently consider the question of the administration of medicines as quite of secondary importance. The former, in his reply, states that he has found sea-bathing and suitable food the most important points, and the latter simply mentions diet and hygiene as the only two essentials in the treatment.

Cleanliness is insisted on by some of the medical officers, doubtless with a view of emphasising the necessity of its greater observance amongst the negroes of the West Indies, the majority of whom have been shown by the evidence adduced to be plunged into such a state of ignorance as not really to know the value to themselves of the carrying out of the most primitive rules of public or private hygiene. In some of the islands where the inhabitants are dependent on the rainfall for drinking and washing purposes, regular bathing in fresh water is impossible, but the sea is not very distant from any of the centres of population in the Antilles, indeed most of the villages are on the coast line. Sea baths have been recommended by several of the older writers as a very important part of the treatment of the disease; and 12 or nearly 30 *per centum* of those medical officers who have replied to the interrogation, mention bathing in the sea as a necessary detail of the curative treatment. Indeed, Mr. Austin of St. Vincent, advises the removal to the sea coast of patients residing inland, in order that daily sea baths may be taken by them.

In some of the islands sea bathing and the drinking of sea water are insisted on as part of the treatment by the native yaws doctors, and the people firmly believe in the curative effects of these baths. I certainly noticed that they had a beneficial influence on those of the patients of the Dominica Central Hospital that were able to take them, and the average stay of the inmates in that institution was less than it was later on at the Morne Bruce Hospital where sea baths are unobtainable. Dr. Thorpe states that "sea "water is essentially a mineral water belonging to the chlorinated alkaline class, sodium "chloride being its chief constituent."* It contains about 3·6 *per centum* of mineral matters, over 2·6 of which is sodium chloride, the remaining solid constituents consisting principally of salts of potassium, magnesium, calcium, ammonium and iron, with traces of iodine, bromine and fluorine.

Towards mid-day in the tropics the sea water by the shore is warm and pleasant, so that persons can remain in it for some time without risk. In the case of yaws patients the crusts of the tubercles become softened in the water, and are then soon detached, and thus the mineral constituents of the sea can exert a local influence on these granulomatous tumours. That this influence, apart from the tonic effect of the sea bath, is a beneficial one, there appears abundant evidence to show.

Mr. Numa Rat, of Dominica, recommends sulphur fumigation and warm sulphur baths during what he terms the "tubercular stage" of the disease; and Mr. Williams, of the same island, also advises bathing in sulphur water, by which he doubtless means the so-called sulphur water of the solfataras that exist in several parts of Dominica and the neighbouring islands. This idea is not a new one, for Levacher, in his work already

* *A Manual of Inorganic Chemistry.* Vol. I. The Non-Metals. By T. E. Thorpe, Ph.D., F.R.S. London. 1878.

quoted, says: "At St. Lucia, at Martinique, and at Guadeloupe, the baths of hot sulphur-"ous waters may prepare the way with advantage for the success of the treatment I have "indicated." As far as Dominica is concerned, however, these waters have been shown by analysis to contain only an infinitesimal quantity of sulphur, and a large proportion of chloride of sodium, but the atmosphere in the neighbourhood of the solfataras is strongly impregnated with sulphuretted hydrogen that is emitted with steam from the various blowholes.

General Treatment.

The replies to the interrogation show a wide diversity as to the nature of the drugs that should be administered as curative agents in the disease. Five of the medical officers advise no internal treatment whatever, and rely apparently on the efforts of nature after the patients are placed on a good diet, and made to observe the laws of hygiene.

The following table, drawn up from an analysis of the 41 replies (in which are included the ideas of treatment enunciated by Dr. Orgias), indicates the nature of the drugs recommended to be administered, together with the number of the medical officers advising their use, and the percentage—which may be taken to represent the relative frequency of the various methods of treatment adopted in the Antilles:—

Name of Drug.	No. of Medical Officers advising the use of each Drug.	Percentage.
Mercury	17	41·5
Iodide of potassium	15	36·6
Iron	15	36·6
Arsenic	11	26·8
Sarsaparilla	6	14·6
Sulphur	2	4·9

Mercury.—Various preparations of mercury have been recommended by the 17 medical officers who prescribe it in the disease. Most of them use corrosive sublimate, but Plummer's pill, the red oxide, and the green iodide, have their advocates. Eight officers advise the administration of Donovan's solution, which appears to be the remedy most in use by the medical staff of Tobago. This preparation is composed of arsenic and iodine, as well as mercury, and it thus contains three powerful medicines often administered in the treatment of yaws. The disadvantage of such an association of minerals in a scientific determination of the therapeutic questions surrounding the disease is that, in the event of cure, it is impossible to say whether one of the drugs is, or all of them in combination are, responsible for the success of the treatment; and, in the event of failure, it is impossible to determine whether one or other of the drugs may not have acted beneficially by itself.

From the time of the earliest writers on the disease until now, there has been a wide divergence of opinion as to the advisableness of administering mercury in yaws. Until within the last 20 years it was undoubtedly the rule to dose nearly all the yaws patients with mercurials in some form or other, and an examination of the literature of the disease furnishes painful evidence of the mischief done by excessive salivation, and other evil effects of the mineral. The so-called sequels of yaws, such as anæmia, ulceration of the fauces, emaciation, and "bone-ache," are all occasional manifestations of mercurial cachexia; and even in the days when it was the rule to poison yaws patients with mercury, far-seeing medical men warned their brethren of the mischief that was being perpetrated.

In 1791, Wright wrote as follows: "Erosions of the nose and palate, carious ulcers, "boneaches, &c., are produced by a long-continued use of mercurial alteratives and "decoction of the woods."

In 1817, Williamson said: "I feel considerable doubts as to the propriety of "administering mercury in any stage of the disease."

In 1819, Dancer wrote as follows: "That mercury is productive of more mischief "than good, when given early in the disease, seems generally acknowledged, and if it be

" ever necessary, it is only when the disease has subsisted for a certain period, and when " the virus has affected the constitution generally."

In the same year, Thomson condemned the mercurial treatment even in stronger language. He said: "The practitioner. . . has only one mode of practice, an alterative " course of mercury, and that the patient must undergo. If the symptoms should cease, " in a short time they again return, a second course must be submitted to, for the first " was not sufficient. I am ashamed to mention the number of courses I have seen a " poor creature go through, and I hardly would get credit if I related what has been " told me by old practitioners."

In 1831, Boyle, who wrote of his experience of the disease on the West Coast of Africa, also condemned the use of mercury; and, like his professional brethren in the West Indies, bore testimony to the fact that the so-called sequelæ of yaws were but the manifestations of a mercurial cachexia. He said: "The greatest mischief has, undoubt- " edly, resulted from the internal use of the last-mentioned medicine [mercury]; for the " particular results to be anticipated from its employment not being derivable, the " mercury, which at all times is uncalled for except when given so as to produce alterative " effects, is generally erroneously persevered in, until, at length, what appears to be a " rheumatic state of the constitution, and what, in truth, arises solely out of the mal- " administration of mercury, sets in; a state which has been erroneously enumerated " amongst the symptoms of the disorder."*

Maxwell, perhaps, of all the older writers had most experience of yaws, and his book gives abundant evidence that he made a careful study of the disease. Some of his theories I have had occasion already to show were erroneous, but his remarks on the results of the different methods of treatment must necessarily carry much weight as those of a careful and experienced physician. He sums up what he has to say on the mercurial treatment, then practised, in the following words: "Having frequent opportunities of " watching the progress of yaws, as it was treated by mercury, and when left to itself, I " soon perceived that the exhibition of this mineral in any of its preparations, possessed " a temporary influence in repelling the eruption, but the number of fatal cases which " followed its use, and the lamentable consequences to which the wretched patient was " doomed, induced me to look upon mercury as an exceedingly dangerous and destruc- " tive medicine in the treatment of yaws, and I abandoned its use in every case, and have " no reason to regret my determination."

Such remarkable evidence against the use of mercury in yaws by men of large experience of the disease deserves the most careful consideration, for these old physicians were as capable as we are now of judging as to whether a certain drug had a beneficial effect or otherwise.

Dr. Orgias, of Grenada, who may justly be considered as one of the authorities on yaws of the present day, and Mr. Foreman, of St. Kitts, who has had considerable experience of the disease in Dominica and Tortola, as well as in the island in which he now resides, both assert that mercury should not be administered. Dr. Orgias has found, by experience, that mercurial preparations often cause the symptoms to disappear only to return later on with increased severity. This harmful action, as has been shown, was noticed by the older writers, and my own experience enables me fully to corroborate it. In many instances, and more especially in chronic cases, small doses of mercury given after a prolonged course of tonic treatment have undoubtedly acted beneficially, but then the same may be said of other drugs, and it is difficult to determine whether the case may not have done equally well without the mercury as with it. Should the mineral be administered in any form its action must at once be stopped when the gums show signs of tenderness. In the wards of a hospital the effects of the drug on the constitution can be readily watched, but this is not the case in dispensary practice, and I noticed especially in Tobago that some of the patients taking mercury became salivated. In Tobago, too, where the mercurial treatment of the disease is uniformly followed, the percentage of relapses is high, and this fact corroborates the testimony of the older authorities as to relapses being dependent to a certain extent on the suppression of the disease by the administration of mercury in any of its various combinations.

The two following cases from my hospital memoranda will show, not only the ill effects of mercury, but also the fact that in some instances it even fails to suppress the characteristic symptoms of the disease.

Case 567.—Central Yaws Hospital. L. W., Negress, 18 years of age. Admitted on the 8th December, 1878, with encrusted tubercles on the arms, back, and left breast.

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* *A Practical Medico-Historical Account of the Western Coast of Africa.* By James Boyle. London. 1831.

Extensive ulceration of both legs, and a large ulcer on the right foot. The bones of the arms and legs are enlarged and nodular. The ulcer of the foot is wide and deeply excavated with everted edges; at the bottom is a large dark bleeding mass of granulations. The patient is cachectic, and very weak.

Five months ago she was attacked with yaws, and Mr._____, the owner of the estate, who, like other planters in the island, imagined he knew more about yaws than the medical officers, treated her with mercury, guaiac, and "zhebe gras" (*Commelyna cayennensis*, Rich). She was salivated, and remained in the misery of profuse ptyalism for "a long time." The yaws tubercles disappeared, and after she recovered from the salivation she thought herself cured of the disease. But soon afterwards the yaws returned, and the ulcers broke out.

After her admission to the hospital she was treated with chlorate of potash, cod liver oil, quinine and iron, and Easton's syrup. She was fed on nourishing and easily digestible food, and she received the egg, milk and brandy mixture, but in spite of every effort she got worse. On the 13th February, 1879, large unhealthy ulcers, causing much pain, broke out about the body, and she died on the 20th in great suffering and misery, her death undoubtedly having resulted from the native treatment pursued in the first instance.

Case 73.—Morne Bruce Hospital. J. M. St. C. 14. Negro. Admitted on the 12th July, 1882, with encrusted tubercles on the mucous membrane of both nostrils; a mass of similar tubercles on the forehead; a general eruption of "dartres," and "tubboes" in the soles of both feet. He has had yaws for "a long time," and has been twice salivated by native yaws doctors without benefit. He is now suffering from mercurial cachexia, and has mercurial tremor.

He was treated with tonics, and with the iodide and chlorate of potassium, and he apparently thoroughly recovered, and was discharged from the hospital on the 31st August, that is, after a stay of about seven weeks. But he was afterwards re-admitted for a relapse of the disease.

Iodide of potassium is recommended by 15 of the medical officers as a curative agent in yaws. It appears to have been used, in the first instance, by Robertson, who gave an account, in 1836, of its beneficial effects in the disease which he had failed to cure with mercury. He says as regards this latter drug that it only produced "temporary benefit, the "disease always relapsing." My own experience teaches me that iodide of potassium is most useful when given after the cessation of the formation of the granulomata. The drug is readily absorbed, and it is conveyed rapidly to all the tissues of the body. Lauder Brunton states that "The iodine set free from the iodide is taken up by the albuminous "substances, and the entrance of the iodine molecules into their composition causes "them to undergo more rapid metamorphosis."* This action readily explains the removal by absorption of the granulomata when the system is under the influence of the drug. But such removal is harmful if brought about too early in the disease; for, as I shall have to show later on, the special growths characteristic of yaws are simply the efforts of nature to localise the disease, and to prevent the general infection of the system with the virus.

Iron.—Various preparations of iron are also specially recommended by 15 medical officers. The use of the drug appears to have been first advised by Mason, in 1831, and since his time it has been commonly prescribed by most medical men having to treat the disease. As iron is a normal constituent of the body, it may, as pointed out by Lauder Brunton, "be regarded as a food as well as a medicine." Owing to the malnutrition of nearly all the negroes, anæmia prevails everywhere, and ferruginious tonics are indicated, therefore, in nearly every disease from which this class of people suffer. In the yaws hospital in Dominica iron is prescribed usually with a bitter infusion at the early stages of the disease, and such treatment is often followed by most beneficial results.

Arsenic.—Preparations of this mineral, exclusive of Donovan's solution, are advised to be given in the disease by 11 medical officers. I have been unable to find any reference to the action of arsenic in the literature of yaws until the publication, in 1879, of my third report on the Dominica Yaws Hospitals, in which a case is referred to as having rapidly recovered under the administration of liquor arsenicalis prescribed by Mr. Duke, the medical officer. The case was that of a girl who had been in the hospital several months

* *A Text Book of Pharmacology, Therapeutics and Materia Medica.* By T. Lauder Brunton, M.D., D.SC., F.R.S. 3rd Edition. London, 1887.

without benefit from treatment until Mr. Duke gave her arsenic; to him, therefore, belongs the credit of adopting the treatment, which was suggested by Cazenave in 1828. Since then the drug has become one of the recognised curative agents in the treatment of yaws, and it appears to be especially useful in chronic and abortive forms of the eruption, such as the squamous patches and papules which often persist for a long time. Its metabolic action on the epidermis is useful in occasioning the throwing off of affected epidermal cells, and the rapid regeneration of fresh and healthier ones.

Sarsaparilla.—This drug is recommended by six medical officers, and its use is general in Tobago, Mr. Purser, of that island, expressing his sense of its value as a remedy in yaws. Most of the older writers on the disease extol the use of sarsaparilla, and as it was a favourite drug in the treatment of syphilis, being prescribed with mercury, its employment in yaws can readily be understood. After a time, however, medical men began to doubt its virtues, and it was discarded at the early part of this century to be taken up again later on, as will be seen from the following extract from the Edinburgh Dispensatory published in 1826.

"It was first brought into Europe by the Spaniards, about the year 1563, with the "character of being a specific for the cure of the lues venerea, a disease which made "its appearance a little before that time, and likewise of several obstinate chronic "disorders. It then lost its reputatation, and was considered by many as a very inert "mucilaginous substance; and the diaphoresis, which it is sometimes supposed to "produce, was entirely ascribed to warm and diluent regimen employed at the same "time. More recently, however, it has come into favour for the cure of many "cutaneous affections, and especially of what are called syphiloid diseases; and if upon "just grounds, it will explain why it should have been so strongly recommended in "syphilis, and why it should have failed to retain its reputation."*

Sarsaparilla is now considered by some medical men to be a valuable alterative, tonic and diuretic, but Lauder Brunton says of its supposed virtues:—"It has been used "a good deal in syphilis, scrofula, chronic rheumatism, gout, and skin diseases, but "probably the good effects are due to the drug with which it is used."†

Sulphur.—This mineral was formerly much employed as a drug to be administered early in the disease. It was believed to favour the development of the eruption, and was usually given to that end before the inevitable "mercurial course." In 1769, Bancroft wrote as follows:—"It is usual to promote the eruption of the yaws, as soon "as they appear, by giving sulphur internally for some days. After several weeks, when "the eruption is not only complete, but the yaws suppurate, they may be cured by a "salivation with mercury."

In 1791, Wright wrote in the same strain. In 1802, Grainger advised the administration of sulphur "for expelling the yaws from the blood." In 1803, Collins asserted that "brimstone is a pretty safe and certain, though a slow cure." And, in 1836, Robertson said he considered it "advisable to keep the patient under the sulphur "powders for a period of not less than six weeks or two months."

The sulphur treatment in the early stages of the disease was strongly recommended by Imray, in 1872, and it has since then been employed with success in many cases in the Dominica yaws hospitals. It does not appear, however, to be much in use now in the Antilles, judging by the replies to the interrogation.

The action of sulphur on the skin, when the drug is taken internally, is to stimulate the cutaneous circulation, thereby relieving chronic congestion, and assisting in the repair of lesions and the absorption of damaged tissue. It acts also as a mild laxative, stimulating the whole course of the mucous lining of the alimentary canal. All these actions are likely to be of benefit in the treatment of yaws, and it is perhaps to be regretted that sulphur is not used as much at the present time as it was in the past.

Local Treatment.

No local treatment whatever is recommended by 11 of the forty medical officers from whom replies were received; and, of the remaining 29, 24 advise the use of antiseptics to the granulomata, and five suggest their destruction by the means of caustics. In three instances astringents are recommended to be applied in conjunction with the antiseptic ointments or solutions.

As the disease is contagious, and as the virus is found in abundant activity in the crusts, and in the secretions from the granulomata and the ulcers, antiseptics can do no

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* *The Edinburgh New Dispensatory.* By Andrew Duncan, Jun., M.D. 11th Edition. Edinburgh. 1826.
† Op. cit.

harm, and they may in certain instances be followed by useful results. But the case is different in regard to caustics. Dr. Mapleton says that solid nitrate of silver, well rubbed in, is "a certain cure for tubercles," and Mr. C. R. Edwards advises the local application of caustics to be followed by stimulating ointments; the other three medical officers who recommend this escharotic treatment have not had so large an experience as Dr. Mapleton and Mr. Edwards, so it will be advantageous to examine into the results of the practice of these two gentlemen.

Now, in his reply to the 10th interrogation, Dr. Mapleton says:—"The disease "almost always relapses after a variable time;" and the case book of the Nevis Yaws Hospital shows that the percentage of relapses is nearly double that of any other yaws hospital. This remarkable preponderance of relapses in the practice of two medical officers who employ the treatment of destroying the tubercles is, as I shall have to show later on, not a mere coincidence. The pathological investigations I have been able to carry on have thrown light not only on the nature but also on the treatment of the disease, as will be fully explained in the next chapter of this report.

13.

Are persons afflicted with yaws treated by unqualified persons in the island in which you reside? If so, state any facts connected with this matter that you are acquainted with.

It has been shown in several places in this report that throughout the West Indies there is a belief amongst the people that medical men are unable to cure yaws, and that the bush doctors understand all about the disease and are very successful in its treatment with their native remedies Unfortunately this belief, which is also held by many persons in the middle rank, and a few persons in the upper class of society in the island communities, has done much harm, for it has given rise to a passive opposition to the measures undertaken for controlling the spread of yaws by the various Governments, and it is responsible to a considerable extent for the attempted evasion of compulsory medical treatment on the part of those afflicted with the disease.

In these circumstances it appeared to me to be necessary to make a careful inquiry into all the facts surrounding the question, and to that end an interrogation was framed so as to elicit any information the various medical officers might have been able to give on the subject. Replies were received from 40 of these officers. Four of them were unable to furnish any information whatever; and, of the remaining 36, eight stated that persons suffering from yaws were not treated by unqualified persons, and 28 replied that they were acquainted with the fact that the people often applied to the "bush doctors" to be cured of the disease.

Mr. Williams, of Dominica, asserts that the native treatment is, "as a rule, very successful." And he is the only medical officer who bears testimony to the success of the treatment of the "bush doctors." He does not, however, bring forward any evidence in support of his statement, nor does he give any details concerning the methods adopted.

Most of the medical officers do not appear to have directed attention to the question; and, except in two or three instances, no details concerning the native treatment have been given. I was almost entirely dependent, therefore, on my own inquiries and observation for information on the subject. In previous sections of this report full details have been given of any facts bearing on the question that have come to my knowledge; and I endeavoured in every instance to obtain botanical specimens of the plants used as yaws remedies in order that their genera and species might be scientifically determined. Many of them were already known to me, and the others were identified by the scientific staff of the Royal Gardens at Kew. And I would here express my acknowledgments to the Director and the Assistant-Director for the help they so willingly afforded me in this matter.

From the replies to the interrogation it would appear that in Tobago alone, of all the islands visited, the people do not apply to the native yaws doctor for treatment. noticed, however, during my visits to the country parts that clay was often applied to the yaws ulcers, and that at the eastern end of the island the pounded leaves of a plant called the "Easter bush" were used as a poultice to the tubercles. Unfortunately, the bushes were not in flower, and so specimens could not be got for determination; but, from the shape of the leaves and other general characters, the plant was probably a species of *Bauhinia*.

Mr. E. D. Ewen, the proprietor of the Hermitage Estate, lying between Charlotteville and Parlatuvier, was good enough to copy out for me some notes he had taken several years before on the native yaws remedies, and the following extract from the paper he sent me shows that in Tobago, as elsewhere in the West Indies, the bush doctors have a number of native remedies for the cure of yaws :—

" (1.) Moko or mafúbé (*Musa sp.*), three leaves pounded and macerated 24 hours in " 1 gallon cold water. Dose, a teacupful three times a day.

" (2.) Wood ants (*Termites*) and nest. A large piece of the nest with its inhabitants " to be pounded and macerated in 1 gallon cold water till the latter turn red (about 24 " hours). Dose, three teacupfuls *per diem*.

" (3.) Silk grass roots (*Furcræa cubensis*). A decoction of root used as a substitute " for sarsaparilla, and to bring yaws to the surface. Dose, 1 pint morning and evening.

" (4.) (Communicated to me as a great favour and certain cure) :—

" (*a.*) Indigo leaves (*Indigofera anil*), ½ lb. ; Soucumba root (*Solanum " mammosum*), ½ lb. Pound together and boil down in two quarts water to 1 quart, " strain.

" (*b.*) Cogwood leaves (*Tecoma pentaphylla*) and bark, ½ lb. ; cocoanut root " (*Cocos nucifera*), ½ lb. Pound and boil down in 1 quart sea water and 1 quart " fresh water to 1 quart, strain.

" (*c.*) Silk grass root (*Fucræa cubensis*), 1 lb. ; lime tree roots (*Citrus medica*, " var. *acida*), 1 lb. Pound and set to ferment in 1 gallon molasses. On " fermentation, mix with decoctions (*a.*) and (*b.*), and strain. Dose, 1 wineglassful " three times *per diem* in yaws and rheumatism."

Whilst in St. Lucia I had occasion to inquire very carefully into the question of the native treatment of the disease, and with Dr. Lestrade I visited the house at Vieux Fort of a celebrated yaws doctor, and found two of his children suffering badly from the malady which he had undertaken to cure a long time before. In this instance two of the assistant colonial surgeons were permitted to watch the treatment, and so far from cures being effected the patients were much worse from the nostrums administered. The correspondence on the native treatment of yaws in St. Lucia, placed in the Appendix of this report, shows the exaggerated language used even by persons of intelligence and education when they come to discuss the question. Mr. Cooper doubtless had seen some cases of relapse of the disease after treatment in the St. Lucia Yaws Hospital ; and, not knowing that yaws is of a relapsing nature, he ran away with the idea that the medical officers did not understand the treatment. There is abundant evidence elsewhere in this report to prove that relapses are frequent after native treatment ; but, as I have shown, these cases are explained away by the bush doctors, who assert that their directions have not been carried out properly.

In countries where the lower orders of the people are still steeped in ignorance and superstition, the belief in the superhuman power of the obeah men and bush doctors will take a long time to eradicate. The history of the gradual evolution of the higher civilisation of the world shows parallel instances in European countries, and even now the quack doctor finds his dupes everywhere.

In his Sanitary Report on his district in Nevis, for the quarter ended the 31st December 1887, Mr. C. R. Edwards made the following pregnant remarks on this question :—

" The usefulness of a medical man in this island is much impeded by the ignorance " and superstitions of the people and by the neglect in carrying out instructions which is " met with everywhere. In a large number of instances the medical man is not sent for " until the patient, who has been ill a week or more, is in a moribund condition. There " are also certain diseases in which it is thought ' Doctor's Medicine ' is of no avail, and " the native herbalist only can do any good ; in these cases the medicines are never " administered, the instructions always disregarded."

In 1840, Levacher thus wrote of the native treatment of yaws in St. Lucia :—

" Dans les colonies, la thérapeutique des différentes espèces de *pian* et de *crabe* est " assez souvent adroitement exploitée par quelques nègres mystérieux. Retirés sur de " petites habitations dans l'intérieur des terres, ils y exercent la médecine et la nécro- " mancie avec la tranquillité la plus absolue. Parfois même ils captent la confiance de " quelques habitans crédules, et leur habileté consiste surtout à en obtenir des sommes " assez considérables.

" Le charlatanisme a, comme on le voit, partout ses adeptes. La cupidité les lui " procure, aussi bien dans les Antilles et parmi les nègres les plus obscurs, qu' au sein " de nos cités le plus belles et au milieu des hommes les mieux civilisés!"

The mystery surrounding the methods of treatment of the bush doctors, which Levacher noticed in his day, still surrounds the practice of the negro yaws doctor of the present time. Certain tisanes are drank for a certain number of days, and the period must neither be curtailed nor lengthened; and into the tisanes and mixtures are put things, such as wood ants and their nests, that clearly show the African origin of the compounds. Winterbottom, in his account of the native treatment of the disease on the West Coast of Africa, in 1803, mentions the fact that a quantity of black ants are put into one of the decoctions; and he further states that a white slave trader, who caught yaws and placed himself under the care of a bush doctor, derived no benefit from the treatment, and expressed his belief that the natives were unable to cut short the disease. Mr. Semper, of St. Kitts, states that even now the people of that island imagine that the drinking of gunpowder and rum will cure yaws; and pounded conch shells are used at the present day by the negroes in Dominica as they were by the Caribs centuries ago. In the early part of this century, it was customary in Jamaica to cram the fissures in " crab yaws " with gunpowder, and then to explode it with a lighted match. Dancer naively remarks that this treatment " produces a sore of a new kind."

I have noticed that the mystic number three is commonly employed by these negro medicine men and women. Thus, in their tisanes, of each root three small pieces must be used. I once asked an old woman whether one large piece would not answer the same purpose, and was gravely informed that the decoction would lose its virtue if the pieces of roots, &c., were not put in by threes.

Some of the indigenous plants, however, undoubtedly possess certain virtues that may be of service in the treatment of the disease; and, were they alone used, no mischief to the constitution would result. But, unhappily, most potent drugs are pressed into service by these people, and it results that much unnecessary suffering, long and lingering illnesses, and, at times, deaths, occur from mineral poisoning in the ignorant efforts to treat yaws.

I have already given details of one case of death and of several cases of much suffering brought about by the excessive mercurialism of wretched people by quack doctors who professed to be able to cure the disease. In my third report on the Dominica Yaws Hospitals this matter was alluded to in the following words:—

" In Jamaica, it is stated by Dr. Bowerbank that mercury in some form or other is " the basis of the various nostrums given for the purpose of curing the yaws, and the " same may with truth be said of Dominica. The mischief which is done by this indis- " criminate use of mercury can scarcely be overestimated. The worst cases of yaws " that have come under my notice have been those which the native quacks have failed " to cure. These patients would have been far better if they had never undergone any " treatment at all, for then their constitutions would not have been ruined by the " reckless administration of powerful poisons by persons ignorant of all principles of " medical science."

Mr. Williams, of Dominica, who now bears testimony to the success of the native treatment, has recorded the fact that much mischief is done by the ignorant use of powerful drugs by the yaws doctors. In a sanitary report on his district dated September, 1881, he thus alludes to the matter:—

" One of the most frequent and most troublesome maladies that I have to deal with " is the after effects of mercury or iodide of potassium taken by the natives to cure " yaws; they do not seem to take large doses, but as during the time they take the " remedy, as they call it, the person is confined in a room with closed doors and windows " and the very minimum of food taken, the effect is often very serious; anæmia and " colic being brought on which is very difficult to deal with."

Several of the medical officers in their replies to the interrogation refer to the reckless administration of mercury by the bush doctors, and that the practice is an old one is seen by the following extract from Williamson's work, published in 1817:—

" Old women and others, who profess to cure yaws more rapidly than others, find " means to introduce mercury to their systems, and thus accomplish deceptive cures, " which are followed by all the miseries of bone-ache, deformity, ulcerations, &c."

On reference to the notes on the cases I examined in the country districts of Dominica, it will be seen that several of the persons were taking corrosive sublimate and other mercurial medicines that they had bought at the apothecaries' shops. One of the bottles was shown to me, and the label was marked "The mercurial mixture: a dessert-spoonful twice a day." On my return to the town of Roseau I wrote to the druggist who supplied

the medicine asking him what was the composition of the mixture, and he denied that he ever sold mercury to the people! Another druggist in the town made no mystery about the matter, but frankly informed my secretary that he often sold yaws medicines to the people. He said his method of treatment of the disease was to give Plummer's pill in five grain doses, and to "follow up the treatment with iodide of potassium in doses "varying according to age." He further volunteered the information that he believes the rival druggist, who had denied ever selling mercury to the people, was in the habit of bartering corrosive sublimate with them for money. He gave them about 10 grains of this powerful drug, and directed them to put it into a bottle full of rum, and to take a table-spoonful every day.

There is no wonder that, with such facilities for obtaining powerful metallic poisons, the medical men often see such deplorable cases of disease aggravated by mercurial cachexia. It would be well for the people if a Poisons Act, based on the Imperial measure, were adopted in every West Indian colony. Indeed such a plan was suggested by Dr Milroy in an article in the *Medical Times and Gazette* of the 11th October, 1879. He said:—"As it is mentioned in Dr. Nicholls' Report that serious mischief continues "to be done in Dominica, as is well known to be the case in other West India colonies, "by the unchecked use of various nostrums for the alleged cure of yaws (all of which "so-called remedies contain, it is believed, some mercurial preparation), it would be well "if the sale of such quack medicines were strictly prohibited by severe penalties."

When the yaws hospitals were first opened in Dominica the common tisanes of the island were given instead of the old decoctions that were recommended by the early authorities on the disease. Dr. Imray thus alluded to the matter in his paper on yaws, published in Dr. Milroy's Report:—

"In former times it was considered an indispensable part of the treatment that "patients should drink during a certain stage of the disease the compound decoction "of sarsaparilla, or decoction of the woods as it was called." * At the present day, the "yaws tisane of the country has taken its place, its curative powers being implicitly "believed in. Guaiac wood is still added to the tisane. The decoction is made for the "most part by boiling together the roots, wood, and bark of several indigenous plants. The "native sarsaparilla is substituted for the more costly officinal root, and probably it is "equally efficacious."

When I took over the direction of the Dominica Yaws Hospitals, in 1877, I found that this tisane was being given to the patients at the Morne Bruce Hospital, the old black nurse boiling the bush medicines for the patients once or twice a week. I stopped the system, and never found any reason to regret my action.

As I have already said, several of the native remedies possess undoubted medicinal virtues. Some of the plants have been recommended by the older writers for use in yaws and other diseases, whilst several of them possess properties the precise nature of which has not been carefully investigated. The method of using these "bush remedies" at the present time has been detailed in the account of my proceedings at the various islands. But the knowledge I was able to gain of their medicinal properties, &c., may advantageously be given in this section of the report, and for the convenience of reference it is proposed to consider the various remedies under the following scientific arrangement of classes and natural orders.

ANIMAL KINGDOM.

Mollusca.

1. *Strombus gigas*, L. Conch shell. Lambys, Dominica. A gasteropod inhabiting one of the largest of living shells, the lip of which is widely expanded. The mollusk is common in the Caribbean Sea, and the people dive for it in the shallows. The shells are burnt and are thereby converted into lime, which is mixed with water, and drank either by itself or in combination with decoctions of native remedies. This lime water is used by the people of Dominica in the treatment of yaws.

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* Dr. Imray was in error here, for the *Decoctum Guaiaci officinalis compositum* of the old pharmacopœias was called commonly *Decoctum lignorum*, or decoction of the woods. In the *Lexicon Medicum*, published in 1839, it is directed to be made in the following manner:—"Take of guaiacum raspings, ℥iij; raisins stoned, ℥ij; sassafras "root, liquorice, each ℥j; water Ox. Boil the guaiacum and raisins with the water, over a gentle fire, to the "consumption of one half; adding towards the end the sassafras and liquorice. Strain the liquor without "expression." It was said to be an useful remedy "in rheumatic and cutaneous diseases, which are dependent on "a vitiated state of the humours."

According to Rochfort, lambys was employed by the Caribs as a remedy for "pyans," which some writers consider to have been identical with yaws. He thus describes the Carib remedy for the disease: "Ils ont une écorce d'arbre appellée *Chipiou*, "amère comme suye, laquelle ils font tremper dans de l'eau, & ayant rapé dans cette "infusion le fonds d'un certain gros coquillage qu'on nomme *Lambys*, ils avalent cette "Medecine."*

In 1803, Collins thus alluded to this remedy: "Calcareous powders, such as the "shell of the conc calcined, and given to the quantity of a drachm or two in a day, has "been frequently employed by the negro doctors for the cure of the yaws, and, as I have "understood with great effect, even in cases that had baffled the art of the regular "practitioner."

This conch water is practically the same as the Liquor Calcis of the British Pharmacopœia. Its action when taken is antacid and slighily astringent. Owing to their errors of diet, many of the negroes suffer from dyspeptic complaints, and the lime water, by curing the dyspepsia, in some instances would promote assimilation of the food, thereby indirectly benefiting cases of yaws.

Insecta.

2. *Termes arborum*, Smeathm. Wood ants. Pou de bois, Dominica. These insects occur in all the larger and wooded West Indian Islands. Their nests are sometimes several feet in circumference, and are usually made about trees or abandoned wooden buildings. The nests are brown in colour, and made up of numerous chambers and galleries from which there are covered ways leading in all directions to the wood on which the insects feed. The material of which the nests and galleries are composed is a hard stuff that has been made up of wood worked into a powder by the mandibles of the insects, and made into a mortar by admixture of a secretion of these termites.

It is impossible to say what is the medicinal action, if any, of these insects and their nests. Probably they are added to the tisanes for some occult purpose. They are used by the bush doctors of Dominica, St. Lucia, and Tobago.

VEGETABLE KINGDOM.

Anonacæ.

3. *Anona muricata*, L. Sour sop. Corossol, Dominica and St. Lucia. The leaves of this tree are used in the "petit tisane" of St. Lucia.

Action: anti-spasmodic and sedative.

Menispermeæ.

4. *Cissampelos Pareira*, L. Velvet leaf. Pareira brava. According to Levacher the root of this vine was largely used in St. Lucia as a yaws remedy. In his work he recommends half an ounce of the roots to be boiled in a pint of water and sweetened, and a cupful to be taken morning and evening. He says "this tisane," or a similar one made of the roots of the langue-bœuf, "is employed with as much success as that of "sarsaparilla."

Action: alterative and diuretic. It is supposed also to be useful in cystitis.

Malvaceæ.

5. *Sida rhombifolia*, L. Gros ballier, Dominica and St. Lucia. Used in the "petit tisane" of the latter island.

Action: demulcent. It cannot, therefore, be of any service in yaws.

6. *Malachra capitata*, L. Wild ochro. Guimauve, Dominica and St. Lucia. This plant is an annual, and is used in St. Lucia in a similar manner to the preceding.

Action: demulcent.

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* *Histoire Naturelle et Morale des Isles Antilles de l'Amérique.* 2nd Edition. Rotterdam. 1665.

Bombaceæ.

7. *Eriodendron anfractuosum*, DC. Silk cotton tree. Jumby tree. Fommager, Dominica and St. Lucia. The large spines with which the young trees are armed are used in the latter island in the "petit tisane." The property of the order, like that of the *Malvaceæ*, is mucilaginous, and, therefore, the woody spines cannot possess any curative virtues.

Maxwell states that the bark of the tree was a yaws remedy of repute amongst the negroes of Jamaica, and he says he used it "with very little benefit," and goes on to assert that after a fair trial he looked "with a degree of suspicion upon many of the "simple vegetable substances thrust forward with superior claims."

The spines and bark of the silk cotton tree are probably used in order to work upon the people's superstition, for the tree is regarded by many of the negroes with dread, as it is supposed to be the abode of evil spirits. A planter in Grenada told me that he was unable to induce his labourers to cut down a silk cotton tree he wished to destroy, for the people imagined that "the jumbies" inhabiting the tree would do them some injury.

Macfadyen thus describes the belief of the negroes regarding the tree: "Even in "a state of decay, it is an object of their superstitious fears; they regard it as consecrated "to evil spirits, whose favour they seek to conciliate by offerings placed at its base."*

Guttiferæ.

8. *Clusia rosea*, L. Kaklin, Dominica. The large rounded fleshy fruits of this tree are pounded in Dominica and sometimes used as applications to yaws in the soles of the feet. The fruit is an irritant poison.

9. *Mammea americana*, L. Mammee apple. A decoction of the bark of this large tree is used as a local application to the yaws eruption. Maxwell recommends, in the case of crab yaws, after the application of gentle escharotics, "the subsequent immersion "of the feet in a strong decoction of mammee bark, *Mammea americana*, for several days." He says that this plan is also efficacious in "running yaws."

Action: astringent.

Sapindaceæ.

10. *Melicocca bijuga*, L. Genip. Genipayer. This is a large tree that grows in many of the West Indian Islands. It bears an oval berry over an inch in length, and the thin layer of yellowish pulp lying between the large seed and the pericarp is eaten by the people. This pulp, De Rochfort states, was used by the Caribs as local applications to the sores produced by the pyans, and he calls the fruit junipa. Du Tertre, in 1667, states that the Caribs blacken their bodies with the juice of the "genipa," and with the burnt leaves of the "roseau," when they are attacked with "epian."†

Action: purgative. Descourtilz states as follows: "Une poignée des racines du "Genipayer, dans une pinte d'eau réduite à chopine, procure une tisane purgative, qu'on "boit matin et soir pendant huit à neuf jours, et qui guérit la gonorrhée."‡

Meliaceæ.

11. *Cedrela odorata*, L. Red cedar. In Montserrat the leaves of this tree are pounded and used as a dressing for sores.

Action: slightly astringent and antiseptic.

Aurantiaceæ.

12. *Citrus medica*, *var. acida*, Brand. Lime. The juice of the acid fruit is taken with sea water as a yaws remedy in St. Kitts. A decoction of the roots is sometimes drunk in Dominica in periodic fevers; and in Tobago a similar decoction is used as a yaws remedy.

Action: tonic, febrifuge and anti-scorbutic.

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* *The Flora of Jamaica.* By James Macfadyen, M.D. London. 1837.
† *Histoire Générale des Antilles habituées par les François.* Par le R. P. du Tertre. 3 vols. Paris. 1667.
‡ *Flore Médicale des Antilles.* Par M. E. Descourtilz. Paris. 1821.

13. *Citrus aurantium var, Bigaradia*, Duh. Sour orange. In St. Kitts the roasted fruit cut in two is used as a local application to the yaws tubercles. It acts as a stimulating dressing.

Action: anti-scorbutic.

Zygophylleæ.

14. *Guaiacum officinale*, L. Guaiac. The wood and the gum of this tree are largely used in most of the islands by the "yaws doctors." As the drug has been admitted into the British Pharmacopœia it is unnecessary to remark on its action here.

Rutaceæ.

15. *Zanthoxylum clava-Herculis*, L. Prickly ash, Jamaica. Epineux, Dominica. A decoction of the young roots, according to Mr. E. D. Ewen, is used in Tobago as a yaws remedy. In Jamaica it has the reputation amongst the negroes of throwing out the yaws.

Action: Lunan states that the medicinal properties are sedative, soporific and antispasmodic*; and Macfadyen says that the bark is sudorific, diuretic and febrifuge.

Ampelideæ.

16. *Cissus sicyoides*, L. Liane brillante, Dominica. Bastard bryony, yaws bush, Jamaica. The root is used in tisanes in Dominica, and the leaves are employed as plasters for wounds in some of the other islands.

Action: a stimulant diuretic.

Leguminosæ.

17. *Crotalaria stipularis*, Desv. Shak-shak, Dominica. The root is used in tisanes in that island.

Action: unknown.

18. *Indigofera Anil*, L. Indigo. The leaves are used in Tobago as a yaws remedy.

Action: hepatic stimulant, a decoction of the leaves is used as an insecticide.

19. *Desmodium incanum*, DC. Corde-à-violon. This weed is used in St. Lucia as one of the ingredients of the yaws tisanes. It has no medicinal properties.

20. *Piscidia Erythrina*, L. Dogwood. The pounded root bark is used in the Virgin Islands as an application to the yaws tubercles.

Action: sedative; it causes dilatations of the pupil. When thrown into rivers the bark intoxicates fish.

21. *Guilandina Bonducella*, L. Nicker seeds. Oua-oui (a Carib name), Dominica. Grainger says burnt nickers are good for "expelling the yaws from the blood."

Action: febrifuge, tonic and astringent.

22. *Cassia Fistula*, L. Purging cassia. Casse, Dominica and St. Lucia.

Action: the pulp contained within the long pods is used as a laxative medicine.

23. *Cassia occidentalis*, L. Stinking-weed. L'herbe puante, café marron, Dominica and St. Lucia. The root is used in the yaws decoctions and tisanes in Dominica and St. Kitts.

Action: diuretic; it is said to stimulate the lymphatic system. A decoction is useful in "prickly heat," lichen tropicus.

24. *Entada polystachya*, DC. Racine Pâque, Dominica. This is a high forest climber, and the tuberous roots are used in the yaws tisanes.

Action: unknown.

Combretaceæ.

25. *Bucida Buceras*, L. Wild olive. Olivier, Dominica and St. Lucia. The bark of the tree is used in the Dominica yaws tisanes.

Action: astringent. The bark is used for tanning leather.

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* *Hortus Jamaicensis.* By John Lunan. 2 vols. Jamaica. 1814.

Cacteæ.

26. *Opuntia Tuna*, Mill. *O. triacantha*, Haw. Prickly pear. Raquette, Dominica and St. Lucia. In all the islands the soft cellular substance from the stems is used as a local application to yaws and other sores and ulcers; and it really makes an excellent emollient cataplasm. Mr. Ewen states that in Tobago the stems are split and the cellular substance is then beaten out and mixed with grease before being applied as a poultice.

Crassulaceæ.

27. *Bryophyllum calycinum*, Salisb. Headache bush. Feuille mal tête, Dominica. Leaf of life, Jamaica. The pounded leaves are used as dressings for ulcers and sores, and the fresh leaves are applied to the brow and temples in headaches.

Rubiaceæ.

28. *Gonzalea spicata*, Gr. Bois touloulou, Dominica. The root is used in the yaws tisanes of that island.

Action: unknown.

29. *Exostemma floribundum*, R.S. Quina. St. Lucia bark. In reply to the 9th interrogation Mr. Numa Rat stated that the bark of this tree is used by the Caribs of Dominica as a yaws remedy. It is a favourite native drug for the cure of fevers and dysentery. Nicolson describes the plant under the name of kinkina. He states that the Carib name is *oulikaëra*, and says "l'écorce de cet arbrisseau est fébrifuge."*

Action: in small doses, tonic; in large doses, febrifuge, emetic and purgative. It appears to have valuable anti-periodic properties, although there is no quinine in the bark.

30. *Chiococca racemosa*, Jacq. Petit branda, Dominica. According to Imray the roots of this scandent shrub are used in the yaws tisanes of Dominica.

Action: diuretic.

31. *Palicourea crocea*, DC. Fleuri Noël, Dominica. The root of this shrub is used in making the Dominica yaws tisanes.

Action: emetic in large doses, diaphoretic in small ones.

Compositæ.

32. *Eupatorium odoratum*, L. Guéri-vite, Dominica. Piaba bush, St. Vincent. The root of this plant is used in making yaws tisanes in Dominica, and the pounded leaves are applied as a dressing to yaws ulcers in St. Vincent. I was unable to obtain a specimen of the "piaba bush" when I was in St. Vincent, and I have to thank Mr. Powell, the Curator of the Botanic Station, for identifying it as *Eupatorium odoratum*.

Action: diuretic.

33. *Bidens leucanthus*, W. Spanish needle, Montserrat. In this island the plant is pounded up, mixed with syrup and applied to "tubboes" in the soles of the feet.

34. *Neurolæna lobata*, R. Br. L'herbe-à-pique, Dominica and Trinidad. The plant is the "chipiou" of the Caribs of the former island, and this fact identifies it with the plant of the same name mentioned by De Rochfort, in 1665, as a remedy for pyans. It is now used in the cure of fevers in Dominica and Trinidad, and in the former island a decoction is employed to kill fleas and other insects infesting domestic animals.

Action: tonic, febrifuge and anti-periodic.

Oleineæ.

35. *Linociera compacta*, R. Br. Bois-fer, Dominica and St. Lucia. The root of this tree is used in making the tisanes employed in these islands.

Action: it has a reputation as an anti-syphilitic remedy.

Apocyneæ.

36. *Tabernæmontana citrifolia*, Jacq. Bois lait. The roots of this small tree are stated by Imray to be used in making yaws tisanes in Dominica.

Action: febrifuge.

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* *Essai sur l'Histoire Naturelle de l'Isle de Saint-Domingue.* Paris. 1776.

Solaneæ.

37. *Solanum mammosum*, L. Turkey berry. Soucumba, Tobago. Melongène bâtard, Dominica. According to Mr. Ewen, the root of this plant made into a decoction with indigo leaves is considered to be a certain cure for yaws.

Action: tonic and diuretic.

Bignoniaceæ.

38. *Tecoma leucoxylon*, Mart. White cedar; Poirier, Dominica. The bark of this tree is used in the preparation of the yaws tisanes in that island.

Action: mildly astringent.

39. *Tecoma spectabilis*, Planch. Cogwood, Tobago. According to Mr. Ewen the leaves and bark of this tree are used as yaws remedies in Tobago.

Labiatæ.

40. *Hyptis suaveolens*, Poit. Frombasin, Dominica and Trinidad. In the former island the leaves of this plant are pounded and applied as a dressing to yaws ulcers.

Action: aromatic and astringent.

41. *Mentha viridis*, L. Mint. Sweet marjoram, St. Kitts. An infusion of the plant is used in that island as a yaws medicine.

Action: aromatic, stimulant, carminative.

Verbenaceæ.

42. *Stachytarpha jamaicensis*, V. Vervain: Jamaica, Trinidad, Tobago, St. Vincent, and Dominica. This plant appears to be used as a yaws medicine throughout the West Indies, either in a decoction by itself or as an adjunct to other native remedies. It is one of the most widely distributed plants in the Antilles. I saw it growing in nearly all the islands, from the dry seashore in the Grenadines to the mountain passes in Dominica and St. Vincent, at an elevation of between 2,000 and 3,000 feet.

In 1803, Collins asserted that the juice of the plant produces the same effect in the disease as sulphur; he advised that it should be "taken in such quantities as to occasion "two or three stools a day."

Action: purgative, emmenogogue.

43. *Vitex divaricata*, Sw. Bois lézard, Dominica. According to Imray the root of this tree is used in making the Dominica yaws tisanes. In Tobago, the leaves, according to Mr. Ewen, are boiled with grease and applied to the yaws tubercles.

Action: unknown.

Polygoneæ.

44. *Coccoloba uvifera*, Jacq. Seaside grape. Raisin bord de mer, Dominica. The bark of this tree is used in making the Dominica yaws tisanes.

Action: astringent.

Euphorbiaceæ.

45. *Jatropha Curcas*, L. Physic-nut. Médecinier, Dominica and St. Lucia. Body-killer, Montserrat. Barricader bush, St. Kitts. In Dominica the pounded leaves are a favourite application to all kinds of ulcers. In Montserrat the leaves are made into a tea, and given in yaws. In St. Kitts the young shoots are crushed in water, and the yaws tubercles and ulcers are bathed with the decoction so formed.

Action: the seeds are a powerful purgative and emetic; the leaves used locally are sedative and detergent.

46. *Janipha Manihot*, Kth. Cassava. In Montserrat and other islands the pounded root is used as a poultice to yaws sores. The starchy meal obtained from the large tuberous roots forms a considerable portion of the food of the negroes in some of the islands, and it is also used to make poultices with.

47. *Ricinus communis*, L. Castor-oil shrub. Palma Christi. Carapat, Dominica. The leaves are used as applications to sores and ulcers in all the islands. In 1802, Collins advised that when the negroes' feet are affected with tubboes, the parts should be bathed in a decoction of the leaves of the castor bush, and that then the attendant should "pare the callus to the quick," a cow-dung poultice being applied afterwards.

48. *Croton balsamifer*, L. White sage, Montserrat. Tubboe bush, St. Kitts. Seaside balsam, Nevis. The leaves and herbaceous stems of this shrub abound with a greenish juice, which is used as a vulnerary. The leaves are made into a tea which is drunk in cases of yaws, and a decoction of the leaves and young stems is used as a local application to the affected parts.

Action: purgative, aromatic, and emmenogogue.

49. *Hippomane Mancinella*, L. Manchioneel. Every part of this tree, which is common on the sandy seashore of many of the West Indian islands, abounds with a milky juice of a very poisonous and acrid nature. This juice inspissates into a gum, which is stated by Lunan to be useful in dropsical affections. In Antigua, the juice of the tree is applied to the yaws tubercles, and it is there considered by the people to be "a radical cure." Chisholm mentions the fact that the manchioneel apples burnt over a fire are used by the negroes in the West Indies to cure the "tubboes" and "crab "yaws" in the following manner: A hole being dug in the sand, alternate layers of charcoal and manchioneel apples are laid in it. The charcoal is then lighted, and a piece of thick cloth is laid over all. The feet are then held in the thick vapour that arises, and kept there for an hour. At the end of this time "the crabs, which before "the application of the steam were hard and intractable, are now completely rotten, "insomuch that, without giving the least pain, they are picked out with a small pointed "knife."

Sea water, or the tender buds of the white cedar tree, *Tecoma leucoxylon*, are said to be antidotes to the manchioneel poison.

50. *Euphorbia hypericifolia*, L. Demerara tamarind, St. Kitts. Used in that island as a yaws remedy. The leaves are made into a decoction.

Action: sedative and anti-spasmodic.

Begoniaceæ.

51. *Begonia dominicalis*, A.DC. Begonia. Oseille de bois, Dominica. The pounded leaves of this begonia are applied to yaws ulcers.

Aroideæ.

52. *Anthurium macrophyllum*, Endl.; *A. Huegelii*, Schott. Seguine, Dominica. Rock seguine, St. Lucia. The roots of these plants are considered to be valuable yaws remedies in Dominica and St. Lucia.

Action: alterative, and reputed anti-syphilitic.

53. *Anthurium palmatum*, Kth. Through the kindness of Mr. Numa Rat, who made inquiries amongst the Caribs in Dominica whilst on a visit to their reserve, I was enabled to get specimens of the "chipiou" (*Neurolæna lobata*) and of this plant, which is the "miby" alluded to by De Rochfort as a Carib remedy for pyans. The juice of the stem was expressed and drunk by those suffering from the disease.

Action: alterative.

54. *Dieffenbachia Seguine*, Schott. Dumb cane. Seguine. Canne marronne, Dominica. The juice of this plant is an acrid poison, and it has been used by the Obeah men and others with murderous intent. According to Lunan "the expressed juice is "used for curing yaws."

55. *Colocacia esculenta*, Schott. Tania. Eddoe. The tuberous rhizomes of this plant are pounded in Tobago and used as stimulating applications to yaws ulcers and sores. They contain much starch and an acrid principle which is dissipated by heat.

Palmeæ.

56. *Cocos nucifera*, L. Coconut. The roots of this palm are employed as yaws remedies in Dominica and Tobago.

Action: stomachic and diuretic.

Commelyneæ.

57. *Commelyna cayennensis*, Rich. L'herbe grasse. Zhèbe gras, Dominica and St. Lucia. Used in the Dominica yaws tisanes.

Action: demulcent.

Gramineæ.

58. *Gynerium saccharoides*, Humb. Roseau reed. The roots of this tall reed are used in the preparation of yaws tisanes in St. Lucia. It is stated by De Rochfort that the Caribs mixed the ashes of burnt roseaus with water obtained from the bases of the leaves of balisiers (*Heliconia* sp.), and this alkaline solution was used as a lotion to bathe the sores produced by the "pyans." Du Tertre, in 1667, also mentions that the burnt leaves of the roseaus was used by the Caribs as an external application. And Nicolson gives *jacapé* as the Carib name for the reed.

Action: roots, diuretic; ashes, antacid.

59. *Paspalum conjugatum*, Berg. Cow grass. Employed as a yaws remedy in St. Lucia.

Action: demulcent.

60. *Andropogon citratus*, DC. Lemon grass. A tea made of this grass is used as a common drink in yaws and other diseases throughout the West Indies. In 1836, Robertson recommended it, and advised the addition of a small quantity of liquor potassæ or carbonate of potash.

Action: stimulant, antispasmodic and diaphoretic.

61. *Zea Mays*, L. Maize. Indian corn. In the petit tisane of St. Lucia, it is directed that three times three grains of corn be put in, care being taken that they are well dried. Of course, this can have no medicinal effect whatever, and it is simply an attempt at mystification.

Liliaceæ.

62. *Furcræa cubensis*, Haw. Dagger bush. Silk grass. Wild sarsaparilla. Langue-bœuf, Dominica and St. Lucia.

The fibrous roots of this plant have been used for many years as a cheap substitute for the sarsaparilla of the British Pharmacopœia. As this *Furcræa* grows luxuriantly in places close to the sea where the soil is poor and the rainfall scanty, it is very widely distributed in the West Indies, and in all the islands in which it is indigenous the supposed valuable alterative properties of the root have rendered it a favourite ingredient of the teas and tisanes used by the bush doctors in their treatment of yaws. Mr. Ewen states that in Tobago a decoction of the roots is considered to have the property of throwing out the yaws to the surface Levacher, in 1840, says that a tisane made with the roots of langue-bœuf or pareira brava is as efficacious in yaws as would be one made from sarsaparilla. And Imray, in 1872, recorded the opinion that "native sarsaparilla" possessed the same properties as the officinal root.

Action: alterative and tonic.

Musaceæ.

63. *Musa paradisiaca*, L. Plantain. The skins of the fruit of the plantain are used in the manufacture of one of the St. Lucia yaw tisanes. And, as they are simply of an astringent nature, they cannot add much virtue to the decoction.

64. *Heliconia Bihai*, L., and other species. Moko; mafubé, Tobago. Wild plantain; balisier, Dominica and St. Lucia. Mr. Ewen states that three leaves of the moko are pounded and used in the native treatment of yaws in Tobago, but the plant does not appear to be employed as a remedy in the other islands.

Action: unknown.

XVI.

THE DISEASE.

Nomenclature.

Yaws is the name that has been applied to the disease by the English from the time of the slave trade, and notwithstanding the fact that attempts have been made to coin scientific designations for it, the latest writers still employ the word "yaws" in their accounts of the malady.

The French term the disease *Pian*, and the Spaniards and Portuguese and their descendants in South America call it *Bubas*.

The word *Frambœsia* was constructed to designate the disease by Sauvages in 1761. As the cutaneous tumours divested of their crusts were considered to resemble raspberries, he latinised the French word *framboise*, and made two varieties of the disease, namely, *Frambœsia Americana* and *Frambœsia Africana*.

In 1798, Swédiaur,* although he says he was unable to find any description of the disease by the Greek and Latin authors, appears to have considered that it bore some analogy to the thymus of ancient writers, and he, therefore, termed the malady *Thymiosis*, a word, however, that was not adopted by later authorities.

Mason Good, in 1825, discarded Frambœsia, which had been used by Cullen in his Nosology,† and applied the term *Anthracia Rubula* to the malady, but he said that *Morula*, from morus, a mulberry, would be a more appropriate designation, and this Latin equivalent for yaws has been adopted by the College of Physicians in the second edition of their *Nomenclature of Diseases*.‡

The word Morula, however, is no improvement on Frambœsia, for only in exceptional instances can the local manifestation of the disease be considered to bear a slight resemblance to a raspberry or mulberry. If nomenclature is to depend on analogy, the analogue should bear correspondence to some common characteristic, and not to exceptional appearances that may often escape observation. A more scientific way of naming the disease would be to apply to it a term expressive of one or more of its attributes, and to that end I may perhaps be permitted to suggest that *Granuloma tropicum* be accepted as the Latin equivalent of yaws, for the granulomata are characteristic of the malady, which prevails only in the tropics.

The word Yaws was said by some of the older writers to have been derived from the word signifying a raspberry in one of the languages spoken on the West Coast of Africa. Dr. Kerr, whose article in the *Cyclopædia of Practical Medicine*, published in 1835, is the best compilation I have seen of information concerning yaws up to that date, thus sums up the question of the derivation of the word:—"Yaws, a word which has its "origin in the vernacular dialect of Guinea and other parts of Africa, where it has been "used to designate the fruit of the *Rubus idæus* (raspberry); and from an imagined "resemblance between it and certain fungoid excrescences from the dermoid tissues "peculiarly characteristic of a disease indigenous in that territory."

Webster, evidently accepting this suggested derivation of the word without proper inquiry, perpetuates the error in his dictionary, for under the word Yaws he says:— "African *yaw*, a raspberry."

Now there is no species of *Rubus* found in tropical Africa; indeed, the genus is distributed over the temperate regions of the globe, and in the mountains of certain tropical countries. It is difficult, therefore, to see how the negroes of the West Coast of Africa could have a native name for a fruit they had never seen and that few of them had ever heard of. Winterbottom appears to have investigated the nomenclature of yaws on the West Coast of Africa. In his work, published in 1803, he says:—"The "yaws is called by the Bulloms bihl, by the Timmanees tirree or catirree, by the "Mandingos mansera, and by the Soosoos dokkettee or kota. It is called by the Por- "tuguese on the coast boba, and by the French pianes." It will be observed that Winterbottom makes no remark concerning the word yaws, and it is to be presumed that he considered it of English origin, for he is particular to give the term applied to the disease by the other European nations engaged in the slave trade.

Mr. Numa Rat, who has acted as a medical officer on the West Coast of Africa, in his Essay on Yaws states that the colloquial name of the disease in West Africa is galtoo; in Congo, tetia; in Angola, momba; and in Calabar, framosi. At his instance, in September, 1890, the Governor of the Gold Coast applied to the medical department of the colony for information concerning the vernacular names of the disease, and the following minute on the subject by Dr. Easmon is full of interest:—

"1. The Fanti name for yaws is Dubi or Dube (pronounced Doobee or Doobay).

"2. The Accra name is Ajortor (pronounced arjortor). The same name is applied "to some forms of syphilis.

"3 and 4. So far as I know, the name 'yaws' is not of West African origin.

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* *Traité Complet sur les Symptômes, &c., des Maladies Syphilitiques.* Par F. Swédiaur. Paris. 1798.

† *Nosology: or a Systematic Arrangement of Diseases.* By William Cullen, M.D. Edinburgh. 1810.

‡ *The Nomenclature of Diseases, drawn up by a Joint Committee appointed by the Royal College of Physicians of London.* Second Edition, being the First Revision. London. 1885.

" 5. ' Pian ' or ' Epian ' is not, so far as I know, of African origin.

" 6. Synonyms for yaws : —

" Sierra Leone, Lagos - - -	Ogōdō.
" Crepi, Kitta - - - - -	Jahtor.
" Haüsa - - - - - -	Tōnjārā.
" Moshi - - - - - -	Toomah.
" Kroo - - - - - -	Soombah (Grand Cess).
" ,, - - - - - -	Subanini (Sinoe).
" Soosoo (Sierra Leone) - - -	Dorgortch.
" Grushi - - - - - -	Sankorror."

This list gives the names applied to the disease by most of the " nations " inhabiting the extensive tract of country extending from Senegal to the south of the Congo. There does not seem to be a common root running through the words, and there is nothing whatever to connect the various names with yaws, pian or bubas. Indeed, Dr. Easmon is of opinion that the two first-mentioned are not of African origin.

In 1840, Levacher made some interesting observations on the orgin of the colloquial names of the disease. He found that Swédiaur mentioned the fact that " siwin " or " sibbens," a syphilitic disease occurring in the south of Scotland, and resembling yaws, was derived from the Celtic words *sivyen*, *sivi*, *sivien*, used to designate a wild raspberry. And he looked, therefore, for the derivation of pian in the same language and was rewarded, as he says, by finding satisfactory proof of the fact that yaws, pian, and bubas are all of Celtic origin. The following extracts from the Celtic dictionary consulted by Levacher certainly supply strong evidence in support of his theory as regards the Celtic derivation of yaws and pian :—

" Ias ; ardeur, chaleur, bouillonnement, cuisson.

" Pian, pianta, pena, poen ; peine, trouble, angoisse."
" Poan ; peine, douleur, maladie, effort."
" Poen ; peine, supplice, douleur, tourment, travail, mal."
" *Pian en irlandais* ; peine, trouble, angoisse."*

It seems clear from these extracts that pian is a Celtic word that might be appropriately applied to a disease such as yaws. The Bretons, who are descended from the Celts, have always been a sea-faring race, and it is most likely that the term pian as applied to syphilis and yaws came from them.

The English derivation of yaws appears to me to be unquestionable. The Celtic word *ias*, pronounced *yas*, and meaning heat, boiling or bubbling up, is the source of the English word yaw, the primary meaning of which, according to Webster, is " To rise in " blisters, breaking in white froth, as cane juice in the sugar works."

The bubbling up of the froth on the boiling cane juice may be likened to the evolution of the cutaneous eruption in the disease. The earliest use of the term yaws, as applied to the malady, appears to have been at the time when most of the slaves carried to the West Indies were engaged in the cultivation of canes and the manufacture of sugar on the recently settled estates, and an association of the terms in use in the boiling house and in the canefields with events in the monotonous lives of the ignorant Africans was inevitable. Even nowadays the vocabulary of the uneducated negroes is so small that common words used to denote different details of their work are employed in a somewhat analogous sense in their domestic life.

There is no difficulty as regards the term bubas applied to the disease by the Spaniards and Portuguese in tropical South America, for *buba* means, in the language of these Latin races, a pustule or a tumour, and its association with the disease is readily understood. The name was applied in the first instance to syphilis. Oviedo†, in 1535, gave an account of a disease that, under the name of " bubas," prevailed in Hispaniola, and which later writers have considered to have been yaws. It is most probable, however, that this disease was syphilis. Indeed, Hirsch says : " It is a not unlikely guess that " Oviedo's opinion of the American origin of syphilis partly arose out of confounding the " latter disease with the ' Bubas.' "

In 1648, Piso wrote of a disease that was undoubtedly yaws and that had been introduced into Brazil by slaves from the African coasts before that date. It was called " bubas " by the Spaniards and Brazilians, and from Piso's account it was often mistaken for the lues Gallica. In fact, it would appear that bubas was the term used in the 17th

* *Dictionnaire de la Langue Celtique.* Par M. Bullet. Besançon. 1760.
† *La General y Natural Historia de Las Indias.* Sevilla. 1535.

and 18th centuries by the Latin races to distinguish syphilis. In Barretti's Spanish Dictionary the following definitions occur:—

"*Buba*, s.f. the French pox; generally used in the plural."

"*Buboso*, adj. one that has the French pox; poxed."*

As in the case of *pian*, however, which, although first employed by the French voyagers to designate syphilis, has now come to be applied commonly to yaws, so *bubas* is the name now used colloquially for that disease in the Spanish-speaking countries of South America.

In my Fourth Report on the Dominica Yaws Hospital the question of Nosology was considered at length; and, as extended experience has not caused me to modify most of the conclusions then arrived at, the following extracts from that report may be given here:—

> The exact nature of yaws has been a subject of controversy from the time of the earliest writers on the disease to the present day. Sauvages and Sagar placed it amongst the cachexiæ; Cullen, following their example, calls it a cachectic impetigenous disease; and this definition was adhered to until the early part of the present century, when the correctness of Cullen's classification was questioned by Dr. William Wright, an able West India practitioner, who was the author of a valuable paper on yaws, which first appeared as a thesis under the name of Dr. Ludford.
>
> The history of this controversy, if it may be so called, is best given in the words of Dr. Mason Good, who says:—"With respect to yaws, the diversity "of opinion has been quite as considerable as that respecting plague. Generally "speaking, it has been placed in the loose and indeterminate class which has "been distinguished by the name of cachexies; Sauvages and Sagar arranged it "under the order Tubera of this class; Cullen in that of Impetigenes. These "writers take little or no notice of any kind of febrile features that accompany "it, whether specific or sympathetic. Dr. Young pays as little attention to the "febrile symptoms by which it is said to be distinguished, and at the same "time transfers it from the cachexies (cacochymiæ, as he denotes them) to the "order of Paramorphiæ or structural diseases. Dr. Winterbottom and Dr. "Dancer, on the contrary, contend that a slight fever in its primary symptom; "and Dr. Ludford, to whom we are indebted for, perhaps, the best history "which has yet been given of this disease, describes it as a proper eruptive "fever, totally unconnected with diet, lues or any other taint of the blood. . . . "Hence, Dr. Parr, who seems to have long wavered in his opinion concerning "the real nature of this disease, regarding it at one time as a *pustulous* "*exanthem*, and afterwards as a mere *cuticular intumescence*, returned, at last, "with a decided mind to his first opinion, and again asserts that the detail "of symptoms shows that the disease is truly exanthematous. This view of "the subject will, therefore, abundantly justify the present arrangement of "both these diseases; support their pretensions to the character of carbuncular "exanthems, and consequently develop the nature of the connection of yaws with "plague, under a nosological system, founded on the principle of symptoms."
>
> Later writers adopted the classification of Drs. Wright and Good, and it is not until we come to the time of Dr. Tilbury Fox that the propriety of placing yaws with the exanthemata is questioned. Dr. Fox says:—"By general consent "this disease, occurring in Guinea, America, Africa, and the West Indies, "particularly Jamaica and Dominica, has been assigned a place under the head "of acute specific diseases. It is very questionable whether the disease has the "least right to be so placed. But pending the possession of more exact "information as to its nature, I speak of the disease in this place."
>
> Lately Dr. Gavin Milroy has published an article in the *Medical Times and Gazette*, in which he records his opinion that yaws is really a cachectic impetigenous disease. In a paper, written in reply to Dr. Milroy, I dissented from this conclusion, but I did not then give my own views of the nature of yaws, as I intended to do so in this report.
>
> From all these facts it is seen that a wide diversity of opinion has prevailed as to the true nature of yaws, some authorities imagining it to belong to the

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* *A Dictionary. Spanish and English and English and Spanish.* By Joseph Baretti. Second Edition. London' 1778.

cachectic diseases and others to the exanthemata. At first sight this great difference of opinion would appear to be very remarkable; but it seems to me that it is to be explained by the fact that some writers have given undue prominence to the precursory febrile symptoms, while others have mistaken the cachectic complications for the true disease.

It may be well, now, for me to state that my experience teaches me that yaws is neither a cachectic, impetigenous, nor an exanthematous disease; but that it properly belongs to the group which Tilbury Fox calls the diathetic diseases.

* * * * *

I have already stated that it should properly be placed amongst that group of diathetic diseases in which Tilbury Fox includes scrofula, syphilis, and leprosy; and, considering that the diathesis is naturally less marked in yaws than in these three affections, I would place it first on the list, giving the second place to syphilis, the third to scrofula (should it be retained in the group), and the fourth to leprosy.

According to the nosology of Dr. Farr, yaws should properly be classed in the second order of Zymotic diseases: that is to say, amongst the Enthetici.

In the "Nomenclature of Diseases" drawn up by the Royal College of Physicians [1869], yaws is placed amongst the local affections, and with the diseases of the cutaneous system. Sufficient has been already said to prove that yaws is a general disease of which the eruption is only the local manifestation. It should, therefore, in this classification, be included in Class B. of the General Diseases, and its proper place would be immediately before syphilis.

The report from which these extracts are taken was written in 1880, and published in the same year; and in the revised edition of the *Nomenclature of Diseases*, published in 1885, yaws is placed in Group D. of General Diseases. That is, among the *Morbi non in classes distributi*, with tubercle, scrofula, leprosy, parangi, &c.

Origin.

The mistaken belief of so many authors that yaws is identical with syphilis has caused the question of the origin of the two diseases to be brought into a state of almost inextricable confusion. Even those who have held to the theory of their identity are not in accord as to whether syphilis originated in Europe, Africa, or America; and, amongst those who have believed yaws and syphilis to be distinct maladies, there is a wide diversity of opinion as to the part of the world where the one or the other, or both, were first prevalent.

In attempting, therefore, to disentangle the difficulties surrounding the question of the origin of yaws, it will be necessary to consider briefly the origin of syphilis.

The word pian, now used colloquially by the French to distinguish yaws, is synonymous with pyans and épian, the names said by the early French writers on the Antilles to have been in use by the Caribs to distinguish a malady that prevailed amongst them. In 1665, de Rochfort stated that nearly all the Caribs were subject to "une "fâcheuse maladie qu'ils nomment Pyans en leur langue." He gave no description of the symptoms, and one cannot, therefore, judge of the nature of the disease; but, later on, he called it "une sale maladie," thus indicating the fact that he considered it to be a filthy one.

In the same year Raymond Breton,* in his Carib dictionary, gave the name yáya as that of a common disease amongst the aboriginal inhabitants of the Antilles. Mr. Numa Rat, whose medical district in Dominica includes the Carib reserve, states in his Essay that yáya is now the Carib name for yaws, but it is possible that Raymond Breton considered the disease to be syphilis, for he said that it was as common in the islands as the "grosse vérole" was in France. It must be remarked, however, that he described the disease as being but slightly dangerous, and asserted that the Caribs cured themselves without trouble or risk, which was not the case as regards pyans or épian.

Two years after the books of de Rochfort and Raymond Breton appeared, viz., in 1667, du Tertre published his work on the Antilles; and in speaking of the diseases of the Caribs, he said:—

"Mais s'ils sont peu tourmentez de la plus part des maladies que nous avons dans "l'Europe: cette infame maladie qu'ils appellent *Epian*, qui est la veritable vérole, dans "le plus haut degré de sa malignité ne les quitte presque jamais: car bien que l'on dise "qu'ils la guérissent facilement, avec le jus d'une écorce d'arbre, dont ils usent en potion,

* *Dictionnaire Caraibe François.* Par le R. P. Raymond Breton. Auxerre. 1665.

" & en se noircissant le corps avec du jus de Genipa, & des fuëilles de Roseau bruslées: " il est certain que tout cela ne fait que pâlier le mal, & que mesme quelques enfans " naissent & meurent avec cette vilaine maladie."

It is clear from this extract that du Tertre believed épian to be syphilis, and the facts that children were born with, and died of the "vile malady," and that it could not be cured but only palliated, prove beyond doubt that épian was not yaws, and show almost conclusively that it was syphilis.

Later on, in 1724, Labat alludes to the disease called épian in the following words:—

" L'Epian est réellement ce que les François appellent le mal de Naples, & que les " Italiens nomment le mal François. Tout le monde le connoît sous le nom de mal " Venerien. & on devroit avec justice l'appeller le mal Ameriquain, puisqu' elle est née " dans ce Païs-là, & que c'est de là que les Espagnols premiers conquerans de ce nouveau " Monde, l'ont apportée en Europe."*

Labat, therefore, following du Tertre, considered épian to be the same as syphilis; and, if any further evidence be required to establish the truth of this belief it is furnished by the fact that the French physicians of the time recognised it as the venereal disease. For, in Lavoisien's Dictionnaire Portatif de Médecine, published in Paris last century, under the word EPIAN the following occurs:—" Maladie fort commune dans l'Amerique, " qui est la même chose que celle que nous appellons en France vérole." In the same work there is an interesting article on YAWS, which is said by the writer to be endemic in Guinea and other countries in tropical Africa. It is also to be remarked that Lavoisien indicates that yaws and syphilis are different diseases in the following words:—" La vérole " & les yaws," . . . . . " sont deux maladies très distinctes."

At the end of last century the publication of the Encyclopédie Méthodique was begun, and that part of this remarkable work relating to medicine contains an exact statement of the current belief of the day. The following extract, therefore, is practically conclusive as to the identity of épian and syphilis:—

" EPIAN. Nom que les naturels de Sainte Dominque donnoient a la vérole, qu'on " croit avoir été endemique dans cette isle, et qui parut pour la premier fois en Europe " l'an 1494. Quelques-uns ont cru que c'étoit un caractère de maladie plus grave et " plus fâcheux encore que la vérole; mais il est actuellement prouvé que c'est la même " maladie que les François ont appellée Mal de Naples, et les Italiens Mal François, " chacun s'empressant de desavouer l'origine d'un mal aussi honteux, et accusant ses " voisins d'en avoir propagé la contagion."

If yaws had been endemic amongst the Caribs it is difficult to see why these people should enjoy such immunity from the disease now. The Caribs of Dominica, or the "Dominicans," as Hermann Moll called them, who number now about 200, live in a district of the island reserved to them by the Government, and they assert that yaws is confined to the negro race, and that they have never known of a case amongst their own brethren. This belief is also held by the people living on the borders of the Carib reserve. It is not absolutely correct, for I found a few instances of the disease amongst the Caribs of the same race living in St. Vincent, and several cases have been met with in Dominica by Mr. Numa Rat and myself; but the fact remains that they are attacked by yaws with exceeding rarity, whilst the negro population around, and in contact with them, are often seriously affected. This immunity is doubtless due to their extreme cleanliness, to their temperate lives, and to their strong constitutions. The Caribs, indeed, are a peculiarly healthy race, and they appear to have always been so. Moll said of them nearly two centuries ago, that they "are temperate and cleanly in their meals," and that they, "by their natural Temperament, Sobriety, and Exercise, enjoy " Health and Long Life."†

The old French authors, already referred to, bear out these statements, and my experience in Dominica leads me to believe that the remnant of the race in that island are in no way inferior to their ancestors as regards vigour and healthiness. It is curious, therefore, in the presence of these facts, that the opinion became current amongst the medical men of the seventeenth and eighteenth centuries, that syphilis, which broke out with such virulency in Italy in 1493–94, and spread rapidly through Europe, had been brought from the Antilles by the soldiers of Columbus on their return from the first voyage of discovery. Astruc‡ says: "The infection was propagated throughout *Europe* " from the Kingdom of *Naples*, where it first spread itself amongst the *French* and

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* *Voyage du Père Labat, aux Isles de l'Amerique.* 2 Vols. The Hague. 1724.
† *The British Empire in America.* By Hermann Moll. 2 Vols. London. 1708.
‡ *De Morbis Veneriis.* Paris. 1740.

" *Neapolitans*; and . . . . it was imported to *Naples* by the *Spanish* soldiers, who " served under *Christopher Columbus*, from the *West Indies*."

Gruner* and others, however, contended that the disease was not carried to Europe from the New World in 1493, but that it was brought from Africa into Spain long before then, and that it had taken on an epidemic form amongst the Moors and Jews who were expelled from Spain under circumstances of great distress and cruelty, from 1487 to 1492. Copland, too, pointed out that " syphilis, according to the testimony of most " reputable authors, had appeared early in 1493, and soon afterwards extended to most " of Europe, whilst according to Oviedo, the most credible of all witnesses on the subject, " the fleet of Gonsalvo, which conveyed the Spanish soldiers to Italy, arrived in Messina " on the 26th May, 1495. Thus the disease was existing two years before the arrival of " the Spaniards, and spreading in the army of Charles VIII. of France." †

It is clear from this that the epidemic of syphilis that spread so rapidly and committed such ravages through Europe, did not originate in the West Indies. Soon after the discovery of America, however, the disease was observed in places visited by the Spaniards, and this fact tends to show that it was taken to the West Indies by the followers of Columbus, and not brought thence to Spain by them. There is undoubted evidence that syphilis was epidemic in Spain several years before Columbus started on his first voyage of discovery, and it is very likely that some of those who sailed with him were suffering from the disease, and that the Caribs were infected by them. It is a well known fact that syphilitic diseases were spread from one country to another in those times more by soldiers than by any other class of persons. The Spaniards visited many of the islands, and, according to the evidence of the old writers, they gave free play to their licentiousness. The result could not but be that the disease would spread rapidly amongst the uncivilised inhabitants of the Antilles, and it probably had much to do with their fearful mortality in those islands settled by the Spaniards. At all events syphilis was introduced from Europe into South America, for Piso pointed out, in 1648, that lues gallica, as syphilis was then called, was brought from Spain to the residents in Brazil.

Columbus first sailed amongst the Antilles in 1492, and the French priests—who told how they witnessed the ravages of Epain, or " la veritable vérole," amongst the Caribs—did not visit these islands until more than a century and a-half after the advent of the Spaniards, and by this time another disease, the true yaws, had been carried from the old world to the new. Sydenham's countrymen, who had lived in the Antilles, and had seen slaves landed from Guinea with yaws upon them,‡ were contemporaneous with, or before the time of de Rochfort and du Tertre, and it is clear, therefore, that when these missionary priests went about amongst the islands, syphilis and yaws, then confounded together, existed side by side, as they do in these places at the present day, and it is more than probable that some of the Caribs contracted yaws from the negroes, for the Caribs held slaves as well as the white planters. Moll says: " In the islands of St. " Vincent and Dominico, there are some Charibbeans who have many Negroes to their " slaves. Some of them they got from the English, and some from Spanish Ships cast " away on the Coasts; and the Blacks serve them as obediently as if they were the most " civiliz'd People in the World."

The fact of the existence of yaws and syphilis in the West Indies soon after the settlement of the islands, explains the errors made by some of the early writers in confounding the two diseases. And it would appear that the words Pyans and Yàya were the names used by the Caribs to distinguish syphilis—the hereditary and apparently incurable malady introduced by the Spaniards, from yaws—the non-hereditary and curable disease brought over by the negro slaves.

It is extremely difficult to come to any positive conclusions concerning such matters in which there is so much conflicting evidence; but a careful study of the literature of the subject has led me to form the opinion that neither yaws nor syphilis had its birthplace in America, but that both diseases were at first exotic, and that they have become in process of time endemic in the West Indies and other tropical countries of the New World.

Geography.

Owing to the fact that several diseases have been so often confounded with yaws, it is difficult to give a tolerably accurate sketch of its general geographical distribution, and a particular account is quite impossible. Writers with no personal experience of yaws

* *De Morbis Gallico Scriptores Medici et Historici.* Jena. 1793.

† *Op. cit.*

‡ " I have been informed by several of our countrymen of great veracity, who lived in the *Caribbee* Islands, that the slaves which are newly brought from *Guinea*, even before they land, and likewise those that live there, are afflicted with this disease [the *yaws*], without having known an infected woman; so that it frequently seizes whole families, both men, women, and children."—*Sydenham*

have imagined that it is identical with ulcerative maladies prevalent in various parts of the globe, and known under different names. Accepting the statements of these writers as incontrovertible evidence, later authors have practically declared that yaws is found in nearly every part of the tropics of the old and new worlds.

It has already been shown that various complications of yaws have been mistaken for manifestations of the disease itself; and this is more especially the case in regard to the cachexia and ulceration produced by an infection of the system with syphilis and tuberculosis, and by what has not inaptly been termed "the abuse of mercury." Similar conditions of cachexia and ulceration occur amongst the miserably poor inhabitants of various tropical and sub-tropical countries, and it is scarcely to be wondered at, therefore, that these conditions should have been set down as identical with those found in cases of yaws, and thought to be essential attributes of the disease. Thus, in regard to the parangi disease of Ceylon, Mr. Kynsey noticed a similarity of some of its symptoms with those stated to be due to yaws, and said in his excellent report: "Frambœsia, or yaws, ' is the disease to which Parangi bears the most striking likeness. The history of both " is identical, and the minor points of dissimilarity may be easily accounted for by " ascribing to the climate and surrounndings generally some modifying influence. The " absence of the raspberry-like excrescence in Parangi is not invariably the case in that " form of it known as 'Dumas.'" *

In reference to this question, Dr. Milroy made the following observations in an article in the *Medical Times and Gazette* of the 23rd November, 1878:—

"In respect of these interesting remarks of Dr. Kynsey, I would observe that " although he (and Dr. Loos also, I believe) has hitherto failed to discover the *frambœsoid* " fungus in any of the cases of 'Parangi' in Ceylon examined by him, the absence of this " symptom is by no means unfrequent in many of the old neglected instances of yaws in " the West Indies, when the disease had passed from its earliest stages and lapsed into " the form of aggravated cachexia, with diverse morbid sequelæ in the integuments and " deeper tissues. This was the case with most of the chronic examples which I met with " in Dominica, and such as are described in my report (page 53). It is also to be " remembered that the *frambœsoid* appearance of the cutaneous disorder in its early " stages is by no means uniformly the same."

Hirsch, in his remarks on the history and geography of yaws, asserts that the disease prevails in Ceylon, and gives the names of Milroy and Kynsey as those of his authorities for the statement.

I shall have to show, when I come to consider the diagnosis of yaws, that it is not identical with parangi, and it may be mentioned that this opinion is now accepted by the profession; for, in 1885, the College of Physicians of London, in their *Nomenclature of Diseases*, place yaws and parangi as two distinct maladies in the same group; and, in 1887, Dr. Christie treats of them in different chapters in Dr. McCall Anderson's work on skin diseases.

Four authors only, as far as I know, have written specially on the geographical distribution of the disease, viz., Milroy, Colcott Fox, Hirsch, and Numa Rat, but the last-mentioned appears to have accepted the generalisations of Colcott Fox and Hirsch as to the prevalence of yaws throughout the tropical world.

A careful consideration of the whole question leads me to the conclusion that the existence of the malady in all the places where these and other writers have asserted that it is prevalent is by no means clearly made out, and more evidence is required as to the precise nature of the endemic diseases said to be identical with yaws, before one can accept this alleged identity as an established fact.

Yaws prevails throughout the tropics of the new world. It is found in various parts of South America and Central America, and it is especially prevalent in the West Indies and in Brazil, in fact, in those countries of tropical America where most of the African slaves were carried to.

It is said to exist in all parts of tropical Africa, but the West Coast appears to be peculiarly its endemic focus. The African islands off Mozambique, including Madagascar, are also reported to be infected; and, naturally, cases are occasionally met with in the northern countries bordering on the Mediterranean Sea.

There appears to be no conclusive evidence that yaws is found in any Asiatic country, notwithstanding the fact that some authors have asserted otherwise. Considering the mistaken notions of the origin of the disease entertained by the earlier writers, implicit reliance cannot be placed on their statements regarding the question. There is

* *Report on the "Parangi Disease" of Ceylon.* By W. R. Kynsey, M.K.Q.C.P.I., L.R.C.S.I.; Principal Civil Medical Officer, and Inspector General of Hospitals, Ceylon. Colombo. 1881.

an endemic ulcerative malady prevalent in the Moluccas and other Eastern Asiatic islands, known as "pateh" or "bouton d'Amboine," which attacks the Malays rather than those of the inhabitants of African descent. As long ago as 1718 this disease was asserted to be identical with yaws by Bontius;* in 1879, Rochas and Rochard made a similar assertion, which was accepted as the statement of a fact by Milroy, in 1880;† by Hirsch, in 1885; and by Numa Rat, in 1891. But bouton d'Amboine is in all probability the same ulcerative disease as that described by almost as many names as there are places in which it is endemic, as, for instance, Delhi boil, bouton d'Alep, bouton de Bagdad, bouton de Pendjeh, bouton de Crete, bouton du Nil, bouton de Biskra,&c. These boutons, or boils, prevail widely in Asia and North Africa, and they have apparently been introduced into the West Indies by the Indian and Chinese coolies, and are now known in these islands as coolie or Chinese itch. I have already referred to the introduction of this Asiatic disease into the West Indies, and I shall have occasion again to refer to the matter when I come to treat of the diagnosis.

Before the suppression of the slave trade, negroes from Central and Eastern Africa were transported in large numbers to various Asiatic countries; and it is quite possible that cases of yaws were carried to the Spanish and Portuguese colonies, and to other places in Asia, by these slaves, as was the case in regard to the West Indies. Yaws, however, does not appear, from all I can learn, to be prevalent to any considerable extent in any part of Africa besides the western tropical littoral zone. Experience in the West Indies, too, shows that the disease is peculiarly liable to attack the East Indian immigrants, who, owing to the care taken of them, are physically stronger than they are in their native country. Those in the West Indies most concerned with the coolies are satisfied that yaws was unknown to these people whilst they were in India, and the anxiety of Mr. Cropper, the Protector of Immigrants in St. Lucia, to prevent the introduction of the disease into India by the returning coolies has already been alluded to in Section VI. of this report.

I have been unable to obtain any satisfactory evidence from the works I have consulted of the fact that yaws is endemic in any part of Asia; and, although the occasional introduction of the disease into Asiatic countries from Africa, or even from the West Indies, is quite possible, there is, I believe, no incontrovertible evidence proving this to be the case.

Between Asia and South and Central America lie many groups of islands where yaws is said to occur. Hirsch asserts that the disease prevails "in several of the island "groups of Oceania, particularly New Caledonia, Fiji, and Samoa." And it is said to have been met with in the Tonga, Society, and Navigator Islands. As far as I am aware, however, those writers who have identified yaws with the endemic disease prevalent in those islands have had no experience of the former malady, and the evidence, therefore, tending to establish their identity cannot be regarded as altogether conclusive.

On the 24th December, 1875, Dr. Macgregor (now Sir William MacGregor, K.C.M.G., Administrator of New Guinea) addressed a report to Sir Arthur Gordon, the Governor of Fiji, on the "Coko" disease (pronounced Thoko) that prevailed amongst the Fijians. The following extract from this report gives a graphic description of the affection:—

"The eruption in young children, among whom it most frequently occurs at first "about the corners of the mouth and about the fundament, might be mistaken for a "commencement of *Herpes*; but it soon appears as if a small soft condyloma was "developing itself. It becomes slightly elevated, the epidermis separating from the cutis, "and a small quantity of sero-purulent matter gradually forming on the top of the latter, "and giving the sore a peculiar whitish-yellow colour. At the same time there is a cir-"cumscribed effusion of lymph going on into the cutis, which thus eventually forms "tubercules of greater or less size and elevation.

"This pustulo-tuberculate eruption may become scattered over the whole body; as "a general rule, it is very notably so over the face, round the mouth, nostrils, and eyes, "and about the neck. The tubercules are usually of a circular form, or elongated, with "rounded corners, varying in diameter from two inches downwards, and elevated above "the surrounding skin sometimes as much as half an inch. Occasionally they are ring-"shaped, with a spot of unaffected skin in the centre, and sometimes, by the coalescence "of several contiguous tubercules, an irregular looking sore may be produced. Individual "sores, however, appear to always retain the rounded form. . . . . .

"This crust is easily removed, usually coming off entire like a cap from the top of "the tubercule. Beneath it there is a small quantity of purulent matter, through which

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* *De Medicina Indorum.* Lugduni Batavorum. 1718.
† *Medical Times and Gazette.* 26 June, 1880.

" protrudes what appear to be papillæ of the true skin, very much enlarged, standing up " separately, sometimes an eighth of an inch in length, the brightness of their hue " appearing in strong contrast with the creamy fluid bathing their almost contiguous " bases."

This description answers in some respects to that of yaws; but the " circumscribed " effusion of lymph in the cutis," the pustular nature of the eruption, and the protrusion of separate papillæ " an eighth of an inch in length," tend rather to show a distinction between the two diseases. I may remark that Mr. G. Ruthven Le Hunte, at present the Commissioner of Dominica, who has seen much service in Fiji, informs me that coko and yaws are very much alike in general appearance. According to the account given to me by the late Dr. Armstrong, of Dominica, who was formerly a medical officer in Figi, the native treatment of the former disease is a barbarous one. He tells me that the affected children are taken to the sea, and that the whole growth is gradually scraped out with a sharp oyster shell. This operation is extremely painful, and the screams of the children are some times heartrending.

As yaws is essentially a disease of the tropics, cases are very rarely met with in temperate countries; and, when they do occur, communication with the endemic foci can always be established. The only alleged spontaneous case of yaws that has been recorded as occurring in England is one mentioned by Dr. Milroy in his paper in the *Medical Times and Gazette* of February, 1877. In the history of the case, as given by Dr. Milroy, there are no symptoms detailed that would lead me to pronounce it as one of yaws, even if I had met with it in a country where the disease was endemic.

A consideration of the facts set forth, shows that yaws prevails in the tropical zone of Africa and America; that there is no satisfactory evidence to prove its prevalence in any country in Asia; and that, although there exist in Oceania certain diseases bearing a resemblance to yaws, their identity with it have not been established in so conclusive a manner as to place the question beyond the region of doubt.

Etiology.

The bearing of questions of race, climate, locality, diet and other hygienic matters, and contagion, on the etiology of yaws has been entered into fully in former sections of this report; and there only remain for consideration: heredity, age, sex, and previous disease, all of which have been held to be factors in the causation and spread of the malady.

Heredity.—Some of the early writers on yaws thought it was hereditary; but it has been already pointed out that syphilis was often confounded with it, and the congenital manifestations of the former disease were doubtless often mistaken for the symptoms of the latter. Thus du Tertre, in 1667, states, as regards épian, that " some- " times children are born, and they die of this vile malady"; and in 1724, Labat speaks of the negroes and the Caribs being attacked with it, " almost as soon as they come into " the world."

In his work on Barbados, published in 1750, Hughes states that the " body " and the " running " yaws were common in that island, and he gives the following account of these diseases:—

" The Body-Yaws appear in many protruberant fleshy knobs, every way as large as a " small Thimble, embossing the Face, Breasts, Arms, and other Parts of the Body. These " in time, by the use of Simples, hereafter to be mentioned, dry and fall off.

" The running, or the Wet Yaws affect chiefly the Joints, especially the Knees and " Elbows, from whence continually distils a sanious Humour.

" This Distemper is thought to be transmitted in an hereditary way from Parents, " who have had the Venereal Disease, to their unhappy Children."*

It is clear from this extract that yaws and syphilis were considered to be different and distinct types of the same disease, and it is a noteworthy fact that the " running " yaws," which was evidently syphilis, was considered at that time to be hereditary, whilst the " body yaws" was not.

In 1800, Moseley asserted that " The seeds of yaws descend from those who have " ever had it to their latest posterity." Craigie, however, in 1836, refers to Moseley's statements in the following words:—

" It has been asserted by Moseley, who has uttered about this disease several unfounded statements, that yaws break out in negroes without communication, society,

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* *The Natural History of Barbados.* By Griffiths Hughes, A.M., F.R.S. London. 1750.

" or contact; and that the seeds of the disease descend from those who have had it to " their latest posterity. The accuracy of the latter statement is questioned by all."*

In 1840, Levacher said that by bad treatment and neglect yaws may pass into a secondary and hereditary state, but he doubtless committed the error of believing that complications of syphilis or tuberculosis were attributes of the disease itself.

Most authors who have had a large experience of yaws declare that it is not hereditary. Thus Rankine, in 1827; Mason, in 1831; Maxwell, in 1839; and Bowerbank, in 1880, are emphatic on the point. And Hirsch, in 1885, says: " The opinions " are divergent as to hereditary transmission of the disease (congenitally, at all events, " it seems never to have occurred, as there is not a single case of that kind given in the " whole literature)."

Dr. Tulloch asserts: " It is never hereditary," and this statement is in accord with my own experience. During the time that I have been connected with the yaws affairs in Dominica, there have been altogether 10 births in the hospitals, and in no instance were congenital or later hereditary symptoms manifested, although the mothers were suffering from yaws at the births of their children. In one case the child was born at the eighth month, and it died the day after birth; but in the other nine instances, birth took place at the full term, and the infants were strong and healthy, and they throve well during the time, extending over 12 months, they were under observation. A child was born in the Morne Bruce Hospital last year, whilst I was engaged in the work of this mission; but Mr. Numa Rat, who was much interested in the case, had made special inquiries concerning the mother's residence, and whilst I was making my tour through the country districts I was able to see and examine the child, which then, that is more than a year after its birth, was perfectly healthy, and it had never had any signs of yaws.

These cases prove also that the mother's milk is innocuous; besides which mothers with yaws have often been admitted with suckling children, and in only one instance has such an infant been observed to develop the disease. In this case the child was accidentally burnt with strong carbolic acid; and about three weeks afterwards yaws tubercles began to form on the resulting sore, thereby showing that it was a clear example of infection through a wound.

During the progress of my mission, I have given particular attention to possible hereditariness of the disease, but I could not learn of a single case. This negative evidence, considered in connection with the hospital statistics and the recorded experience of those writers who have seen much of the malady, lead me to the conclusion that yaws is not hereditary.

Age.—With the exception of the tables attached to Dr. Tulloch's reports on yaws in Tobago from 1888 to 1890, and those contained in my reports on the Dominica yaws hospitals for the years 1878 and 1879, no statistical information appears to have been published concerning age as a predisposing cause of the disease. Most authors, however, have asserted that their experience taught them that children were peculiarly liable to be attacked. Dr. Tulloch's and my own statistics bear out these assertions. The following table shows the ages of 739 patients discharged from the Central Yaws Hospital in Dominica during the years 1878 and 1879 :—

Age.	Under 5 Years.	5-10 Years	10-15 Years.	15-20 Years.	20-30 Years.	Over 30 Years.
Number of cases - -	120	236	142	65	78	98
Percentage - - -	16·2	31·9	19·2	8·8	10·6	13·3

From these statistics it appears that from 5 to 10 years is the age during which the disease is most liable to occur, and that the large proportion of cases, namely 67·4 *per centum* occur before the age of puberty.

Unfortunately the ages on which my own statistics are based do not correspond with those of Dr. Tulloch, and I am unable, therefore, to combine both tables so as to obtain results on larger numbers.

* *Elements of the Practice of Physic.* By David Craigie, M.D., F.R.S.E. 2 vols. London. 1836.

Dr. Tulloch based his calculations on 763 patients, and the following table is made up from his statistics :—

Age.	Under 5 Years.	5-10 Years.	10-20 Years.	20-30 Years.	30-40 Years.	40-50 Years.	50-60 Years.	Over 60 Years.
Number of cases - - -	205	212	150	58	64	34	24	16
Percentage - - - -	26·9	27·7	19·7	7·6	8·4	4·4	3·2	2·1

These figures indicate that in Tobago, as well as in Dominica, most cases of the disease are met with in children between 5 and 10 years of age, and that in both islands the majority of the patients are under the period of adolescence. No age, however, is exempt from the operation of the contagion ; but children, it would appear, are more liable to infection. In the West Indies the children of the lower orders are frequently almost naked, infants in fact are nearly always entirely so ; and whilst playing together inoculation of the disease, through an abraded surface or a sore, is very likely to take place.

Inoculation experiments in animals with the virus of other diseases than yaws have shown that age has a remarkable influence in regard to susceptibility, the younger animals being less immune, and therefore more easily inoculated than the older ones.

In regard to the question of the relation of age to the susceptibility of yaws, it must be remembered that with every additional year of life there is an increasing number of persons rendered more or less immune by a previous attack. And thus in a country where the disease has prevailed extensively for more than a generation, statistics concerning the ages of those infected at any particular time can only be regarded as approximately correct. It would appear, however, that the young are more liable to yaws than the old, and this is what might be concluded by the analogy of other maladies, and by the facts regarding the inoculation of animals with the virus of diseases due to micro-organisms.

Sex.—All the older authors are silent as to the influence of sex in the predisposition to yaws. In my fourth report on the Dominica yaws hospitals the question received some attention, for statistics were there given of the sex of the 273 cases discharged from the Central Hospital during the year 1879 ; and as the table is of interest, and no similar one has been drawn up since, it may with advantage be embodied in this report. The table is as follows :—

Age.	Total Number of Cases.	Males.	Females.	Percentage. Males.	Percentage. Females.
Under 5 years - - - -	38	24	14	63·2	36·8
5 to 10 „ - - - -	94	60	34	63·8	36·2
10 to 15 „ - - - -	60	42	18	70·0	30·0
15 to 20 „ - - - -	28	15	13	53·6	46·4
20 to 30 „ - - - -	29	13	16	44·8	55·2
Over 30 years - - - -	24	10	14	41·7	58·3
Totals - - -	273	164	109	60·1	39·9

This table shows that from infancy to adult age males are more frequently affected than females ; but, that women more often suffer from the disease than men. The lower orders of the people in the West Indies in their earlier years lead much the same lives. Infants and children of both sexes of course play about together and in their youth they work together in the cane-fields and elsewhere, where they form the "small gangs" of labourers under a driver. The only possible explanation, therefore, of the fact that more boys are affected with yaws than girls, is that there is a predisposition on the part of the former to the contagion of the disease. When, however, the girls arrive at womanhood,

such is the low state of morality in the West Indies that they nearly all become mothers, and then the care of their children, many of whom are soon affected with yaws, places them more than the men within the operation of the contagium of the disease. In this way may be satisfactorily explained the fact that women are oftener affected with yaws than men; for the preponderance of males in the statistical tables refers to the children and youths who have been shown to be more often attacked than adults.

The following table made up from returns I have been able to obtain from various islands indicates the relative proportion of males and females of all ages admitted to the hospitals:—

Island.	Period.	Total Number of Cases.	Males.	Females.	Percentage of Males.	Percentage of Females.
Grenada - -	1880–1882 and 1884–1890.	1,828	1,177	651	64·4	35·6
St. Lucia - -	1887 - -	130	75	55	57·7	42·3
Montserrat -	1881–1891 -	134	69	65	51·5	48·5
Dominica - -	1879 - -	273	164	109	60·1	39·9
	1882–1890 -	750	428	322	57·1	42·9
	Totals - - -	3,115	1,913	1,202	61·4	38·6

This table, calculated on so large a number as 3,115 patients admitted to yaws hospitals in four islands of the West Indies, may be considered as giving a fairly accurate idea of predisposition due to sex. And it may be roundly estimated that the disease attacks males and females in the ratio of three to two.

Previous Disease.—In some instances an attack of one disease predisposes to another, and the late Dr. Pearson Irvine very properly observed that "no clinical history is of "value unless it includes an account of former illnesses."* It may be said that the debility that exists during the convalescence from most general diseases renders the patient more liable to become infected with yaws and other similar contagious maladies. But this is simply due to the fact that there is less resistance to the impression made by any morbid poison in debilitated states of the constitution, whether produced by disease, fatigue, and fasting, or by any other depressing cause.

It cannot be said, however, that there is any known disease an attack of which leaves a predisposition to yaws. All authors are silent on the point, and although I have inquired into the histories of several thousand cases of yaws, I have never met with a single instance in which such a predispostion could be established.

The case may be said to be different however, in regard to those diseases and local injuries that cause a break in the continuity of the surface of the skin. Although even then sores, abrasions, and wounds do not of themselves predispose to yaws, yet they offer a convenient site for the entry of the contagious matter; for, whilst persons with whole skins may apparently associate with impunity with infected persons, it has been found by experience that there is no such safety in regard to those suffering from cutaneous lesions.

It has been shown in former sections of this report how persons have become infected with yaws through ulcers, abrasions, and wounds of the skin; and the details given of the cases of inoculation establish the fact that the disease is produced by the entry of the virus through a break in the cutaneous surface.

Most medical men in the West Indies are acquainted with instances in which healthy persons associate with those suffering from yaws, apparently without risk of infection. And this fact, considered in connection with the immunity that has hitherto protected the medical men themselves, and with the rarity of the infection of yaws nurses, tends to show that the disease is propagated only by the direct inoculation of a broken surface. Maxwell, in 1839, in alluding to this matter, made the following remarkable statement:—

"I knew a white man whose child had a regular crop of fungoid yaws who kissed "and handled it with impunity, because his skin was free from abrasion; and Dr.

* *The Causes of Disease.* By J. Pearson Irvine, M.D., in Quain's *Dictionary of Medicine.* 2 Vols. London. 1888.

" Robertson communicated to me the case of another white man who slept with two of " his children while they had yaws and escaped, owing to the clean unruffled state of the cutis."

Insects.— In the West Indies there are many insect pests, such as wasps, flies, mosquitoes, sand flies, ticks, chigoes, &c., and the irritation caused by their bites and stings frequently gives rise to small sores, which are aggravated by rubbing and scratching in the efforts to relieve the pain or itching usually present. At times the sores so produced become infected with the yaws virus, and thus indirectly the insects are the cause of the disease. Dr. de Verteuil, in his work on Trinidad, alludes to the matter in the following words : —

" *Ulcers*, particularly of the legs and feet, are a disgustingly common sight. They " attack almost exclusively those who travel or labour, as many of the poorer classes do, " with bare feet or legs ; but they may also generally and justly be considered as the " consequence of neglect and filthiness. They are also frequently caused by certain " insects, viz., *chigoes* and *bêtes-rouges*. The latter, almost invisibly small, attack the " legs, producing much itching and cutaneous irritation ; the former penetrate into the " toes, heels, and soles of the feet, causing also an itching sensation, and, if not extracted " in time, produce first a very small ulcer, which soon increases by its own extension, or " the formation of fresh ones, so as almost to honeycomb the edges and surface of the " soles. By constant irritation and exposure they assume an unhealthy appearance, the " bones by degrees become diseased, whilst the inflammation sometimes extends to the " whole foot ; at this stage amputation is found to be the only remedy. Newly-arrived " Africans and Coolies, and even native labourers, are particularly liable to these ulcers."

The following interesting case shows how the ulcer produced by a chigoe may be infected with yaws :—

Case 382.—Central Hospital. J. A., 11. Negro. Admitted on the 27th October, 1878, with many chigoes (*Pulex penetrans*) in both feet, but no yaws. As he was quite lame and suffering pain, he was kept in the hospital, at his earnest request, to have the chigoes extracted. On the 11th November, a yaws granuloma appeared on one of the small sores left by the removal of a chigoe. He was discharged cured on the 23rd December, that is after a stay of eight weeks.

Symptoms.

It is seldom that cases are admitted to the yaws hospitals, or come under the notice of the district medical officers, in the earliest stages of the disease ; and thus there has always been some difficulty in determining the exact train of symptoms antecedent to, and immediately following the evolution of, the eruption.

During the incubation period there may be no indications of derangement of health, and the patients will pursue their ordinary occupations without apparent loss of strength or spirits. Frequently, however, pains of a rheumatic character affecting the long bones and the larger joints of the body annoy the patients, especially at nights, and in these instances langour and debility are also present.

The invasion of the disease is doubtless, in most instances, marked by an elevation of temperature ; which, however, is frequently so slight as to escape the uneducated observation of the class of people amongst whom cases of yaws most commonly occur. Malaise, and more or less of the rheumatic pain are nearly always experienced, and the patients will relate how they " felt weak " and their legs and arms " hurt them," or how they were " not too well," and had lost their appetites just as the disease declared itself. But in many instances the symptoms are not sufficiently serious to occasion cessation from work, and I have met with numerous cases of negroes attempting to conceal the fact that they had yaws lest they should lose their places, or be prevented from pursuing the course of their ordinary routine of life.

In other instances, however, there is considerable constitutional disturbance, which lasts from a few days to a week. The fever may be preceded by a rigor, and it is of a continued type, the temperature during the day usually ranging from 100° F. to 103° F., and there are frequently nightly exacerbations.

During this period the ordinary subjective and objective phenomena of the febrile condition are present. The tongue is white and furred ; the pulse is fast, and it may be hard or soft, but it is usually full ; and there is an increase in the number of respirations. There is also at times considerable disturbance of the digestive organs, giving rise to vomiting or diarrhœa, or both. The urine is somewhat scanty and high coloured, and leaves a deposit on standing. Pains in the loins and rheumatic pains in the bones and

joints often persist during the febrile stage. Occasionally they are very severe, and they are invariably worse at nights. There is a loss of appetite, and the persistent headache which is a fairly constant symptom, and the broken sleep distress the patient, and help in bringing about a condition of debility after the cessation of the febrile phenomena.

When the fever is on the decline the characteristic eruption begins to evolve; and, in a typical case of the disease, the following symptoms will be noticed.

The skin appears harsher and drier than it is in health, and in various places there are light coloured patches, which on close examination are seen to be due to furfuraceous desquamation. Under a lens this exfoliation is observed to be partial, the flakes of the horny epidermis being attached at one end and free at the other. The patches are usually small and rounded, but they may be oval, or irregular in outline, and in rare instances they are disposed as rings encircling healthy skin. They are most frequently scattered about the body and limbs, but they may occupy a considerable area, and occasionally the patches coalesce and give the whole skin the appearance of having been dusted with flour. In some cases this appearance is not well marked, and may escape casual observation, as there is no apparent elevation of the patches, and the desquamation is recognisable only by means of a lens. But, in other instances, the patches are raised above the level of the surrounding skin, and the heaping up and continual exfoliation of the proliferated epidermal scales cause white marks which are very noticeable on the dark skin of the negro, as in case 107 in the notes of the patients I examined in Dominica, given in Section XII. of this report. This appearance is seen in Figure IX., which is copied from Dr. Tulloch's third report. The squamous patches are known in Dominica, St. Lucia, and the French colonies as "pian dartre," and in Jamaica they are called "yaws cacca." They not only occur at an early stage of the disease, but they may persist throughout the attack, or appear as a distinct eruption at any period of its progress.

After some days papules will be seen to have formed in the squamous patches. On examining these papules with a powerful lens they are seen to be apparently pushed up from the rete Malpighii through the horny epidermis, which breaks over their summits and splits in lines radiating from the centre, the necrosed segments curling away from the increasing papule. When the papules become about a millimetre in height and breadth, a yellow point may be observed on the summit; and if the examination be made with a Coddington or a platyscopic lens, magnifying not less than 20 diameters, the formation of the papules can be made out easily. The yellow point will then be seen to consist, not of a drop of pus under the epidermis, as has been stated by writers on the disease, but as a naked cheesy-looking substance, which cannot be wiped away unless undue force be used. Frequently a hair will be observed issuing from this yellowish substance, thereby indicating that the hair follicles are the centres of the change going on.

This papular stage is known in the French-speaking islands as "pian gratelle," which term indicates sufficiently well the grater-like appearance of the affected parts of the skin. Indeed the eruption bears a superficial resemblance to that condition of the cutaneous surface known as cutis anserina.

This papular form may persist, in whole or in part, during the entire period of the attack, or it may appear at any time during the progress of the disease. When a general eruption of these papules takes place as a late symptom, the case is likely to prove a protracted one. This fact is well known to the people of Dominica, some of whom style this stage of the disease "pian charaib." In Jamaica the term "guinea corn yaws" has been given by the negroes to the papular eruption, as the papules are about the size of the seeds of the guinea corn, *Sorghum vulgare*, Pers.

When the papules remain without further development, after a time there is some alteration in their form. The summit becomes depressed into a concavity, the sloping sides and cup-shaped bottom of which are lined with the yellowish cheesy material; and, under a strong lens, the papule presents an outline that may, perhaps, be best likened to that of a perfectly formed volcano. That is to say, it is a truncated cone with a narrow lip and a shallow crater-like depression at the summit which is occupied by an inspissated material of a sulphur-yellow colour. Such papules persist principally about the knees and elbows, but they may be met with at all parts of the body and limbs, the exposed surfaces being their most frequent sites.

In the typical disease, however, the papule goes on increasing in size until what is known as the "tubercle," or "bouton pian" is formed, and this is the characteristic local manifestation of the disease that has occasioned the name of framboesia to be given to it on account of the supposed resemblance of the growth to that of a raspberry.

As will be seen later on, these so-called "tubercles" are really granulation tumours, and a better and a scientifically accurate term for them is *granulomata*, which I propose hereafter to employ.

The various stages of their development from the papules may often be seen in the same patient, more especially at the onset of the eruption. The transition from papule to granuloma is easily understood. The papule, instead of remaining stationary to constitute the gratelle, continues to increase in size in all directions; and, as it grows, the minute yellow mass at the summit widens so as to form a cap of yellow incrustation on the tumour. The granulomata are seen usually as round elevated growths from the size of a split pea to that of a crown piece, or even larger, and of different shades of yellow in colour. The smaller granulomata are usually rounded at the summits and edges, but the larger ones may be flat topped or depressed somewhat in the centre.

The appearances presented by these growths springing from the skin of the negroes are well shown in Figures II., III., and IV., the last being an especially faithful representation of granulomata of various sizes. Mr. Thomas McHattie, of Antigua, now a medical student at the Edinburgh University, was good enough to paint Figures II. and III. for me; and to Dr. W. Stewart Campbell, of Tortola, I am greatly indebted for Figure IV. and the other excellent water-colour sketches illustrative of the local symptoms of the disease. No good coloured sketches of the typical manifestations of yaws have yet been published, and I have been peculiarly fortunate in obtaining a series for this report; for, not only do they add to its scientific value, but they may be of much service in enabling observers to clear up debated points in the alleged identity of yaws with diseases prevailing in the eastern tropics.

The granulomata vary much in size and shape. In ordinary instances the size corresponds to the dimensions already given; but, by the coalescence of several of the growths, they may cover very large surfaces. Thus, I have met with cases in which the whole cheek, or the whole popliteal space, or dorsum of the foot, has been occupied with masses of encrusted granulomata; and, in these instances, the surfaces of the crusts were irregular and sometimes fissured, and the outline of the masses was also irregular, being made up of various curves. In Figure V. is seen a good representation of a large irregular granuloma on the abdomen of a child. The outline of the typical growth is circular, as in Figures II. and III., and in the smaller growths shown in Figure IV. This circular form is remarkably well depicted by Dr. Campbell in Figure VI. Sometimes, however, the granulomata are ovoid or reniform in shape; and, in rare instances, they are annular, enclosing sound skin, as represented in Figure VII. They are frequently seen in the neighbourhood of the mouth or anus, and sometimes these orifices are encircled by a coalescence of contiguous tumours. When the granulomata are seated about the mouth the moisture and muscular movements, as well as the constant injury they there suffer, cause the crusts to become softened and detached. One often notices, therefore, that the tumours in these situations are irregularly covered with dry or moist crusts in some places, and in others are non-encrusted. In the latter case they are either coated with a yellowish-grey viscid exudation, or they present the appearance of pale red fungous masses. When the tumours spring from the perineum in the neighbourhood of the anus they are for obvious reasons invariably non-encrusted, and the pale red fungoid masses are often peculiarly well seen in this region.

The crusts, as will be noticed on reference to the coloured figures, are of a yellow colour, blotched in places with red by blood stains, and marked with dark spots and lines due to accretions of dust, dirt, &c. When first formed their colour is bright yellow, which shows up conspicuously on the dark skin of the coloured races. Indeed, when a negro with a typical eruption of yaws is once seen the characteristic appearance is not likely to be forgotton. In process of time the bright colour of the crust is lost, and it gives place to a dirty shade not unlike the soiled rind of cheese. Later on, and especially when the tumour is disappearing by absorption, the crust becomes dry and brownish, and eventually it may be almost black.

The crusts are firmly adherent, and some force is required to effect their detachment. If they be removed there will be seen underneath reddish fungoid tumours with probably several slight bleeding points due to the injury caused by their forcible removal. These red growths are the granulation tumours, the typical local manifestations of yaws. Their structure will be considered later on, but their naked eye appearances may be described in a few words as red fungous masses springing from the dermis and rising to an elevation of from $\frac{1}{8}$ to $\frac{6}{8}$ of an inch above the surface of the skin, the height attained by the growth usually depending on the greater or lesser lateral extent. Dr. Campbell has very kindly made a water-colour sketch for this report of a granuloma after the removal of the crust. This sketch, which is reproduced in Figure VIII., represents

faithfully the appearances of the tumour when divested of its protective covering. On sending me the sketch Dr. Campbell made the following observation on the case:—

"The tubercle was situated on the front of the left side of the scrotum, just below "the root of the penis. Its size was about 1¾ inches in diameter. I did as you directed, "but could not get the scab off completely as it had been removed a few hours before. "and had only half formed. There was a little bleeding, but I wiped it dry and copied "the result as fairly as I could. . . . I cannot say much as to its resemblance to a "raspberry, I should think a strawberry was more like it."

The appearance which has given rise to the name framboesia is very well seen in the figure, and it will be noticed that the likeness to a raspberry is not particulary great.

If the crusts be removed, either accidentally or otherwise, the surfaces of the granulomata at once begin to excrete a pale yellowish-grey viscid material which soon inspissates into fresh crusts. There is nothing resembling pus in the ordinary secretion; and, therefore, the term pustulo-tubercular as applied to the tumours by writers on the disease is an erroneous one. The fact that the secretion is not puriform has been noticed by the following authors, viz.: Hume, in 1744; Hillary, in 1759; Collins and Winterbottom, in 1803; Boyle, in 1831; and Horton, in 1879. Boyle says the discharge is "thin and "ichorous, never yellow and consistent, like that from an abscess"; and Horton describes it as "a thin sanious fluid."

When the tumours are subjected to constant irritation and friction, as when the granulomata are situated in the anal fissure, their surfaces become callous, and the growths are seen in their permanent non-encrusted form. In these instances the reddish colour is not florid as in Figure VIII., but of a pale pinkish tint, and the surfaces which are usually flat and smooth do not bleed when touched or slightly irritated. Sometimes these non-encrusted granulomata are met with in other situations, and principally on the lower extremities. On reference to the histories of the 132 cases given in Section XII., it will be seen that seven or 5·3 *per centum* of the patients had these non-encrusted tumours; and of the seven cases, in six the granulomata were on the legs or feet.

When the tumours are of a large size, and they do not form crusts, they are called by the people the "mother" or the "master" yaws, it being a popular fallacy that they are invariably the cause of the other manifestations of the disease. The "mother yaw" may be formed by the coalescence of several large granulomata, or it may arise by the infection of an innocent ulcer. In the latter case the common idea is, in a way, a correct one, for the disease took its origin by the entry of the virus into the system through the ulcer, which, later on, became the site of the largest granuloma. When the mother yaw is formed by the coalescence of several large tumours, the mass naturally takes a much longer time to resolve than is the case in regard to the smaller granulomata in other parts of the body. And occasionally it breaks down into an ulcer which often becomes of an intractable nature. This ulcer is still called the mother yaw, although it is indistinguishable from one produced by accidental or other causes, and notwithstanding the fact that the original disease may have been entirely eradicated from the system.

The mother yaw is not often met with. I find by my hospital notes that in 300 consecutive cases admitted to the Central Yaws Hospital from the 20th March, 1879, to the 25th February, 1880, there were only four patients with this form of the disease, and these figures give a percentage of 1·3. Of 750 cases treated in the Morne Bruce Hospital there were 19 cases of mother yaw, that is 2·5 *per centum*. It will also be seen on reference to the notes of the 132 cases of yaws examined in Dominica, and detailed in Section XII., that there were three cases of mother yaws, or, in other words, 2·3 *per centum*. The symptom, therefore, is an exceptional one, and it is of no special import when it occurs.

Although the granulomata are richly supplied with blood vessels they would appear to be wanting in nerve filaments, for they give rise to scarcely any pain, and they are not endowed with much sensibility. The crusts may often be torn off without the patients experiencing even discomfort, and the application of escharotics is usually not a painful operation. It has long been the practise of the old yaws doctresses to determine in a rough and ready manner the nature of any doubtful eruption by squeezing on to it the extremely acid juice of a ripe lime. If this prove painless the sore is decided to be due to yaws.

Ordinarily the granulomata increase in size and attain their maximum growth within two weeks of the time of their evolution from the papules. In favourable cases they remain stationary for several weeks, and then commence to disappear by absorption in the following manner. The crusts become thinner, drier, and darker in colour; the tumours shrink in size; and, as they shrink, the crusts are detached at the circumference—this detachment increasing in extent as the granulomata gradually resolve. At

last the wasted crusts fall off as dry scabs, and there is seen in place of the granulomata slightly indurated circumscribed portions of the skin, the colour of which is lighter than natural. In rare instances this slight induration increases and spreads laterally, producing that condition of the skin known as keloid. The following case that occurred in my hospital practice illustrates this unusual sequel to the granulomata :—

Case 697.—Central Yaws Hospital. M. J., 23. Negro. Admitted on the 25th April, 1879, with encrusted tubercles about the face, left arm, and body.

13th September. On the left arm, above the elbow, a large tubercle has been absorbed, and a mass of keloid has appeared in its place.

The patient left the hospital on the 24th October, and the later history of the case is unknown.

In the great majority of instances this induration soon disappears ; and, in the dark races, the light colour is replaced by a black macula which may take a considerable time to fade away. In light-coloured or white persons the maculæ are frequently whiter than the healthy skin, but this is not invariably the case, for I have met with instances in which dark patches have been left by absorbed granulomata in fair-skinned people. As a rule, however, the maculæ are an exaggeration of the colour of the individual ; that is to say, in the dark-skinned races they are darker than the prevailing hue, and in the light-skinned races they are lighter.

As soon as the macule is formed there is nothing whatever to indicate, except the alteration in the pigmentation, that a tumour formerly existed at the site. There is no induration, and no apparent loss of substance. The skin is perfectly smooth, and cicatricial tissue is entirely absent. After a variable time the maculæ, too, disappear, and then all trace of the tumours is gone. It has been stated that the maculæ persist for years and are seldom effaced ; but this, according to my experience, is not usually the case. Ordinarily they do persist for a long time, which may be measured by years, but I have seen them disappear entirely in a few weeks, and in the majority of instances they are not permanent. As an example of the rapid disappearance of the maculæ the following case may be cited :—

Case 93.—Central Yaws Hospital. F. F., 5. Negro. Admitted on the 16th October, 1877, with encrusted tubercles about the gluteal region, and a ring of them surrounding the mouth. He was discharged cured on the 18th December, that is after a stay of two months, and at that time all the maculæ had disappeared, and there was nothing whatever to indicate the site of the tumours.

The particulars just given show how the granulomata disappear by resolution, but such a favourable termination does not always happen ; for, in debilitated subjects, and in cases where the tumours have received much injury or irritation, they break down into ulcers which may or may not be covered with crusts. The ulcers at first are no larger in lateral extent than the granulomata from the breaking down of which they have been formed, and they do not extend below the true skin. As a rule they heal readily, and do not occasion much pain or trouble. But, in cachectic individuals, and in those cases in which irritating dressings have been applied, they may spread deeply and widely until subcutaneous tissue, fascia, muscle and bone are successively attacked. Sometimes these ulcers become terribly destructive to the surrounding tissues, and this is more especially the case when the patients have been brought to a condition of mercurial cachexia by the ignorant administration of repeated doses of corrosive sublimate, or when the disease is complicated with syphilis or tuberculosis.

When these large ulcers have persisted for some time the constant drain from them, and the incessant and severe pain, appear to have the effect of suppressing the disease in some instances. That is to say the granulomata, the papules and the squamous patches disappear entirely. But, the disease may still remain latent in the system ; for, if the ulcers be cured the symptoms of yaws will return and the malady will then run its ordinary course. In other cases, however, the disappearance of the eruption may be permanent, and the ulcers which were the result of the breaking down of the granulomata will lose their infectiveness, as pointed out by Mr. Boyd in his reply to one of the Interrogations. To call these ulcers yaws ulcers is liable to create confusion and to lead to error. They will often persist long after all taint of yaws has departed from the system, indeed, they may last a lifetime. They are seen in all the forms into which ulcers have been classed by writers on the subject, and it is unnecessary to burden this report with descriptions that may be read in any text book on surgical diseases. I have known of instances in which persons have professed to be able to decide at once whether a sore was a "yaws ulcer" or not. This is simply impossible, for considerable experience and long observation and study of the question lead me to assert confidently that, without other

symptoms on which to form a diagnosis, it is not possible to declare whether an ulcer be due to yaws or not. Dr. Tulloch, whose experience of the disease is unrivalled by few, has arrived at the same conclusion. In his last report he alludes to the matter as follows :—

"When tubercles are persistently neglected or very roughly handled, and, almost "invariably in weakly subjects, they rupture and form ulcers, irregular in shape, as a rule "cleanly punched out, and, in cases of long standing, with raised and callous edges; but, "except that they are more difficult to heal, these in most instances, cannot be distin- "guished from ulcers of an ordinary nature."

In the West Indies the labourers are peculiarly liable to get their bare legs and feet injured by the tropical vegetation. The leaf of the sugar cane cuts like a knife, and there are many plants and trees with spines, prickles and sharp-edged leaves which produce small wounds in the naked skins of those people who work in the fields or the bush. These wounds, which are usually neglected or irritated by unsuitable treatment, frequently break down into intractable ulcers, indistinguishable from those seen in some cases of yaws. Occasionally, however, these innocent ulcers become infected by the yaws virus, and they often form a yellowish crust, or granulomatous growths fill them up in whole or in part. It has been customary in the Dominica hospitals to describe this last condition as "tubercular ulceration." The following case shows how a simple ulcer may become infected.

Case 688.—Central Yaws Hospital. *S. J. B.*, 18. Negro. Admitted on the 15th April, 1879, with a large superficial ulcer, five inches in diameter, over the left ankle. A small yaws tubercle on the left arm. Dartres and maculæ on body and limbs. He has had the ulcer for years, and he became affected with yaws only six months ago. The symptoms of yaws disappeared in a few months under the hospital treatment, but the ulcer remained in the same condition in spite of treatment until August, when it became filled up with red tubercles covered with moist yellow crusts. The following notes from my case book show the termination of the case :—

20th August. The tubercles are ulcerating, and the centre of the mass is depressed with a dirty moist yellow slough at the bottom.

9th September. Ulcer cleaning : it looks healthier.

2nd December. A large encrusted tubercle has appeared on the right arm near the elbow. There are rheumatic pains extending down the same arm to the hand.

12th December. Ulcer clean with red granulations.

The patient remained in the hospital for many months after the last note was taken. The yaws disappeared again, but the ulcer would not heal, and he was finally discharged to the Poor House.

Most of the cases of yaws recover without any ulceration whatever; and, when it occurs, it may be considered to be an accidental symptom, and not one characteristic of the disease, for yaws is essentially a non-ulcerative malady. For the purpose of this report, I have carefully gone over the histories of a large number of patients treated in the Dominica yaws hospitals, and I find that of 300 consecutive cases admitted to the Central Hospital from the 20th March, 1879, to the 25th February, 1880, in only 24 cases, that is in eight *per centum*, did the granulomata break down into ulcers.

This absence of ulceration in uncomplicated cases of yaws is most important, not only in respect of diagnosis, but also as assisting in the determination of several questions regarding the disease. Milroy and others have erred in considering the accidental ulceration and other complications as distinct attributes of the malady, and this has given rise to a good deal of misconception as to its real nature.

The granulomata occasionally spring from the matrix of the finger or the toe nail; and, as in these cases the tumours are particularly liable to injury, they often break down into a form of ulceration indistinguishable from *onychia maligna*. At other times, however, the tumour terminates in resolution, leaving the nail twisted to one side and corrugated. The following case shows that under careful treatment the progress of the onychia may be arrested.

Case 417.—Central Hospital. *S. L.*, 16. Negro. Admitted on the 15th July, 1878, with encrusted tubercles on both feet. The third toe of the left foot is affected with onychia due to the ulceration of a tubercle. On the left forefinger there is a tubercle sprouting from the matrix of the nail, which is pushed to one side. There are scattered tubercles about the nose and face. No dartres or gratelles. He has been six months ill with yaws. Ordered sulphide of calcium.

24th July. Tubercle commencing to disappear by resolution.

5th August. The tubercles on the face have not disappeared yet. The one on the left forefinger is becoming absorbed, and the progress of the onychia has been arrested.

The nail is corrugated, and it is slightly raised and pushed to the side opposite to the tubercle. The corrugation does not implicate the whole nail, but only the portion over and around the tubercle. Ordered iodide of potassium mixture.

26th August. Onychia cured.

On the 4th September he passed to the care of Mr. Duke, the medical officer of the hospital, who continued the iodide of potassium mixture; and, on the 4th November, he was discharged cured, after a stay in the hospital of sixteen weeks.

An examination of the case books of the Dominica yaws hospitals shows that onychial ulceration—whether due to granulomata sprouting from the matrix, or to infection of sores produced by chigoes, &c.,—is somewhat frequently met with. Thus in 300 consecutive cases admitted to the Central Hospital 22 cases, or 7·3 *per centum*, had onychia during some period of the disease.

As most of the poorer people in the West Indies walk with bare feet, the epidermis of the soles is always thick and hardened; and thus, when the granulomata form there, they are unable to force their way through the external layers of the skin. The tumours are, in fact, so bound down that they can only spread laterally, and so they generally become of a large size, in some instances the greater part of the sole being implicated. These granulomata in the soles are called "tubboes," or "tubba," by the negroes in most of the islands; in Jamaica they are often termed "crabs;" in Montserrat, "crappox;" and the French designate them "crabes." The pressure produced by the confinement of the tumours between the thick, hard epidermis and the fascia of the sole, causes them to be extremely painful and to be endowed with so much sensitiveness that those suffering in this way are unable to walk or even to stand without much pain. After the lapse of a considerable time the epidermis over them gives way in the centre, and then splits in radiating lines away from the granulomata, which grow up rapidly until they are raised a quarter of an inch or more above the general level of the skin.

As the tumour forces itself to the surface, the epidermis in the neighbourhood proliferates and is thrown off in flakes, so that its appearance is ragged and uneven, as if the superficial layers had been unequally eaten away by some corrosive liquid. It has been frequently asserted that the tubboe is a sequel of yaws, and that its presence denotes that the "dregs" of the disease are in the system. It does happen at times that the granulomata appear later in the sole than in any other portion of the body, and this is probably due to the obstacles presented by the enormously thickened epidermis to their growth. But I have frequently met with cases in which the tubboe has been the earliest, or even the only manifestation of the disease, and many others in which granulomata have appeared in the soles at the same time as a general eruption of the tumours on other parts of the body.

Of the 300 consecutive cases admitted to the Central Yaws Hospital in Dominica from the 20th March, 1879, to the 25th February, 1880, I found that in 13, or 4·3 *per centum*, the tubboes appeared at the same time as the eruption of the granulomata in other parts of the body, and that in only 8 cases, or 2·7 *per centum*, were they secondary to it. It will be noticed that amongst the 132 cases of yaws particulars of which are given at the end of Section XII, there are no less than 22 cases, or 16·6 *per centum*, in which "tubboes" were met with. This discrepancy in the per centages is due to the fact that persons with tubboes alone seldom seek hospital treatment, as they consider the condition a sequel to, and not a special attribute of the disease.

The tubboes in the soles of the feet are remarkably well shown in Figure X., for which I am indebted to Dr. Pierez of Antigua, and in Figure XI. B., which was kindly photographed by Mr. Boyd of Grenada, specially for this report. In these figures the granulomata are seen protruding through the necrosed epidermis which is split and rugged at the edges of the circular aperture. Mr. Boyd has been good enough to send me the following interesting history of the case depicted in Figure XI. B.:—

"Felix John, a black creole, at 14 years noticed, in October, 1890, a large tubercle on "his neck which rapidly spreading into a general eruption of yaws caused his admission "to hospital on 1st January, 1891. This primary outbreak soon dried up, leaving but "one tubercle on the scrotum of a somewhat intractable nature, and he was discharged "apparently cured on 28th February, 1891.

"Two months later he was admitted suffering from fissures on the soles of the feet, "through which tubercles protruded, and a crop of mixed papules and tubercles followed "accompanied by induration of the inguinal glands. Intense pain was experienced "during the growth and protrusion of the sub-cuticular tubercles on the soles which was "only relieved by incision of the superimposed skin. A rather tedious recovery followed, "the papular eruption being the last to dessicate. He was free from any osteal or "periosteal troubles and was discharged in July, three months after his re-admission."

The soles of the feet and the palms of the hands are at times affected by a chronic dermatitis somewhat analogous to the squamous patches in other parts of the body. This condition is occasionally termed "dartres," but the usual local name for it is "crabs." In Jamaica it would appear that the terms "tubboe" and "crab" are synonymous, for they seem to be used indifferently by authors who have written on the disease as it occurs in that colony. Robertson states that "crabs" are also called "running yaws" in Jamaica. In Montserrat, they are called "dry crappox," and in the Virgin Islands "dry tubboes," which term is also apparently employed to designate the tubboe itself.

This dermatitis affects the external portions of the skin principally. The epidermis is cracked, the fissures at times running down deeply and exposing a weeping surface, which is exceedingly tender and painful. The upper layers of the epidermis are eroded and sometimes split into laminæ which flake off entirely, or separate only partially, thus giving an extremely ragged appearance to the skin. Here and there, too, there are at times pits that cause the skin to look like a honeycomb. This dermatitis is well represented in Figure X., and in Figure XI. A. It is frequently excessively chronic in its course; and, as has been pointed out by writers on yaws, it may exist for years uninfluenced by any treatment adopted.

I once had under my care, at various times, a negro boy afflicted with this chronic dermatitis of the palms of the hands and the soles of the feet. The superficial layers of the epidermis were eroded and partially detached in some places, giving rise to a ragged appearance that was very striking. The boy grew up to manhood before the disease finally disappeared. He suffered neither pain nor discomfort from the affection, and he worked in the cane fields for his livelihood, his general health not being in any way disturbed. This chronic superficial dermatitis is called by the people of Dominica "crabs "courants," "pian Guinea," and "pian Africain," but in certain cases it has no connection whatever with yaws, although it is very much like the dermatitis occurring in that disease.

The peculiar appearances produced by the granulomata and squamæ when they affect the soles of the feet are due entirely to the hypertrophied state of the epidermis produced by walking barefooted; and, in consequence of this hypertrophy, diseased conditions of the tissues, which to the naked eye are indistinguishable from the so-called "tubboes" and "crabs," are met with, and often occasion extreme difficulty in arriving at a correct diagnosis. Any circumscribed tumour pushing its way through the hard and thick epidermis of the sole will give rise to appearances identical to those of the yaws granulomata in these situations; and, dermatitis due to the irritation of mud, dirt, heat, insect pests, &c. will produce in the negroes' feet a condition indistinguishable from that sometimes met with in yaws.

In connection with this matter I may mention a case I saw at Cayon, St. Kitts, with Mr. Cleveland, the medical officer of the district. It was that of a negress, 36 years of age, who had a tumour protruding from the sole of the foot. The tumour began to grow nearly a year before, and was identical in form and other appearances with a granuloma of yaws. But there were no cases of the disease in the neighbourhood, and the history did not point to yaws. The tumour was black in colour; but, sometimes, from extravasated blood, the "tubboes" themselves are dark brown or black. The diagnosis was uncertain, and, at my request, Mr. Cleveland excised the tumour and sent it to me for microscopical examination, with an interesting history of the case, which will be found in the Appendix. The growth on examination proved to be a melanotic tumour.

Several authors have observed the fact that these conditions of the soles of the feet are not necessarily attributes of yaws. Thus, in 1836, Robertson, who applied the terms "crabs yaws" and "running yaws" to the affections, writes of them as follows:—"In no "instance have I had any reason to suppose that crab yaws was capable of producing "yaws . . . . The running yaws . . . like crab yaws, is incapable of producing yaws."

In 1840, Levacher was more emphatic. He says:—"Le crabe est presque toujours "regardé comme l'héritage ou le compagnon du pian; dans quelques cas, cependant, il "peut se développer chez des individus qui n'en ont jamais éprouvé les atteintes.

"Il semble plus fréquent chez les femmes que chez les hommes, et paraît être encore, "plus que le *pian*, le partage de la race noire."

In an interesting letter addressed to the *British Medical Journal*, in 1881, Dr Jasper Cargill, of Jamaica, alluded to this question in the following words:—

"Now, I have seen a good deal of this so-called 'crab yaws,' as well as 'frambœsia,' "and I have never been able to connect one with the other. My last case was a well-"to-do Barbadian (black), who had never had 'frambœsia.' It was a typical case of "'crab yaws.' He was being treated by an old woman, with salt pork locally applied, "which of course was doing much harm. I poulticed the feet, and applied strong car-

" bolic acid lotion, and, after a time, iodoform, which in a few weeks apparently cured " him."*

In Section X. of this report particulars are given of instances of dermatitis, that are indistinguishable from these so-called " crabs," occurring in persons who have never left Anguilla. And as yaws has not been introduced into the island it is evident that the condition must be occasioned by ordinary irritation.

Although the granulomata may be met with at any part of the superficies of the body, they commonly occur on the anterior and exposed surfaces. The eruption, too, is most frequently symmetrical, thereby pointing to the fact that it is due to a constitutional cause. During the year 1878, I made an analysis of the parts affected by the granulomata in 100 consecutive cases admitted to the Central Hospital, and subsequent observations have confirmed the correctness of the figures then arrived at. Of these 100 cases, 58 were males and 42 females, and the ages varied from 14 months to 50 years.

On the Face and Head the eruption occurred in 49 cases.						
On the	Trunk	„	„	„	20	„
„	Genitals	„	„	„	16	„
„	Perineum	„	„	„	20	„
„	Upper Extremities	„	„	„	29	„
„	Lower Extremities	„	„	„	70	„

In three cases only were the tubercles found on the scalp, and they were not once met with in the axilla.

This table shows that the lower extremities are affected in the great majority of the cases, and this is due to the fact that the bare feet and legs of the labouring classes in the West Indies are so liable to injury and therefore, to inoculation with the virus of the disease. In nearly all the instances in which the perineum and genitals were affected the cases were those of children.

The granulomata may be few and scattered, or they may be many in number and set close together in various regions of the body. Figure XII. represents a case in which a number of large growths occupy a considerable portion of the surface of the head and neck ; and, in Figure XI. B., a number of them are seen on the chest.

Ordinarily the granulomata develop only from the skin, but in rare instanees they grow from the mucous membrane of the nostrils, the lips and the mouth, and rarer still they are met with on the glans penis and the prepuce. In Figure XIII. a ring formed by the coalescence of small tumours is seen encircling the angle of the mouth, and passing across the upper and lower lips into the mouth. For this interesting illustration I am indebted to Dr. Pierez, of Antigua, who photographed it from one of his own patients in that island.

Most of the earlier authors are silent on the point concerning the implications of mucous membranes. In 1831, Mason said:—" The mucous tissues seem incapable of " producing the yaws tubercle ; at least, I do not recollect to have seen any on these " surfaces."

Imray, in 1872, directed attention to the fact that the tumours " may form on the " nostrils where the mucous membranes joins the skin."

Hirsch, in 1885, mentioned that the " nodules," as he called the granulomata, may " occur also on the mucous membranes in the nose, inside the cheeks, on the gums, and " in the vulva."

Tulloch, in 1890, said : " They [the tubercles] are very rarely absolutely implanted " on mucous membrane, although they very frequently invade it to a greater or less " extent."

The implication of the mucous membranes by granulomata starting on the skin in the vicinity, as in Figure XIII., is often observed, but it is questionable whether such cases occur very frequently. Of 750 consecutive cases admitted to the Morne Bruce Hospital in Dominica, the mucous membrane was implicated in 21 instances, that is in 2·8 *per centum*. And in the 132 patients whose histories are detailed in Section XII., the mucous membrane was affected in 3, or 2·3 *per centum* of the cases. It is, however, exceedingly rare to meet with isolated granulomata on these membranes. I met with only two cases during my mission, one at Charlotteville in Tobago, and the other at St. Joseph in Dominica. I have certainly not seen more than 10 such cases during the whole of my experience of the disease, and these facts show, therefore, how rare is the condition.

The duration of the uncomplicated disease varies considerably. It may last for periods of time that will be measured by weeks, months, or even years. The duration,

* *"Crab Yaws" in Jamaica—What is it?* By Jasper Cargill, M.D. *British Medical Journal*. 1 Jan., 1881.

indeed, depends on idiosyncracy, condition of health at the time of infection and treatment, both hygienic and medicinal.

In mild cases in vigorous subjects, the granulomata will begin to be absorbed within six weeks of their formation; and in other instances they will remain without the slightest change for many months, no matter what may be the nature of the treatment.

It frequently happens, too, that succes-ive crops of the eruption are evolved during the course of the disease. This secondary eruption may either stop short at the squamous or papular stage, or it may take the form of the granulomata. The crops may also be partial or general. In fact there is nothing whatever to distinguish them from those that appeared at the onset of the disease, and there is no sore throat, or any other symptom that can establish their connection with syphilis.

They are usually preceded, as was the first eruption, with febrile symptoms and rheumatic pains in the bones and joints; and in their course and termination they present no special characters. Usually there is a distinct interval between each succeeding eruption, during which time there is an apparent disappearance of the disease; but cases occur in which successive eruptions appear at irregular intervals, so that the patient is affected at the same time with granulomata at all stages of development and decline.

The history of *Case* 395, in the 10th Division of Section XV. of this report, shows how four successive crops of the eruption may be met with in the same person. Thomson mentions a case he had under his care in which there were six crops of the eruption, and he says that "such cases are by no means of rare occurrence."

During the course of the disease, after the fever of the stage of invasion has subsided, in most instances there is no marked deterioration of the general health. The appetite will be good, the sleep unbroken, and the spirits unaffected. But there is always a disinclination to work and to take exercise, and careful observation will show that there is a certain amount of debility, which in some instances progresses to unmistakable cachexia. In reference to this matter Dr. Tulloch makes the following observations in his third report:—

"Yaws is, in my opinion, almost invariably attended by more or less cachexia "(using the term in its looser sense of 'an unhealthy condition of the blood or general "'system,' Roberts), which manifests itself even at this early stage by loss of flesh, and "debility of varying amount. I have seen this impression upon the system so pro-"nounced as to be beyond all question of doubt, and I have seen it so slight as to be "hardly perceptible; while in some cases no prominent signs of its presence occur "during the whole course of the disorder."

The two principal indications, besides cachexia, of the infection of other tissues than the skin, are the enlargement of the lymphatic glands, and the pain in the bones and joints.

It will be noticed at times that the femoral and inguinal, and even the cervical glands are tender without any sensible enlargement; but, in a certain number of cases, these glands will be greatly enlarged and very painful. The femoral glands are most often affected in this way, and next in order of frequency come the inguinal and cervical, and the other lymphatic glands that lie close to the surface. The following case in which there was an enlargement of the femoral glands is a good illustration of those conditions in which the symptom is most often met with.

Case 1,395.—Central Yaws Hospital. *Y.P.*, 6, negress. Admitted on the 28th February, 1881, with encrusted tubercles on the scalp, face, neck, body, genitals, and perineum. The tubercles are small; and, with the exception of those on the scalp, they give the appearance of a symmetrical general eruption. The femoral glands are enlarged. The child is emaciated and cachectic.

She was treated with cod-liver oil and vinum ferri at first, afterwards arsenic, sulphide of calcium, and sulpho-carbolate of calcium were successively prescribed, and she was discharged cured on the 27th December, after a stay in hospital of nearly 10 months.

A careful examination of 750 consecutive cases admitted to the Morne Bruce Hospital, showed that in 39 instances, that is in 5·2 *per centum*, there was marked cachexia; and the absorbent glands were found to be greatly enlarged in 28, or 3·7 *per centum* of the cases.

It has been already pointed out that rheumatic pains of the joints and the bones, more especially those of the arms and legs, may precede the eruption and persist for some time afterwards. Occasionally, however, these pains come on at later periods, and then they are unusually severe. They are a well-known symptom of the disease. In the English speaking islands they are called the "yaw pains"; and in the French patois

spoken in Dominica, St. Lucia, and Grenada, the term "douleur pian" has been applied to them. At times they are intense, and I have seen men and women lying down and moaning or crying out with the agony. They appear to me to be much more frequent when mercury has been administered, and this observation is in accord with the statements of some of the early writers on the disease.

This yaws pain must not be confounded with that condition described as "bone-ache" by the old authors, and due in a great measure to the aggravation of the disease by the inducement of mercurial cachexia. This matter has been considered in Section XV., and it is, therefore, unnecessary to treat of it at length here; but the following observations by Winterbottom show that this physician, who practised in the middle of last century, was able to discriminate between symptoms consequent on yaws, and those due to accidental complications:—

"When mercury has been prematurely used, though it causes the pustules to fall "off, and clears the skin, yet it does not cure the disease. A train of disagreeable "symptoms sooner or later appear, which often continue to harass the patient during "the miserable remnant of his life; this is called by the negroes the bone-ache. The "unhappy sufferer is tormented with deep-seated pains in the bones, especially round "the joints, which are occasionally aggravated to a violent degree; the periosteum "becomes thickened, inflamed, and painful, and nodes are formed on the bones. When "these symptoms have continued for some time, the bones are affected with caries, and "even become soft and lose their form."

Complications.

Anæmia is so frequently seen associated with yaws, that it has been considered by authorities to be an attribute of the disease. Such, indeed, was my own impression for some years, but extended experience taught me that in ordinary uncomplicated cases there is no deficiency in quantity or quality of the blood. It has been shown in Section XV., that the mal-hygiene of the negroes is responsible for much of the anæmia and other conditions of ill-health so frequent among them. And as naturally the poorest of the people most often suffer from yaws, the disease is necessarily complicated with those states of the constitution to which the appropriate term "mal de misère" has been applied.

Fortunately, however, this condition so produced soon disappears under the nourishing hospital diet, and the administration of ferruginous and other tonics; and the yaws is then found to be much more amenable to treatment, and much less likely to be further complicated with forms of ulceration.

Under the old mercurial treatment the anæmia was aggravated, and this was one of the principal causes that brought about the train of serious symptoms alluded to by writers under the terms of "bone-ache," and "repelled yaws."

Pica.—This curious perversion of the appetite known under the terms, cachexia Africana, negro cachexy, malacia, mal d'estomac, and dirt-eating, is closely connected with anæmia, and is often due to the same causes. Indeed anæmia is always present in cases of pica. Levacher is the only author who mentions malacia, or mal d'estomac as a complication of yaws, but I have met with a few cases in the Dominica hospitals, and I found them always of a protracted nature, for the habit of dirt-eating once induced is rarely recovered from except in the case of young children. It would appear from the accounts of the older authors that cachexia Africana was very common amongst the slaves and more especially amongst those who were brought over from Guinea, in whom nostalgia was a frequent prelude to the extraordinary perversion of appetite.

In the cases of pica I have met with in the yaws hospitals, where by careful watching the patients have been prevented from eating earth, they have scratched the whitewash off the walls to indulge their unnatural craving for the ingestion of mineral matters.

In one instance, that of a little negro boy, whose granulomata broke down into apparently incurable encrusted ulceration, it was found that he tore off the crusts and ate them, and when this was prevented, he got hold of the littler children, and picked the crusts off their granulomata to satisfy his peverted appetite. Fearing he might be caught whilst doing this in the daytime, he used to rise at all hours of the night and pick off the crusts whilst the children were sleeping. He was discovered in the act accidentally, and then an inquiry caused the little patients to say what had been happening for a long time. The boy's hands were tied up in bags, and he eventually recovered, but the cicatrices of his ulcers became the seat of extensive keloid growths.

Syphilis, more especially in its tertiary form, as I have already pointed out in Section XV., is met with in yaws patients; and several of the medical officers have given cases in illustration of the fact. Such a complication is a very serious one, and the so-called tertiary stages of yaws are in most instances due to the results of a syphilitic cachexia. The gravity of these cases is at once seen when the question of mercury is considered in connection with them. In syphilis, mercury is necessary to cure the disease, but in yaws the administration of the drug in the early stages will frequently greatly aggravate all the symptoms, and possibly induce relapses. When, therefore, yaws and syphilis occur as intercurrent affections, the proper treatment of the one is very likely to have the effect of exacerbating the other. Some of the most fearful examples of destructive ulceration of the face and other parts that I have witnessed, have been due to the complication of yaws by syphilis, or of syphilis by yaws. Such a case is represented in Figure XIV. The wretched young man was an inmate of the poorhouse in Dominica.

Tuberculosis.—This disease, as a complication of yaws, is most often met with in its localised forms of scrofula and lupus. The matter has been treated of at length in Section XV., and in Section XIV. illustrative cases have been brought forward by several of the medical officers. Figure I. shows yaws and lupus as met with by Dr. Tulloch in Tobago, and Figure XV. is an example of the same condition, only of a less aggravated type, as it is sometimes met with in Dominica.

Varicella.—During the time the yaws hospitals have been established in Dominica chicken-pox has prevailed several times in an epidemic form, and it has invariably attacked some of the patients in the hospitals. At first the varicella pursued its ordinary course, apparently uninfluenced by the yaws, but later on the latter disease impressed its character on the eruption of the former. Many of the vesicles gradually became transformed into granulomata; and, as some of the vesicles were never ruptured, it is evident that their transformation was not occasioned by infection from outside the body.

Vaccinia.—The infection of vaccination sores with the virus of yaws has been already referred to in Section XV., and several cases have also been noticed in which yaws impressed its character on the vaccinia itself. These instances, analogous in every way to the cases of varicella and yaws just alluded to, have been thought by a few to be the results of the propagation of yaws by vaccination; but, as I have already pointed out, there is no reliable evidence yet brought forward to prove that the virus of yaws has been invaccinated with human lymph.

Skin Diseases.—Persons suffering from yaws may contract various skin diseases which in some instances produce anomalous symptoms that have puzzled medical men.

In Section VI. particulars are given of a case I saw in the St. Lucia Hospital in which a boy with a bad attack of *Tinea tropica* had been infected with yaws, the appearances that were produced were very curious indeed, and might easily have been mistaken for an anomalous form of the yaws eruption. The following case of yaws and herpes, from my hospital notes, indicates how various lesions of the skin are likely to be associated with yaws:—

Case 1,146.—Central Yaws Hospital. *F. M.*, 7, negro. Admitted on the 11th September, 1880. After his admission he was attacked with coryza, followed by herpes on he upper lip, and a short time afterwards an encrusted tubercle appeared at the site of one of the vesicles.

Ulcers.—The commonest complication of yaws is ulceration. So common, in fact, was this accidental termination of the granulomata in past times, when the administration of mercury, pushed to salivation, was the routine treatment, that all authors described it as a symptom of the disease. Later writers, following in the steps of the older authorities, have perpetuated the error. It has been shown in other portions of this report, that the normal termination of the characteristic yaws tumours is by resolution, and, therefore, their breaking down into ulcers is an accidental circumstance due either to local irritation or to the influence of concomitant disease.

At times, this ulceration, more especially when it is of a scrofulous character, is so extensive and painful, that the constrained positions into which the patients are compelled to place themselves for lengthened periods to obtain rest or ease from suffering, cause contraction of the flexors, and consequent crippling. This is more especially the case in children, and it is remarkable how soon tonic contraction of the muscles of the limbs will take place in young persons. Sometimes the constant keeping of the arm or leg in a

flexed position for only a few days will cause a rigid contraction of the flexor muscles that will take a considerable amount of time and patience to overcome.

Talipes.—This deformity sometimes results from the "tubboes" and "crabs" in the soles, as well as from ulcers about the ankles and feet of yaws patients. The pain caused by placing the feet to the ground in the ordinary manner makes it necessary for those suffering from such symptoms to throw the weight of the body in progression either on the toes or heels or the margins of the feet, and in this way all the various forms of talipes are brought about. An examination of the statistics of the Central Yaws Hospital shows that, of the 1,647 cases admitted, there were 12, or 0·7 *per centum*, of the patients that were suffering from one of the forms of club foot due to the causes just enumerated.

Diagnosis.

In previous sections of this report, the diagnostic differences between yaws and *syphilis*, *tuberculosis*, and *leprosy*, have been alluded to in sufficient detail to render it unnecessary to enter into the matter here.

Whilst I was engaged in writing this report, however, Mr. Numa Rat sent for my examination an interesting case from the yaws hospital, and the following notes I took at the time may be given here, as they illustrate very well the nature of some forms of tuberculous ulceration that are often described as due to yaws.

J. G., mulatto, aged 20. He lives at that part of Dominica where, as I have already stated in Section XV., lupus is endemic. His father died of "dropsy," his mother is still alive, and the other members of the family are in good health. He is above the class of labourers; and, it would appear, has never suffered from poverty, although his diet, like that of all the inhabitants of the district in which he resides, has been a poor one. He had yaws during childhood, but he recovered perfectly from the attack, and never had any return of the symptoms of the disease.

He is a thin, anæmic, and cachectic light-coloured person. He has slight hypertrophy of the heart, and the respiratory murmur is roughened. There is extensive serpiginous ulceration, covered with brown crusts, over the left breast and left scapula, and the axillary glands of the affected side are enlarged and tender. He has had the disease many months; he could not say how long.

The ulceration on the chest extends from the border of the axilla across the thorax to the centre of the sternum. It is nine inches in length, and varies from three-quarters of an inch to two inches in breadth. The ulceration is superficial; it is healing in some places, and extending in others. There are scars indicating that portions have healed, and these scars are white or reddish in colour, and they are puckered and indurated. The ulceration at the back is of the same character, and nearly as extensive as that over the chest, but the crusts are thicker, and they have split in vertical and transverse lines, giving a peculiarly uneven aspect to the surface. The margins of both ulcers are reddened, and a purulent discharge exudes from beneath the crusts. On the back, an inch below the inferior border of the ulceration, there is what is apparently a fresh spot of the disease. It is slightly raised above the surface, reddened at the margins, and the centre looks like a vesicle that has become pustular. On breaking the epidermis, which was spread tightly over the yellow matter beneath, a thin puriform fluid exuded, and, on scraping this away, a shallow ulcer was discovered.

Cover-glass preparations were made of the discharge from the ulceration, and in most of them nothing was observed besides ordinary pus cells, but the purulent fluid taken from one spot showed micrococci, which had probably infected the ulcers after the man's admission to the yaws hospital.*

This case may be described as one of tuberculous ulceration, and it is identical in appearance with that termed scrofuloderma by some authors. There is nothing whatever to connect it with the attack of yaws the patient suffered from in childhood, and yet such cases are often declared to be the later manifestations of yaws.

Such large ulcerated surfaces are naturally peculiarly liable to be affected with the yaws virus when the persons suffering from them are placed within the operation of the contagion; and it is quite possible that the patient, J. G., may later on develop signs of yaws as the result of his stay in the yaws hospital.

The other diseases that have been confounded with yaws are the sibbens, that at one time was prevalent in the south of Scotland; button-scurvy, that was formerly met with in the south of Ireland; the radesyge of Scandinavia; the scherlievo, fiume, and falcadina

* In another case sent to me by Mr. Numa Rat, in which there were somewhat similar scrofulous ulcers, a number of cover-glass preparations were made, but no microbe was discoverable.

of northern Italy; le mal de Chicot, or the disease of St. Paul's Bay, which prevailed in certain parts of Canada between the years 1776 and 1780; the verrugas of the Peruvian Andes; the parangi disease of Ceylon; the coko disease of Fiji; and the Oriental sores or boutons de Biskra, which are endemic in Crete, the countries of Africa bordering on the Mediterranean Sea and various parts of Asia.

In respect of most of these diseases, an important fact regarding their diagnosis from yaws, is that they all were, or are, endemic in temperate countries, whereas yaws is essentially a disease of the tropics.

It has been now determined that *sibbens*, *scherlievo*, *fiume*, *falcadina*, and *le mal de Chicot* are, or were, simply local names for various manifestations of syphilis, and it is, therefore, unnecessary to enter into particulars concerning the differences between them and yaws.

The button scurvy of Ireland was also thought to be syphilis, and Hirsch mentions the fact that it bore a striking resemblance to yaws; but the microscopical appearances of the tumours indicated that they were of the nature of warts. The eruption was observed principally on the palms of the hands, and the inner sides of the thighs and arms. The disease is now almost, or entirely, eradicated from those parts of Ireland where it was prevalent.

Radesyge is evidently leprosy, which is known to be endemic in parts of Scandinavia. The following description by Craigie of the later symptoms indicates at once the leprotic nature of the disease :—

"Whether the first external indications of the disease be wheals, (*maculæ*) scales, or "pimples, they are speedily accompanied or followed by many small knotty bodies or "tubercles, sometimes of a copper, sometimes of a leaden colour, first of the size of a "leaden-drop or a garden pea, and moveable under the skin, afterwards larger and more "fixed. These tubercles occupy first and most abundantly the face, viz., the eyelids, nose, "cheeks, chin, lips, external ears, and then the rest of the person; and in this distribu-"tion the skin of the face is not only sooner, but more seriously and completely, diseased "than that of any other region. The skin of the forehead becomes thickened, wrinkled, "and puckered; the eyelids are swelled, inverted, and surrounded with a rose-coloured "or dark leaden circle; the cheeks are swollen, and of a dark red colour; the lips "become thickened, indurated, and retracted; the muscular cartilages are convoluted; "and the whole countenance assumes an expression at once frightful, hideous, and "pitiable. This disorganising process is not, however, confined to the facial skin. In "the mucous covering of the *uvula*, the palatine velum, the tonsils, and the fauces gene-"rally, the same or analogous changes take place."

Verrugas is a disease that is commonly met with in the valleys of the Peruvian Andes. It attacks principally the whites; and it appears to be manifested chiefly by a cramp-like feeling of contraction in the gullet, and by the eruption of rounded tumours, from half an inch to an inch or more in lateral extent, of the nature of warts, in which are clefts from which arise frequent and sometimes nearly uncontrollable hæmorrhages. The tumours appear not only on the skin, but on the mucous membrane, and it is stated that they are also found in the stomach and intestines. None of these symptoms are similar to those met with in yaws, and it is curious, therefore, that verruga peruviana should have been confounded with that malady.

Parangi.—It has been already shown that the parangi disease of Ceylon was thought by Mr. Kynsey to be yaws, and that Milroy, Colcott Fox, and Hirsch, added the weight of their authority to the opinion of this identity.

It is curious that the name parangi, which means foreign, and was employed by the Singalese to distinguish the Portuguese when they settled in Ceylon, like some of the terms applied to yaws was first used to designate syphilis. Kynsey says :—

"In Ribeyro's history* the disease is mentioned thus: 'The Neapolitan disease "'which the natives call Parangilede, or Portuguese sickness, since the Portuguese first "'introduced it into the country, is not easily cured.'

"There is little doubt the word was restricted to syphilis, which was first introduced into Asia in the sixteenth century, soon after its epidemic-like outbreak in Italy, when the army of Charles VIII. was besieging Naples.

"Previous to the sixteenth century syphilis was, I believe, unknown in India. The "old Hindu writers described various maladies of the genital organs; but they were "unacquainted with venereal disease, and there is no name for it in the Sanskrit language. "In modern Sanskrit works it is called 'Faringa Rógo' or Portuguese disease."

* History of Ceylon, presented by Captain John Ribeyro to the King of Portugal. 1685.

The incubation period of parangi, which is not marked by any recognisable symptoms, is said to extend from two to eight weeks. The stage of invasion is ushered in by fever which lasts from two to eight days, and is followed by the eruption of papules like those of acne or lichen, which may terminate in resolution with desquamation and pigmentation of the skin, or may proceed to ulceration. In the latter case the papules enlarge, suppurate and form a crust, under which ulceration goes on. Kynsey describes the ulcer as being "clean and healthy, the granulations standing out individually. If "the crust be removed it is never reproduced even in immature papules."

When the eruption appears in the soles of the feet it gives rise to a condition very like that observed in the "tubboes" of yaws and in other diseases. In Ceylon this is called "dumas," and Kynsey describes it as follows :—

"The horny cuticle protrudes and becomes very painful, and in a short period "ruptures and gives egress to a fungoid growth covered with a dirty yellow scab. This "fungoid growth consists of hypertrophied papillæ and fibrous tissue."

The microscopical appearances are said to show that the disease is confined to the epidermis : but, in the same paragraph, Kynsey asserts that the papillæ, which form part of dermis, are implicated as well. The following is his brief reference to the histology of the growths :—

"Microscopic examination of the tissues reveals nothing more than hyper-"trophied papillæ, and the morbid action would appear to be limited to the epidermis, "and to consist of a rapid proliferation and necrosis of its elementary cells."

On the decline of the disease cicatricial tissue, which is usually pigmented, marks the sites of the ulcers ; and one attack does not appear to afford any immunity.

The above is, briefly, a description of the uncomplicated disease as given by Kynsey and his colleagues who assisted in obtaining the information for the *Report on the "Parangi Disease of Ceylon,"* published in 1881. But in many instances sequels — which Kynsey describes as symptoms of the "fourth stage," are met with and clearly indicate that the same causes are at work in Ceylon to aggravate disease as have been shown to do so much harm in the West Indies. The following remarkable passage from Mr. Kynsey's report shows that excessive mercurialism is responsible for as much suffering in the East as it is in the West Indies :—

"When the disease passes on to its fourth stage the eruptions break down, the "subjacent ulcers become unhealthy, spread rapidly, destroying the skin to great depths, "the discharge becomes profuse, the pain great, the desire for food is abolished, "emaciation ensues, and the general health of the patient suffers so much that he is no "longer proof against nor able to combat ordinary inflammatory diseases ; an attack "of one generally is the last event of his life. When the patient survives the fourth stage, "and the ulcers heal, the most horrible distortions and deformities ensue from the "contraction of the cicatrices, and render him a misery to himself and his surroundings. "All these and the various diseases of the bones, &c., may be correctly ascribed to the "abuse of a remedy which in skilful hands contributes to the cure of the disease— "mercury."

On comparing the symptoms, as detailed above, with those of yaws, it will be seen that the two diseases are totally different. The chief diagnostic sign, and one that at once separates yaws from parangi, is that of ulceration. Parangi is essentially an ulcerative disease, whilst yaws is not. Again the chief attribute of yaws, namely, the granuloma, is absent in parangi. It is true that the "dumas" bears a resemblance to the "tubboe." But, as I have already shown, tumours resembling tubboes may occur in persons in the West Indies who have never had yaws. In fact, the appearance is produced principally by mechanical agencies ; for any kind of circumscribed growth from the dermis pushing its way through the leathery cuticle of the soles of those who walk barefooted is likely to give rise to the similar appearances.

The conclusion to be drawn from comparing the attributes of the two diseases is that yaws and parangi are distinct from each other ; and it is an interesting fact that Dr. Loos, who investigated the nature of parangi at the instance of the Government of Ceylon, in 1868, arrived at the same conclusion. In a letter to the Under Secretary of State for the Colonies, Dr. Milroy, in June 1873, suggested that parangi was yaws, and that the attention of Dr. Loos should be directed to the descriptions of that disease in his report by Dr. Imray, of Dominica, and Dr. Bowerbank, of Jamaica.

In reply to Dr. Milroy, Dr. Loos wrote as follows :—"I have read the portion of "the report relating to yaws with much attention and interest. I may, however, "state that I was not altogether ignorant of the existence of yaws, and the possibility "of parangi disease being allied to it. . . . . After careful consideration, however, "I dismissed the idea of any very close resemblance of parangi disease to yaws, and the

" clear descriptions of the latter disease given in Dr. Gavin Milroy's report have tended, " still further, to strengthen my conviction that the two diseases are not identical."

Oriental sores.—This disease—known as Delhi boil, bouton de Briska, Caneotica, and by the other terms already detailed in another portion of this section—was thought by Milroy to be identical with yaws. A good deal has been written about these boils, " clous," or " boutons " by medical men who have observed them in various parts of the East, but the latest and, I believe, the best account of this many-named malady is contained in the first part of the valuable work of M. M. Henri Leloir et Emile Vidal, entitled *Traité Descriptif des Maladies de la Peau*, and published in Paris in 1889. These joint authors clearly established the identity of the diseases called by as many names as the places in which they have been found to be endemic, and they suggest for the designation of them the French term " Bouton des Pays Chauds."

These oriental sores were demonstrated by Dr. Edgar Weber in 1876 to be contagious, and they are not only inoculable, but auto-inoculable. They attack both sexes indiscriminately, and persons of all ages. Domestic animals, too, are subject to the disease. After an incubation period of 15 days there is an eruption on the exposed parts of the body of papules that have been likened to those of acne, around which is an exfoliation of the epidermis. The summits of the papules then become yellowish from suppuration, and crusts are formed. Under the crusts ulceration proceeds, and the ulcers are clean, and the granulations secrete a sanious or sero-purulent fluid. The edges of the ulcers are raised, and close by other papules form which, breaking down into fresh sores, cause an extension of the ulcerated surface. If the crusts be removed they rarely re-form. When the sores take on a healing action they fill up usually with fleshy granulations, the surrounding skin becomes pigmented, and cicatrices which are persistent indicate the site of former clous.

Leloir and Vidal describe five varieties of the disease as follows :—

1. An *eroding ulcerous form*, the name of which sufficiently indicates its nature.

2. A *papillomatous form*, in which the ulcers are filled up with exuberant granulations.

3. An *abortive papulo-tuberculous form*, in which the papules do not ulcerate or become encrusted, but are the seat of fine foliaceous desquamation. This is the mildest variety of the disease.

4. A *coherent confluent form*, in which the ulceration invades very large surfaces. It is stated that in this variety the whole region of the buttocks may be occupied by the ulceration.

The duration of the disease is from 3 to 12 months, and one attack does not afford any immunity. The contagion is said to be carried by flies and other insects; and in places where the malady is endemic the sores prevail more at certain seasons of the year than at others.

As regards the pathology the disease shows a certain affinity to that manifestation of tuberculosis known as lupus. Histologically, it consists of a neoplasm of an inflammatory nature seated in the dermis, not resolvent spontaneously, but tending to a partial or a total destruction of the tissues in which it is developed.

The horny layer of the epidermis is thickened, and some of the cells are protoplasmic. The Malpighian layer is also proliferated, and it sends down broad and ramified prolongations into the dermis. Islets of the neoplasm are seen in the dermis and in the subcutaneous tissue, and the embryonic cells are disposed more especially around the blood vessels. The hair follicles, and the sebaceous and sudoriporous glands are destroyed; the nerve fibres are isolated by separation, and the walls of the blood vessels are infiltrated with the embryonic cells, the middle coat being thickened with the result that the lumen is partially obliterated.

A careful consideration of the attributes of these so-called oriental sores shows a close affinity between them and parangi. Indeed, my study of the subject leads me to conclude that the two diseases are identical. The points of diagnosis between parangi and yaws serve equally well to distinguish the latter disease from the oriental sores.

Dermatitis orientalis.—In Section VI. of this report I described under this name an ulcerative disease that had been introduced into St. Lucia by the East Indian immigrants. I met with cases of it also in Antigua and Barbuda, it having been carried to the former island by Chinese coolies. In St. Lucia it was occasionally mistaken for

yaws, and the following extract from a letter of Mr. Boyd of Grenada, addressed to me on the 27th August, 1891, shows that the disease had been introduced into that island also from India :—

"We have a quantity of the so-called 'cooiie itch' here, and it is frequently "mistaken for yaws. Your nomenclature is a suitable one, but I have always looked "upon the disease as akin to Impetigo contagiosa only aggravated by dirty habits."

The eruption consists of vesicles or papules which ulcerate and form a yellowish crust, under which ulceration proceeds, and may coalesce with other ulcers formed in the same way. The sores appear to originate about the hair follicles, and they are exceedingly painful. The disease is of an inflammatory nature, it is highly contagious; it lasts usually for several months, as I was informed, and it is liable to relapse.

Unfortunately I had not sufficient time to investigate the matter thoroughly, but the few facts I was able to gather point to an analogy between the disease and the so-called oriental sores and parangi. The name I suggested is sufficiently descriptive as far as present knowledge goes, and it is certainly better than "eruption," "coolie itch," and "Chinese itch," which I noticed on hospital case papers.

Coko.—The diagnostic points that would seem to distinguish this Fijian disease from yaws have been already noticed under the head of geographical distribution. But too little is known of the malady to render it possible to write with any degree of certainty concerning it. Should it prove really to be yaws, a wide field of investigation will be opened up in topographical medicine. The attention of the medical staff of the colony of Fiji may well be directed to the most interesting question of the true nature of this curious endemic malady, a complete description of which has yet to be written.

Prognosis.

In my third report on the Dominica Yaws Hospitals the following remarks were made in regard to the question of prognosis:—"Yaws is not a disease of much gravity "if the patient be properly treated from the first. When, however, the constitution is "abused by the excessive administration of mercury, the symptoms become inveterate "and the prognosis is unfavourable. In the later stages, when the general system "is debilitated by bad and insufficient food, want of cleanliness, and the non-observance "of hygienic rules, the malady is indeed a grave one, and if the patient do not die, many "months, and even years will be occupied in the re-establishment of health . . . . "When appropriate treatment is had recourse to from the commencement of the disease, "from one to three or four months will be occupied in the cure, but in complicated and "old-standing cases very little progress can be expected for many months, and the "disease may linger on for several years. At the end of the last stage exhaustive "diarrhœa sets in, or general anasarca, due to the vitiated state of the blood, carries off "the patient."

A much more extended experience of the disease does not lead me to alter these views in any essential particular.

Very little has been written in regard to the prognosis of yaws. A few of the authors have stated that the duration is uncertain, and others have referred briefly to the average time occupied in the treatment of the disease; but, with the exception of Dr. Tulloch, they do not appear to have based their opinions on any statistical information, and as a result there is a wide divergence of statement concerning the question. Thus Dancer, in 1819, said that the cure might be effected under appropriate treatment in a few weeks, and Levacher, in 1840, fixed the period at from two to three months; whilst Thomson, in 1820, asserted that 10 months was the average time, and Bowerbank, in 1873, informed Tilbury Fox that 13 months was occupied in the treatment of severe cases.

Imray, in 1872, referred to the matter in the following words:—"The duration of "the disorder, from the time of its breaking out on the skin to its disappearance, is "usually from two to four months, under an appropriate mode of treatment. But, as "has been already stated, it may exist for many months, or many years, and its effects "may be felt through a lifetime."

In his third report Dr. Tulloch states as follows:—"The average duration of cases "before coming under treatment, which had been 50 weeks in the first 300 cases, has "now fallen to about seven. As a rule, the people now bring in their patients as soon "as they recognise the nature of the disease. The average duration of treatment of "cured cases is about nine weeks. In the first series of 300 it was as low as 5·3 weeks, "but cases are now kept longer under observation."

Attached to my third hospital report was the following table showing statistics

concerning the duration of the treatment of 466 cases discharged from the Central Yaws Hospital, and this was, I believe, the first occasion on which such information had been arrived at :—

Age.	Average stay in Hospital.	Longest stay in Hospital.	Shortest stay in Hospital.
Under 5 years - -	2 months, 26 days	8 months, 3 days	1 month.
5—10 „ - -	2 „ 25 „	13 „ 8 „	29 days.
10—15 „ - -	3 „ 28 „	15 „ 21 „	1 „ 6 „
15—20 „ - -	5 „ 10 „	13 „ 14 „	1 „ 7 „
20—30 „ - -	4 „ 22 „	14 „ 8 „	27 „
Over 30 „ - -	4 „ 6 „	16 „ 1 „	28 „

This table indicates that the disease is more severe and takes longer to cure in adults than in children, but that during the period of adolescence, and the years immediately succeeding it, the attacks of yaws are of a more protracted nature.

Early in the year 1880 similar statistics were made in regard to 273 cases discharged from the hospital during 1879, but they were more in detail, as they gave information of the average stay of the males and females. The following table shows the results arrived at from the calculations :—

Age and Sex.	Average stay in Hospital.	Longest stay in Hospital.	Shortest stay in Hospital.
Under 5 years. Males - - - -	4 months, 27 days	15 months, 4 days	1 month, 24 days.
Females - - - -	3 „ 8 „	7 „ 12 „	28 „
5—10 „ Males - - - -	3 „ 28 „	10 „ 29 „	1 „ 4 „
Females - - - -	3 „ 10 „	9 „ 10 „	1 „ 7 „
10—15 „ Males - - - -	5 „ 12 „	21 „ 27 „	1 „ 5 „
Females - - - -	4 „ 16 „	11 „ 12 „	14 „
15—20 „ Males - - - -	5 „ 20 „	21 „ 25 „	24 „
Females - - - -	6 „	17 „ 15 „	1 „ 1 „
20—30 „ Males - - - -	5 „ 21 „	11 „ 23 „	17 „
Females - - - -	3 „ 3 „	5 „	1 „ 3 „
Over 30 years Males - - - -	2 „ 23 „	3 „ 25 „	1 „ 15 „
Females - - - -	4 „ 15 „	„ 7 „	1 „ 9 „

This table indicates generally a much longer period of detention in the hospital than the former one, but this was due to the institution being kept without a proper supply of medicines, and to other unsatisfactory matters that have been alluded to in Section XII. of this report. It is chiefly valuable as showing the relative average duration of the disease under treatment in both sexes. It would appear that up to the age of puberty the malady is less severe in females than in males, and that afterwards the reverse obtains.

Yaws is a chronic disease producing more or less debility which is aggravated by the mal-hygiene of the people amongst which it most prevails. But, unless it be associated with any of the complications already mentioned, it cannot be said to lead to a fatal issue. It appears to have the property of lighting up any latent tendency to tuberculosis, more especially the scrofulous and lupoid forms, and then the combination of the two diseases often gives rise to a fearful state of ulceration and deformity. Similar conditions are produced by syphilis and mercurial cachexia, but all these complications have been considered at length in former Sections.

The Report of the Registrar General of Births and Deaths in Jamaica for the year

1878-9 contained some statistics concerning the mortality from yaws in that island. He says "Yaws shows a fatality of 52 cases. The last census showed 2,464 persons affected "by it, the death rate on which numbers would be 2·1 per 100." The death rate of the whole island for the same period was 23·3 per 1,000; so that, according to the Registrar's figures, yaws would appear to save life to the extent of 2·3 per 1000. These figures are, of course, simply an approximation to the truth, for neither the census returns relative to diseases nor the stated causes of deaths are particularly accurate in the West Indies; but the calculations tend to show that yaws cannot be regarded as dangerous to life. The disease interferes much with labour supply, it increases pauperism, and it occasions much suffering in many ways, but its prevalence in an island even to a large extent does not appear to affect the death rate.

The following table shows the mortality rates of the various yaws hospitals comprised within the scope of the Commission :—

Hospitals.	Periods.	No. of Patients. Treated.	No. of Deaths.	Death Rate per Thousand.
Grenada - - - - -	1886–1890	1,104	7	6·3
St. Vincent - - - - -	1883-1888	206	3	14·6
St. Lucia:				
Morne Fortuné - -	1882–1888	1,411	27	19·1
Rat Island - - -	1888–1890	577	13	22·5
Montserrat - - - - -	1881–1891	134	5	37·3
Nevis - - - - - -	1887–1891	466	1	2·1
Dominica:				
Morne Bruce - - -	1871–1873	333	6	18·0
Prince Ruperts - -	1876-1878	391	16	40·9
Central - - - -	1877–1882	1,650*	88	53·3
New Morne Bruce - -	1882–1891	885†	19	21·5
Totals - - -	—	7,157	185	25·8

* Including 3 children born in the hospital. † Including 4 children born in the hospital.

From this table it will be seen that the death rate in most of the hospitals is so extraordinarily low as to indicate that yaws would seem rather to preserve than to destroy life. Even in the case of the Central Yaws Hospital in Dominica, where the mortality was much increased—as it has already been shown—by intercurrent epidemic diseases, the rate is really a very low one for a hospital. There were altogether 185 deaths amongst 7,157 patients treated in six islands, and this gives a mortality of 25·8, which is really 10·3 per thousand less than the average annual death rate of Antigua for the decennial period 1881-1891.

These figures prove conclusively the fact that yaws is not a fatal disease when the patients are placed under proper medical treatment. The low mortality in the yaws hospitals is due in a great measure to the improvement in the general health brought about by the sojourn in the institutions, where the patients are under much better hygienic conditions than they can possibly be in their own dirty hovels.

Histology and Pathology.

Beyond the fact that the characteristic cutaneous so-called "tubercles" had been recognised as belonging to the class of infective tumours, very little was known of the pathology of yaws up to the time of the investigation undertaken by Mr. Watts and myself.

After the completion of this preliminary scientific work, an account of which is given in a special report in the Appendix, I was unable to devote any time to further

inquiry of a like nature until the general work of the Commission was finished. When this was done, however, I roughly fitted up a small laboratory in Dominica, and continued the investigation into the histology and pathology of the disease. It has been already explained how this work delayed the writing of the report; but as it has enabled me to give a much-needed account of the true nature of yaws, its bearing on several important questions relating to the malady amply justify this extra expenditure of time.

About this period I was afforded by the kindness of Mr. Numa Rat the opportunity of performing an autopsy on the body of a man that died in the yaws hospital, and thus material was obtained to permit me to work out the microscopic anatomy of the disease, with the result that I am now able to make known the nature of the various lesions characteristic of yaws.

On examining into the literature of the subject little was found to assist me in the work. All the older authorities ignore the matter; and most of what was known of the morbid anatomy up to the year 1885, is well summed up by Hirsch in the following words:—

"According to the anatomical examinations of the affected tissue made by Paulet, "Ferrier, Charlouis, and Pontoppidan, it appears that in yaws we have to do with a "chronic dermatitis proceeding from the papillary layer and extending deeper into the "corium in the successive stages of the malady. Charlouis has found, at the beginning "of the skin affection, dilatation and tortuosity of the surface vessels, and afterwards of "the deeper, together with escape of colourless blood corpuscles and extensive accumu-"lations of these in the tissues; and he is convinced that the progressive enlargement "of the papillæ of the skin and the changes in the deeper parts associated therewith, "have kept pace with the changes in the vascular system. He has found, also, that, "as the disease progresses, the hair-follicles, as well as the sebaceous and sweat-glands "and the muscles of the skin, are implicated in sympathy. After repeated micro-"scopic examinations of the morbid tissues, he is unable to arrive at the actual cause "of these pathological changes. Pontoppidan found, on cutting out a nodule and "examining it under the microscope, after it had been hardened in alcohol, that the "crust consisted of a conglomerate of dried-up epidermis and pus-corpuscles, beneath "which was a stratum of granulation-cells (as in granulomatous growths), the papillary "stratum being entire although somewhat flattened, the rete mucosum, on the other "hand, wasted and occupied by round cells, while the corium was free from adventitious "elements. He could never discover fungi, such as Tricophyton or Microsporon, either "in the slough or in the layers beneath."

Hirsch does not allude in this account to the fact that, in 1879, I pointed out the true nature of the so-called "dartres" and "gratelles." For, in my third report on the Dominica Yaws Hospitals, I showed that these eruptions were simply abortive stages of the granulomata. And Hirsch has further omitted to state that Bowerbank, in 1880, said he had reason to believe that a parasitical growth exists in the disease. Bowerbank asserted, in fact, that he had met with "a growth of defined shape and size, "of a light yellow colour, and in appearance like the seed capsule of the melocactus."

Tulloch, in 1890, gave very little information on the matter. What he said in his third report is as follows:—

"The typical tubercles are formed by hyperplasia of the true skin and subjacent "connection tissue under the necrosed epidermis with exudation into their substance of "a viscid fluid which constantly oozes from their surface. . . . . In appearance "the typical yaws tubercle bears a fanciful resemblance to a raspberry, and hence is "derived the name 'Frambœsia.' Its roughly granular appearance is due to the "dilatation by the contained fluid of the connective tissue spaces in the deeper layers of "the skin, each of which bulges forward separately."

Numa Rat, in 1891, stated that the eruption began by the infiltration of the papillæ with the granulation tissue, and said:—

"The origin of this excessive formation of cells, at certain points of the dermis, "must be due to a conveyance of the yaws virus through the blood, there being no "change in the lymphatic system which would lead to the supposition that it was the "channel of contagion. The lymphatic glands and vessels are never affected by the "virus so as to produce suppuration and induration. If at any time there should be "enlargement of the lymphatics, this is entirely sympathetic and explainable by the "irritation of the eruption, as it would be by any sore or wound, and is frequently due "to the itch which accompanies the affection. On the other hand, an examination of the "vessels of the dermis, at the commencement of the eruption, shows that they are "distended and that the white blood corpuscles are escaping freely through their walls."

It would appear from these various extracts that the minute anatomy of the disease

had never been thoroughly investigated, and that there were not sufficient facts known to enable any one to form a correct estimate of its true pathological nature, the observations of various writers on the matter being simply opinions formed on insufficient knowledge.

In considering the histology of the disease it will be advisable to describe the affected tissues in the order in which the symptoms referable to them are observed. Thus, as regards the eruption, the squama is first seen, and then there are developed from it in natural sequence the papula and the granuloma. The granuloma may terminate in resolution, to be followed by the macula showing the former site of the tumour and its influence on the normal elements of the skin. The granuloma, too, may under certain accidental conditions break down into an ulcer, which will be described. The effect of the disease on the blood, on the absorbent system, and finally on the thoracic and abdominal viscera will be considered in so far as I have been able to investigate them.

As all the appearances I shall have to describe are those met with in coloured persons from whom the material for the inquiry was obtained, it may be as well to mention the following particulars concerning the negro skin in health :—The ridges are always well marked and they are usually made up of from three to five papillæ, which are larger than those of the skin of the white races. The papillæ of the skin, taken in St. Kitts from the arm of a negro, I found by actual measurement of various sections to vary from ·056 mm to ·098 mm in height, and from ·042 mm to ·07 mm in width at their bases.

The upper part of the dermis and the two lower layers of the epidermis are darkly stained with melanine which is deepest in colour at the rete Malpighii, where there are many large pigment cells, oval or round in shape, and measuring from 4·9 μ to 7·3 μ in diameter. The horny layer of the epidermis is seen to be stratified, and some of the exfoliating superficial cells are readily stained with methyl violet by Gram's method, and the colour is not removed entirely by the iodine solution or by absolute alcohol. This colouration does not appear to be due to microbes as none were observed in the sections I made, although they were carefully examined with a $\frac{1}{12}$-inch oil immersion objective, and a No. 4 eye piece. The hair follicles, the sebaceous and the sudoriporous glands present no differences from those of the white races, except that they exist in greater numbers.

Sections of that part of the skin covering the sole of a negro's foot are most beautiful objects under the microscope. The ridges are disposed with great regularity, showing like a series of equal truncated cones resting on a level base. Through the centres of the ridges are seen in places the wide ducts of the sudoriporous glands ascending spirally to the summits and opening at the highest part.

The horny layer is very thick, varying from ·28 mm to ·35 mm in depth. And the rete Malpighii varies from ·08 mm to 21 mm. The sudoriferous glands are especially large and numerous, their use in such a situation being obvious, for unless the cutaneous surface were kept at a certain degree of moisture, injury and disease of the deeper tissues would result from the people walking along the roads, which are rendered during the day intensely hot by the direct tropical rays of the sun.

A number of sections of the various tissues affected by yaws in different stages of the disease were examined ; the material from which they were cut having been hardened in absolute alcohol. The sections themselves were examined, stained and unstained, colouring agents being used to determine the nature of the tissues and the presence or absence of microbes.

Squamæ or "dartres."—The epidermis is increased in thickness, but the horny layer irregular. Towards the circumference of the patch it separates into strata, which are seen to be flaking off, some of the flakes being attached at the periphery. Towards the centre the dead cells and cellular débris are heaped up in masses, and in other places the greater part of the horny layer has almost disappeared, nearly exposing the upper portion of the Malpighian layer, which shows a proliferation of its cells. The pigment cells are enlarged ; they measure from 7 μ to 10 μ in diameter ; many of them are polygonal in form, and they infiltrate the whole of the rete Malpighii, and are especially numerous over the papillæ. The dermis is very vascular and thick, and the papillæ are enlarged at the periphery of the squama and have disappeared in places in the centre, the lower pigmented cells of the epidermis running in a wavy line over the flattened dermis, where it is deprived of its papillæ. The papillæ are largest just below the heaped-up masses of epidermis, and they are much broadened and lengthened, being wide at the base and rounded at the summits.

There are islets of granulation tissue between the bands of fibrous tissue, and they are more abundant in the neighbourhood of the follicles and blood vessels.

The hair follicles are widely dilated at the exit of the hair, and they contract gradually, being, in fact, funnel shaped, and the dilated portions are filled with epidermal cells and debris.

Cocci either singly or as diplococci are seen in the dermis and epidermis: they are especially abundant in the upper layers of the epidermis, and in the hair follicles. In some instances they have travelled along the follicle right up to the hair bulb, which they have invaded in great numbers. These cocci measure from ·5 μ to 1 μ in diameter, and they do not apparently differ from those cultivated from the secretion of the granulomata. Portions of the exfoliating epidermis are completely darkened by masses of cocci, and the shedding of these epidermal scales evidently sets free a number of colonies of the microbe.

The squamæ in the sole of the foot, owing to the altered structure of the skin in this situation, differ in appearance materially from those seen in other parts of the body.

The horny layer is very much thickened, being from ·42 mm to ·67 mm in depth, and the upper strata are exfoliating as in the case of the squamæ in other parts of the body. But the principal differences are the formation of pits which enclose hard oval grain-like bodies averaging ·056 mm in length by ·028 mm in width. In unstained sections these oval bodies are yellow in colour, and they are sufficiently large to be visible to the naked eye.

In cutting sections of the dartre in the sole, sometimes these cuticular grains, as I may call them, fall out from their pits, like seeds from their capsules. The nature of the grains was not evident at first, but by making a series of sections, and treating them with various agents, their structure and formation became clear. They were found to consist simply of flattened epidermal cells and granular debris arranged concentrically. There was no nuclear body, and no central parasite either animal or vegetable.

These cuticular grains are formed in the following manner: The proliferation of the cells of the cutaneous tissues causes an entire obliteration of the beautiful arrangement of ridges seen in the healthy skin of the sole, and the growth of the epidermis being greater in some places than in others there is an involution of circumscribed portions of the horny layer. These involuted strata are further rolled up by continued proliferation of the tissues in contact with them; and, at the same time, the upper part of the epidermis being exfoliated or worn away, the involuted cuticle is left without any attachment at its upper part, and then it presents the appearance of a pit contracted at its orifice and filled with an oval body. Later on this body becomes somewhat loosened, and its upper portion is worn away and becomes ragged or fibrillated, owing to its stratified formation. At last, as the contracted orifice of the pit widens by the wearing away of the general surface of the skin, the cuticular grain is set free, and a cavity is left which tends to become shallower in process of time until its remains are flaked off by the exfoliation which is always going on.

On staining sections with picro-carmine it was seen that the cuticular grains are composed of the horny keratinous material of the cuticle, and that there is no trace of protoplasm in them. When they are set free the pits are observed to be wholly or partly filled with granular epidermal debris or a yellowish amorphous substance like that which forms the crust of the granulomata.

Somewhat similar bodies, but round and much larger were observed by Vandyke Carter* in sections of the affected skin in "caneotica," as the oriental sores are called in Crete. But the nodules—"globes épidermiques," he observed occurred not singly, but in groups collected together in depressions of the epidermis, and, although their structure resembles that of the cuticular grains in yaws, their formation would appear to be different, for no involution of the horny layer of the epidermis is apparent in Vandyke Carter's figures. It is necessary to mention that Leloir and Vidal did not find these "globes" in their sections of the affected skin in bouton de Biskra.

The two lower layers of the epidermis forming the rete Malpighii are thinner than in health, the width averaging about ·07 mm. In contact with the horny layer is a stratum of oval and fusiform protoplasmic cells, two or three deep. The oval ones averaging 2·4 μ long by 2 μ wide. The pigment cells over-lying the dermis were few in number, and the melanine granules in them were of a much lighter colour than is seen in the normal skin. Under the pits the papillæ have disappeared entirely, probably from pressure, as in some of the sections, where the old and empty pits were being exfoliated

* *Notes on Caneotica.* By H. Vandyke Carter, M.D. In *Skin and other Diseases of India and Hot Climates generally.* By Drs. Tilbury Fox and T. Farquhar. London. 1876.

by the splitting up and flaking of the horny epidermis; the papillæ were seen to be reforming.

The blood vessels of the dermis were abundant and dilated; and small collections of granulation tissue were seen in their neighbourhood, and under the pits of the epidermis. The sudoriparous glands had entirely disappeared.

Several colonies of micrococci were seen deep in the dermis, and the microbes were abundant in the epidermis, being particularly numerous in the horny layer and in and around the cuticular grains. Some of the oval protoplasmic cells of the rete Malpighii had taken up cocci, but no instance of phagocytosis was observed in the dermis.

Papulæ or "gratelles."—The transition from the dartre to the gratelle is seen to be due to an increasing proliferation of the cellular elements of the skin at circumscribed areas. The papillæ are enlarged gradually from the periphery to the centre of the affected skin. The rete Malpighii is increased in thickness principally by multiplication of the round cells; the pigment cells, however, do not increase at the same rate, and the melanine is paler than usual. The horny layer is also increased in thickness, the lower cells are distinctly protoplasmic, and the upper ones are necrosed giving rise to desquamation. In places large flakes are seen to be separating, their detachment taking place at first towards the elevated centre of the papule. The summit of the papule, in its early stages, is entirely deprived of the ordinary cuticle, which is replaced by a heaped-up mass of debris without any pus or secretion.

In the dermis there is a greater infiltration of granulation cells than in the case of the dartre, and a few leucocytes may be seen against the walls of the dilated vessels and some have passed through into the tissues. But this migration of the white blood cells is not apparently carried on to any considerable extent, for it was observed in only a few of the sections.

In those sections in which hairs occur the follicles are noticed to be widely dilated towards the surface of the skin, and the hair at the dilated portions is surrounded with cellular debris and a yellow amorphous substance identical in appearance with the inspissated secretion that forms the crust of the granuloma. None of the hairs had lost their pigmentation, but some of them had been destroyed, and that part of the follicle below the epidermis had disappeared entirely; and, in these cases, the horny epidermis had nearly closed the orifice by a process which converted the follicle into an avoid cavity. Some of these cavities contained egg-shaped bodies, yellow in colour, and composed entirely of the inspissated secretion, and they are doubtless the same growths observed by Bowerbank, and thought by him to be of a parasitical nature. They are, however, totally different in structure to the cuticular grains met with in the squamæ in the soles, and they are much larger. This yellowish concretion is that described on page 285 as being seen in the depression at the summit of the papule when it is examined under a lens, and it is apparent that the depression is simply the widely dilated hair follicle.

In a few of the sections this yellow body had been washed away—probably in the process of staining and decolourising the specimen—and, in these instances, the hair was seen lying loose in the oval-shaped cavity. In other sections the hairs had apparently been destroyed, and the yellow bodies might without exaggeration be likened in shape to the seed capsule of the melocactus.

Micrococci and diplococci were observed in abundance in all the layers of the epidermis, and they were especially numerous in the yellow substance in the dilated hair follicles. The protoplasmic cells in the horny layer of the epidermis had apparently ingested some of the cocci, the outlines of which as seen within the cells were somewhat irregular indicating that they were being destroyed.

No sebaceous or sudoriparous glands were observed in any of the sections.

Granulomata, or "tubercles."—The structure of these tumours is described in detail in the special report by Mr. Watts and myself contained in the Appendix. A further examination of fresh sections, however, enabled me to ascertain that some of the papillæ contain a layer of spindle-shaped cells between the external covering of fibrous tissue and the mass of granulation cells of which the bulk of them is made up in the fully formed tumour.

The pigment cells which are exceedingly numerous in the lower layers of the epidermis at the circumference of the tumour, are on an average 4·8 μ in diameter, and they possess a dark nucleus and many melanine granules.

The granulation cells like those observed in the squamæ and papillæ are for the most part round in outline, and they contain, as a rule, one large nucleus. The cells vary in diameter from 6 μ to 9·6 μ, thus they are much smaller than ordinary leucocytes, and Charlouis was, therefore, in error in his observations.

The colonies or zooglœa of micrococci sometimes seen in the dermis surrounded by granulation cells are on an average 16 μ in diameter.

Neither in the sections of the papules nor in those of the granulomata were any pus cells noticed, and this fact is a proof of the error made by many observers in describing the ordinary eruption as a pustulo-tubercular one. Of course if the suppuration be set up by injury or irritation of the growths, the case is different, but even then the formation of pus is not great unless the granulomata degenerate into ulcers; which, as I have shown, must be considered as not a symptom, but a complication of the disease. If cover-glass specimens of the secretion of the granulomata be made—after the forcible removal of a crust under proper antiseptic precautions—many round cells averaging 4·8 μ in diameter will be seen. They are, therefore, much smaller than pus cells, and they do not contain large nuclei dividing by fission. The cells occurring in the secretion are simply the granulation cells of the tumour; and, in all the stained cover-glass specimens I have examined, micrococci were extremely abundant. If the crusts have been loosened for some time genuine pus cells may be found, however.

When the eruption of the so-called "tubercles" terminates in resolution, the granulation cells gradually disappear, the papillæ decrease in size, and the sections show an entire absence of micrococci except in the thin crust and the desquamating epidermal cells at the circumference of the tumour. At first the lower portion of this wasted crust is apparently directly in contact with the decreasing papillæ, which lie close together. But, after a time, the epidermis is formed by an extension of the spheroidal cells from the periphery. The crust gradually loosens at the edges as these cells spread towards the centre; and, before it is cast off, a thin horny layer has formed to protect the mucous strata. The cells of the rete Malpighii are entirely protoplasmic, being deeply stained red by the picro-carmine solution.

The pigment cells are abundant, and they infiltrate the upper part of the dermis so much that the line of demarcation between it and the rete Malpighii is obscured, and in some places can scarcely be made out. These pigmented cells are oval or irregular in outline, and some I measured were from 4·8 μ to 7·2 μ in diameter, that is about the size of similar cells in healthy skin.

In the dermis may be seen a number of fibroblasts smaller than the granulation cells of the fully formed granuloma, most of them are multinuclear, and they vary from 4·8 μ to 7·2 μ in diameter. In one section in which the papillæ had nearly resumed their natural size, all trace of granulation cells had entirely disappeared, and the inter-papillary processes of the rete Malpighii were again apparent.

Those of the hairs that had escaped being destroyed showed no change, either in pigmentation or structure from those in healthy skin; and the follicules were seen to be resuming their natural condition, except that the sebaceous glands had disappeared. Neither, in any of the sections, could the sudoriparous glands be made out; and it is to be inferred, therefore, that both these glands and a few of the hairs are the only structures of the skin that suffer any permanent damage from the morbid action.

Maculæ.—In the sketch of the symptoms of the disease it has been shown that the sites of the absorbed granulomata are indicated for a time by dark stains or macules. A number of sections were made of the skin affected in this way, so as to determine the exact nature of the macules, and the following appearances were observed: The first thing noticeable in these sections is that granulation tissue and micrococci are entirely absent from them, and that there is a proliferation of the pigment cells, indeed the lower layers of the epidermis and the contiguous portion of the dermis, appear to be composed almost entirely of these cells which are on an average 5 μ in diameter. This densely pigmented layer is about ·021 mm in depth.

The papillæ are small, low and flat-topped in some places; and, in others, they have not yet formed after their collapse by the removal of the granulation tissue, of which they had been mainly composed. In the parts where they have not been reconstrusted, the dermis runs along as a wavy or straight line beneath the epidermis.

The epidermis is thicker in some places than in others. In the thinner portions it measures ·028 mm, and the thicker parts are ·063 mm in depth, of which the horny layer constitutes ·028 mm, and the rete Malpighii ·035 mm.

The dermis is infiltrated in places with fibroblasts containing several nuclei. These cells are fusiform in shape in some instances, and they are about 3·6 μ in diameter.

In sections in which the return to natural skin is more advanced, a larger number of papillæ are seen, and the flattened portions of the dermis are fewer in number and smaller in extent. In no instance were any of the cutaneous glands observed.

A consideration of the facts regarding the histology of the macua shows that its

dark colour is due really to two causes, viz., Firstly, to an increase in the number of the pigment cells. And, secondly, to the fact that, the papillæ being unformed, the melanine is more apparent as seen through the flat and thin epidermis of an uniform thickness than when it is observed in healthy skin through the deeper mass of epidermis which is broken into regular ridges. As the pigment cells gradually resume their normal proportion, and the papillæ completely reform, the appearances would more nearly approach those of the normal cutaneous tissues in the neighbourhood, and this is what is seen to take place as the maculæ gradually disappear in process of time.

Ulcers.—It has been pointed out that in cachetic persons and in those suffering from concomitant disease, the granulomata may in some instances break down into shallow ulcers instead of terminating in the usual way by resolution. One of these small ulcers was excised from the body of the man that died in the yaws hospital in Dominica, and a number of sections were made so as to determine whether its structure differed in any essential particulars from that of an ordinary ulcer.

The only differences observed were that micrococci were seen deep in the cellular tissue beneath the floor of the ulcer, and that the epidermis and hair follicles close to the margin of the ulcerated surface were also invaded by the microbes.

The margin of the ulcer was abrupt, and the papillæ of the skin in the neighbourhood were enlarged as in the case in regard to the granulomata and papules.

At the margin the papillæ had disappeared entirely, their place being taken by linear processes of the granulation tissue of the ulcer, which extend into the proliferated rete Malpighii. Instead of the thin pellicle at the edge of the ulcer, there was an accumulated mass of epidermis, which showed that a healing process had not been set up.

At the floor of the ulcer all the cutaneous tissues have disappeared, their place being taken by a mass of ordinary granulation tissue, which is traversed by blood-vessels. A few pus cells are seen on the surface, most of them probably having been washed away by the agents used in preparing the sections.

The Blood.—In the report by Mr. Watts and myself, in the Appendix it has been shown that the blood is apparently free from the micrococci observed in the affected tissues in yaws. In order, however, to continue the inquiry on this point, I made some cover-glass specimens of the blood from the heart of the man that died at the yaws hospital, and sections were also made of a clot found in one of the cavities. The results were negative, no microbes of any kind being discovered in any of the specimens, although Gram's, Ehrlich's, and Gibbes' processes of staining were tried in succession. As there was also a failure to cultivate any growth from the blood in living and dead patients, it is to be inferred that this fluid is unaffected in the disease, although it is proper to mention that Mr. Watts and I succeeded in growing the micrococcus in drop cultures of my own blood.

The internal organs.—It has already been stated that material for the examination of various organs was obtained at the autopsy on the man that died at the hospital, and the following is an account of the appearances presented by the numerous sections I made.

Absorbent glands.—A prevertebral gland was examined, and micrococci were found in all the tissues, but in chief abundance in the capsule, in which large colonies were frequently observed amongst the fibrous tissues. They were also seen singly, in pairs, diplococci, and in chains of from three to five.

Several small colonies were noticed in the connective tissues of the cortex, and a few cocci were observed in the lymph corpuscles of the medulla. These cells were round and oval, and they measured from 2·7 μ to 5·4 μ in diameter.

Spleen.—Some of the sections from the parenchyma of the spleen were normal in structure, and no microbes were observed in them. But in those sections through the capsule and the contiguous pulp cocci were seen in abundance. They were contained in the two layers of the peritoneum and in the tunica albuginea, but mostly in the last mentioned fibrous covering in which there were large colonies. One mass of cocci alone was observed in the parenchyma in the neighbourhood of the capsule.

Lungs.—Most of the specimens showed small nodules of tubercle, indicating that the man was affected with pulmonary tuberculosis at the time of his death, but cocci were seen only in one of the sections which passed through the pleura. Masses of the micrococci were interspersed amongst the fibres of this envelope, and several smaller colonies had invaded the contiguous lung substance.

Liver and *Kidneys.*—The substance of these organs was free from the microbes, but the capsules were affected as was the capsule of the spleen. In regard to one of the sections of the kidney, the following passage occurs in the notes I took at the time of the microscopic examination: "Masses of cocci have invaded nearly the whole of the "capsule in the section."

The yaws micrococcus.—It has been shown that micrococci, identical in appearance with those occurring in the tissues affected by the characteristic cutaneous lesions of the disease, were present in abundance in the lymphatic gland examined, and, in large numbers, in the other organs of the body. They select apparently the fibrous tissues in preference to the other structures, but they may even invade the substance of the organs themselves. It is a remarkable fact that none of the microbes were discovered in the blood. Had they been in this fluid even in small numbers, some of them would have become entangled in the clot taken from the heart, and they would have appeared in the stained sections cut from it; but no trace of any micro-organism was seen, although every part of all the sections was carefully searched under high magnifying powers.

In none of the organs in which the microbes were found did they appear to have set up any marked inflammatory action; for, although there was some hyperplasia of the fibrous tissues in which they occurred, there was no cellular infiltration. It must be observed that all the material for the examination of the external organs was obtained from one subject; and that, therefore, the absence of granulation tissue in these organs is not conclusive evidence that it may not exist in them in certain stages of the disease. The pains in the long bones and in the articulations which occur in cases of yaws, more especially when the accession of fever indicates a general infection of the system, would seem to point to some departure from the normal condition of the periosteum and the other fibrous tissues in these situations. The presence of micrococci giving rise to pressure by hyperplasia of these tissues would account for the pain, and for the tenderness which is sometimes present. Unfortunately, I have not yet been able to examine any of these structures, but it is a fair inference to draw that they are affected in a similar manner to the fibrous capsules of the organs already described.

It will be seen, on reference to the special report (in the Appendix) on the experiments conducted by Mr. Francis Watts and myself, that we found in Antigua a micrococcus invariably in the secretion of the granulomata, and in the affected cutaneous tissues. Pure cultivations of this microbe showed that its microscopical characters were constant, and that its macroscopical appearances differed from those of micrococci already discovered, and described in various works on bacteriology. Inoculation experiments into living animals gave negative results, but these are inconclusive, inasmuch as the animals also proved immune to the inoculation of the virus of the disease, with which yaws can be produced artificially in human beings. Later still, the same microbe was found in every instance in the secretion of a number of the granulomata occurring in patients in the yaws hospital in Dominica. It may be considered, therefore, to be a constant accompaniment of the disease. A patient examined after his death at the yaws hospital is found to have these micro-organisms, not only in the squamæ, papulæ, and granulomata forming the characteristic local manifestations of the malady, but they are also discovered in abundance in the lymphatic gland and in certain portions of the other internal organs. And, finally, an examination of the maculæ, which represent the absorbed granulomata, indicate that the micrococci have entirely disappeared. Of course, in the absence of the artificial production of the disease by the inoculation of living animals with a pure cultivation of the microbe, and its re-discovery in the tissues of the inoculated animals, it cannot be stated positively that the micro-organism, found by Mr. Watts and myself, is the *fons et origo mali.* But it is clear from a consideration of the attributes of the disease that it is due to a microbe, and the micrococcus being a constant accompaniment inference points to the fact that it is pathogenic of yaws.

For a considerable time scientific investigation in regard to the microbic origin of other diseases proceeded no further than this. Micro-organisms, believed to be the causes of certain maladies in consequence of their invariable presence in the affected tissues were not absolutely proved to be pathogenic until after much careful work in bacteriological laboratories. The knowledge now gained of the micrococcus found in the tissues of persons affected with yaws, is analogous to that which, until recently, existed in regard to the leprosy bacillus.

Further investigation, conducted on the lines indicated by the work of Mr. Watts and myself, may prove beyond question of doubt that the micrococcus is the true contagium of yaws, or otherwise. At all events, if this micrococcus be not altogether responsible for the introduction of the morbid poison, its constant presence in the

neoplasmata, and its absence in the healed tissues, show that it bears a part in the diseased process.

An important fact in connection with this matter is that I have succeeded in cultivating the micrococcus from the dust swept from the floor of the yaws hospital in Dominica. Not having the necessary apparatus for plate cultivations, a broad surface of nutrient gelatine was obtained in a flask, and this was inoculated in a number of places with the dust. The plan adopted was to pass the sterilised öse through the dust slowly, and to inoculate the surface of the nutrient medium with the minute fragments thus taken up. Three growths were obtained in this way, viz., mould, bacterium lineola, and the yaws micrococcus. Pure cultivations of the micrococcus were subsequently got, and they differed in no way either macroscopically or microscopically from those obtained in the original experiments and detailed in the report of Mr. Watts and myself, except that the growths were much larger and in every respect more vigorous. And this fact not only shows that the microbes are preserved in the soil, but it tends to indicate that after being so preserved they are more virulent, and, therefore, able more readily to infect any person into whose system they obtain an entry.

This discovery of the micrococcus, found in association with the disease, in the dust on the floor of rooms in which yaws patients have been living has an important bearing on the mode of propagation of the malady. The dust from which the micrococcus was cultivated was kept by me in a closed box in a dry place for several months, and yet the microbe multiplied very rapidly when placed in a suitable soil. It is clear, then, that if the microbe obtained access to any wound or ulcer it would grow vigorously; and, assuming it to be the cause of yaws, the propagation of that disease by micro-organisms that have been preserved in the dust in a negro's hut or elsewhere is easily understood.

The clinging of the contagion to certain huts and localities, and the sudden outbreak when the heavy rains moisten the earthen floors of the poorer people's hovels, may be readily explained by the fact of the presence of a microbe that may lie in the dry dust for months without losing its vitality. These earthen floors are saturated with organic matters on which micro-organisms would grow rapidly. The tropical heat is present, the nutrient matter is sufficient, and all that is required is moisture. This is supplied in the rainy season in the tropics, when everything in a house is sensibly dampened, as is seen by the growth of mould on boots and other objects kept in the driest rooms.

Yaws may be a local or a general disease.—There has existed a considerable difference of opinion amongst authors as to whether yaws is a local or a constitutional disease; and, on the accurate determination of this question, there rest important questions concerning diagnosis and treatment. Hirsch leans to the theory of its local nature. He says: "Yaws has none of the properties of a constitutional disease. . . . It has "markedly the character of a local malady." Most of the recent writers, however, who have had experience of the disease in those countries in which it is endemic, are agreed that it manifests an undoubted constitutional character. Now, it appears to me that both theories are in a measure correct; by which I mean that yaws may be either local or constitutional, the determination of the matter in the infected individual depending on whether the cellular barrier placed at the point of the introduction of the virus is sufficient to prevent the general invasion of the system by the microbes and the consequent diffusion of their metabolic products.

I am satisfied that in very mild cases, in which there is no constitutional disturbance, and in which complete recovery takes place soon, the disease is simply a local one, for the stimulation at the point or points of entry of the virus is sufficient to produce so rapid a proliferation of the connective tissue cells as to prevent a general infection of the system. It may be, too, that a mobilisation of the defensive forces exerted by the scavenging cells of the body may also be concerned in localising the disease; but I believe the cellular massing at the infected spots is due rather to a multiplication of the cells already existing there.

Should this defensive cellular barrier be insufficient to hold the invading microbes in check until they can be disposed of, or should the juices of the part be unable to neutralise the toxic chemical products of the microbes, then a generalisation of the disease must necessarily follow.

That yaws may manifest constitutional symptoms, the clinical histories of many cases of the disease abundantly show, and it is an important fact in regard to the matter that the weaker the patients the more often does generalisation occur. And, commonly, it is seen that strong, healthy individuals whose tissues might be expected to be endowed with full defensive vigour, often escape a serious attack simply by the rapid heaping up of a cellular barrier at infected points having localised the morbid process.

That constitutional diseases may be so localised is seen in the case of tuberculosis, for lupus is but the localisation of the malady to certain parts by the erection of a barrier of granulation tissue. Dr. J. Syer Bristowe, at the discussion this year at the Pathological Society of London on Phagocytosis and Immunity, summed up this question tersely when he said that:—"Local skin tubercle or lupus, instead of producing "general tuberculosis, seemed to prevent it."

The Carrying of the contagium by flies.—It has been stated by many authors that the contagium of the disease is carried by flies, and that in this manner innocent sores and healthy wounds are inoculated by the virus. In fact, Swédiaur asserts that yaws may be propagated by flies alighting on the corner of the eyelids, on the angles of the mouth, or on any part slightly escoriated. In the West Indies it is believed universally by the people that sores are frequently inoculated by flies, and in this way the attack is often by them accounted for. In the rainy season flies are a positive pest in all the islands, and in the hospitals the greatest care has to be taken to keep them off wounds even whilst the wounds are being dressed. The following extract from de Verteuil's work on Trinidad indicates the extent of the pest of flies in that island:—

"The blue fly, it seems, more especially haunts inhabited places. The grey fly is "met with in the high forest, and they must, indeed, be numerous there, for let any "putrid substance be exposed and it is immediately covered with swarms of those flies. "These insects are a source of loss to the planters, and an incessant cause of annoyance "even to individuals; for the moment the animal presents a raw surface on its hide, "however small it may be, they are sure to deposit their larvæ on the spot; they act "similarly on the wounds or sores of incautious persons. I remember the case of a "man who had some sore in one of his nostrils, and lived near a slaughter-house; being "a confirmed drunkard, he one day fell asleep in the open air in front of his dwelling; "a few days after he was taken with intense headache, and soon after with hæmorrhage "from the nose. On examination, it was found that the evil was caused by two or three "dozen worms, arising from the above-mentioned fly. They are also invariably "deposited on the navel, and not unfrequently on the very lips and gums, of newly "dropped calves, so that the most watchful attendance is required for several days after "birth."

In Dominica the connection of flies with the spread of yaws is so believed in that certain of them are called by the people "yaws flies." I sent on specimens of the so-called yaws flies to the British Museum for determination, and Mr. Ernest E. Austin was good enough to direct special attention to the matter, as the following extracts from his letters indicate:—

"Of the six flies sent by Dr. Nicholls from Dominica, the four which are distin- "guished by the pair of transparent spots on the 2nd segment of the abdomen are "specimens of *Hermetia illucens*, Linn. They belong to the family Stratiomyidæ, and "as, so far as is known, all the members of this family are vegetable feeders, both in the "larval and adult stages, I think it extremely improbable that these flies can be in any "way concerned in carrying the contagion of the yaws disease.

"The other two flies are a species of *Sarcophaga* (Fam. Sarcophagidæ), and in all "probability are specimens of *Sarcophaga plinthopyga*, Wiedemann, like the one "previously sent. The number of unidentified descriptions of species belonging to "this genus is so great, and the Museum Collection is at present so ill-supplied with "series of specimens, that absolute certainty as to specific identity is impossible. But "so far as I can determine them the flies belong to the above-mentioned species.

"The larvæ of *Sarcophaga* live upon rotting animal matter, and have also been "found in ulcerous sores upon human beings, so that these flies would be quite capable "of carrying the contagion of the disease."

* * * * *

"When I sent you my note the other day the two specimens of *Sarcophaga* were "still wet with spirit, and, consequently looked just like the one previously sent. I have "since submitted them to further examination after drying, and now find that the two "specimens belong to totally distinct species, and are neither of them the same as the "one previously sent (*Sarcophaga plinthopyga*, Wied.) One of the new specimens "appears to belong to *Sarcophaga lambens*, Wied.; the other to a species apparently "undescribed. If the three specimens of *Sarcophaga* were actually taken from wounds "caused by yaws (as to which you gave me no information), it follows that three distinct "species of *Sarcophaga* are connected with the disease. This, however, is in no way "extraordinary, when we consider the habits of the genus."

It would appear, therefore, that three flesh flies, viz.:—*Sarcophaga plinthopyga* Wied.; *S. lambens*, Wied.; and a third species unknown to science, may be concerned in the spread of yaws. Such flies could easily inoculate wounds and sores with a pathogenic micro-organism, and there is every reason to believe that a small number of cases of the disease are produced in this way.

Fowl "Yaws."—The fact has already been alluded to that there is a disease affecting fowls which is called yaws, and several writers have imagined it to be identical with the human malady of the same name. Numa Rat says, in his Essay:—"Fowls are subject "to a disease the eruption attending which is similar, both macro-and micro-scopically, "to that of human yaws . . . . Though the tubercles may break out over every "part of the body, they are most plentiful about the head and beak, the eyes being "almost entirely closed by the scaly eruption. Cattle, also, may be similarly affected, "the disease being apparently limited to bulls and cows, for I have never observed it "in sheep or goats."

In 1820, Thomson directed some attention to the disease in fowls known as "yaws," and he said:—"I have examined several that died from the disorder, and found it "nothing else but *chigoes* which caused it." In 1840, Levacher wrote as follows concerning what he termed "*Pian des volatiles*":—

"Le pian offre cela de très curieux qu'il attaque aussi, sous ces climats, certaines "espèces de volatiles.

"Les jeunes dindes, les poulets et les pigeons contractent des pustules tuberculeuses, "exactement semblables au pian squammeux, dont j'ai fait la première variété de cette "maladie.

"L'éruption a lieu autour des yeux, sur le cou, sur les barbes et sur la crête des "gallinacées. Certaines influences atmosphériques, la sécheresse en particulier, semblent "les déterminer plutôt que d'autres, et la contagion que, dans ces cas, n'existe pas pour "l'homme, est grande parmi ces oiseaux.

"Lorsqu'ils en sont affectés leurs plumes se hérissent; ils sont tristes, se retirent "à l'écart et meurent en très grand nombre. Le jus du citron est le remède qu'emploient "les habitans; ils en font frotter les tubercules plusieurs fois par jour, et ce moyen "semble réussir assez bien.

"D'après *Macé*, l'usage de l'orge à l'intérieur guérit les oiseaux, et agit d'autant "plus favorablement qu'il les rafraîchit et les relâche en même temps."

Mr. Numa Rat kindly sent to me for examination the head of a young turkey that was affected with this fowl yaws. The specimen was an old one that had been kept some time in alcohol which apparently had not been changed so as to harden the tissues properly. It was not possible, therefore, to obtain good sections, and I was unable to devote enough time to investigate the matter thoroughly, but the following facts I was able to establish show that there is no identity in structure between yaws in man and so-called fowl "yaws."

The disease consisted in an eruption of granulated growths about the head of the turkey, of a yellow colour externally and a greyish one internally. These growths were composed of a friable material that broke down readily, and rendered it impossible to cut good sections, but the friability was perhaps due to imperfect preservation, and it may not exist in recent specimens. The growth was seen under the microscope to consist of an amorphous faintly granular material in which were imbedded oval bodies, a medium sized one measuring ·252 mm by ·14 mm. These bodies were constructed of an investing capsule ·019 mm in thickness, containing an apparently gelatinous material, the central portions of which had disappeared, probably in the process of staining. The capsule was composed of fibrous tissue and long fibre-like cells, which was stained red by picro-carmine. There was also seen to one side of the growth an irregular oblong body very much larger in size than the oval ones, and containing granular matter, stained yellow by picro-carmine, and invested by a capsule similar in appearance to that of the smaller bodies. In the substance of the granular matter were two dense, long and thick linear masses of blackish material the nature of which was indefinite.

In certain portions of the amorphous material of which the growth was principally composed were band-like processes of small spindle shaped protoplasmic cells. And towards the outer parts of the specimen were similar cells forming an epidermal tissue that was stained of a brown or greyish colour.

This rough and incomplete sketch of the histology of the so-called "tubercles" characteristic of the disease, is sufficient to show that it has no affinity to yaws in human beings. There was no granulation tissue in the specimens and after staining by Gram's ethod I failed to detect any microbes in them. The smaller oval bodies may be insect's

eggs; and, although no chigoes were discovered, there is, so far, no evidence against their presence in the disease. To summarise, it may be said that the growth appeared to be composed principally of an inspissated secretion in which were bodies that looked like the eggs of insects. This secretion was doubtless an exudation due to an inflammatory process set up by the irritation of a parasite, the exact nature of which is still undetermined.

Treatment.

The treatment of the disease has been discussed at length at the end of Section XV. —and the question may, therefore, be considered somewhat briefly here.

An uncomplicated attack of yaws, in an otherwise healthy individual, tends to spontaneous recovery; and this fact has been observed by many writers who have had experience of the malady.

In 1817, Williams said :—" The yaws will run a certain course, and spontaneously " wear off, with very little assistance from art;" and, since his time, similar statements have been made by other authors. In my own practice in Dominica, and during my travels through the West Indian Islands as Yaws Commissioner, I have had ample opportunities of ascertaining that a certain number of cases recover without any medical treatment whatever. Most of these instances, however, are those in which the disease has not become generalised; and it is frequently impossible to decide in the early stages whether one has a local or a general infection to deal with. Besides which, in such a malady as yaws, the local cellular barrier to general infection may at any time be broken down with the result that a constitutional affection is produced.

It has been, I fear, too much the practice of hospital and district medical officers to treat the cases of yaws under their care by a routine method; but for this, in most instances, certain writers on the disease are responsible. Thus a recent author has asserted that mercury is a specific for yaws, and he states in effect that to attempt to cure the disease without mercury will only result in disappointment. He then proceeds to advise the administration of a mixture containing corrosive sublimate and another potent drug having a cumulative action, in certain stated doses to every man, woman, and child suffering from yaws who may be inmates of a special hospital or attendants at a district dispensary. This advice would be liable to lead to much mischief if it were generally followed; and, indeed, if such routine treatment were all that is necessary in dealing with the disease, the solution of the yaws difficulty can be made an easy and a speedy one by placing a supply of the mixture at certain points of infected districts, and by putting an intelligent person capable of giving the necessary directions in charge of its distribution.

As a matter of fact, however, each case of the disease should be carefully examined and separately prescribed for by a medical man; for, of a dozen persons affected with yaws taken indiscriminately from an infected district, every one might require a different treatment. Besides which the complications of yaws are many and frequent, and in most instances it is hopeless to attempt to combat the disease successfully until the patients are brought into a better state of general health. It follows, therefore, that in a large number of cases the treatment for a considerable time will have to be directed, not so much to the yaws, but to the concomitant disease; for, unless this be done, no good and an immense deal of harm will be brought about.

In matters relating to the curative treatment of yaws, as in other maladies, the only scientific and satisfactory methods are those suggested by a careful consideration of its pathology. The disease is undoubtedly due to the influence on certain tissues of micro-organisms. Nature itself uses every effort to isolate these microbes by building up a cellular barrier which confines them to certain points, and thus limits the harmful action of their toxines. Should the constitution be vigorous enough to continue this process in an effective manner, the microbes are destroyed, or they are held in check for a sufficient time to enable immunity to be developed. If, however, this warring against the micro-organisms languish by reason of ill-health, or by accidental breaking down of the cellular barriers, a general infection takes place, and then the disease, which was at first purely local, becomes a constitutional one.

From a consideration of these facts the rational line of treatment may be inferred.

If a specific for yaws were known, then treatment would be easy and successful in every uncomplicated instance of the disease. For the specific drug on being administered would either kill the microbes *in situ* or neutralise their metabolic products, thus protecting the organism from all morbid influences. Is there such a specific for yaws? Some writers assert that there is, and they point to mercury as being as effectual in

completely curing yaws as it does syphilis, or as quinine does intermittent fever. The value of this much vaunted yaws remedy, however, has not only been called in question, but many able medical men of large experience of the disease emphatically assert that it is positively harmful. The information I have been able to collect on this important point is pregnant with suggestive inferences. The results of the mercurial treatment in hospital and dispensary practice have been thoroughly inquired into and tabulated for the purposes of this report. And it is seen that those medical men who employ the mercurial treatment are not any more successful in their practice than their brethren; indeed, in islands where this treatment is the only one adopted, it is found that the percentage of relapses is really higher.

Although I write against the routine treatment of yaws with mercurial preparations, it must not be inferred that I am what may be described as an "anti-mercurialist." In the yaws hospitals under my direction in Dominica, mercury—principally in the form of corrosive sublimate—was used in considerable quantity, for in some cases I found it to be a valuable drug in the treatment of the disease. At one time I dosed all the patients with mercury, as many authorities recommend; the result was so unsatisfactory, however, that I gave up the system. In writing, therefore, against the routine treatment with mercury, I am not giving expression to a biassed opinion, but am really speaking from personal experience of considerable extent.

At first sight the known power of corrosive sublimate as a microbicide would seem to indicate that its internal administration must be followed by the destruction of the pathogenic micro-organisms. But experience in regard to other diseases due to a similar cause teaches that this is not the case. No microbicide, of all those known now, has been found even to hold in check the bacilli of tuberculosis or leprosy. Recent discoveries in bacteriology point to the fact that the production of artificial immunity must be looked for, not in mineral or vegetable drugs, but by inoculation with an attenuated virus, or in the employment of anti-toxines formed from the microbes themselves. It is not likely, however, that any such agents will soon be available as means to counteract the effects of the virus of yaws. For until a properly equipped laboratory, under the control of competent men, is established in a country where the disease is endemic, such scientific work cannot be accomplished. Reasoning by analogy, however, it is to be presumed that sooner or later some material will be discovered, the invaccination or inoculation of which will protect the individuals of a community against the ravages of yaws.

Fortunately, the disease is not a fatal one, and although there is no specific for it yet known, still it has been found by experience that certain methods of treatment have the effect in most instances of curtailing the morbid process. In the majority of cases this treatment must necessarily be long, for yaws is a chronic disease, and it has been found that undue interference with its course is likely to do more harm than good. The malady has, therefore, to be *guided* to a cure, and the business of the medical man is to do everything in his power to strengthen the constitution in order that the vital processes at work to combat the morbid influences may be kept at their full vigour. To this end anæmia must be counteracted, and intercurrent disease cured. Digestive troubles must be removed. Irregularities of the excretory organs must be set right. And good diet, and proper sanitation, must be assured.

These essentials having been attended to, the question of special medicines to be administered claims attention.

At the early stages of the disease, those drugs that are likely to suppress the efflorescence of the eruption should certainly not be administered. For if there be any interference with the formation of the cellular barrier, that is with the granulation tissue which creates mainly the characteristic cutaneous manifestations, then the microbes will be set free to work any mischief in the system they are capable of producing. Drugs and methods that may favour cutaneous circulation, are indicated at this stage as accurately scientific aids to the system in its efforts to cope with the malady. For the rapid proliferation of the tissue cells, and their maintenance at full vigour, require an ample cutaneous blood supply. This explains how chills produced by cold baths taken too early in the day, by wearing insufficient clothing when out of doors, by living in damp huts, and by exposure to the inclemency of the weather, cause frequently a sudden disappearance of the exanthem with a nearly certain recrudescence of the disease.

Injury to, or destruction of, the granulomata at the early stage cannot be too strongly condemned. The pathology of yaws shows that they are the results of the efforts made by nature to isolate the infected points from neighbouring tissues. If these efforts be counteracted, not only will there be danger of generalising the disease, but there will be an interference with the development of that peculiar property of the body fluids whereby they become capable of neutralising the morbid poison. It has been shown that

in the practice of those medical men who adopt the plan of destroying the granulomata, relapses are frequent; indeed, one strong advocate of this line of treatment asserts that in his experience "the disease almost always relapses after a variable time." In those cases, however, where one or two of the tumours obstinately persist when all other signs of the malady have disappeared, it will be found necessary to destroy them, for their nature is not identical with the granulomata of the early stages. It will be found that chronic inflamatory changes are responsible for their persistence and that an organised tissue has replaced the greater part or the whole of the mass of granulation cells.

It has been the practice in the yaws hospitals in Dominica to anoint the affected portions of the bodies of the patients with carbolic oil so as to prevent the exfoliation of infective débris from the cutaneous surface. In dispensary practice this is even more necessary than in a hospital, as many of the fresh cases of yaws occur by the inoculation of minute lesions of the skin. And, as contagion by contact is improbable in all these cases, it is to be inferred that infection takes place by microbes that have been preserved in the dust or in the soil.

When the exanthem, as the three stages of the granulomata may be termed, has matured and lasted some weeks, medicinal agents may be given to cause the absorption of the cutaneous tumours. But as a rule the eruption is very chronic in its course, and the treatment has, therefore, to be persisted in for some time.

In the yaws hospitals in Dominica, in uncomplicated cases it has been the custom to administer a saline mixture containing diaphoretic and diuretic drugs, with the view of encouraging the secretion from the skin and the kidneys. After a time, which varies according to the indications in each case, confection of sulphur is given, the beneficial action of which has been alluded to in Section XV. And, when the eruption is matured, iodide of potassium is prescribed in a mixture to which is added chlorate of potassium, so as to induce a slight diuretic action.

During the time of treatment daily baths are advisable. Should the hospital be in the neighbourhood of the shore, sea bathing will be found to be beneficial; but care should be taken not to allow the patients to bathe until the rays of the sun are sufficiently powerful to prevent chills. Warm baths taken occasionally may be employed with advantage; but so badly are some of the special hospitals equipped that there is no possibility of giving the patients the advantage of such baths, which, it may be mentioned, were strongly recommended as curative agents by Winterbottom, in 1803; by Mason, in 1831; and by Maxwell, in 1839.

In a number of cases this line of treatment will be followed by a permanent cure, but other drugs may be administered with equal success in suitable cases. Thus, calx sulphurata (sulphide of calcium) may be prescribed instead of the confection of sulphur, and when there is any cachexia experience has shown that the drug is extremely useful. It is recommended to give calx sulphurata in doses of $\frac{1}{10}$ grain, but I have found that much larger doses must be employed to produce beneficial results in yaws, and no irritant effects on the stomach have been noticed from them.

Sulphocarbolate of calcium, in 2-grain doses, has also been administered with benefit, and so has corrosive sublimate in the later stages of the disease, either combined with iodide of potassium or given in a mixture with perchloride of iron. A mixture containing $\frac{1}{12}$ grain of corrosive sublimate, and 10 minims of tincture of the perchloride of iron, with glycerine and infusion of quassia, was largely used by me in the Dominica yaws hospitals some years ago. It proved of benefit in a certain proportion of the cases; but, notwithstanding every care taken, there were a few instances of salivation, and I then prescribed it less frequently. Mercury is found most useful in those states where the granulomata do not mature but remain as squamæ or papulæ. Even in these cases, however, at times it will fail to produce any beneficial result; and then, arsenic either as the liquor arsenicalis or arseniate of iron, may be administered with success.

The complications, under which of course are included the various forms of ulceration, are to be treated by the ordinary rules laid down in works on medicine and surgery; for the indications for their management differ in no way when they are met with in persons suffering from yaws than when they occur in other patients. I may remark, however, that I have had gratifying success in my treatment of some of the fearful leg ulcers so often seen in negroes, by adopting the plan recommended some years ago by my old fellow-student, Mr. L. Kesteven, in a letter he wrote to a medical periodical. It consists in directing against the ulcer for 10 or 15 minutes steam impregnated with oil of eucalyptus. Liston's steam spray apparatus is used for the purpose. Under this treatment large foul indolent ulcers will often clean up rapidly and take on a healing action, and then skin grafting will soon effect a cure.

Many of the patients will require modifications in the treatment indicated above,

for special symptoms will have to be attended to, and all irregularities in the functions of the various internal organs must be watched for and counteracted. But every medical man knows the appropriate treatment that should be adopted in these emergencies, and it is quite unnecessary to lay down here precise rules for their management.

As there is no specific for yaws, and as the disease tends naturally to recovery if it be uncomplicated, and if the patients be placed under proper hygienic conditions, medical men who take the trouble to make themselves conversant with the true nature of its attributes will find no difficulty in curing the great majority of the cases placed under their care. Satisfactory results may be obtained by different methods of treatment, provided that efforts of nature to combat the invading virus as indicated by the pathology be not interfered with.

Hitherto, in those colonies in which attempts have been made to "suppress" yaws, all the attention of the governments and the medical officers has been directed to the cure of persons suffering from the disease, and no efforts appear to have been made to prevent its further spread by prophylactic measures that experience has taught to be of so much value in limiting the ravages of contagious diseases in England and elsewhere. The scepticism expressed by Gavin Milroy and others as to the part played by contagion in the development and spread of the malady, and the leaning of a few authorities to the theory that it is identical with or the outcome of syphilis, may have had much to do with the neglect of precautions that sanitary authorities in England would adopt as a matter of course, were such a disease to prevail in any urban or rural district.

In the yaws "suppression" acts in force in some of the colonies provision is made for the enforcement of a few sanitary precautions, such as forbidding the bathing of infected persons in rivers and streams, and the washing of their clothes and bedding therein. And in "the Yaws Prevention Ordnance 1883," of Grenada, there is a provision for the compulsory registration of infected houses. But, as far as I could ascertain, in no instance have these wise provisions been systematically carried out. Indeed, in several places in this report, I have recorded the fact of yaws patients bathing in streams from which water for drinking and domestic purposes was obtained.

Instances have been reported by medical officers in which the disease has been spread by affected children attending schools, and the history of yaws in Antigua and Tobago shows that this has been an important factor in enlarging the infected areas.

No attempt appears to have been made in any of the islands to disinfect the houses where cases of the disease had been found, and the clothing and bedding of yaws patients are invariably used by healthy persons without hindrance. I have known of wretched huts in Dominica that have been for a long time centres of infection; for, when patients with the disease were removed from them, it broke out again on other persons who continued to inhabit the place. The value of these old and filthy huts was probably not more than 3 *l.* each, as they were made of mud and wattles with thatched roofs, and it would have saved money to the public chest if they had been burnt to the ground, and if the owners had been well compensated. Provisions for the closing and demolition of unhealthy habitations exist in English Public Health Acts, and had some similar legislation been affected in the West Indian Colonies, there would be much fewer hot-beds of yaws than there are now.

Even in the yaws hospitals in most of the islands there is no proper provision for a thorough disinfection of the clothes of discharged patients. These clothes are, of course, washed, and in some instances they are boiled, but this has been proved to be ineffectual in destroying the germs of disease. The only safe way of disinfecting such articles without injuring them is to subject them to currents of steam at 100° C. for at least an hour's time. Portable machines for such steam disinfection may, I believe, be now bought for 13 *l.*, and there certainly should be one at every yaws hospital and in every medical district.

In each district, too, there should be a small sanitary staff of intelligent persons under the direction of the medical officer; then such matters as compulsory notification of the disease and proper disinfection of infected houses could be satisfactorily carried out. The house has been called "the sanitary unit," and it therefore demands the careful attention of sanitary authorities. There is little use in curing patients in the yaws hospital if they go back to live in filthy hovels in which are secreted other cases of the disease. It has been shown in the section of this report treating of re-infections, that there is not always immunity after an attack of the disease, and many of the cases of second attacks are due to the patients returning to infected houses. Twelve years ago I drew the attention of the authorities of Dominica to this matter, and the following

particulars concerning a case in point were appended to my third report on the yaws hospitals :—

Case 93.—A boy, five years of age, was admitted to the Central Hospital on October 16th, 1877, with tubercles forming a ring round the mouth, and other tubercles on the perinæum. He was discharged on December 18th. Before sending the boy away I made a careful examination of him, and as I could discover no sign of the disease I wrote a note to that effect in the case-book, it being the only occasion upon which I made such an entry. It was, therefore, much to my surprise when the child was re-admitted, with fully developed yaws on both extremities, on November 5th, 1878, nearly eleven months after his discharge. As I felt confident that the boy was thoroughly cured on the first occasion, I determined to spare no trouble in discovering, if possible, the source of the second infection ; and to that end, I sent the Master of the hospital to the village from whence the boy came, to make careful inquiries into the history of the case, and the following facts were then brought to light.

A sister of the boy was found concealed in a hut in a terribly diseased condition. She had large frambœsial tubercles about her face and limbs, her feet were nearly full of chigoes ; she was in a state of great emaciation and unable to stand on account of pain and contraction of the flexors of the legs ; she was, moreover, in a most filthy condition, and swarming with lice.

The girl had been attacked with yaws before her brother, and when the police removed him to the hospital the girl was hidden away by her friends. After the discharge of the boy he was allowed to associate freely with his diseased sister, and at night he slept by her side. In these circumstances it is not to be wondered at that the child became infected a second time.

If there had been a system of compulsory notification of the disease, and proper provision for the perfect cleansing of infected houses, such a case as this one could not occur. The wretched child, crippled with yaws and various complications, doubtless acted as a focus for the continual spread of the disease, for cases were frequently cropping up in the vicinity of the hut in which she was hidden away.

XVII.

Concluding Observations.

The history of yaws in the various islands comprised within the scope of the Commission shows that the spread of the disease is a matter of considerable importance to the governments and the people. Although not fatal to life in an extraordinary degree, yaws is a loathsome malady that often spreads rapidly by contagion, and that at times becomes epidemic in its endemic foci. In an uncomplicated form, it is in most instances readily curable, yet it unfits its victims for work for a long period, thereby crippling the labour supply ; and, owing to the mal-hygiene of the class of people amongst whom it prevails most, it is often aggravated and sometimes rendered incurable by the intercurrence of other diseases. Thus it is an important and not infrequent cause of pauperism ; for, owing to the utter disregard of sanitary matters by the people, strong, healthy, and industrious men contract the disease, often without any fault of their own, and being unable for months or years to labour, they and their families become a burden on the State. Besides the rapid spread of yaws amongst the labouring population it has invaded in some places the ranks of the upper classes, thereby giving rise to widespread alarm.

The question, indeed, became so serious in those colonies where the disease prevailed most, that the people clamoured for special legislation to control its spread, and it was hoped by many that the loathsome malady might be eradicated by the compulsory segregation of infected persons. The necessity for the special acts and ordinances that were passed is indicated by the unanimity with which the island legislators have continued to vote large sums of money for the upkeep of the yaws hospitals.

The following table shews the number of patients treated in these hospitals, and the special expenditure that has been incurred in the islands in which they have existed:—

Islands.	Periods.	Number of Patients treated.	Estimated Total Expenditure.	Average Annual expenditure.	Average Cost of each patient.
			£.	£.	£. s. d.
Grenada - - -	1875-90	2,402	8,583	536	3 11 6
St. Vincent - - -	1883–88	206	800	160	3 17 8
St. Lucia - - -	1882-90	1,988	* 9,665	1,208	4 17 3
Dominica - - -	† 1875–91	3,106	‡ 14,562	910	4 13 10
Nevis - - -	1887–91	466	987	247	2 2 4

* Including the cost of the erection of buildings still in use.
† Statistics relating to the period 1871–74 are unobtainable.
‡ Including the cost of the erection of buildings now abandoned.

This table shows that during the last 17 years over 8,000 yaws patients have been treated in the special hospitals of these five islands at a total expenditure of nearly 35,000 *l.*, and that each patient cost on an average the sum of 4 *l.* 4 *s.* 9 *d.*

Notwithstanding this large expenditure, and the amount of time and labour devoted to the work of controlling the spread of the disease, its eradiction from the islands would seem to be as far off as ever. Undoubtedly a great deal of good has been effected, but it may be asked whether this good is in any way commensurate with the sacrifices made; and, unfortunately, it must be said that it is not.

The history of yaws in the various islands, which I have given in sufficient detail to enable anyone to grasp the whole question, shows that in spite of every effort made, the disease still keeps a hold on the people, and that the authorities have as much difficulty now in bringing the infected persons under treatment as they had when the systems in operation were first inaugurated. This difficulty is due in a great measure to the ignorance of the people, as well as to their indifference to the disease, and their dislike and distrust of the proper medical treatment of it. These are of course but characteristics of imperfect civilization; and, whilst they may account for great obstacles in the way of the successful working of the compulsory acts, they are not insuperable obstacles, and they have been at times overcome so that the undoubted failure of the measures undertaken to control effectually the spread of the disease, must be looked for elsewhere.

As regards the measures themselves, full particulars are given in this report, not only of their scope and detail, but also of the way in which they have been carried out. They are of three kinds, that is to say, they provide for three separate systems of dealing with the spread of the disease. They may, therefore, be considered briefly under the following three heads, viz.—

I. The voluntary system, which is in operation in Nevis and Montserrat.

II. The compulsory dispensary system, which is in operation in Tobago.

III. The compulsory system of segregation, which was in operation in St. Vincent, during the years 1883–88, and which is now in force in Grenada, St. Lucia, and Dominica.

I. A careful consideration of the history of the yaws affairs in Nevis and Montserrat, shows that the purely voluntary system has entirely failed to bring the disease in these islands under the control of the medical authorities. A great amount of good has been done, of this there can be no doubt; but the disease appears to be as firmly fixed in the islands as it was when the system of dealing with it was first inaugurated, and the difficulty of finding out the cases has been increased, inasmuch as the people have learnt to hide those affected with yaws.

In regard to Nevis, a special hospital was established in one of the three medical districts, and the medical officer was placed in charge of it; for a time he had no difficulty in filling the wards, but afterwards he was forced to suggest compulsory legislation as he was unable to get the affected persons to enter the hospital. Besides which the other medical officers apparently did not trouble themselves about the matter; and, as I learnt, they resented the interference of the medical officer of the yaws hospital who was not armed with any authority outside his own district. Thus, in one of his reports, he estimated the number of cases in the other half of the islands, beyond his control, as being four times as great as it was within his own district. These matters were

brought to the notice of the Government, but nothing appears to have been done to remedy them, and the result was that the expenditure of 250 *l.* a year in a small island had to be continued with the almost certain knowledge that the hospital was to become a permanent institution.

In Montserrat, the voluntary system differs from that of Nevis. There is a small hospital for the accommodation of the worst cases, and the two medical officers attend to the other patients at dispensaries in various parts of the country districts. At first the system appeared to work well, and the authorities reported that the disease was almost eradicated from the island. But, later on, it was found that many infected persons were hidden away, and that many others declined to avail themselves of the services of the medical officers. These circumstances having been reported to the Colonial Office, Lord Kimberley, on the advice of the medical department of the Local Government Board, instructed the Governor to take the necessary steps to erect district hospitals, or to provide for the careful nursing of the patients in their own houses, and to pass a measure through the legislature to enforce a system of compulsory notification. None of these instructions, however, were carried out, and the ineffectual attempts to deal with the spread ot the disease have been continued until now, that is for a period of eleven years.

No particulars concerning the total number of patients treated by the medical officers, or of the actual expenditure under the head of yaws, could be obtained. And owing to the fact that the whole island was in the temporary charge, during my visit, of a medical officer unacquainted with the people and the country, I was unable to get full information on all subjects connected with the inquiry, but from my own observations it appeared to me that under the present system a complete control of the spread of the disease was altogether impossible.

II. The system that is in operation in Tobago has been described as that of the compulsory attendance of all infected persons at district dispensaries where they are examined and supplied with medicines by the medical officers. The system is a very inexpensive one; for, inasmuch as the medical officers have not received any extra remuneration for their greatly increased duties, the Government have had only to defray the cost of the drugs. From September, 1887, to the beginning of the year 1890, no less than 1,423 yaws patients were placed under treatment at a cost to the island of about 350 *l.* only, that is 4 *s.* 11 *d.* for each person.

If, therefore, the system be a satisfactory one, the difficulty in dealing with the prevalence of the malady may be considered of easy and inexpensive solution. But the history of yaws in Tobago shows that, whilst the dispensary treatment has undoubtedly done a considerable amount of good, it is quite insufficient by itself to control the spread of the disease. It may also be observed in regard to this matter that the history of yaws in Antigua also shows the impossibility of holding the malady in check by the dispensary system alone. Drs. Pierez and Mackie, the medical officers of the infected districts in that island, have worked hard to bring the cases under proper medical treatment, but in spite of all their efforts yaws is undoubtedly spreading in the island.

Many of the worst cases can, of course, never appear at the dispensaries in Tobago, and the patients are not visited in their own homes, many other persons are "dismissed" uncured on account of their utter disregard of the instructions of the medical officers, and a considerable number leave off attending before they are cured, or refuse altogether to undergo any medical treatment. The compulsory law, too, appears to be faulty, or a wrong construction has been put on its clauses by the chief magistrate, and although this important matter has been brought to the knowledge of the Government nothing whatever has been done to remedy it. Consequently there is practically no compulsory dispensary system now in force in Tobago, the state of affairs being analogous to that of Antigua and Montserrat, except that in the latter island the worst cases are admitted to a special hospital.

III. The system of compulsory segregation of infected persons in special hospitals is practically the same in Dominica, St Lucia, and Grenada. It was not possible to obtain much information concerning the working of "the Yaws Prevention Ordinance, 1885," of St Vincent, as the hospital was closed four years before my visit to the island. But in the three other colonies I was able from inquiry and personal observation to come to a conclusion as to the amount of success that had attended the special measures adopted.

The first "Yaws Act" was passed in Dominica, in 1875, and it is entitled, "An Act to "make provision for arresting the spread of the disease called 'Yaws' with a view to its "ultimate extinction." This Act was drawn up by the late President Eldridge; and as will be seen on comparing it with the other yaws enactments in the Appendix, it has

been used as a model for all of them. The provisions of the various measures are practically the same, so that it may be considered that the means undertaken for arresting the spread of the disease are identical in Dominica, Grenada, and St Lucia.

In Grenada yaws was very prevalent before the system of compulsory segregation was adopted; but, by perseverance in the carrying out of the various provisions of the ordinance, the disease appears to have been got under a certain degree of control. The beneficial effects of the compulsory law was pointed out, in 1888, by Dr. Hatton in the following words:—"A few years ago, persons suffering from this disease might be seen "at the Courts, in the streets, at the schools and in fact wherever there was a public "gathering; this is not the case now." It was evident, however, from my experiences in the island, that many cases of yaws were hidden away, and the history of the disease shows that at no time were the medical officers able to give any reliable information concerning its prevalence amongst the people. On several occasions this fact was prominently brought to the notice of the Government; and, although the law gave them power to establish compulsory notification, no action appears to have been taken to strengthen the hands of the medical authorities in this or in any other way. The sudden outbreak of the disease in many parts of the island after my visit was due probably as much to the presence of a number of secreted cases as to the clinging of the contagion to places in which persons affected with yaws had been living.

The question relating to the disease are, if possible, of a more serious nature in St Lucia than in any of the other colonies; for the island has recently been garrisoned with white and black troops, and there is at all times a large coolie population, a considerable part of which will return to India, There is thus the double danger of the troops being infected, and of the disease being carried to India. As regards the danger to the troops the local medical authorities appear to be divided in opinion, but sufficient evidence has been given in this report to show that the soldiers may at any time become subject to the disease. The East Indian labourers are peculiarly susceptible of yaws, and the number of them that have been affected has rendered coolie immigration much more costly to the country, for the expense attending their hospital treatment appears to have been, not a charge on the immigration fund, but on the general revenue.

The history of the disease in St. Lucia discloses the remarkable fact that the authorities were so unacquainted with the condition of the people that two separate inquiries resulted in the finding of only 14 cases of the disease, and in less than three months after the opening of the special hospital 145 cases had been admitted, and since then nearly 10,000 *l.* has been spent on the measures undertaken for ridding the island of yaws.

It is unnecessary to enter here into particulars concerning the progress of affairs in St. Lucia, as it has been already given in detail; it may be observed, however, that most of the attention of the officials has been directed to the care of the affected coolies, and that the disease appears to be nearly as prevalent amongst the creole population now as it was when the system of compulsory segregation was started. This is due mainly to the unfortunate action of Mr. Llewelyn, who forbade the admission of creole patients and used every effort to close the yaws hospital, notwithstanding explicit contrary instructions issued from the Colonial Office. By this action the good that had been effected by a large expenditure on the yaw hospitals was practically swept away.

Although a stringent yaws ordinance is in operation its provisions are evidently not carried out, and there is evidence that the police who are charged with duties under it do not trouble themselves very much in the matter. It would appear also that in Grenada and other islands the police are at fault in not carrying out the direction of the compulsory acts, but it must be said that their duties are so multifarious that it is impossible to expect them to act as efficient yaws constables.

The measures undertaken to "suppress" the disease have been longest in operation in Dominica; and in none of the islands have there been so many misfortunes attending the yaws affairs, or so much waste of public money by their mismanagement as in that island. After several ineffectual and costly efforts to subdue what may rightly be called a yaws epidemic, a very large expenditure was incurred to "eradicate" or "stamp out" the disease; and this is the only time in the recent history of yaws in the West Indies that such measures were undertaken with promise of ultimate success. But the system was suddenly given up, and the results arrived at by over four years, incessant work and heavy outlay were abandoned. Afterwards, although the Secretary of State authorised increased expenditure so as to provide means for effectually holding the disease in check throughout the island, the expenditure was really considerably decreased, with the result that the malady became again prevalent in the districts from which it had been cleared.

As I have already given a complete history of the Yaws affairs in Dominica it is unnecessary to refer further to the matter here.

It is thus seen that the three separate systems now in operation in the West Indies for controlling the spread of the disease have proved ineffectual, and that the results obtained are not commensurate with the expenditure incurred. This being the case it follows that it will be unadvisable to continue these systems, at all events without some modifications. It has been said by persons of high official authority, that it is altogether useless to adopt any measures to control the spread of the disease, inasmuch as they will prove ineffectual so long as the negro remains in his present low social condition. There is, however, much fallacy in this. Can the negro be left alone to raise himself by a long and by no means certain progress towards the higher level of civilization attained by his European fellow subjects? The settled policy of the colonial governments for the last generation has proved otherwise, for they have considered it their duty to provide the negro with medical attendance, hospitals, and poor-houses, and every effort is made to raise him intellectually by a State system of education. The present low social and moral condition of the bulk of the population of these colonies is the outcome of the wrongs of the slave trade, and it will be a long time yet before a radical change can be expected in such matters. As most of the people of the West Indies are the descendants of negroes enslaved by the English, with the full knowledge and consent of the Government of the time, there is a moral obligation on England to take a paternal care of the negroes until they are sufficiently educated in all matters to be able to stand alone to fight their own battle of life.

The question must also be regarded in the light of public hygiene. A loathsome disease exists in a country, and experience has shown that unless repressive measures be undertaken it will spread far and wide, it may be slowly and insidiously, but yet assuredly its prevalence will increase, and at any time the malady may become epidemic. In no country under a highly civilized government can such a matter, when fully understood, be allowed to continue without interference, and it is seen that such a view of the difficulty has been adopted by the Governments of most of the islands in which yaws has largely prevailed. To close all the yaws hospitals, and to abolish the other measures in operation for counteracting the evil, are courses that in the circumstances would appear to be altogether out of the question, they would be justifiable only on the score of absolutely necessary curtailment of public expenditure, but even such a plan of economy would be financially disastrous in the end, inasmuch as it would be inevitably followed by an increase of pauperism, and by a crippling of the labour supply with the necessary consequence of a diminished trade and a lessened revenue. Something must be done, therefore, to stay the ravages of yaws amongst the people, and this brings me to the concluding work of the Commission; namely, to advise what system should be adopted in future for grappling with the disease.

It may, perhaps, tend to elucidate the matter if I first of all point out briefly what appear to me to be the defects of the present systems. These defects naturally fall under four heads, viz.:—

I. The absence of a system of notification of the disease.

II. The absence of a special hospital in those islands in which the dispensary system is in operation.

III. The adoption, in those islands in which compulsory segregation is in force, of a system whereby the district medical officers are relieved of all duty and responsibility in regard to the spread of the disease in their districts.

IV. The utter disregard in every island of the sanitary precautions necessary to prevent the further spread of the disease.

1. The necessity of compulsory notification in regard to yaws in the West Indies has been abundantly apparent from the detailed accounts of the progress of the disease in the infected islands. Over and over again it has been shown that the officials most likely to have a knowledge of the hygienic condition of the people are quite unable to arrive at any accurate estimate of the number of affected persons in the various districts. Thus the Governments, in their attempts to grapple with the evil, have always been working in the dark. No better illustration of this fact could occur than the history of the disease in St. Lucia and Dominica. In the former island the authorities thought they had to deal with only 14 infected persons, and already over 2,000 have passed through the hospitals. In Dominica provision was made for the segregation of several hundred cases

and over 3,000 have been isolated. If there had been a reliable method of estimating the number of cases in the infected islands a more effectual plan of operation would doubtless before now have been devised.

During the time of the yaws administration in Dominica, a system of notification was practically in force in those districts that had been cleared of the disease. For registers were kept by the yaws constables, and every week a list of fresh cases or relapses was sent to the medical superintendent. No particular difficulty was experienced after a time in getting the people to give information of fresh outbreaks of the disease, and it does not appear to me that there will be any insuperable obstacles in the way of establishing an efficient system of compulsory notification in any of the West Indian islands. The negroes are always ready to obey the law if they are satisfied that it will be rigorously carried out, and that to break its provisions will entail certain and speedy punishment.

II. In those islands in which the dispensary system of dealing with the disease has been established, it has been shown that a certain number of the cases are too ill to attend for treatment, and that some of the patients will not properly follow out the instructions of the medical officers. If the former cases were to be visited periodically in their own homes, it would necessitate a much larger medical staff in some of the islands, and even then, owing to extreme poverty, which is an invariable accompaniment of disease amongst the thriftless negroes, curative treatment could not be expected. It follows, therefore, that there must be an asylum for these cases, as well as for those refractory patients who will not undergo treatment unless forced to do so.

Such establishments need not necessarily be expensive, either in structure or in upkeep, for most of the cases of the disease will be in dispensary patients, and a rigid enforcement of a compulsory law, made without clauses that render its whole scope nugatory, as is the case now in Tobago, will enable the medical officers to diminish greatly the number of infected persons that might expect hospital treatment. These hospitals may either be central or district ones, for the physical peculiarities and the needs of the island in which they are placed will have to be taken into account before their sites and scope be decided on.

III. It will doubtless occur to any one reading the history of yaws in the West Indies that it is a remarkable fact that the dispensary system, which has really effected a great deal of good in Tobago and Montserrat, in Dr. Pierez's and Dr. Mackie's districts in Antigua, and in Mr. Numa Rat's district in Dominica, has not been systematically followed in those islands in which compulsory segregation has been established. No better way could have been adopted to relieve the strain on the special hospitals, and to decrease the public expenditure, for it was not possible at any time in Grenada, St. Vincent, St. Lucia or Dominica to segregate all the patients, and there was nothing to prevent the district medical officers doing in one island what their colleagues were doing so well in another.

Rules were made in Dominica under legislative authority by Administrator Burford-Hancock, in 1881, with the view of imposing on the district medical officers certain duties in regard to persons affected with yaws in their districts. But these officers agitated against the matter, and the rules were rescinded by Sir John Glover.

Both in St. Vincent and St. Lucia the adoption of the system was advised by Mr. Llewelyn, but it was never established. And thus in these three islands, and in Grenada, many cases that might have been cured as dispensary patients at the cost of a few shillings necessitated the expenditure of pounds to defray the cost of hospital treatment.

If the dispensary system be adopted and carried out in all the islands in which yaws prevails there will be entailed a large amount of extra work on the district medical officers, and it is but right to point out that this should receive the due consideration of the Government.

IV. Unfortunately hitherto every effort has been directed to the cure of the disease and its prevention has practically received no attention. This appears to me to be the most serious defect in every system that has been tried.

The pathological facts I have been able to establish as part of the work of this Commission throw light on the way in which the disease is spread, and indicate what should be the precautions taken to limit infected areas and to destroy the hot-beds of the disease. Yaws being of microbic origin, its germs may lie for considerable periods in dust and dirt ready at any time to infect wounds and sores and even minute abrasions

that would pass unnoticed. No system of dealing with the disease can, therefore, be considered as even approaching to efficiency that does not provide for—

(*a.*) The isolation as far as possible of infected houses.

(*b.*) The thorough disinfection afterwards of these houses, and the destruction or disinfection of the clothes and bedding used by the sick.

(*c.*) The demolition of the wretched hovels that are a danger to the public by reason of the clinging of the contagion to them.

(*d.*) A rigid enforcement in all instances of ordinary sanitary precautions.

As regards the necessity of the measures marked (*a.*), (*b.*), and (*d.*), there can be no question by any one having the most elementary knowledge of sanitation; but the history of the progress of the disease in the various islands shows that these measures have been neglected in a most unaccountable manner. It cannot be said, however, that the non-observance of ordinary sanitary rules is due to neglect on the part of the medical officers in warning the governments; for during the progress of the inquiry I have perused many reports and other official documents in which urgent attention has been unavailingly directed to this most important matter. In the history of yaws in Antigua, where the death rate is high, and where infant mortality is appalling, I have had occasion to give extracts from official documents disclosing a general condition of insanitation that is a positive disgrace to an English colony.

In respect of the demolition of huts that are dangerous to the public health by reason of the clinging of the contagion to them, the suggestion will doubtless be new to the West Indies; but provision is made for such demolition in the English Public Health Act and the Artizans and Labourers' Dwellings Act, and similar measures adapted to the various colonies in the West Indies would be of great benefit to the people. In illustration of the persistency with which yaws clings to negroes' huts, I may draw attention to a remarkable fact that was brought to my knowledge by a very intelligent negro in Montserrat. On the windward side of that island there is a sugar estate called Roches, on which a village formerly existed. This village was infested with yaws; but, for some reason or other the people abandoned it, and built new huts in the midst of their "provision grounds" on the mountain side. At once there was a remarkable, and, apparently, a permanent diminution of the disease. There was no alteration in the life of the people, the climate was practically the same, but the sanitary surroundings were immensely improved. The infected huts were abandoned, and yaws almost disappeared.

Compulsory notification and sanitary laws cannot, however, be properly carried out unless special officers be appointed. This of course will entail some expense; but the expenditure will, to put it on its lowest footing, prove remunerative in the end. For to diminish the spread of a loathsome disease, to prevent the crippling of a portion of the labour supply, and to save life, are synonymous with increased prosperity of the people. Besides which, the expenditure that will be saved by a diminished number of hospital patients will before long, I believe, prove to be considerable.

In order that the spread of yaws may be prevented by an efficient system of sanitation, it will be necessary for the appointment of a small staff of sanitary inspectors in every medical district. These inspectors should be under the immediate direction of the medical officer, and they should be charged with seeing after the proper carrying out of compulsory notification, and of the sanitary measures decided to be put in force.

It has been pointed out that even were an island freed from yaws it might again become infected by the re-introduction of the disease; but by the establishment of a proper system of notification such an event could not give rise to much danger. The prompt isolation of cases is sufficient to prevent the spread of the disease, and in proof of this fact may be cited the history of the introduction of yaws into Carriacou, and its eradication without difficulty by the energetic action of the medical officer.

As regards those islands, such as St. Vincent, St. Kitts, and Antigua, in which yaws prevails, and in which no organised plan for controlling its spread is now in operation, it appears to me to be absolutely necessary for some action to be taken without further delay. St. Vincent is probably now the most affected island of the archipelago. In Antigua the disease was re-introduced some years ago, and in spite of every effort of the medical officers in whose districts cases were found, it is spreading slowly and surely. In St. Kitts, the number of cases and the extent of the infected area have astonished some of the resident medical officers themselves.

Whatever measures be decided on for controlling the spread of the disease in future, it appears to me to be absolutely necessary that in each island there should be an officer

with sufficient power to direct the yaws affairs, and to compel those acting under him to perform their duties satisfactorily. This officer should also not be always be bound down to any particular place by local official duties, but he should be able to make an occasional inspection of the various districts to enable him to become thoroughly acquainted with the way in which the measures are working. In each of the Windward Islands there is a Colonial Surgeon, but, except in St. Lucia, the office appears to carry no authority with it. In Grenada the Colonial Surgeon occasionally inspects the district. In St. Vincent and Tobago the Colonial Surgeons are also district medical officers, and they cannot leave their districts. To erect half-a-dozen different authorities in a small colony, and to arm them with equal powers in regard to measures affecting the best interests of the whole island, will not be calculated to ensure the efficiency of these measures. To such divided responsibility and absence of central control is due to a considerable extent the want of success that has attended the yaws affairs in the various islands. A serious defect of this nature in the St. Lucia system was pointed out by the Protector of Immigrants when he said :—"The Ordinance requires an officer in charge of "its machinery, to set it in motion and to keep it moving."

Finally, it is necessary to point out that if there be established an organised plan of dealing with the disease in the various islands in which it prevails, it will add much to the efficiency of the system if there be one directing head responsible alone to the Secretary of State. I have had occasion to point out several times that explicit instructions from the Colonial Office in regard to the yaws affairs have been disregarded by the local authorities. And in every instance it appears to me that this non-compliance with official instructions has led to disastrous results. This fact points, therefore, to the necessity of an occasional inspection—should such be practicable—of affairs by an officer not responsible to the local governments. The islands are so isolated from each other that the authorities of one colony are quite unacquainted with the working of measures that have been in force for years in another colony. The mistakes committed in one island, because they are unknown abroad, do not act as warnings to the officials of other islands; and the success of measures adopted in one colony is, for want of knowledge of them, of no advantage as an example to be followed in the others. Many of the medical officers could scarcely be more isolated; they know less of the prevalent diseases and the treatment adopted in an island within sight of the windows of their houses, than they do of similar matters in London or Paris.

Their small incomes do not permit them to spend much money on books, and they have no chance, like the richer lawyers in some of the islands, of consulting a professional library formed at the public expense. Some of them, therefore, as they have informed me, have been entirely dependent on their own unaided observations for their knowledge of yaws, and for this reason I have considered it advisable to give in this report the views of most of the writers on the disease, and to enter as fully as possible into the various scientific matters relating to its nature and treatment.

The work of the Commission has been much greater and it has occupied a much longer time than was expected when it was entrusted to me. But your Lordship will see from this report that the work was of such a nature that it could not be hurried through, and the immense importance of the various questions surrounding the yaws difficulty to thousands of Her Majesty's West Indian subjects rendered it necessary for me to inquire minutely into many matters in order that I might, after careful study of them, be in a position to supply the Government with the fullest information possible.

In conclusion, I would draw Your Lordship's special attention to the valuable and able assistance rendered to me in this inquiry by Mr. C. A. Seignoret, who has acted as Secretary during the whole time, and who has now been appointed Chief Clerk in the Registrar's Office in Dominica by the Governor of the Leeward Islands.

I have, &c.

H. A. Alford Nicholls.

ILLUSTRATIONS

SHOWING THE

LOCAL MANIFESTATIONS OF

YAWS,

AND SOME OF ITS COMPLICATIONS.



FIG. I.

Showing Lupus and yaws.

Judd & Co Ltd Lith 4414. 3.93.

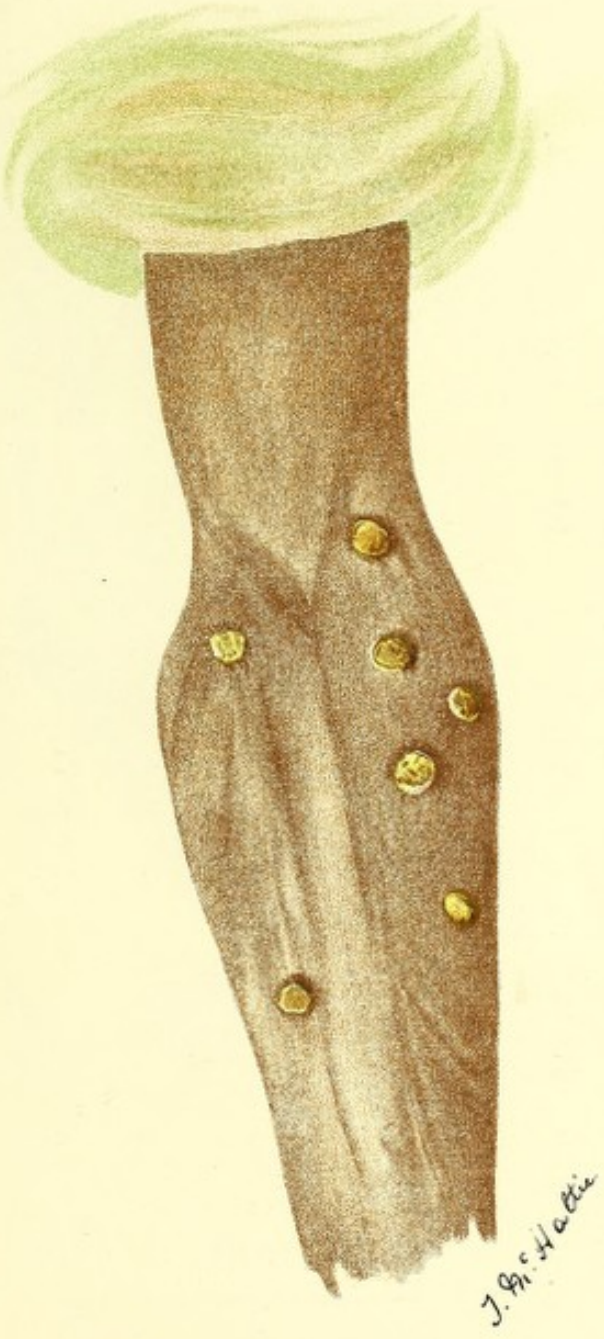


FIG. II.

Showing the encrusted granulomata.

Judd & Co Ltd Lith 46 & 48 St



FIG. III.

Showing the elevation of the encrusted granulomata.

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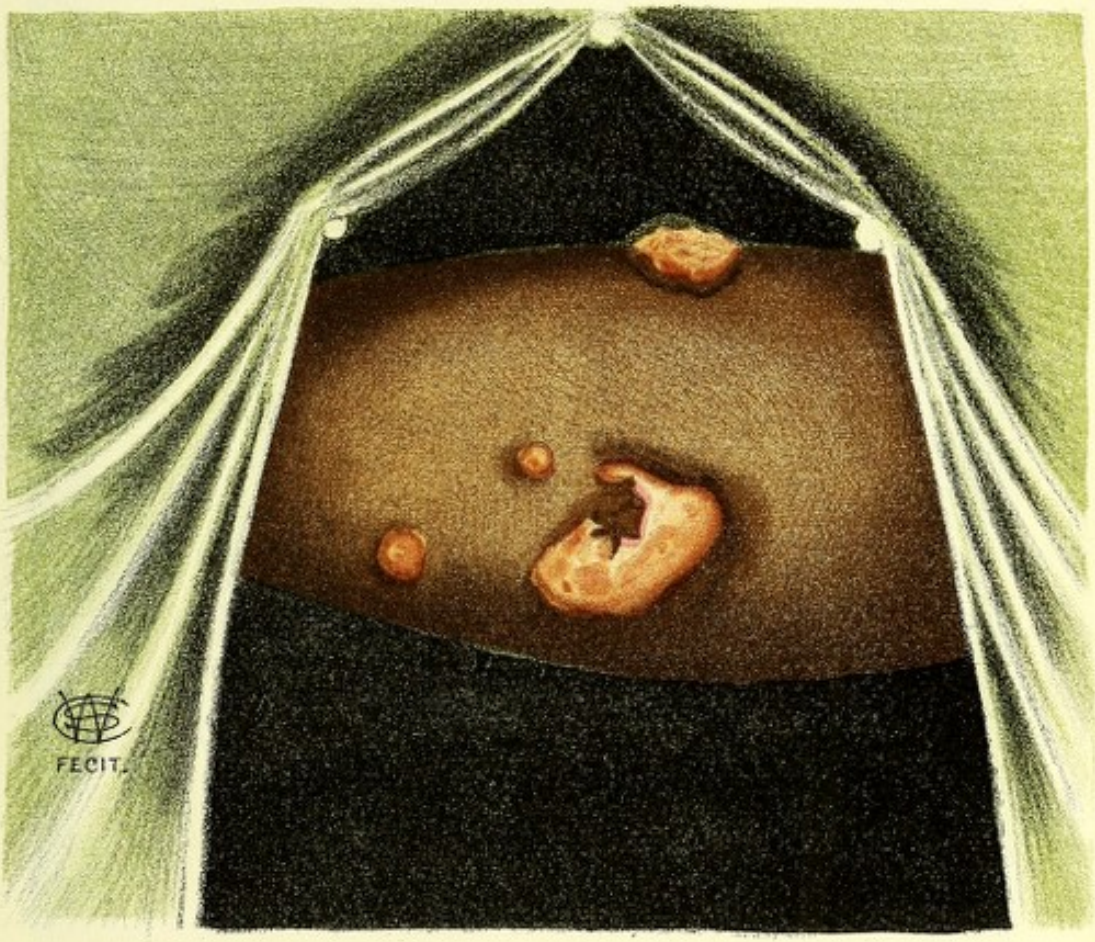
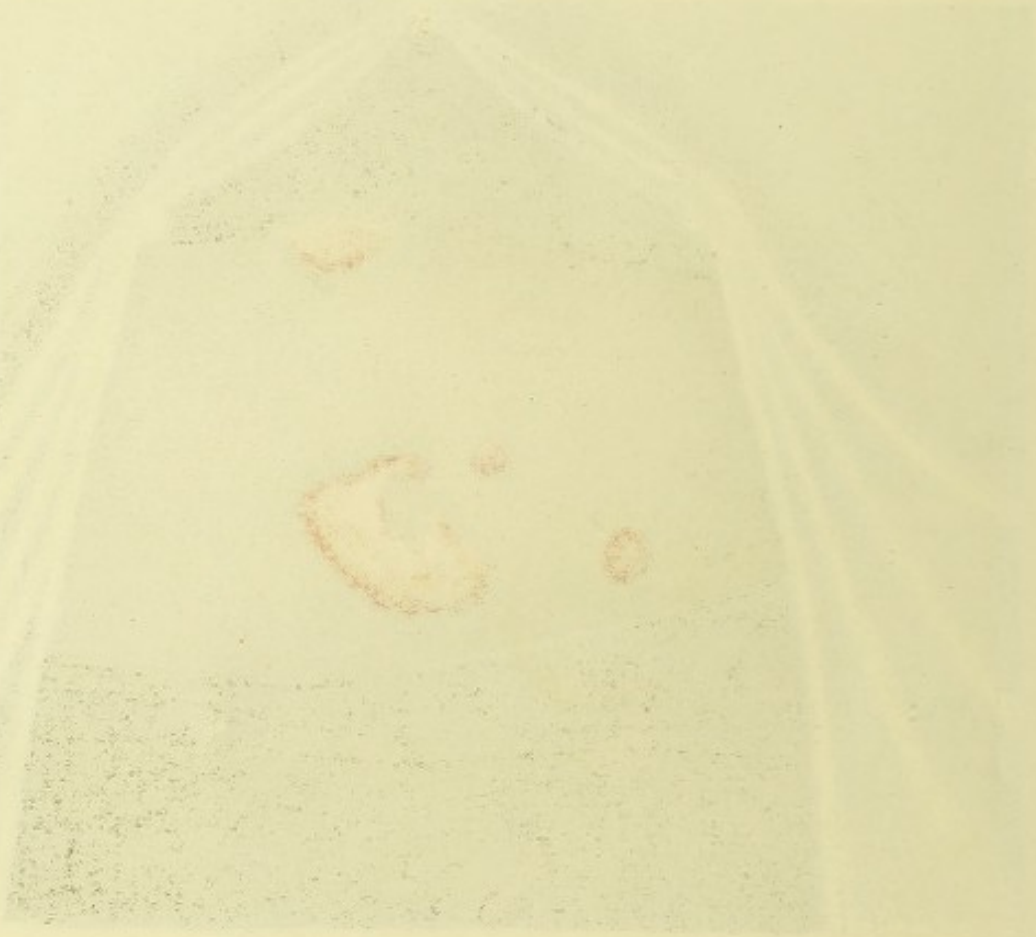


Fig. IV.

Showing large and small encrusted granulomata.

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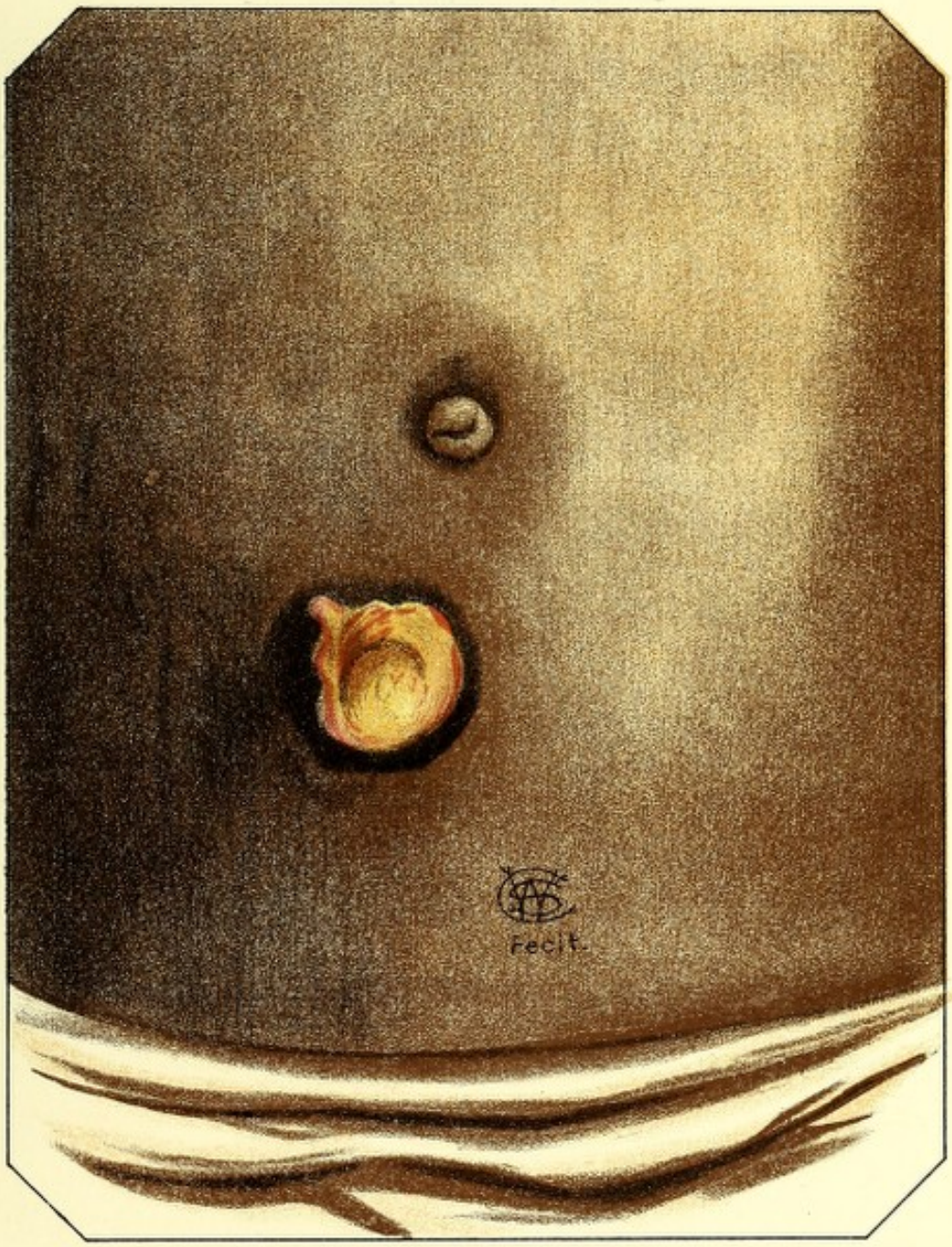


FIG. V.

Showing an encrusted granuloma of irregular form.

Judd & Co Ltd Lith.





Fig. VI.

Showing a large solitary encrusted granuloma over the left olecranon.

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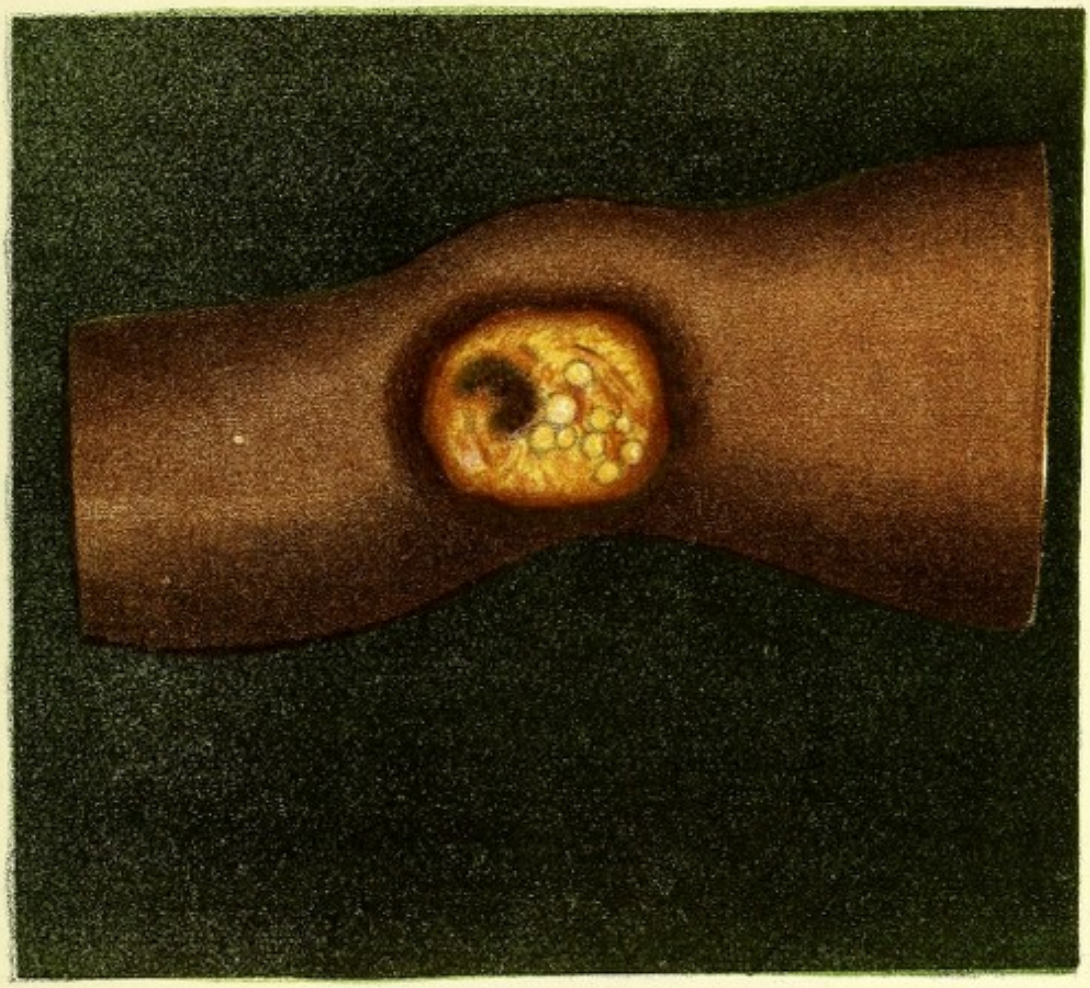


FIG. VII.

Showing an annular granuloma enclosing healthy skin.

Judd & Co Ltd Lith 4616



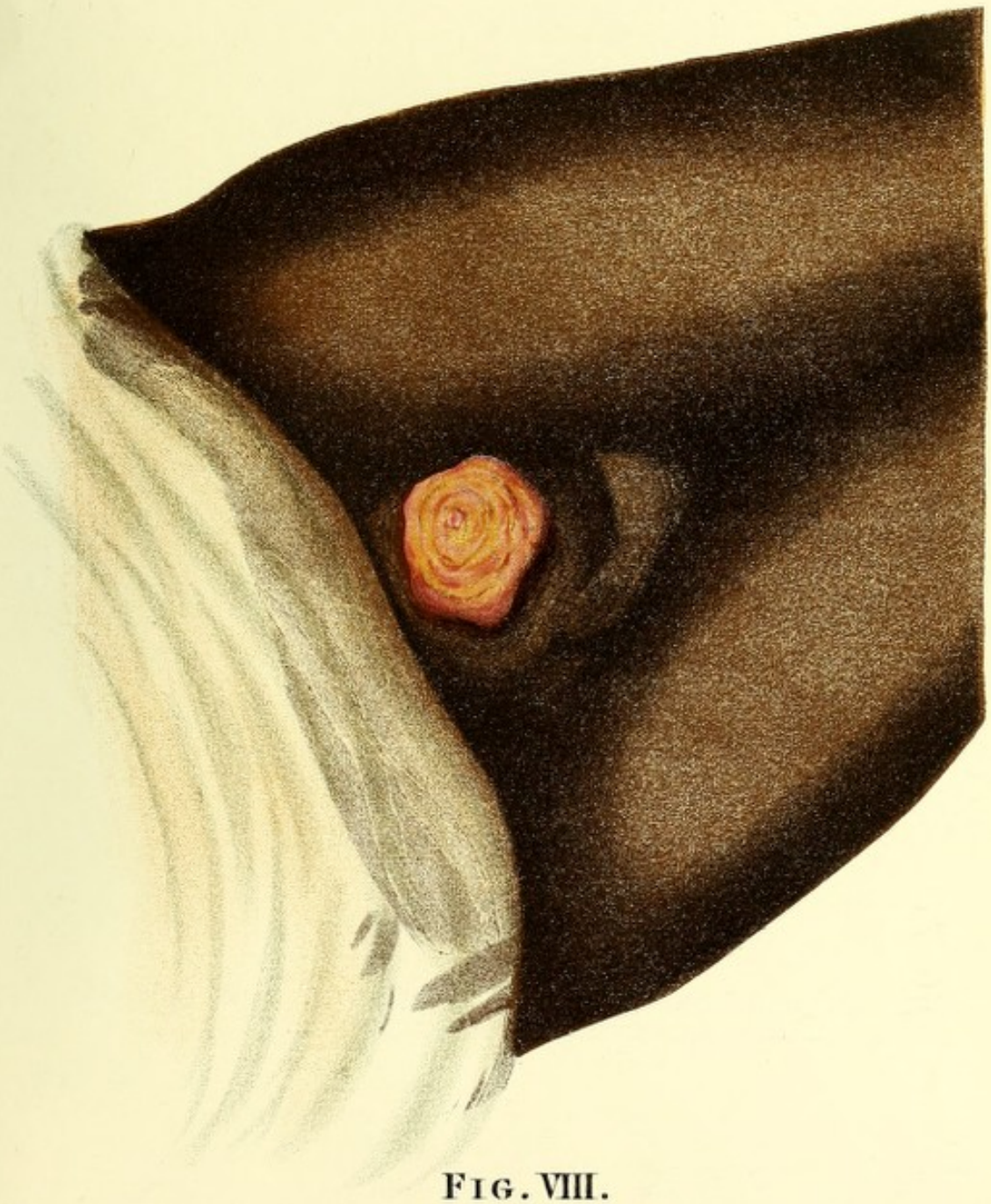


FIG. VIII.

Showing the appearance of a granuloma after the removal of the yellow crust.

Judd & Co Ltd Lith 49

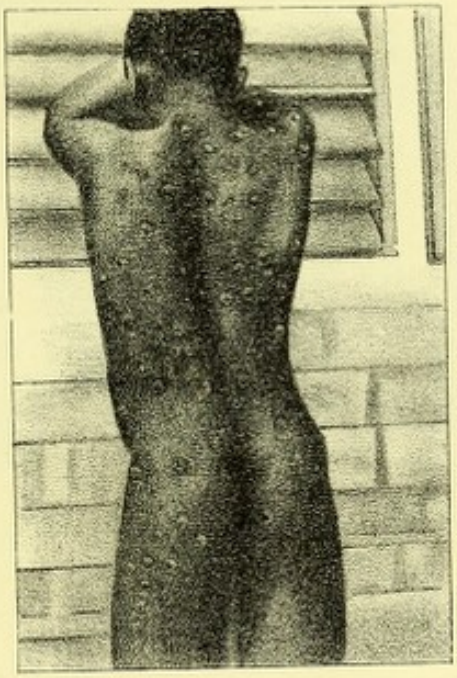


FIG. IX.

Showing the maculæ or squamous patches "Dartres".

Judd & Co. Ltd. Lit.

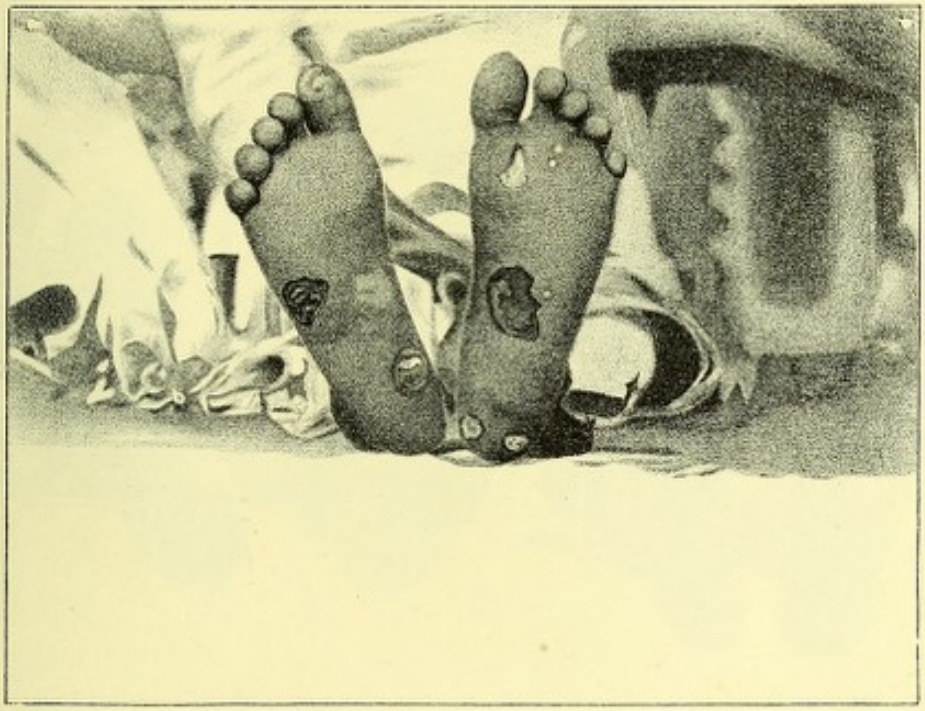
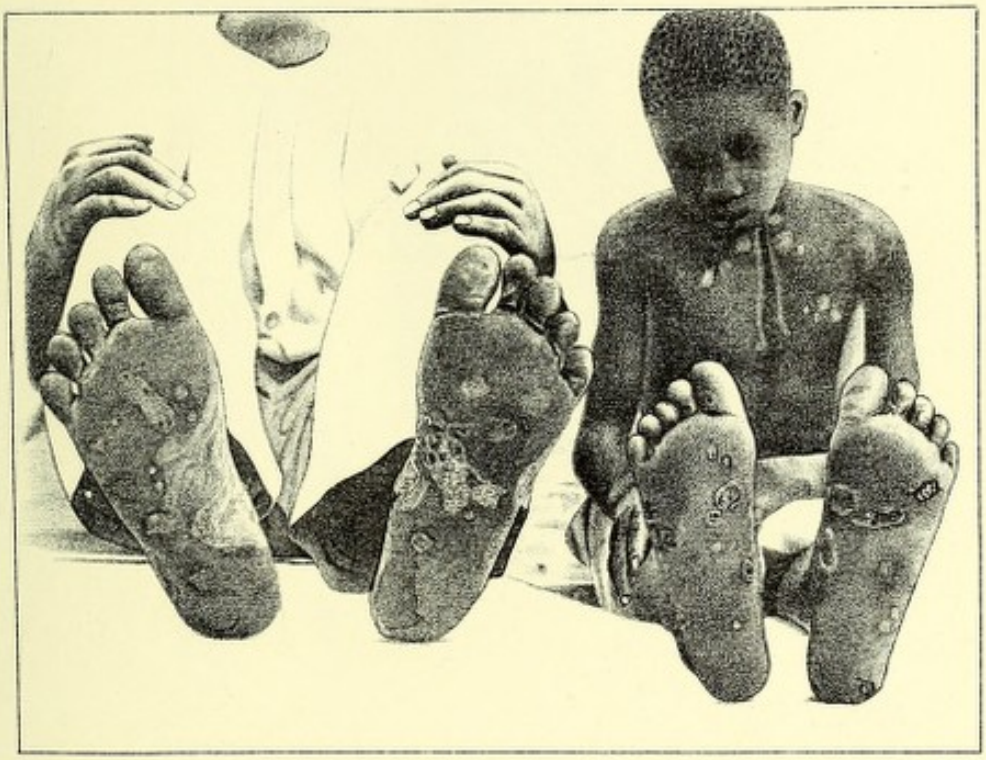


FIG. X.

Showing granulomata about the heels-"tubboes" and dermatitis-"crabs" at other portions of the sole.

Judd & Co. Ltd. Lith. 4414 3.33



A. B.

FIG. XI.

Showing, A. Dermatitis "Crabs", and B. Granulomata "tubboes", in the soles of the feet.

Note. *The linear marks over the sternum in Fig. B. were caused by accidental burning with carbolic acid.*

Judd & Co Ltd Lith 4414



FIG. XII.

Showing large encrusted granulomata about the head and neck.



FIG. XIII.

Showing the encrusted granulomata on the mucous membrane of the mouth.

Judd & Co Ltd

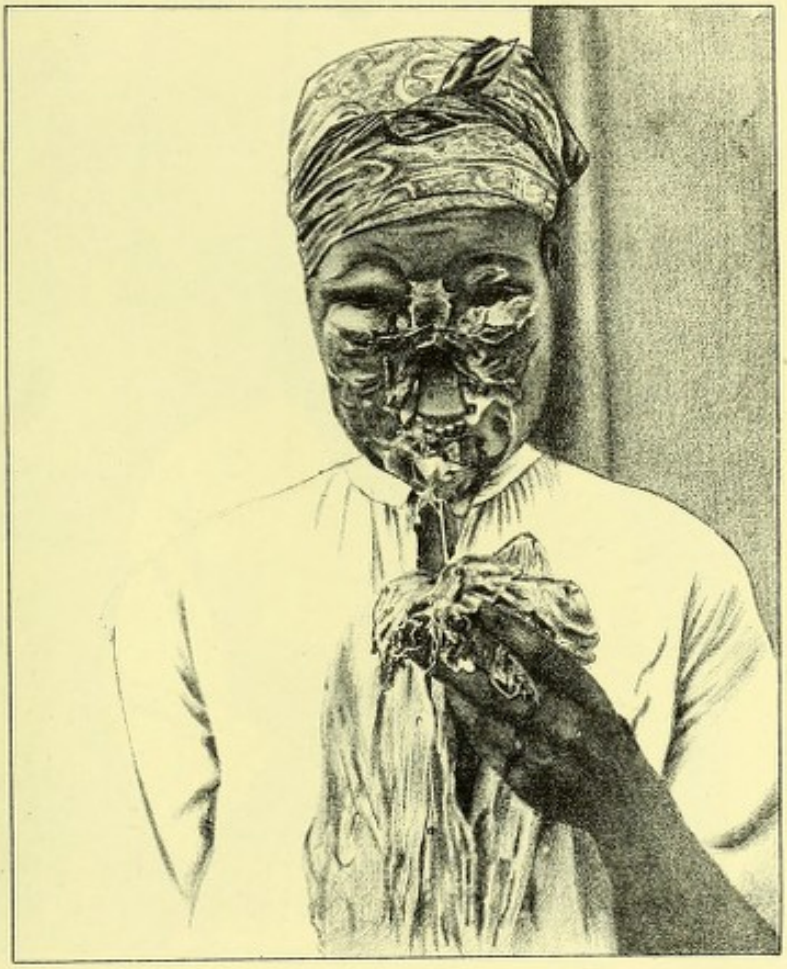


Fig. XIV.

Showing destructive ulceration of the face, nose and mouth due to tertiary syphilis that appeared during an attack of yaws.

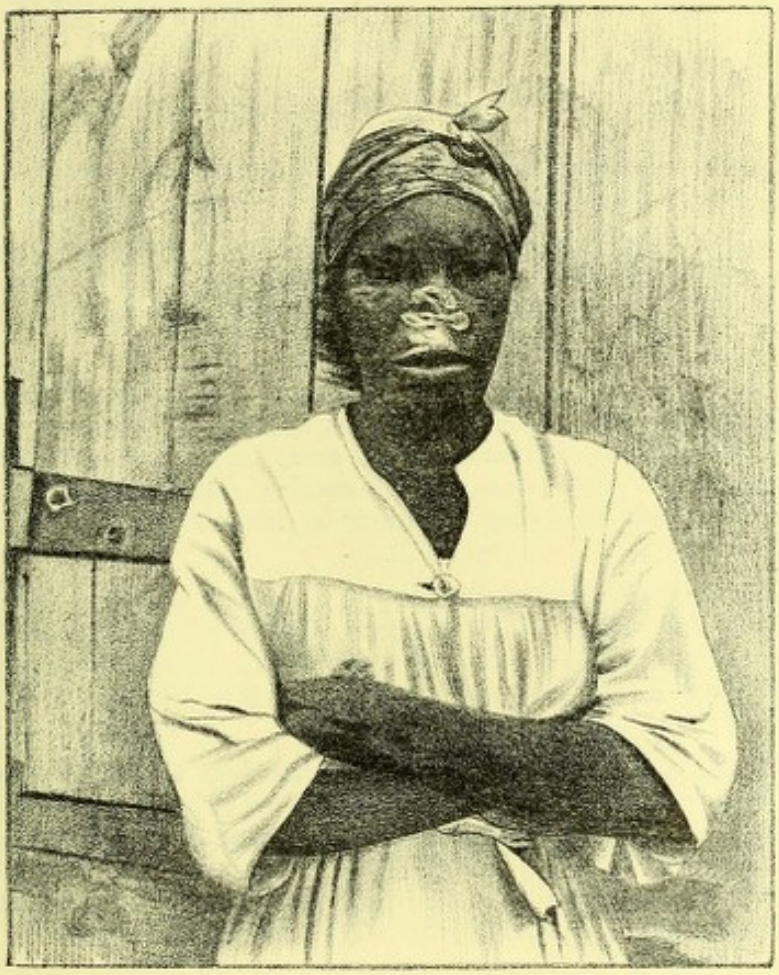


FIG. XV.

Showing lupus of the nose and face, which came on during an attack of yaws.

ILLUSTRATIONS

SHOWING THE

HISTOLOGY OF YAWS.

Prefatory Observations.

On the 24th August 1892, this Report was sent on to the Secretary of State for the Colonies, with a covering letter, in which the following paragraphs occurred:—

> "Accompanying the Report is a box containing 20 microscopic slides showing the minute anatomy of the local manifestations of yaws, for the illustration of that section of the Report dealing with the histology and pathology of the disease."
>
> "It will greatly increase the scientific value of the Report if the minute anatomy be illustrated by photographs or drawings of the microscopic specimens. It has been found impossible to get these drawings made in the West Indies; and, as there are artists who make a speciality of such work in London, it has occurred to me that the best plan is to send a series of the sections of the diseased tissues."
>
> "The slightly increased expense in publishing the Report that will be occasioned by illustrating the minute anatomy of the malady will be amply repaid by the augmented value of the document from a scientific point of view; for, as I have shown in the Report, the pathology of yaws is now practically unknown.
>
> "Should your Lordship authorise the further illustration of the Report in this way, it will be necessary to place the matter in the hands of an expert, in order that the references to the figures may correspond with the text of that section dealing with the histology and pathology. I would, therefore, beg to suggest that the medical department of the Local Government Board be asked to make the necessary arrangements for the satisfactory accomplishment of the work."

The Marquis of Ripon has been pleased to accede to my request, and to authorise the further illustration of the Report with coloured drawings of the microscopic specimens I sent to the Colonial Office.

A proof of the Report was forwarded for my revision from the Colonial Office to Dominica on the 9th May; and accompanying it were the original 15 coloured drawings done by Mr. M. H. Lapidge, with a memorandum from Sir George Buchanan informing me that my specimens had been "examined by accomplished microscopists in London, who instructed Mr. Lapidge about the fields to be reproduced, the magnifying powers, and the like," and asking me to arrange the drawings for the Report so as best to convey information, and to write the necessary descriptions.

I may, perhaps, be permitted here to make my acknowledgments to Sir George Buchanan for his kind help in this matter, and to express my satisfaction at the skilful way in which the histology of the disease has been depicted.

If Mr. Lapidge's coloured drawings be faithfully reproduced, the medical profession will be placed for the first time in possession of an immense amount of most important information concerning the real nature of a disease that has been always shrouded in obscurity, notwithstanding the fact that so much has been written on it since the middle of last century.

The drawings are not diagrammatic, but faithful pictures of the sections I selected from several hundred made with the expenditure of much time and trouble. Each figure, therefore, cannot be expected to show all the elements contained in the diseased tissues it was taken from, only a diagram drawn after the careful examination of a large series of sections could do that. But, notwithstanding this difficulty, it will be seen that the appearances described as characteristic of the local manifestations of the disease are brought out in most instances so clearly as to be easily recognisable.

All the tissues from which the sections were made were hardened in absolute alcohol; and, after the preparations had been carefully examined under different magnifying powers, they were arranged in series, stained in various ways and permanently mounted in Canada balsam.

It may be advisable to draw attention to the fact that the small nuclei in the multinuclear cells shown in Figures XXI. and XXVII. look very much like microbes that are being ingested; and such, indeed, was the opinion I formed when I first examined the sections after staining them by Gram's method and decolorising them carefully with absolute alcohol and clove oil. But, by staining them afterwards in picro-carmine solution, the violet colour was driven out, thereby showing the stain to be a nuclear one simply. Afterwards I was satisfied I had only nuclei to deal with by coming across the following statement in Flügge's work on micro-organisms: "In order to differentiate "better between nuclei and bacteria double staining is at times very suitable; we may "mention, for example, double staining with picro-carmine and gentian violet, which "depends on the fact that the carmine can drive out the violet from the nuclei, but not "from the bacilli."*

I have mentioned elsewhere in the Report that the only cells in which I have been certain that I have seen micrococci ingested are the protoplasmic cells of the lower layers of the horny epidermis of the affected skin. It may be that the phagocytosis occurs in the granulation tissue, but, so far, I have seen no example of it. The cells appear to me to merely cut off the affected parts from the other tissues so as to isolate them, and to neutralise by their juices the metabolic products of the microbes. The rapid multiplication of these barrier granulation cells is beautifully shown in Figures XXI. and XXVII., where the nuclei are seen to be dividing up by transverse fission, over and over again. By clinical observation it is seen that the granulomata increase rapidly from the minute papule to a tumour of ten times the size of a crown piece, and the rapid multiplication of the granulation cells, which form the bulk of the growths, is well shown in Mr. Lapidge's drawings.

Dominica, 12 June 1893. *H. A. Alford Nicholls.*

Description of the Figures.

Figure XVI.

Vertical section of a squama ("dartre"), stained with picro carmine and bismark brown. Magnified 26 diameters.

aa. Heaped up masses of necrosed epidermis and debris.

b. Necrosed epidermis flaking off.

cc. Sections of dilated and funnel-shaped hair follicles, the hairs being surrounded with inspissated secretion and debris.

dd. Enlarged papillæ.

e. Adipose tissue.

Figure XVII.

Vertical section of a squama. Stained by Gram's method. Magnified 50 diameters.

aa. Heaped masses of epidermis, the cells of the horny layer being loaded with micrococci which have retained the violet stain after decolorisation with absolute alcohol and iodine solution.

bb. Hairs and their follicles in section in the dermis, showing that micrococci have established themselves in the follicles.

---

* *Micro-organisms, with special reference to the etiology of the infectious diseases.* By Dr. C. Flügge. New Sydenham Society's Translation. London, 1890.

Figure XVIII.

Vertical section of a squama in the sole of the foot. Stained by Gram's method, and afterwards with picro-carmine solution. Magnified 26 diameters.

a. Greatly thickened horny layer of the epidermis.

b. A cuticular grain showing how it has been formed by involuted strata of the horny layer of the epidermis.

c. A pit from which a cuticular grain has escaped. The pit is partly worn away, and it is being flaked off.

d. Enlarged papillæ.

e. A portion of the dermis from which the papillæ have disappeared, probably from the pressure of the cuticular grain.

f. Papillæ reforming under the pit from which the cuticular grain has escaped.

Figure XIX.

Vertical section through the centre of a papula ("gratelle"). Stained by Gram's method, and afterwards with picro-carmine solution. Magnified 26 diameters.

a. Thickened horny layer of the epidermis flaking off.

b. Protoplasmic cells forming the deeper layer of the horny epidermis.

cc. Enlarged papillæ.

d. Greatly dilated hair follicle with the portion of a hair in the centre. The yellow substance surrounding the hair, and filling up the dilated follicle, is similar in structure to the crusts of the granulomata. Under high powers the follicle is seen to contain masses of micrococci that have retained the gentian violet stain. The follicle has been extruded from the dermis by the granulation tissue which has formed a wide barrier between it and the surrounding tissues.

ee. Granulation tissue.

Figure XX.

Vertical section through the margin of a papula. Stained by Gram's method, and afterwards with picro-carmine solution. Magnified 26 diameters.

a. Horny layer of the epidermis flaking off.

bb. Protoplasmic cells forming the deeper layer of the epidermis.

cc. Enlarged papillæ.

d. A hair and its follicle in section.

eee. Granulation tissue in the dermis.

Figure XXI.

Section showing the granulation tissue of a papula. Stained by Gram's method. Magnified about 750 diameters.

aa. Cells containing one large nucleus.

b. A cell with two nuclei dividing.

c. A cell with three nuclei, the largest one dividing.

dd. Multinuclear cells.

e. Pigment cells, and melanine granules that have escaped from the cells.

Figure XXII.

An entire section of a small granuloma ("tubercle") During the hardening of the specimen in the alcohol, in addition to the usual contraction, there has been a curling inwards of the margins where the skin is unaffected. Stained by Gram's method, and afterwards by picro-carmine solution.

A. Natural size of the specimen.

B. Magnified 10 diameters.

a. Unaffected skin at the margin, showing the natural size of the papillæ.

bb. Papillæ gradually enlarging from the circumference to the centre of the granuloma, when they attain their greatest development.

c. The termination of the proliferated epidermal tissues and the beginning of the crust which replaces them over the tumour.

d. Large masses of the micrococci that have retained the violet stain after decolorising the specimen.

e. Granulation tissue that has invaded and caused enormous enlargement of the papillæ.

f. Sections of hairs showing unaltered pigmentation.

g. A blood stain in the crust.

Figure XXIII.

Transverse section through one of the smaller papillæ of a granuloma. Magnified 230 diameters.

a. Granulation tissue of the papilla.

b. Interpapillary of the rete Malpighii infiltrated with numerous melanine granules that have escaped from the pigment cells.

Figure XXIV.

Oblique section of a portion of a granuloma. Stained by Gram's method. Magnified 300 diameters.

a. A portion of the crust that has replaced the interpapillary process of the epidermis.

b. Granulation tissue of the papilla.

ccc. Colonies of micrococci.

dd. Melanine granules.

ee. Arteries in sections.

Figure XXV.

Secretion of a granuloma after forcibly removing the crust. The secretion was taken from a patient in the Yaws Hospital in Dominica. The cover glass preparation was stained with fuchsin and methyl blue (Gibbes'). Magnified 300 diameters.

aa. Micrococci.

b. A pus cell.

c. Granulation cells.

Figure XXVI.

Vertical section of a healing granuloma. Stained by Gram's method. Magnified 26 diameters.

a. The thinned crust lying directly in contact with the upper part of the papillæ, and darkened by masses of micrococci that have taken up the violet stain.

b. Papillæ in contact with each other by reason of the removal of the inter-papillary portion of the crust.

c. Pigment cells and melanine granules darkening the dermis.

d. Granulation tissue at the upper part of the dermis.

Figure XXVII.

Section showing a small collection of granulation cells from the dermis of the object illustrated in Fig. XXVI. Magnified about 750 diameters.

aa. Multinuclear cells.

bb. Homogeneous wavy fibres of the dermis.

Figure XXVIII.

Vertical section of a healing granuloma. Stained by Gram's method, and afterwards with picro-carmine solution. Magnified 26 diameters.

a. A portion of the thinned crust.

b. The epidermis reforming over the papillæ.

cc. Granulation tissue.

d. A hair and its follicle in longitudinal section, showing that they have escaped destruction.

ee. Connective tissue of the dermis free from granulation tissue.

Note.—No micrococci were found in this section.

Figure XXIX.

Vertical section of a macula. Stained with fuchsin and methyl blue (Gibbes'). Magnified 100 diameters.

a. Horny layer of the epidermis.

b. Deeply pigmented Malpighian layer of the epidermis.

c. Portions of the dermis devoid of papillæ, and infiltrated with pigment cells.

d. Collections of round and fusiform connective tissue cells (fibroblasts).

e. Two papillæ.

Figure XXX.

Vertical section of a fading macula, stained by Gram's method, and afterwards with picro-carmine. Magnified 100 diameters.

a. The horny layer of the epidermis disquamating and entirely free from microbes, no portion of it having retained the violet stain.

b. The rete Malpighii less deeply pigmented than in the section shown in Figure XXIX.

c. The dermis from which the papillæ have disappeared by the removal of the granulation tissue, of which they were mainly composed.

d. A flat-topped papilla.

ee. The dermis from which all trace of granulation tissue has disappeared.

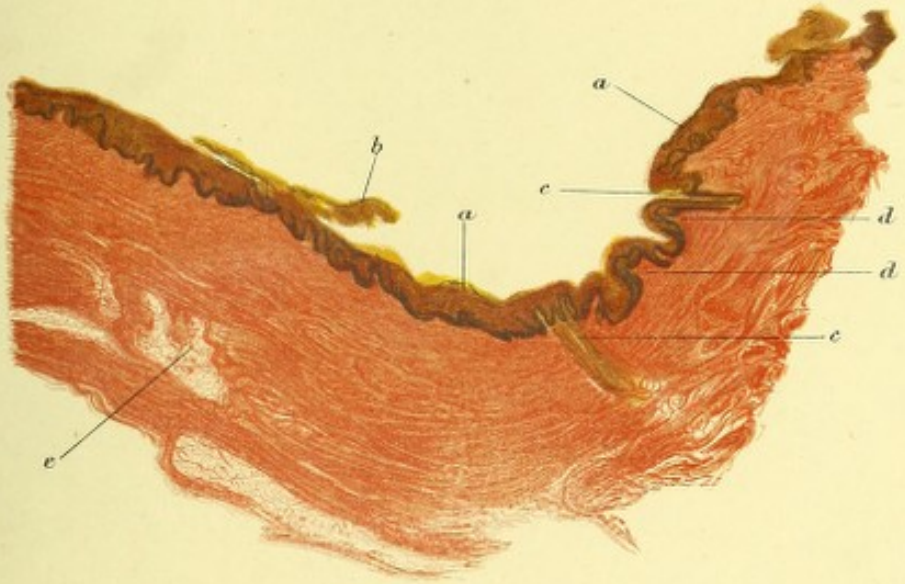


FIG. XVI.

Vertical section of a squama, magnified 26 diameters.

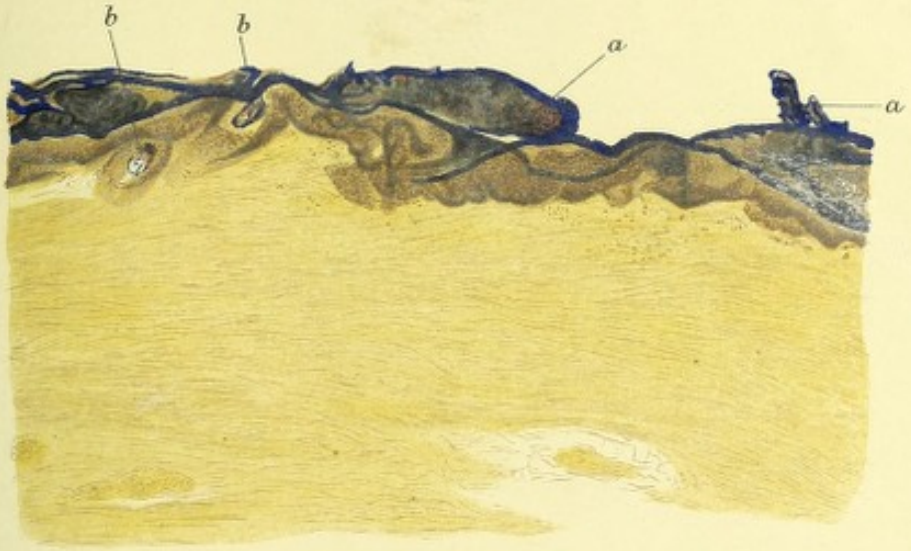


FIG. XVII.

Vertical Section of a squama,
magnified 50 diameters.

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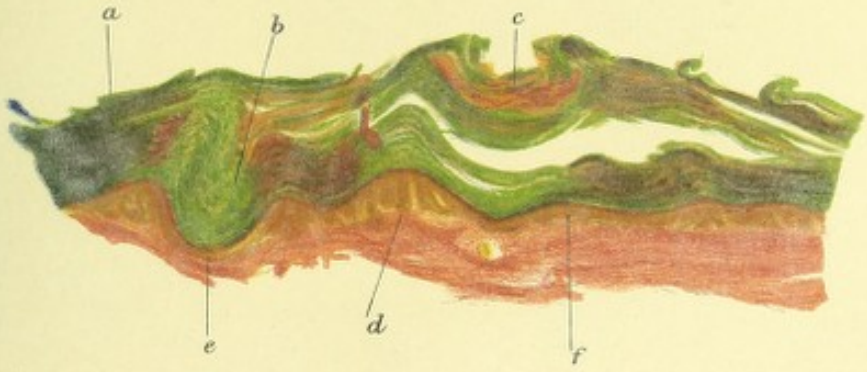


FIG. XVIII.

Vertical Section of a squama in the solé of the foot, magnified 26 diameters.

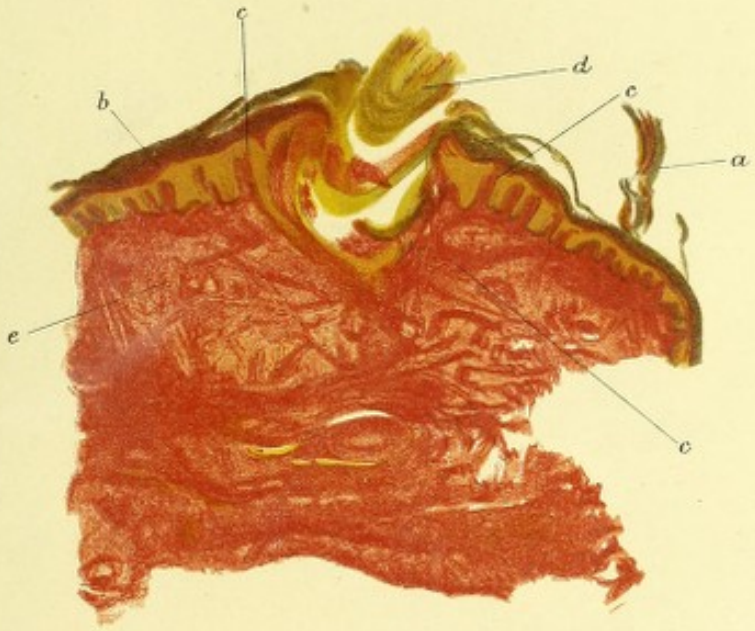


FIG. XIX.

Vertical Section through the centre of a papula, magnified 26 diameters.

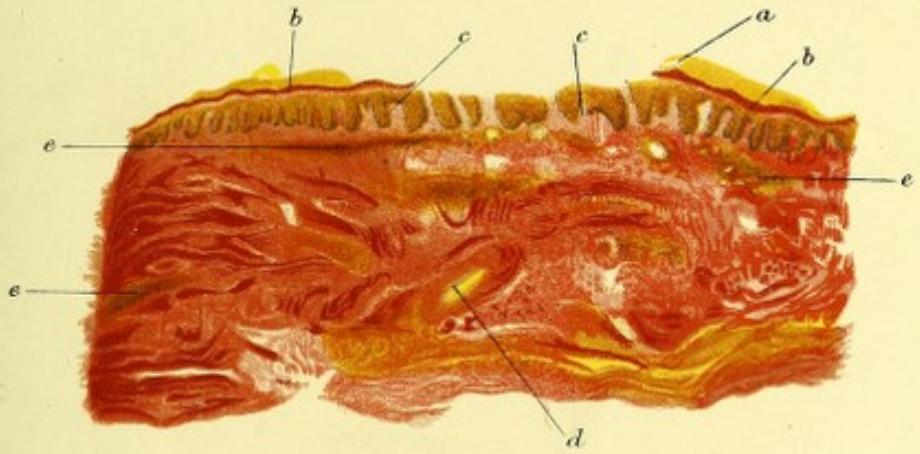


FIG. XX.

Vertical section through the margin of a papula, magnified 26 diameters.

Rapidge

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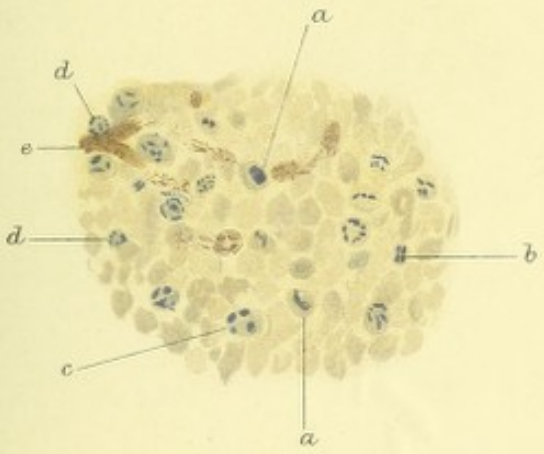


FIG. XXI.

Section showing the granulation tissue of a papula, magnified about 750 diameters.

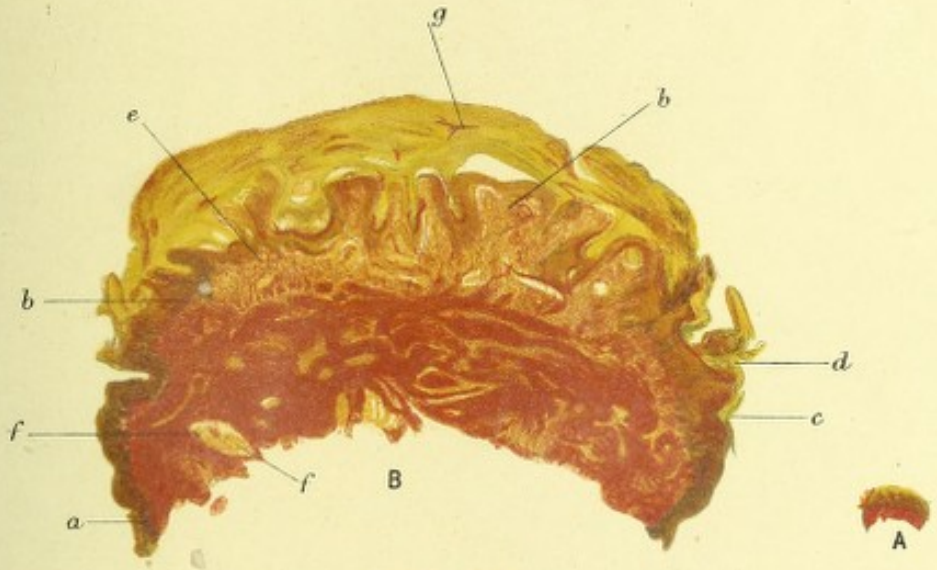


FIG. XXII.

An entire section of a small granuloma,
A. *Natural size.* B. *Magnified 10 diameters.*

Lapidge.

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FIG. XXIII.

Transverse section through one of the smaller papillæ of a granuloma, magnified 230 diameters.

dge.

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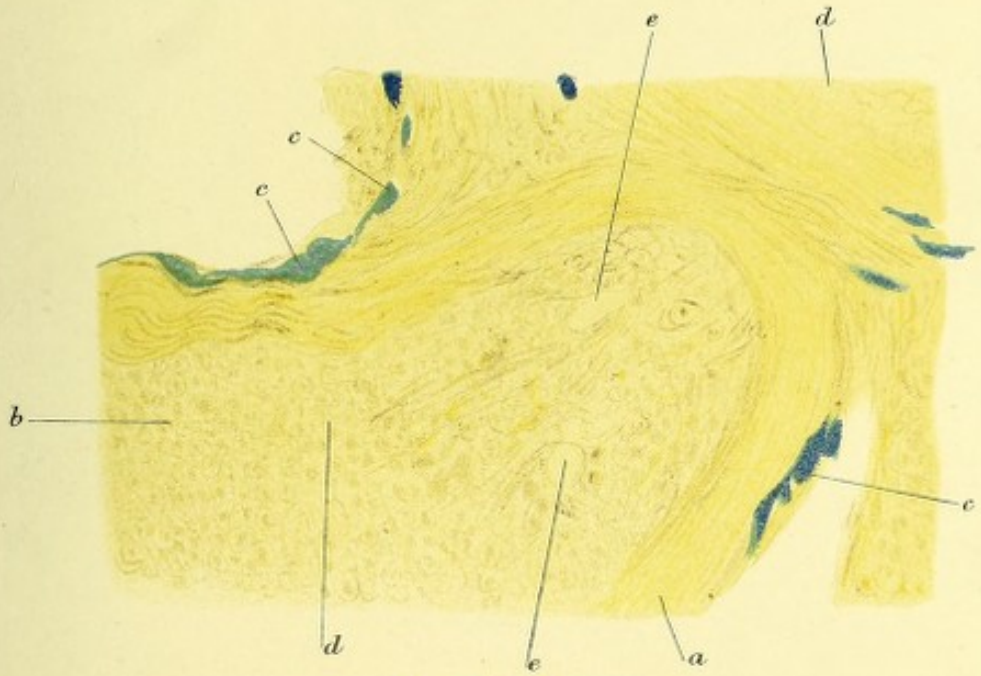


FIG. XXIV.

Oblique section of a portion of a granuloma, magnified 300 diameters.

M.H Lapraye

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FIG. XXV.

Secretion of a granuloma after forcibly removing the crust, magnified 300 diameters.

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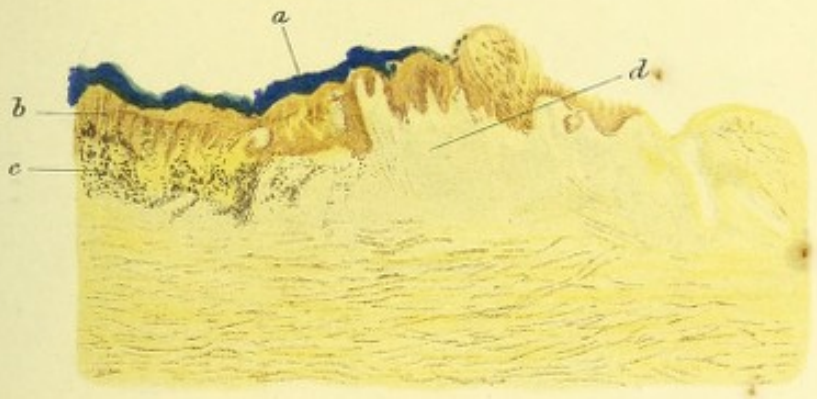


FIG. XXVI.

Vertical section of a healing granuloma, magnified 26 diameters.

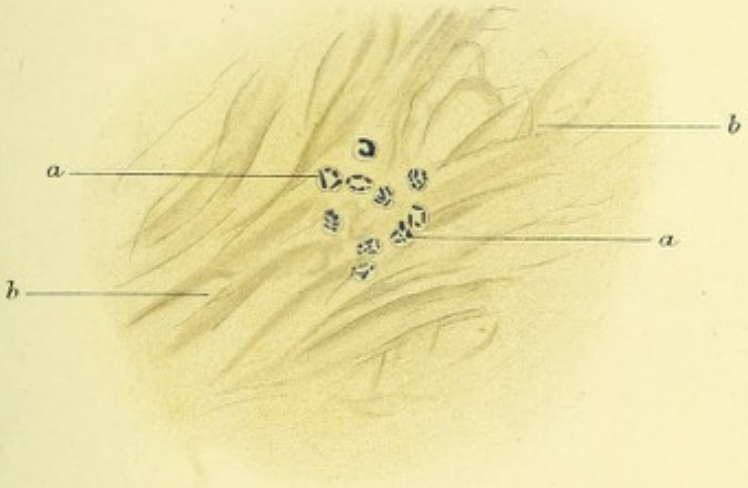


Fig. XXVII.

Section showing a small collection of granulation cells from the dermis of the object illustrated in Fig. XXVI, magnified about 750 diameters.

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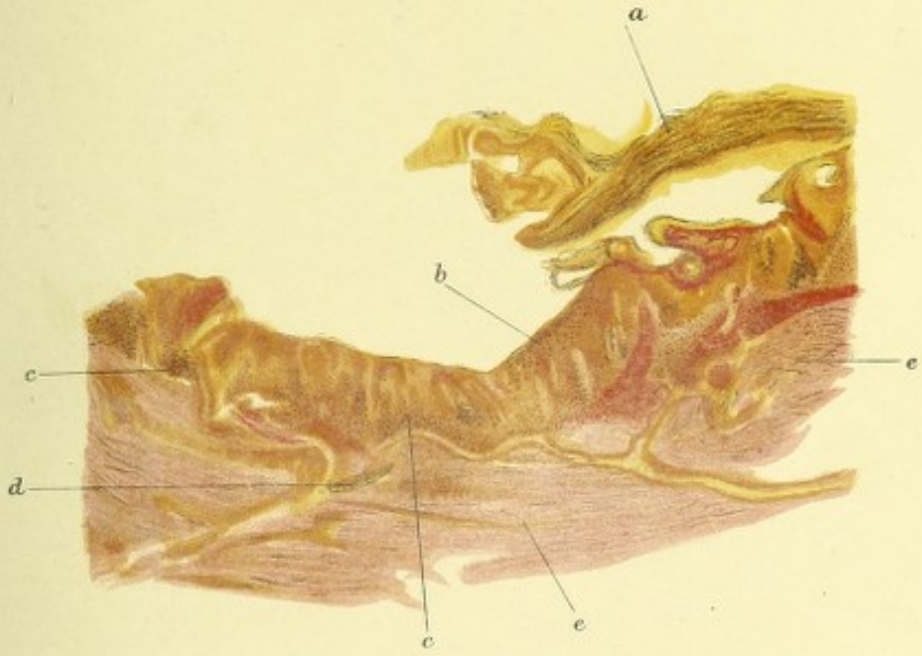


FIG. XXVIII.

Vertical Section of a healing granuloma, magnified 26 diameters.

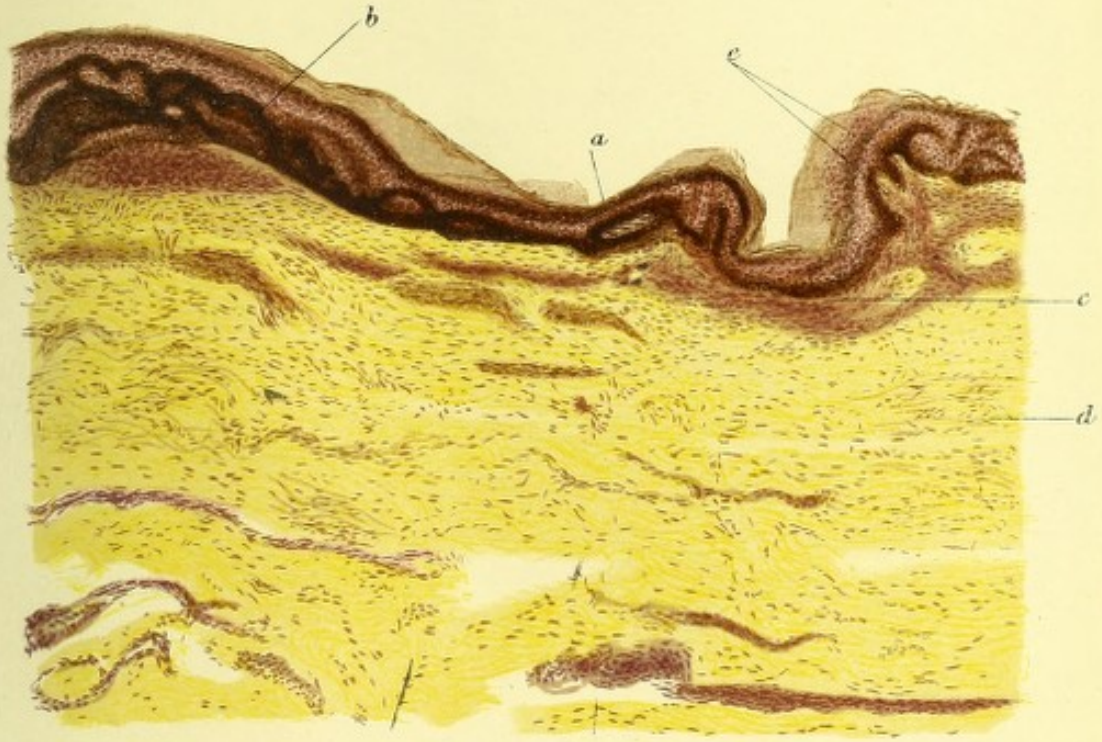


FIG. XXIX.

Vertical section of a macula, magnified 100 diameters.



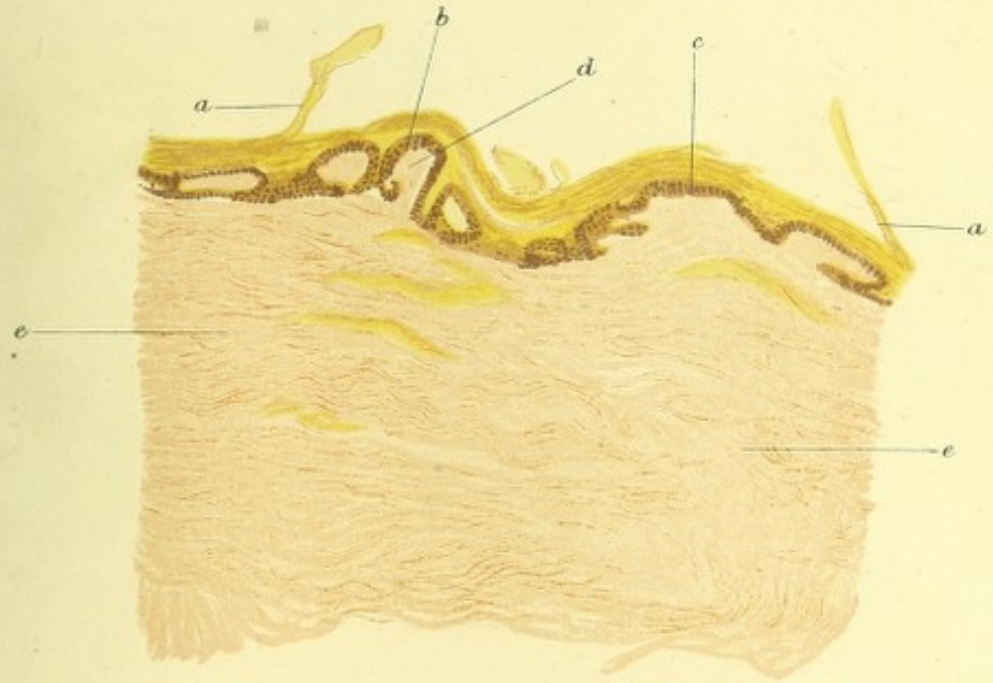


FIG. XXX.

Vertical section of a fading macula, magnified 100 diameters.

APPENDIX.

(A.)

REPORT on some Experiments conducted with a view of determining the nature of Yaws, by *H. A. Alford Nicholls*, M.D., F.L.S. and *Francis Watts*, F.I.C., Assoc. Mason Coll., Government Chemist of Antigua.

The investigation was conducted by us jointly in Antigua from the 21st August to the 21st September, 1891, when Dr. Nicholls left for Montserrat, St. Kitts and Nevis. During his absence Mr. Watts made some experiments with cultures of the microbe that had been isolated from the yaws secretion, and Dr. Nicholls performed some further culture and inoculation experiments in St. Kitts and Montserrat. On his return to Antigua, on the 2nd December, certain points bearing on the pathology of the disease were investigated at the laboratory, and he left for Dominica on the 17th December and continued the work there.

Through the kind help of Dr. Mackie, of Antigua, three persons affected with yaws consented to attend at the laboratory in St. John's, on the 21st August, and to supply the material for the investigation. They were David Bowers, aged 40; his wife Rosannah Bowers, aged 30; and one of their children, David Bowers, jun., aged five. They had all been suffering from yaws for many months, and they had the encrusted "tubercles" or granulomata characteristic of the disease on various parts of their bodies and limbs.

I. The crusts were removed from several granulomata on the arms of David Bowers, and placed in alcohol for subsequent examination.

II. Cover-glass impressions were made so as to ascertain whether there were any microbes in the secretion of the granulomata.

III. Drops of blood were taken from Dr. Nicholls' finger, inoculated with the secretion of a granuloma on the neck of David Bowers, and the drop slides were set on one side for cultivation.

IV. Two each of the four following nutrient media contained in the ordinary tubes were inoculated in the usual way with the secretion from a granuloma on the shoulder of David Bowers.

A. Liquid blood serum.
B. Solid blood serum.
C. Solid egg albumen.
D. Nutrient gelatine (Crookshank's formula).

Two each of the three following nutrient media were inoculated with blood from the finger of Rosannah Bowers:—

A. Solid blood serum.
B. Liquid blood serum.
C. Nutrient gelatine.

Control tubes of the various media were set on one side, and in every instance they remained sterile.

V. A rabbit was inoculated with the secretion from a granuloma on the abdomen of David Bowers.

VI. A fowl was inoculated from a granuloma on the neck of Rosannah Bowers.

VII. A fowl was inoculated from a granuloma on the lip of David Bowers, jun.

The inoculations in the animals were performed in the following manner:—The skin on the inner side of the thigh was pinched up with sterilised forceps, a slight incision made with a sterilised scalpel, and the secretion placed in the pocket by means of a sterilised platinum öse.

On the 2nd September David Bowers permitted the excision of a granuloma from his arm, and a kitten was inoculated from the secretion obtained from another tumour on the arm.

The cover-glass impressions were stained with methyl violet; and on examination the secretion was found to contain a few large cells with two or more large nuclei, which were probably pus cells. There were also many round and oval smaller cells, all of which were nucleated, and several contained two or three nuclei. Micrococci 1 u. in diameter were abundant as were also diplococci. The micrococci appeared to be encapsuled in some material that did not take up the stain.

Four blood drop-cultures were kept in the water-oven during the day at a temperature of 36° C. In the afternoon the temperature was raised to 38° C., and left to fall to the ordinary temperature of the laboratory during the night. There was no incubator then in Antigua, and the method adopted was the only possible one, but we discovered later on that the ordinary temperature in the tropics was high enough for the purpose of the experiments. Two of the droplets showed

no sign of a microbe; but, in the other two, micrococci similar to those found in the yaws secretion grew abundantly in the serum. The following brief notes show the results of these cultivations:—

22 August,	10.30 a.m.	Nothing very definite.
23 „	9.30 „	Cocci abundant in the serum.
24 „	9.30 „	Cocci very abundant.
25 „	10 „	As before.
15 September,	1.30 p.m.	Cocci singly and in pairs abundant in serum. Slides washed off to-day.

The Tables attached to this Report show briefly the results of the cultivation of the microbe in the four nutrient media selected.

In the case of the six tubes inoculated with blood from the finger of Rosannah Bowers, no definite result was obtained. But in one of the nutrient gelatine tubes there was a growth of bacillus subtilis, which doubtless was due to contamination during inoculation. It will be observed, too, that the inoculations of solid blood serum and nutrient gelatine with blood from the heart of the patient that died in the Yaws Hospital, at Dominica, did not result in any growth, and thus these two series of experiments tend to show that the blood is free from any virus in the disease.

The tables show that in every instance in which media were inoculated with the secretion from the granulomata a definite growth was obtained. On the solid media this growth appeared in rounded or oval patches along the wire track. It caused some erosion of the track with a slight amount of liquefaction, so that the furrow was moist, deepened, and irregularly eaten away as in an ulcerated surface of the skin. The growths usually appeared on the solid media as small, moist-looking, whitish globules in appearance not unlike a drop of mucus. Mr. Boon, of St. Kitts, likened the cultivations started in that island to small melted drops of a sperm candle. In some of the first cultivations orange, or salmon-coloured growths, of a similar form to the white ones, appeared in places, and at times they started on the summits of the white growths. At first we thought we had two organisms to deal with, but subsequent experiments and microscopic examinations, tended to show that the yellow and white growths were apparently identical except in colour.

On more than one occasion it was observed that the white growth changed to a salmon colour. And in the case of No. 1 tube, in which a white growth appeared on the solid blood serum, a salmon-coloured growth was produced in the second generation (Tubes 15 and 16), and was continued to the third generation.

In the fluid or semi-fluid media the growth usually occurred as a whitish opalescent material uniformly diffused. At times this growth was also on the surface, and sank as a cloud on slight agitation of the tube. In one instance, No. 16 in the table, a bright yellow growth appeared on the surface some time after the white cloudy one had become diffused through the fluid; and in most cases in which the yellow growth was developed, it was after the white one was approaching its maximum development.

The following transcript from our notes gives particulars concerning the development of the growths:—

Tube 1.—21 August, 1891. 11 a.m.—Solid blood serum inoculated with secretion from tubercle of David Bowers. Placed in water-oven in the afternoon; temperature 38° C. downwards.

22 August. 10 a.m.—Growth along wire track in white oval mucoid masses which are not continuous. Tubes left in water-oven at 38° C.

23 August. 9 a.m.—Larger growth. The masses appear semi-fluid and to have run down the sloping surface of the medium.

24 August. 9.30 a.m.—Growth has a fluid tendency; a considerable quantity in the moisture at the bottom of the tube.

12.30 p.m.—Tubes with nutrient gelatine (Tube 16) and solid egg albumen (Tube 15) were inoculated with the growth. A red fowl was also inoculated, and cover-glass preparations were stained with methyl blue. Growth: a micrococcus very well defined 1 μ. in diameter, which occurs singly and in twos (diplococci).

Tubes 3 *and* 4.—21 August.—Liquid blood serum, inoculated in a similar manner to No. 1 tube, and placed in the water-oven in the afternoons at a temperature of 38° C. downwards.

22 August.—No change.

23 „ 9 a.m.—Slight appearance of white growth at the bottom of the tubes.

24 „ 9.30 a.m.—Growth now in distinct spots at the bottom of the tube, not uniformly diffused.

25 „ Growth continuous as before.

5 September.—Slight non-coherent whitish growth on the surface of No. 3 tube; the growth sinks as a cloud on slight agitation, and it appears of a yellowish colour on being shaken.

7 September.—The growth beginning on the surface of No. 4 tube.

10 „ Similar appearances, but growth increased.

11 „ Cover-glass specimens made and stained with methyl blue. On microscopic examination there were seen cocci, diplococci, triads, and tetrads, presenting precisely the same appearances as those found in the secretion of the yaws granulomata. In the case of the triads the three cocci were not arranged in a pyramid, but in a rectangular manner, as though a coccus of a tetrad had fallen away.

Tubes of solid blood serum and solid egg albumen were inoculated, and an attempt was made to infect a fowl and a monkey with the microbe.

Tubes 5 *and* 6.—21 August.—Solid egg albumen inoculated in a similar manner to No. 1 tube.

22 August. 10 a.m.—Furrow along wire track, well marked; in one tube about 0.5 mm, in the

other 1·0 mm. wide. The erosion of the wire track gives the appearance of an ulcerated surface, the edges are slightly raised. The growth is colourless and moist-looking.

23 August. 9 a.m.—Growth the same in character, but somewhat extended.

24 „ 9.30 a.m.—No change.

25 „ Growth continues.

26 „ The growth along the wire tracks has extended downwards into the media, forming deep furrows. Attempted to inoculate monkey by rubbing a small quantity of the growth with a sterilised öse from one tube into a small abrasion made on the inner side of the animal's left thigh.

Made cover-glass specimens from the opened tube, which was immediately closed.

An examination of the cover-glass preparations, which were stained with methyl blue, showed micrococci from 0·5 to 1μ. in diameter. Some are free, but most are collected together in small colonies.

5 September.—The cultivation in the tube that was opened is apparently still pure. On the unopened tube there are two small circular patches of a pale pink colour.

10 September.—The growths in both tubes are now of a pale orange colour; at the bottom of the lowest patches there is a whitish mucus-looking growth. Both media have still moist-looking eroded channels in the wire track. Cover-glass preparations made as before showed micrococci.

Tube 15.—24 August.—Solid egg albumen inoculated from growth in Tube 1, and kept at the ordinary temperature.

25 August.—Growth as in Tubes 5 and 6.

10 September.—A white mucoid growth along the wire track in interrupted oval patches. Some of the patches are covered in places with an orange-coloured growth. Cover-glass specimens, stained with methyl blue, showed micrococci and diplococci, but they were not abundant.

Tube 18.—Second cultivation on solid blood serum from growth in liquid blood serum. Ordinary temperature.

11 September.—Tube inoculated.

12 „ Slight growth along needle track.

13 „ Distinct growth in small round spots, which are colourless and quite transparent.

14 „ Growth appears like drops of mucus, precisely as that in Tube 1, inoculated from patient.

15 „ Growth increasing.

19 „ Four tubes inoculated from growth, viz., two with nutrient gelatine (Tubes 22 and 23 in table), one with solid egg albumen (Tube 20), and one with liquid blood serum (Tube 21); and, in each instance, pure growths of the micrococcus were obtained.

Tube 35.—This was one of the St. Kitts series. Solid blood serum was inoculated with the secretion from a granuloma on the perineum of Abram Sendall, a negro, 54 years of age. Dr. Mapleton kindly permitted the experiments to be performed at his consulting room, and this and the other tubes were kept at the ordinary temperature, which varied from 73° F. to 90° F. (23°C. to 32° C. *circa*).

7 November.—Medium inoculated.

9 „ A white mucoid growth in rounded patches along the wire track.

11 „ A salmon-coloured growth has appeared, and it is in excess of the white one.

13 „ Growth increased.

16 „ The upper whitish growth is turning to a yellowish or salmon colour.

18 „ Growths increased in size; there are patches of salmon colour on the lower growths.

The following table shows numerically the results of the cultivations in the 26 tubes of nutrient media.

Media.	No. of Tubes.	White Growth.	White and Salmon-coloured Growth.	Salmon-coloured Growth.
First Generation.				
Solid blood serum	6	2	4	—
Solid egg albumen	3	—	3	—
Nutrient gelatine	3	3	—	—
Liquid blood serum	2	2	—	—
Second Generation.				
Solid blood serum	1	1	—	—
Solid egg albumen	2	—	1	1
Nutrient gelatine	1	—	1	—
Third Generation.				
Solid blood serum	1	1	—	—
Solid egg albumen	1	—	1	—
Nutrient gelatine	5	4	1	—
Liquid blood serum	1	1	—	—
Totals	26	14	11	1

This Table indicates that in 14, or 53·8 *per centum*, the growth was whitish in colour, and that in 11, or 42·3 *per centum*, it was white and salmon-coloured. In one case only the growth appeared salmon-coloured from the first, but it was not watched so carefully as the others, and it is possible that the initial white mucoid appearance was overlooked.

The chromogenic property of the growth appeared to be more marked in cultivations on solid media as will be seen from the following table:—

Media.	No. of Tubes.	White Growth only.	White and Salmon-coloured Growth.	Salmon-coloured Growth.
Solid blood serum	8	4	4	—
Solid egg albumen	6	—	5	1
Nutrient gelatine	9	7	2	—
Liquid blood serum	3	3	—	—
Totals	26	14	11	1

Of the 26 tubes, 14 contained solid media; and, in only four of them was the growth white throughout. In the tropics, with its high temperature, nutrient gelatine remains in a semi-fluid condition, and seven out of the nine tubes with this medium developed the white growth after inoculation, as did all the liquid blood serum tubes. This fact is noteworthy; but, without further investigation, we do not feel ourselves warranted in suggesting any satisfactory explanation of it.

As regards the colour of the growth, the white mucoid appearance of the patches on the solid media is sufficiently expressive, but there may be some difference of opinion as to the yellowish colour that was observed for the most part in the older cultivations. It may be described as yellowish, or orange, but in some instances there was a decided admixture of pink which led us to adopt the terms salmon-coloured as more accurately descriptive of the tint. It is proper to note that in Tube 6, two small patches of pink appeared when the growth was developing an orange colour.

Altogether we performed 14 inoculations in various animals. Eight were from the secretion of the granulomata of yaws patients, and six were from the cultivations. All the results may be said to have been of a negative character; although as will be seen from the table, slight irritation and reaction were set up in several instances. Considering the fact that many animals are immune to undoubted pathogenic micro-organisms, the practically negative results of our animal inoculations cannot be said to be conclusive one way or the other. With the small amount of time at our disposal for this special investigation, with the unusual difficulties attending our work in a chemical laboratory unadapted for bacteriological study, and with the obstacles Dr. Nicholls had to contend with in carrying on scientific research during the course of his mission, it could not be expected that all the various precautions necessary in experiments in living tissues could be observed.

In 1820, Thomson conducted some experiments with a view of determining whether animals were susceptible to the virus; and the following extract from his work on the diseases of negroes in Jamaica tends to show that the domestic animals are immune:—

"Several years ago, in order to satisfy myself of the correctness of Bajon's assertion, I made it "the subject of experiment on various animals, and the result in every instance has clearly proved "that no such communication is possible.

"Matter from a yawsy sore was ordered to be rubbed on a raw sore in a young speyed heifer; "the animal was prevented from licking it; the wound healed in the usual rapid manner; at the "same time slight wounds were made in the nostrils, and the virus inserted, with the same nugatory "results. Various attempts, which it is needless to particularise here, were made to introduce the "poison into the bodies of dogs, rabbits and Guinea pigs, without any success. Pigeons and "domestic fowls were also made the objects of trial. Fowls, as well as pigeons, are liable to large "swellings about the eyes and beak, which prevent the bird from feeding, thereby proving fatal; "negroes call it the yaws. I have examined several that died from the disorder, and found it was "nothing else but *chigoes* which caused it, from their not being extracted in proper time. Cattle "are subject to an eruptive complaint, which is termed yaws; but it may be remarked that negroes "give this appellation to every suspicious eruptive appearance either on themselves or the brute "creation."

In 1878, slight sores were produced on two young cats, and they were allowed to go freely amongst the patients in the Central Yaws Hospital in Dominica. After a time an eruption broke out on them that was in appearance like unto yaws in human beings; the cats died, and their bodies were got rid of before Dr. Nicholls could examine them. Unfortunately, he has lost his notes that he made at the time, and so certain observations that were then recorded are not now available.

Dr. Pierez, of Antigua, informed us that he had produced the disease in cats by rubbing paste made from yaws crusts into an abrasion of the skin. He was good enough to inoculate a cat for us, but the inoculation failed.

Whilst at Nevis, Dr. Nicholls inoculated two kittens at the yaws hospital there by inserting a fragment of crust under the skin of the ears. The animals were left in charge of Mr. C. R. Edwards, the medical officer, who reported that the wounds healed up without anything calling for remark. Afterwards, however, he was good enough to inoculate a cat by inserting a fragment of the granuloma under the skin, and in this instance it would appear that either yaws or something nearly

akin to it was produced. The following extract from his letter of the 7th March on the subject to Dr. Nicholls is of peculiar interest :—"The kittens, one of them, broke out all over, but chiefly on "the paws, with an eruption of small tubercles (very small) which appeared to me to be yaws, but were "not sufficiently characteristic for me to swear by. I brought it home, intending to send it up to "you, and would you believe that some one has stolen it. I have searched and looked in vain all "over the neighbourhood for it. The people here will steal a kitten in preference to anything else, "and those who do it are the country folk who come to town to sell or buy. They are always "anxious to exchange fowls for kittens, and will never lose an opportunity of stealing one. . . . "The number of days from the insertion of tubercle in the ear to the eruption was 51."

It is very much to be regretted that this kitten was lost, as an examination of the eruption would have determined the question as to whether it was yaws or not. It may be, in the case of the other animals inoculated, that the dose of the virus was too small, for animals that are immune to small doses of pathogenic poisons and to attenuated virus may be infected by larger quantities. Thus, in the case of the micrococcus of bouton de Biskra, Duclaux injected 20 drops of the culture of the microbe, and in our experiments we simply rubbed in a minute portion of the secretion of the granulomata, or of the cultures, with a sterilised platinum öse. That such small quantities of the virus inoculated into human beings is followed by the modified disease is proved by Dr. Nicholls' inoculations performed some years ago, and the failure to infect animals in the same way is proof of the fact that they are more or less immune. Future investigation, however, may determine that they are not refractory to large doses of the virus, or to small doses repeatedly administered.

The crusts that were removed from the granulomata of David Bowers, after being hardened in alcohol, were embedded, and a number of sections were made with a microtome.

Some of the sections were stained by Gram's method, and a few of these were afterwards stained with a picro-carmine solution in addition. Their structure may be described as follows :—

The material of which the crust is formed appears to be of an amorphous nature ; but, in places, and more especially at the lower portion where it is in contact with the granuloma, it is somewhat granular. Here and there a stratified appearance is visible. In some of the sections, towards the centre, are reddish patches, probably due to minute hœmorrhages from the granuloma, for a few hæmatocytes can be seen in them. At the upper and external portion of the crusts fragments of hair, cotton, and other fibres, and many particles of dirt are abundant. Some of the vegetable fibres are stained dark blue, and they evidently came from a blue cotton shirt the patient was wearing.

Micrococci similar to those found in the secretion from the granulomata are present in all portions of the crust, and they are particularly abundant in the upper or internal layers. They occur singly, in twos, and in small masses, and they were found in all the sections. In two of the preparations examined small colonies of bacillus subtilis were observed.

The conclusions to be drawn from the examination of the crusts are that they are formed by the inspissation of the secretion of the granulomata ; and that blood cells carried off from the tumour by the secretion are fixed in its substance during coagulation, and that foreign material such as dust, dirt, &c., adhere to the viscid secretion, and thus help to make up the substance of the crust. The cocci are, doubtless, in part carried off by the secretion and remain inoperative in the crust, and the presence of the bacillus subtilis we consider to be accidental.

Two of the tubercles, or granulation tumours, were examined after being prepared in the same manner as were the crusts. As they were hardened in alcohol there was some shrinkage; and, therefore, the measurements of the entire sections only represent approximately the actual size of the growths.

The source of these tumours was as follows :—The smaller one was excised from David Bowers, and the larger one was sent to Dr. Nicholls by Mr. Numa Rat, of Dominica, who excised it from a patient in the yaw hospital of that island.

Sections of the smaller and less developed granuloma measure six centimetres in length, and 4·3 centimetres in height ; and, as a small portion of the sound skin had been removed, the whole structure of the cutaneous tumour can be observed.

The epidermis is gradually thickened from the circumference to the centre. At the periphery there is proliferation of all the elements, the papillæ increase gradually in size, and the pigment cells of the Malpighian layer are especially numerous, and they even extend into the horny epidermis. Towards the centre the horny layer, and most of the spheroical cells of the Malpighian layer are lost entirely, the lower layers of the epidermis being continuous with the amorphous crust of the granuloma. In this situation, too, the pigment cells are few, and they are disintegrating—the pigment granules being set free in the tissue where they appear as minute round bodies.

The crust begins at the circumference where the horny layer of the epidermis disappears over the enlarged papillæ, it gradually increases in thickness and attains its maximum height over the longest papillæ of the centre of the tumour. Large vacuoles are seen occasionally in the substance of the crust ; they are oval in form, and measure, on an average, ·126 millemetre by ·084 millemetre.

The dermis is infiltrated with round granulation cells, and there is a proliferation of the fibrous tissue, which consists of thickened anastomosing bands. In places islets of granulation tissue are seen separated from each other by broad bands of these fibres. The blood vessels are enlarged, and the capillaries running into the papillæ are dilated. The granulation tissue invades the papillæ, some of them being entirely composed of it. Towards the centre of the tumour the accumulation of proliferated columnar and spheroidal cells of the inter-papillary processes of the Malpighian layer has caused many of the papillæ to be compressed and elongated, some of them having been converted into long narrow linear processes twenty times the length of a normal papilla. These elongated papillæ are composed of fibrous tissue, the granulation cells being absent from them. Several hairs are seen in section, and they are deeply pigmented.

Cocci are seen in abundance in the crust, in the layers of the epidermis covering the enlarged papillæ at the circumference of the growth, and in the hair follicles. In the centre of the granuloma

they extend down the inter-papillary processes to the lower portion of the Malpighian layer. Occasionally small colonies of them are seen in the dermis.

Sections of the larger and more developed tumour received from Dominica were 9·6 centimetres long and 5·7 centimetres high. In the centre of the growth the enlarged papillæ could be seen by the naked eye when mounted sections were held up to the light.

On microscopic examination, all the histological cutaneous elements were easily recognised in various parts of the sections, showing that the tumour was formed by an invasion of the normal structure with granulation cells. At the circumference of the growth the transition from sound skin to the granuloma is easily made out. The epidermal tissues are proliferated over the gradually enlarging papillæ; and when the papillæ become double the natural size the horny layer is separated in a flake which is attached at a periphery. Towards the centre the epidermis entirely disappears, and the lower part of the crust is in direct contact with the papillæ throughout the whole of their free surfaces. The crust, therefore, has inter-papillary processes, as had the Malpighian layer of the epidermis which it replaces. The pigment cells have become disorganised, and the melanine granules have escaped into the crust, and have invaded the deeper tissue of the skin, many of them being seen in the dermis. They so resemble micrococci that in unstained sections they might be mistaken for them.

The blood vessels are enlarged. The tumour is rich in them, and in one section a large artery can be seen entering the base. In the larger papillæ small vessels have taken the place of the capillary loops. The fibrous tissue of the dermis is proliferated, but it exists in smaller relative quantity than it does in the sections of the less devoloped tumour excised from David Bowers. The substance of the growth is almost entirely composed of granulation tissue, the cells being packed closely together. The papillæ are enormously enlarged, those in the centre for the most part swelling out into the form of a club at their free extremities; and, in some instances, the summits are divided into lobes. At the outer portion there is a narrow layer of fibrous tissue, and the bulk of the process is composed of round granulation cells.

Micrococci, like those found in the secretion, and exactly similar to those of which pure cultivations were obtained, are abundant in the epidermis and the crust. They have invaded the hair follicles and, in some instances, have reached the hair bulb. In one section eight colonies were seen deep in the dermis; and, in another, masses of cocci were observed in two of the papillæ.

The results of our work in regard to this inquiry may be summed up as follows:—

I. A microbe, in the form of a micrococcus, was found constantly in the secretion from the granulomata characteristic of yaws.

II. This microbe was successfully cultivated in nutrient media, and pure cultures were obtained to the third generation.

III. The macroscopic appearances of the cultivated microbe may be described as white mucoid oval, or rounded masses, with a chromogenic tendency, which, however, was not displayed so well in fluid media. The colouring matter when present was, in most instances, of a salmon tint.

IV. Under the microscope the microbe was seen to be a coccus, from 0·5 to 1·5 μ in diameter. It occurred singly, or in twos, threes, fours, short chains and zoogloea, or small colonies. As the cocci multiply by transverse fission, this grouping in diplococci, triads, tetrads, and streptococci, is merely accidental, and, where observed, is only indicative of the rapid growth of the micro-organism.

V. The microbe was found in abundance in the affected tissues of persons suffering from the disease, and no other pathogenic microbe was found in association with it.

VI. In no instance was the microbe discovered in the blood, although it was successfully multiplied in the serum in drop cultures.

VII. The microbe was found and successfully cultivated in Antigua, St. Kitts, and Dominica, and it occurred under identical conditions in these three islands.

VIII. Inoculations into animals from the cultivations, gave negative results, as did also inoculations from the secretion of the granulomata, by which Dr. Nicholls, some years ago, was able to communicate the disease to human beings. These facts, therefore, whilst they indicate that animals are probably immune, do not disprove the theory that the microbe is pathogenic.

IX. In the absence of the concluding proofs of the pathogenesis of the microbe, namely, the production of the disease in a healthy animal by inoculation of the pure cultivations, and the after discovery of the micro-organism in the fluids or tissues of the affected animal, we cannot positively declare that the micrococcus is the contagium of the disease.

X. But, in view of the facts we were able to establish, and of the subsequent discovery by Dr. Nicholls of the microbe in the lymphatic system, and in various organs of a patient that died of yaws, we are of opinion that the micrococcus is the cause of the disease, and that it invades the system through the lymphatics.

H. A. Alford Nicholls.
Francis Watts.

26 July, 1892.

TABLE I.

Experiments in Nutrient Media at Antigua.

No.	Date.	Name of Patient or Number of Tube.	Nutrient Medium.	Material Used.	Results.	Remarks.
1	1891: 21 August	David Bowers	Solid blood serum	Secretion from tubercle after removal of the crust.	Raised ovoid white mucous-looking growths along the wire track. The growths appear semi-fluid. These growths were found to contain numerous well-defined *micrococci* 1 μ. in diameter.	Cultivated at about 38° C.
2	21 „	ditto	ditto	ditto	Similar growth to No. 1	ditto.
3	21 „	ditto	Liquid blood serum	ditto	A whitish growth at the surface, which sinks as a cloud on agitation. Microscopic examination showed *micrococci* solitary, in twos and in fours.	ditto.
4	21 „	ditto	ditto	ditto	Similar growth to No. 3	ditto.
5	21 „	ditto	Solid egg albumen	ditto	Deep erosion of the wire track, from $\frac{1}{2}$ to 1 mm. in width, the edges being slightly raised. Growth colourless and moist in appearance at first; afterwards orange-coloured, with white mucoid patches as in Tube 1. A *micrococcus* was found, but not abundantly.	ditto.
6	21 „	ditto	ditto	ditto	Growth similar to No. 5., but two small pink patches appeared on the growth. A *micrococcus* was found as in No. 5.	ditto.
7	21 „	ditto	Nutrient gelatine (Crookshank's).	ditto	A circular depression first appeared on the surface, and then a white growth. Liquefaction. *Bacillus subtilis*, and *micrococci* were found, the former more abundantly.	ditto.
8	21 „	ditto	ditto	ditto	Results as in No. 7.	
9	21 „	Rosannah Bowers	Solid blood serum	Blood from tip of finger.	No growth. The tubes remained sterile for several weeks.	ditto.
10	21 „	ditto	ditto	ditto	ditto ditto	ditto.
11	21 „	ditto	Liquid blood serum	ditto	ditto ditto	ditto.
12	21 „	ditto	ditto	ditto	ditto ditto	ditto.
13	21 „	ditto	Nutrient gelatine	ditto	Bacillus subtilis developed probably from accidental contamination.	ditto.
14	21 „	ditto	ditto	ditto	ditto ditto	ditto.
15	24 „	Tube 1	Solid egg albumen	Secretion from tubercle.	An oval white mucoid growth along wire track, covered in places with a salmon-coloured growth. *Micrococci* found. This and the remaining tubes were kept at the ordinary tropical temperature.	Second generation.
16	24 „	Tube 1	Nutrient gelatine	ditto	Liquefaction of medium. Whitish growth uniformly diffused. No film or crust on surface at first, but on 10th September there was a bright yellow growth on surface. Micrococci found.	ditto.
17	30 „	Tube 15	ditto	ditto	A salmon-coloured growth along wire-track.	Third generation.
18	11 September	Tube 3	Solid blood serum	ditto	Growth similar to No. 1	Second generation.
19	11 „	Tube 3	Solid egg albumen	ditto	Salmon-coloured growth along wire track.	ditto.
20	19 „	Tube 18	ditto	ditto	Salmon-coloured growth along wire track with a white growth at the bottom, which appeared on the 5th day.	Third generation.
21	19 „	Tube 18	Liquid blood serum	ditto	White cloudy growth on surface and diffused through medium.	ditto.
22	19 „	Tube 18	Nutrient gelatine	ditto	White and salmon-coloured growth on surface and diffused through medium.	ditto.
23	19 „	Tube 18	ditto	ditto	White cloudy growth diffused through medium.	ditto.
24	19 „	Tube 19	Liquid blood serum	ditto	White cloudy growth on surface and diffused through medium.	ditto.
25	19 „	Tube 19	Solid blood serum	ditto	White mucoid growth on surface and a mass at the bottom of the fluid that has exuded from the solidified serum; the growth is also diffused through this fluid.	ditto.
26	19 „	Tube 19	Nutrient gelatine	ditto	Growth similar to No. 23	ditto.
27	19 „	Tube 19	ditto	ditto	Growth similar to No. 23	ditto.
28	24 „	Tube 18	Sterilised potato	ditto	White mucoid growth. Mould subsequently appeared.	ditto.
29	24 „	Tube 19	ditto	ditto	White mucoid and yellow growth in beaded lines along the wire track.	ditto.
30	29 „	Tube 19	Sterilised ripe banana.	Secretion from tubercle.	A clear colourless growth appeared on the inoculated surface. Micrococci were found with some contaminating bacilli.	ditto.
31	29 „	Tube 18	ditto	ditto	ditto ditto	ditto.

TABLE II.

Experiments in Nutrient Media at St. Kitts.

No.	Date.	Name of Patient.	Nutrient Medium.	Material Used.	Results.	Remarks.
32	1891: 7 November	Alex. Hart	Nutrient gelatine	Secretion from tubercle on forehead.	White growth uniformly diffused, and rendering the medium slightly opalescent. Mould (*Penicillium glaucum*) appeared at the side of the tube above the medium.	
33	7 „	ditto	Solid blood serum	ditto	White mucoid growth along the wire track. At the top, where the medium has become dry, the growth is salmon-coloured.	
34	7 „	ditto	Solid egg albumen	ditto	Erosion of wire track, and white mucoid growth in oval patches at margins of furrow. Subsequently small salmon-coloured growths appeared on several of the white patches.	
35	7 „	Abram Sendall	Solid blood serum	Secretion from tubercle in Perineum.	White mucoid and salmon-coloured growths in rounded and oval patches along the wire track. The salmon growth is in excess of the white. On the 16th November the upper white growth turned to a salmon colour.	
36	7 „	ditto	Nutrient gelatine	Secretion from tubercle in Perineum.	White growth diffused in medium.	

TABLE III.

Experiments in Nutrient Media at Dominica.

No.	Date.	Name of Patients, or Number of Tube.	Nutrient Medium.	Material Used.	Results.	Remarks.
37	1892: 11 March	Michel Gaudin. Aged 60.	Solid blood serum	Blood from heart; opened post-mortem.	Medium remained sterile	Patient died at 9.30 a.m., and post-mortem performed at 1 p.m.
38	11 „	ditto	Nutrient gelatine	ditto	ditto ditto	ditto.
39	11 „	A girl at yaws hospital. Aged 12.	Solid blood serum	Secretion from tubercle.	White mucoid and salmon-coloured growths as in No. 35.	Disease in early stage and well developed.
40	11 „	A boy at yaws hospital. Aged 9.	ditto	ditto	Similar growth to No. 39	ditto.
41	11 „	Tube 39	Nutrient gelatine	ditto	Diffused white growth as in No. 36.	ditto.

TABLE IV.

Experiments in Animals at Antigua.

No.	Animal Inoculated.	Site of Inoculation.	Material Used.	Date of Inoculation.	Result.
1	Rabbit	Beneath the skin of the inner side of the thigh.	Secretion from tubercle of David Bowers.	1891: 21 August	No result.
2	Fowl	ditto	ditto	21 „	No result.
3	Fowl	ditto	Secretion from tubercle of David Bowers, Jun.	21 „	On the 3rd September the fowl looked out of condition. The comb and feathers drooped. There was a serous discharge over part of the comb, and an unhealthy moist look round the eyes and at the corner of the mouth. Afterwards the fowl recovered.
4	Fowl	Skin scarified at inner side of thigh.	Tube 1	24 „	Fowl strayed away two days afterwards.
5	Monkey	Skin scarified at inner side of thigh.	Tube 5	26 „	On the 29th August the inoculation spot was reddened and slightly elevated. 11th September, inoculation healed without scar.
6	Kitten	Skin of ear scarified and virus rubbed in.	Secretion from tubercle of David Bowers.	2 September	On the 3rd September there was a slight scab over the inoculated spot, but the kitten did not develop any signs of yaws.
7	Monkey	Skin scarified at inner side of thigh.	Tube 3	11 „	Inoculation failed. Reddened and slightly elevated spots have made their appearance at other parts than the sites of inoculations at intervals since then.

TABLE V.

Experiments in Animals at Montserrat.

No.	Animal Inoculated.	Site of Inoculation.	Material Used.	Date of Inoculation.	Result.
8	Dog	Beneath skin of the inner side of right thigh.	Tube 19	1891: 3 October	On the 10th October there was a small spot of inflammatory induration at the site of inoculation. Three days afterwards, however, through the carelessness of a servant, the puppy was left out in the rain all night, and it was found dead in the morning.
9	Kitten	ditto	Tube 19	3 „	A small scab formed at the inoculated spot, and there was some induration for a week after the scab dropped.
10	Fowl	ditto	Tube 19	3 „	No result.

TABLE VI.

Experiments in Animals at St. Kitts.

No.	Animal Inoculated.	Site of Inoculation.	Material Used.	Date of Inoculation.	Result.
11	Kitten	Skin of inner side of thigh scarified.	Secretion of tubercle of Abram Sendall.	1891: 7 November	Kitten dwindled away and died. The servant at the hotel threw away the body before it could be examined.
12	Kitten	A pocket made under the skin of thigh, the material was inserted, and the skin afterwards sutured.	A fragment of crust from a tubercle of Abram Sendall.	7 „	A circumscribed spot of indurated inflammation produced. It did not proceed to suppuration. The kitten was carried to Nevis, and then to Antigua, where it strayed away from the laboratory. Up to six weeks after the inoculation there was no sign of eruption.

TABLE VII.

Experiments in Animals at Dominica.

No.	Animal Inoculated.	Site of Inoculation.	Material Used.	Date of Inoculation.	Result.
13	Kitten	A pocket made under skin of inner part of ear, and the fragment of material inserted.	A fragment of crust from a tubercle of one of the patients at the yaws hospital.	1892: 23 January	A small yellow crust, similar to a yaws crust, formed at the site of inoculation, and there was a red areola round it. This healed up, and no further symptoms were developed.
14	Kitten	Inner side of ear scarified, and paste rubbed in.	Paste made with a yaws crust.	23 „	A similar appearance to No. 13.

(B.)

Notes on Mr. *Jonathan Hutchinson's* Remarks prefatory to Mr. *Numa Rat's* Essay on Yaws.

In August, 1891, I received a copy of Mr. Numa Rat's Essay on Yaws, which had been printed at the instance of the Government of the Leeward Islands, by Messrs. Waterlow and Sons, of London. I have already had occasion to refer several times to this Essay, and to dissent from some of the conclusions arrived at by its author. Just as I was about to complete the writing of this report Mr. Numa Rat kindly sent to me a copy of what is practically a second edition of his Essay. The later memoir is slightly different from the one first printed ; but, on a careful comparison of the two, I find that in only one instance are the quotations I have given not identical with the text of the revised Essay. The passage in question occurs in the sixth division of Section XV., and it reads as follows :—

"There is a severer form of this ulceration, which resembles that of exedent lupus in its "destructiveness. It begins from within the nares or throat, and involves all the tissues of the nose "and palate, occasionally destroying the upper lip also." This paragraph does not occur in the revised Essay, and it is clear, therefore, that on further consideration Mr. Numa Rat has altered his opinion that such destructive ulceration is due to yaws. It would appear, too, from a reference on page VII. of the prefatory remarks, that Mr. Hutchinson was supplied, like me, with a copy of the first printed Essay.

A careful consideration of Mr. Hutchinson's preface shows that he is strongly impressed with the idea that yaws is either syphilis, or a syphiloid disease that may have been produced by the long influence of race and locality. And, as any opinion promulgated by so distinguished a surgeon—who ranks as one of the first authorities on syphilis—is likely to be accepted without reserve by a large number of medical men, it is necessary for me to examine the data on which that opinion has been formed. For, as will be seen on perusal of this report, very important questions are involved in the dismissal, or the general acceptation of the theory that yaws is either syphilis, or that it stands in relation to that disease as does a species to a genus.

Mr. Hutchinson has written, of course, with great impartiality, and I may at once say, that the opinion he has arrived at is warranted to a great extent by the evidence before him. But in questions of science, as well as in law, a correct judgment cannot be formed unless the evidence is so conclusive as to render it of the nature of a statement of facts concerning which no fallacies are possible. Mr. Hutchinson himself supplies proof that the evidence as regards the identity of yaws and syphilis is not conclusive, for he remarks at the beginning of his commentary, as follows:—"The decision as to the true nature of the locally restricted disease known as yaws, must be "recognised as being one which is still surrounded by much doubt and difficulty. All the more "recent observers who have studied the malady in its native haunts are, I think, unanimous in the "opinion that it is not syphilis."

Mr. Hutchinson then proceeds to give the following terse sketch of the attributes of yaws, as detailed in Mr. Numa Rat's Essay:—"Our author describes it as a disease which is communicated "by contact, and which acknowledges a primary sore. After a definite interval a febrile stage "follows, attended by an erythematous or scaly eruption, after which comes the more typical "appearances in the form of scattered fungating ulcers. Finally, after variable periods, of months "or years, we have in many instances tertiary phenomena in the form of 'gummata'. To these "facts, as to its natural course, we have to add that mercury and the iodides are specific remedies "for the disease in all its later stages, and that for a permanent cure mercury is more to be trusted "than the iodides. If, then, yaws be not syphilis, it is clear that it offers a very exact parallel "to it."

In regard to this passage, I may at once say that if yaws present such a train of symptoms it is undoubtedly syphilis; and, further, that a medical man having no knowledge of yaws, and reading such a description of it, must wonder how it is possible for a number of his professional brethren to have persistently denied the fact of the idendity of the two diseases.

I now propose to consider the six attributes alleged to be distinctive of yaws in the above summary.

1. *Concerning the communication of yaws by contact.*—This matter has been already noticed at length in my report; and it may be at once allowed that yaws is communicated in many instances by contact. And where this the sole way in which it is spread the fact could only show that yaws, like syphilis *and other diseases*, is inoculable. But a number of infected persons cannot be proved to have contracted the malady in this way, and it is stated by most observers who have directed attention to the matter, that it may be communicated by flies, by wearing the clothes of affected persons, by sleeping in the same bed in which they have lain, &c. Then, too, my experiments prove that the microbe—which is found constantly in the deceased tissues—retains its vitality after it has remained for months in dry dust and that when inoculated into a suitable medium it will grow rapidly.

2. *Concerning the so-called primary sore.*—This matter has also been alluded to in former places in this report, and I believe it has been proved that in the majority of instances yaws does not acknowledge a primary sore. Thus, in the inoculation experiments, detailed in the 9th division of Section XV., it is shown that in no instance was there any primary lesion, and certainly my experience of the disease leads me to assert that there is no characteristic initial lesion in yaws as there is in syphilis.

Should there be any growth at the site of the implantation of the virus it differs in no essential particular from the characteristic eruption of the disease in one or other of its stages. Thus, it may be a squama, a papula or a granuloma, all of which are due to the efforts of the tissues to localise the poison by the building up of a cellular barrier between it and contagious structures. Sometimes, as I have shown, this attempt to prevent general infection is entirely successful, or only so for a time, and in this latter instance fresh granulomata appear which, however, are not to be considered in the light of a secondary eruption, but only as an extension of the disease, for they are identical with the earlier manifestations.

3. *Concerning the febrile stage.*—As I have shown, although an elevation of temperature most frequently occurs at the time of the invasion of the disease, yet it may be wanting, or altogether so slight as to escape the observation of the patients themselves. Indeed, some observers have directed special attention to the apparent absence of a febrile stage in many of the cases that have come under their notice. The presence or absence of fever really depends entirely on the fact as to whether the disease has become a local or a general one; for, in the former case, there is no constitutional disturbance, and in the latter there is unmistakable febrile movement.

4. *Concerning the so-called erythematous or scaly eruption.*—I must at once take exception to the accuracy of these terms as applied to the eruption of yaws. Dr. George Thin thus describes erythema:—"A non-infective superficial inflammation of the skin, the essential characteristic of "which is redness, which disappears on pressure by the by the finger, re-appearing when the pressure "is removed." Now there is no eruption in yaws with these characteristics. The earliest stage of the eruption, which I have described as squamous, is of course a scaly one, inasmuch as there is exfoliation of small flakes of necrosed epidermis. But partial or general desquamation is characteristic of many skin diseases, and it is simply an exaggeration of a physiological process that is always in operation in healthy individuals.

Much confusion has resulted in regard to the terms applied by observers to describe the appearances seen in cutaneous affections, and the difficulty of diagnosis is often increased by writers using designations that may be applied to half-a-dozen different forms of eruption. The true way to determine the exact nature of an exanthem is to inquire into its histology. This I have done in regard to the three stages of the yaws granulomata, and it will be seen, I believe, on an examination

of the facts I have been able to bring forward, that there is in yaws no erythematous scaly eruption properly so-called.

5. *Concerning the so-called scattered fungating ulcers.*—I have directed attention in several places in Section XVI. of this report to the fact that when ulceration occurs in yaws it may be considered to be an accidental symptom, and not one characteristic of the disease, inasmuch as yaws when uncomplicated is essentially a non-ulcerative malady. And, in the 5th division of Section XV., it is shown that the presence or absence of ulceration is the chief diagnostic feature between the yaws granulomata and certain syphilitic eruptions. A microscopic examination of the tumours charactistic of yaws indicate that they are caused by an infiltration of the normal elements of the skin with granulation cells, which ordinarily do not tend to bring about destruction of the tissues in which they are situated. It is clear that this rapid proliferation of connective tissue cells is simply a conservative effort of nature to cut off the infected parts from the general system. As soon as immunity is established, the cells disappear without any ulcerative changes, and the skin sooner or later resumes its normal appearance, no cicatrix resulting.

To describe this process as that of fungating ulceration is to give an altogether erroneous idea, not only of its clinical characteristics, but also of its histology and pathology.

6. *Concerning the so-called tertiary phenomena in the form of "gummata."*—I have written at considerable length in this report on the question of what have been called the tertiary symptoms of yaws, which have been also described by writers as sequels, or later manifestations of the "repelled" disease. It has been shown that some of the early authors not only recognised these symptoms, but put them down to their real causes, namely, syphilis, tuberulosis, and mercurial cachexia. Mr. Numa Rat, therefore, in asserting that these symptoms are due to yaws, is only reviving old theories that were practically disproved by authors at the beginning of the century. Mr. Hutchinson, himself, is evidently in considerable doubt as to whether or not these symptoms really be due to yaws. Thus, he says:—"In cases of tertiary symptoms from supposed yaws, such, for instance, as "ulcerations of the palate, is it often the fact that syphilis can with confidence be excluded. May "not such cases as those given at pages 38 and 39 have been instances of the co-existence of yaws "with syphilitic taint?" Mr. Hutchinson will see from this report that his question is answered emphatically in the affirmative.

Mr. Numa Rat gives the following case in illustration of his theory that destructive ulceration of the throat is due to yaws:—A negro, aged 18, was attacked with "sore throat, uvula and fauces "congested." Afterwards his pharynx, uvula and tonsil became inflamed, and a greenish-yellow matter was seen to be adherent to it; there was also ulceration of the posterior surface of the uvula. He was sent to the general hospital, and he left after a time. Later on he got thin; his voice became altered and quite nasal; and, on examination, the whole of the soft palate was found to be ulcerated away, and his pharynx was covered with a purulent discharge. His previous history showed that he had an attack of yaws when he was five years old, and that he recovered in nine months. And Mr. Numa Rat says:—"He had never had any illness, slight or severe, since the "attack of yaws, which soon left him. He always worked well, felt well, and lived well. His "work was that of an estate labourer and wood-cutter. He is a well-built, well-developed, muscular "young man, whom one would consider in perfect health."

These are all the facts, and it will, I think, occur to most persons that it is altogether impossible to establish a connection between the attack of yaws at the age of five, which was recovered from in nine months, and the ulceration of the throat, which occurred after more than twelve years of vigorous health. There are no symptoms whatever concomitant with the throat affection to establish even the remotest relation to yaws.

As regards yaws "gummata," I may state unhesitatingly that not only have I never seen such a thing, but that the term as applied to a symptom of yaws was altogether unknown to me until I read the Essay in question. I have searched the literature of the disease, without finding any reference to yaws "gummata." Mr. Numa Rat gives particulars of five instances in which he observed these "gummata," and it may be advisable to consider them briefly. They are as follows:—

Case VI.—A negress, aged 30. "Skin of leg ulcerated at certain parts, and at others hyper-"trophied and scaly, with keloid-like cicatrices."

Previous history.—Had an attack of yaws when 16 years of age, and got better. Two years afterwards "subcutaneous fleshy nodules" developed in the legs. These nodules "burst" disclosing reddish ulcers which "discharged serum and pus very freely."

Case VII.—A negro, aged 35. "Ulcers of the leg."

Previous history.—Had yaws as a child from which he recovered. When 20 years of age "a "subcutaneous nodule" appeared in the left calf. It burst, and produced a chronic ulcer. Other nodules appeared, and they terminated in a similar way.

Case VIII.—A mulatto, aged 28. "Ulcers of the leg."

Previous history.—He had an attack of yaws when 10 years of age, "the eruption consisting of "papules and erythematous spots covered with thin scales, followed by tubercles." . . . "Shortly after their disappearance a subcutaneous nodule was noticed on the right tibia, and "remained there four years. This was followed by another on the right instep, to which leeches "were applied. The leech bites produced ulcers, which kept spreading up the leg and were a long "time healing."

Case XIII.—A mulatto, aged 25. At 13 years of age he contracted yaws, which was cured in nine months. "After this he remained well for three years A gumma then appeared half an

" inch above the site of the old ulcer which had been infected with yaws." This " gumma " broke down into ulceration, which scabbed over and became cured. Afterwards—that is nearly four years after he was cured of yaws, and eight years before he came under Mr. Numa Rat's notice—" a " *typical* yaws fungus developed on the skin over the internal tuberosity of the right tibia." It " *dried and disappeared*" in two months, leaving " *a scar*," thereby showing that there was destruction of tissue, which is not the case when the yaws granulomata disappear by absorption. Later on other " gummata " appeared on the limbs and face ; they ulcerated, and on their healing, they left citatrical tissue, by the contraction of which much deformity was produced. It is a noteworthy fact in regard to this case that Mr. Numa Rat says : " He (the patient) attributes the persistence and " severity of the symptoms in his case to his having exposed himself imprudently to damp and cold " while under the influence of mercury which he had taken during the early stages of the disease."

Case XIV.—No particulars regarding age, &c., are given in this case. " Ulcers of the fore- " arm ; covered with dark brown scabs."

Previous history.— " Had yaws as a child. " About three years ago a large subcutaneous " nodule appeared over the upper end of the ulna. It remained two years, at the end of which time " it disappeared without ulcerating. About a week after its disappearance small red subcutaneous " nodules were noticed over the present site of the ulcers. Each lasts about four or six weeks, then " ulcerates and scabs over, and is followed by another, which goes through the same process."

All these cases were, I believe, seen by Mr. Numa Rat in his district, which is the part of Dominica where, as I have already stated, lupus would appear to be endemic and from where, moreover, persons suffering from tertiary syphilis have been admitted into the Roseau Infirmary. It is difficult to determine in regard to each of these five cases whether syphilis or tuberculosis be responsible for the symptoms described, but it appears to me that there is no warrant for them to be ascribed to yaws.

It must be pointed out that Mr. Numa Rat has been in Dominica for only a few years, and that, therefore, the description of " erythematous spots covered with thin scales in Case viii, and the " typical yaws fungus " in Case xiii, are not from his own clinical observations, but from statements of the patients or other persons ; and, in regard to such matters, the evidence of the patients and their friends cannot be accepted without reserve. Unless a *post hoc propter hoc* line of reasoning be adopted, it cannot be said that the connection of these so-called " gummata " with the attacks of yaws has been established ; indeed all the facts tend to prove that the " tertiary symptoms" described are attributable to syphilitic or scorfulous disease. These matters have been fully gone into in other portions of this report, and it is unnecessary to recapitulate here.

It appears to me, from a very careful examination of the whole question, that Mr. Jonathan Hutchinson and Mr. Numa Rat, are together in possession of the parts that would make up the whole truth if they were properly fitted together. Mr. Numa Rat recognises very properly that yaws is a disease *sui generis* and unconnected with syphilis, but he has mistaken syphilitic and other complications for attributes of yaws, and he has classed them as forming a tertiary stage to that malady.

Mr. Hutchinson, on the other hand, accepting these complications as symptoms of yaws, and rightly identifying them with syphilis, essays to account for the real attributes of yaws in the modification of those of syphilis by the long operation of the peculiarities of race and climate.

In a sense then these joint authors are both right and both wrong. They are both searching after the truth, and they will, therefore, I feel sure be glad of this criticism on their writings.

Mr. Numa Rat will find that some of his views have been supported in my report, and that his able replies to the interrogations have received due recognition. He will, therefore, be the more ready to excuse me for pointing out what I believe to be the true explanation of the anomalous symptoms that I know have occasioned him much thought and study.

As regards Mr. Jonathan Hutchinson, he will, I doubt not, be glad to find that most of the lines of investigation he suggests at the conclusion of his Prefatory Essay have been anticipated by me, and he will welcome the mass of information I have had the good fortune to be able to collect for the consideration of the government and the profession.

H. A. Alford Nicholls.

St. Aroment, Dominica.
21 August, 1892.

(C.)

CORRESPONDENCE in *St. Lucia* concerning the native treatment of the disease.

1.

Mr. *John Anderson Cooper*, Warden, to Administrator *Knollys*, C.M.G.

Micoud, 24 March, 1891.

Sir,

I HAVE the honour to bring to your notice the fact the prevalence to a most frightful extent in this quarter of the disease called yaws.

Some time last year, at the request of the Government, the medical officer of the district, Dr. Tabone, with myself visited certain localities in this quarter with the view of reporting upon the progress of the disease. In four or five hours which were visited there were found about 13 cases of persons affected.

The disease, which at present is confined to the rural parts of the district, is advancing by rapid strides towards, and will, in all probability, find its way into the village if some effective means be not adopted to arrest its steady progress.

In conclusion, it may not be out of place to remark that the disease is a local one and as such requires local treatment. There are many persons in this quarter who I am convinced are experts in the treatment of the disease, and I have no doubt that their services could be utilised with advantage if the Government could consider that they have a right to interpose to relieve suffering humanity and protect the healthy portion of the community against infection.

I have, &c.

His Honour the Administrator. (signed) *John Anderson Cooper*, Warden.

II.

The Colonial Surgeon to Administrator *Knollys*, C.M.G.

His Honor, 7 April, 1891.

Mr. Cooper's statements may be considered as much exaggerated. He likes strong words, &c.

It is a curious fact that when the disease is prevalent so are "experts in its treatment." Then how does the disease increase?

We recently had a trial of such an "expert" at Vieux Fort, and who ultimately only proved his ability to impose.

The pretensions of these "expert" or "panseurs" should not be encouraged; they frequently have recourse to preparations of mercury and arsenic, which is measured by rule-of-thumb and given indiscriminately. Not one of them that I have met, and several have applied to be for employment, can read or write.

Pending the location of a doctor in the district and the re-opening of the yaws asylum, matters may be allowed to rest.

(signed) *C. Dennehy.*

III.

Administrator *Knollys*, C.M.G., to Mr. *John Anderson Cooper.*

Sir, St. Lucia, 8 April, 1891.

I have the honour to acknowledge the receipt of your letter of the 24th ult., reporting that yaws is frightfully on the increase in your neighbourhood, and recommending that "experts" in its treatment, of which you say there are many in the quarter, should be employed by the Government.

Dr. Nicholls, who is a recognised authority on the disease, will shortly visit the island with a view to making inquiries. In the meanwhile, the Government cannot encourage unqualified "experts," who are almost invariably mere impositors.

I have, &c.

(signed) *C. C. Knollys.*

IV.

Dr. *Alford Nicholls* to Administrator *Gouldsbury*, C.M.G., M.D.

Castries, St. Lucia,

Sir, 25 June, 1891.

In a letter addressed on 24th March last to Mr. Knollys by Mr. John Anderson Cooper, Warden of Micoud, it is stated, *inter alia*, that the writer is convinced that there are many persons in his quarter who are "experts in the treatment" of yaws, and he advises the Government to utilise the services of these persons.

2. I shall be glad if your Honour will kindly ascertain from the Warden of Micoud the facts that have led him to feel "convinced" that these so-called "experts" are able to cure yaws.

3. He will also be advisable, if possible, to ascertain the exact method of treatment adopted by these persons, if Mr. Cooper be able to bring forward any facts to establish his assertions.

I have, &c.

(signed) *H. A. Alford Nicholls,*

Special Commissioner.

V.

Administrator *Gouldsbury* to Mr. *John Anderson Cooper*.

(No. 307.)

Sir, Government Office, 26 June, 1891.

WITH reference to your letter of 24th March last, in which you state that there are many persons in the quarter of Micoud who are experts in the treatment of yaws, I shall be obliged if you will furnish, for the information of Dr. Nicholls, Special Commissioner, who is making investigations into the treatment of yaws, the facts which have led you to feel "convinced" that these "experts" are able to cure the disease, and if you will ascertain, if possible, the exact method of treatment adopted by these persons.

I have, &c.
(signed) *V. Skipton Gouldsbury*,
Administrator.

VI.

Mr. *John Anderson Cooper* to Administrator *Gouldsbury*.

Sir, Micoud, 6 July, 1891.

I HAVE the honour to acknowledge the receipt of your Honour's letter of the 26th ultimo, in which you have required of me to furnish, for the information of Dr. Nicholls, Special Commissioner, the facts which have convinced me that certain persons in the quarter of Micoud are able to cure yaws, and also the method of treatment adopted by those persons.

In reply to your Honour's letter, I beg to inform you that my conviction of the ability of the persons referred to in my previous letter to cure the disease, is born of the one fact that where the disease has been treated to a cure by them it has never been known to make its re-appearance in any form whatever, which circumstance, I hold, is of itself conclusive evidence that the cure was radical; whereas it is popularly known (at least in this quarter) that many persons who had been affected with the disease had no sooner been discharged as cured from the Yaws Hospital in Castries, where they had been under scientific treatment, than the disease broke out upon them again, and necessitated the unfortunates to have recourse to the local "doctors" for proper treatment.

These statements I am prepared to back with solid proofs.

I should have stated that I had the opportunity of interviewing Dr. Nicholls, at Dennery, on Thursday, the 2nd inst., and explaining to him the local method of treating the disease.

In reply to a question put to me by the doctor, I stated that I have heard of mercury being used in the treatment of the disease, which statement he particularly asked me to embody in my reply to your Honour. This I do, but I must also make mention that, from all accounts I have had, I am satisfied that its employment is against the general practice.

The doctor also desired me to explain why, in the presence of so many persons of special knowledge, the disease should be so prevalent in this quarter.

I am not a scientist, but I may safely mention this as the most probable solution of the matter, that when a disease breaks out in a community it will spread in proportion to the relaxation of indispensable hygienic conditions. The disease being chiefly confined to the labouring population of the rural parts of the district, among whom the strict observance of the laws of health is rather the exception than the rule, the number of cases which may be cured under such circumstances must necessarily bear a very significant ratio to the number of cases requiring treatment.

Besides, those who understand the business of treating, will not, as is quite natural, volunteer their services, unless they are sure of remuneration, which, in the majority of instances, the persons affected are unable to give.

I have, &c.
(signed) *John Anderson Cooper*,
Warden.

VII.

Dr. *Alford Nicholls* to Administrator *Gouldsbury*.

Sir, Castries, 11 July, 1891.

I HAVE to thank your Honour for the copy of Mr. Cooper's letter of the 5th instant, which, however, is unsatisfactory.

2. Mr. Cooper brings forward nothing but his own assertion in regard to the statements advanced in his own letter; he makes what is really a serious, and I believe an unjust, attack on the medical treatment of yaws patients adopted by Drs. Dennehy and Norton; and he does not give any details as regards the native treatment he alludes to, although I specially asked him when I saw him at Dennery to embody these particulars in his reply to your Honour.

3. As Mr. Cooper states that he is prepared to back up his statements with solid proof, I would ask that he be called upon to furnish this proof, together with a written detailed account of the treatment he refers to, and specimens of the smaller branches and flowers of the bush remedies, in order that I may determine their botanical names and form an estimate of their properties.

4. The list of native remedies mentioned to me by Mr. Cooper is as follows:—1. "Gross "Balier," a mallow which has only mucilaginous properties. 2. "Segine," an aroid, probably *Anthurium Huegelii*. 3. "Guimauve." 4. "Sarsaparilla," which I imagine is the native remedy got from the roots of an aloe, *Furcræa Cubensis*. 5 Wood ants' nests! 6. Dried banana skins! 7. Conch shells! 8. Arsenic.

5. Dr. Lestrade informed me that a well-known yaws doctor in his district gave him a similar list of "remedies," except that mercury was substituted for arsenic.

6. I visited the house of this "yaws doctor" in Vieux Fort with Dr. Lestrade on the 8th instant, and found two of his children with yaws. The mother tried to secrete one of the cases; the other, a boy, was very ill in bed with yaws, cachexia, and pneumonia. These children had been ill a very long time, and thus the yaws doctor has failed to cure his own children.

7. I trouble your Honour with these details as the opinion prevails here amongst a large section of the population, as it does in other half-French colonies, that the medical men cannot cure the disease, and that the bush "doctors" can. It is very necessary, if possible, to get at the real facts of the case, for the popular belief in the ignorance of medical men about the disease has done, and is doing, a great deal of harm.

8. As Drs. Dennehy and Norton have had much experience in the treatment of yaws, I would ask your Honour to submit this letter to them for their information, and for any remarks that they may wish to make in regard to the questions under consideration.

I have, &c.
(signed) *H. A. Alford Nicholls,*
Special Commissioner.

VIII.

The Colonial Surgeon to Administrator *Gouldsbury.*

His Honour the Administrator,

I HAVE on a previous occasion commented on Mr. Cooper's statements and the alleged ability of "panseurs" or bush doctors to cure yaws.

It is but a waste of time to deal with such "solid proof," as can only be backed by evasions and assertions.

(signed) *C. Dennehy.*

12 July, 1891.

IX.

Colonial Assistant Surgeon *Norton* to Administrator *Gouldsbury.*

His Honour,

I SHOULD say that it is very strange, there being so many bush doctors who can cure yaws, that the disease is so prevalent and still on the increase. I may say that a very great increase has occurred since the yaws constable has been done away with, and we were not allowed since May 1889 to receive creole patients who came to the hospital voluntarily. The male patient that Dr. Nicholls mentions is one of the Isidores who were given up to their father (one of the famous bush doctors) by order of the Administrator, as he had promised to cure them in three months under the supervision of Dr. Lestrade.

I may further remark that this man, Isidore's father, was one of the old bush doctors, and I was requested to visit his place every week, which I did for six months, but cannot say that I saw during that time one cure; this was from January to August 1875.

They have often applied to Dr. Dennehy to be employed, but were very soon sent off without their application being taken into consideration.

Dr. Nicholls is quite correct about the belief of the people, which is the same with other diseases besides yaws.

I have, &c.
(signed) *Herbert Norton,*
Colonial Assistant Surgeon.

15 July, 1891.

X.

Administrator *Gouldbury* to Mr. *John Anderson Cooper.*

(No. 362.)

Sir, 18 July, 1891.

I HAVE received your letter of the 6th inst., in reply to mine of the 26th ultimo, on the subject of yaws, and have to acquaint you that Dr. Nicholls does not consider that the information you have supplied is in any way satisfactory or conclusive, in which opinion I entirely concur. Indeed, your

letter does not advance beyond the point of assertion, and I think you are now bound to substantiate your statements by the "solid proofs" you profess yourself prepared with.

Dr. Nicholls has requested that you will furnish a written detailed account of the treatment you refer to, and also that you will supply him with the smaller branches and flowers of the bush remedies you have enumerated.

I have, &c.
(signed) *V. Skipton Gouldsbury.*

XI.

Mr. *John Anderson Cooper* to Administrator *Gouldsbury.*

Sir, Micoud, 24 July, 1891.

I AM in receipt of your Honour's letter of the 18th inst.

In reply, I beg to inform your Honour that when Dr. Nicholls visited my quarter on the 18th instant, I understood that it was with the object of merely finding out the existence or not of yaws in the quarter (as is shown in the accompanying letter to me from himself), but not of verifying my assertion that the disease is more successfully treated by the local "doctors" than it is at the yaws hospital in Castries, which same assertion I had made to the doctor when I interviewed him at Dennery, or I should have produced the evidence of persons whose experience of both modes of treatment perfectly qualifies them to decide on their comparative merits. As the doctor asked for no such evidence, I did not think it necessary to produce it.

In the parts called Derrisseau where the disease seems to prevail to a frightful extent, I took the doctor to a house in which there had been some four or five cases when Dr. Tabone, accompanied by myself, visited that locality last year. I did this only to substantiate my statement that yaws was prevalent in the district. The parties themselves—not myself—said that it was a fortnight ago since they had discontinued drinking "tisanne" or remedy, and that they were cured, which latter assertion the doctor controverted. The doctor therefore misunderstood me if he supposed that I presented those persons as specimens of those who are cured under the method of the local "doctors."

It would be manifestly preposterous on my part to attempt to set myself up as an authority on a subject of which I possess only a popular knowledge, but your Honour will excuse me for saying what must be known to myself, as to everybody else in the quarter of Micoud, that where the disease is indifferently treated, it generally assumes the form of what is known as "crab yaws." Therefore, the absence of that form or of any other indications of its continuance in the system after five or six years of the treatment is invariably considered as conclusive evidence that a cure has been effected, and numerous examples of such cures in my district I am prepared to produce, if your Honour will allow me an opportunity in the form of an enquiry on the spot.

The detailed statement of the treatment of the disease as well as the articles used, some of which I have been able to procure only after some trouble, which explains the delay, is herewith sent as requested.

I have, &c.
(signed) *John Anderson Cooper,*
Warden.

Yaws, and the local method of treatment of it.

1. *Symptoms.*—The existence of this disease in the system is known by the appearance of large white spots on the body, and the unhealthy hue which the skin assumes.

2. *Treatment.*—In consequence of the contagious nature of the disease, the patient is segregated and subjected to a severe course of treatment, during which is administered

I.—*The petite tisanne.*

This is an infusion of roscau roots,[1] cow grass,[2] gross ballier,[3] white boyeau roots,[4] guimauve,[5] prickles of fommager,[6] sour-sop leaves,[7] plantain skins,[8] nine grains of corn,[9] a piece of pumpkin, all well dried. This is poured into a small jar and allowed to settle for a day or two, after which it is good to drink. When drunk (the quantity to be taken being from three to four tumblersful a day), it brings the yaws out in the form of cutaneous eruptions. which gradually get dry. If this "tisanne" fails to produce the usual effect, milk boiled with thyme is generally taken as an alternative. At this stage, sea-baths prove highly beneficial. Regimen is likewise a matter not to be overlooked. The patient is allowed to eat all animal food with the exception of pork, fresh fish, crab, lobster, and the like. Salt must not be used under any circumstances in the dietary of the patient. Vegetables can be eaten freely.

This "tisanne" is used as a lotion in cases of yaws ulcers.

After the eruptions have subsided, the patient is introduced to the

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[1] *Gynerium saccharoides*, Humb.
[2] *Paspalum conjugatum*, Berg.
[3] *Sida rhombifolia*, L.
[4] I did not see this plant.
[5] *Malachra capitata*, L.
[6] Fommager. *Eriodendron anfractuosum*, DC.
[7] *Anona muricata*, L.
[8] *Musa paradisiaca*, L.
[9] Maize. *Zea Mays*, L.

II.—*Gros tisanne or tisanne royale.*

This is different from the petit tisanne in its being an infusion of bois feure,[1] rock sigine,[2] roots of the langue bœuf,[3] ginger (all of which must be perfectly dried and pounded very fine in a mortar). To these are added guaiac,[4] antimonial powder, and a half bottle of molasses. This is kept in a small jar and allowed to ferment for eight days, after which it is strained into a demi-john —a clean piece of linen being used for the purpose, and drunk by the patient at the rate of three tumblersful a day until the patient is supposed to be cured, which supposition is based upon the return of the natural complexion of the skin.

For the purposes of ablution, an infusion of the dregs (after the straining process) of the articles before-mentioned is used.

Under this "tisanne," the diet is specially restricted to salt fish (soaked until it has lost its flavour) with olive oil and vegetables, except potatoes. Walking out in the cold, especially barefooted, is to be avoided, or "crab-yaws" may be the result.

Jalap and cas,[5] which is administered to the patient every fortnight during the entire treatment, constitutes the sole purgative.

(D.)

DOMINICA.

(No. 17 of 1875.)

An Act to make provision for arresting the spread of the disease called "Yaws," with the view of its ultimate extinction.

[L.S.] I assent,
George Berkeley, Governor.

Preamble. Whereas the Yaws is again spreading amongst the population of this Presidency, and it is desirable that all means should be used for arresting its progress, and, if possible, exterminating the disease.

Be it enacted by the Governor and the Legislative Assembly, as follows :—

Board appointed to aid in carrying out provisions of Act. I. The Governor shall appoint five persons to be and act as a Board to aid and assist him in carrying out the provisions of this Act, any three of whom shall form a quorum for the transaction of business.

Presidency divided into Medical Districts. II. The Presidency shall for the purposes of this Act be divided into such medical districts for the treatment of the yaws disease as the Governor may by Proclamation determine.

Government Medical Officers to have charge of Hospitals; III. The medical officers appointed under the "Medical Aid Act, 1874," shall have charge of the Yaws Hospitals in the respective districts; but in case of there being two hospitals in one district, or in case of there being no medical officer of the district, it shall be lawful for the Governor to appoint a medical officer to such hospital, at such salary as the Governor may decide; provided always that such salary does not exceed the sum of 100*l.* per annum.

and to make rules for management of same. IV. It shall be lawful for the medical officers to frame such rules and regulations (and from time to time to alter and amend the same, or to substitute others in lieu thereof) for the internal management, and for securing cleanliness in the hospitals hereinafter to be provided, as they may deem fit, such rules and regulations (or altered, amended, and substituted rules, and regulations), shall upon being confirmed by the Governors and Board, have the force and effect of law.

Hospitals to be procured or erected at such places as may be decided upon by Governor and Board. V. The Governor shall procure or cause to be erected in the several districts appointed under this Act suitable buildings to be used as hospitals for the reception of yaws patients at such places as may be decided upon by the Governor and Board, and such hospitals, where it is practicable, shall be enclosed.

Civil Engineer to furnish plans for Hospitals. VI. The plans for such hospital and enclosures shall, together with the estimated cost thereof, be furnished by the the civil engineer, and shall be submitted for the approval of the Governor and Board before such plans shall be executed.

Constables appointed. VII. The medical officers shall appoint such constables for each yaws district and hospital as they may consider necessary, and such constables shall receive an annual salary not exceeding 30*l.* for the first year, with an additional shilling after such period for each person suffering from yaws that they may bring or cause to be brought to the district hospital; such appointment to be confirmed by the Governor and Board.

Nurses appointed. VIII. The medical officers shall appoint such nurses or servants for such district hospitals as they may see fit, such appointment to be confirmed by the Governor and Board.

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[1] Bois Fer. *Linociera compacta*, R. Br.
[2] Seguine. *Anthurium macrophyllum*, Endl.
[3] *Furcræa cubensis*, Haw.
[4] *Guaiacum officinale*, L.
[5] Casse. *Cassia Fistula*, L.

Persons suffering from Yaws to repair or be removed to Hospital.

IX. It shall be lawful for any district medical officer, police, or other magistrate, minister of religion, or any constable, to require any person whom he may have reasonable grounds to believe is suffering from yaws to repair to, or be removed (in case of inability to repair thither) to the district hospital.

Inmates of Hospital arrested if found wandering about.

Segregation allowed in special cases.

X. Every inmate suffering from yaws who shall leave the district hospital without the authority of the district medical officer in charge of such hospital shall be arrested in any house or place in which he may be found by any police officer or other constable, and conveyed to the district hospital: Provided always, that it shall be lawful for the Governor to sanction, in special cases, upon the recommendation of the medical officer of the yaws district, the segregation of persons suffering from yaws who may be under the treatment of any duly qualified medical man.

Persons refusing to go to Hospital, &c., &c., liable to imprisonment.

XI. Every person who shall refuse to go or to be conveyed to, or shall persistently leave or run away from the district hospital before being cured, or without the permission of the medical officer in charge thereof, or who shall bathe himself or wash his clothing at any river or stream except at such place or places as may be appointed for such purpose by any rule or regulation herein provided to be made, shall on conviction before a police or district magistrate, on the information or complaint of a police or other constable, be liable to imprisonment for any period not exceeding 90 days.

Medical Officer or Magistrate may enter any suspected place to search for persons suffering from Yaws.

XII. It shall be lawful for any medical officer or any magistrate who has reason to believe any person suffering from yaws is in any house or place to enter such house or place in the day time to search for such person, or to issue a written authority to any police or other constable so to do, and, if such person shall be found therein by such district medical officer, magistrate, police, or other constable, shall arrest and carry such person to the nearest district hospital, there to be kept under treatment until such person shall be cured of such disease.

Penalties for harbouring or concealing.

XIII. Every person who shall harbour or conceal or who shall remove or entice away or receive any person suffering from yaws who shall be under treatment in any district hospital, or who shall enter or visit such hospital without the sanction of the medical officer, shall for every such offence forfeit and pay a penalty not exceeding *5l.*

Penalty for non-compliance with provisions of Act.

XIV. Whoever shall violate or fail to comply with any of the provisions of this Act, or with any rules or regulations passed under its authority, shall when not otherwise provided for be liable to a penalty not exceeding *5l.*

Certain persons made liable to contribute toward support of their relations in Hospital.

XV. Whenever it shall be made to appear to the medical officer of the district that any infant whose parent or any person whose wife, or husband, or parent shall be of ability to provide for the medical care and treatment of such infant or other person in such hospital aforesaid, it shall be lawful for such medical officer to direct the district or other constable to prefer a charge or suit against such person so liable as aforesaid before a resident or police magistrate for the amount of the cost of such medical care and treatment, provided that such amount does not exceed 6*d.* per day, and such resident or police magistrate is hereby authorised to hear and determine such charge or suit in a summary manner.

Penalty for obstruction to persons in execution of duty.

XVI. Whoever shall obstruct any person employed, or empowered to act, in the execution of any duty imposed by or under the provisions of this Act, shall when not otherwise provided for, be liable to a penalty not exceeding *5l.*

Recovery of penalty.

XVII. All penalties recoverable under this Act shall be recovered in a summary manner before any resident or police magistrate, and in default of payment of any penalty imposed under this Act, it shall be lawful for the said magistrate to imprison the offender for any term not exceeding three months.

Governor may from time to time suspend and revive Act.

XVIII. It shall be lawful for the Governor in Council from time to time to suspend the operation of this Act or any part thereof, and for such period of time as may be thought expedient, and again to revive the same or any part thereof.

Limit of expenditure.

XIX. The expenditure under this Act shall not exceed the sum raised under its provisions without the express sanction of the Legislature, and all sums recovered shall be specially directed to the object of this Act.

10 per cent. in addition to existing taxes to meet expenditure under this Act.

XX. For the purpose of providing the necessary means for carrying out the provisions of this Act there shall be levied and collected for *two years* from the *first day of January*, One thousand eight hundred and seventy-six, in addition to the sums, rates, or duties *now paid* into the Public Treasury for the uses of this Presidency an additional tax or duty of Ten pounds per centum on such sums, rates, or duties, save and except on the sum, tax, or duty raised under the "Stamp "Act, 1875," and the Water-rate levied under the "Water Works Act, 1872."

Passed the Legislative Assembly the ninth day of December, 1875.

H. A. Seignoret, Clerk Legislative Assembly.

Dated at Antigua, the twenty-ninth day of December 1875, in the thirty-ninth year of Her Majesty's Reign.

Duly published in the town of Roseau, the sixth day of January, A.D. 1876.

Jos. Fadelle,
Prov. Marshal.

DOMINICA.

(No. 5 of 1877.)

An Act to alter and amend "An Act to make provision for arresting the Spread of the Disease called Yaws, with the view of its ultimate extinction."

[L.S.] I assent,
George Berkeley, Governor.

Whereas it is desirable, to ensure greater efficiency, to alter and amend the "Yaws Act, 1875," especially with reference to the medical charge of the Yaws Hospital in this Presidency.

Be it enacted by the Governor and the Legislative Assembly, as follows:—

Section II. and part of Section III. of Yaws Act, 1875, repealed.

I. The second section, and the following words occurring in the third section, of the "Act to "make provision for arresting the spread of the disease called yaws, with the view of its ultimate "extinction," namely:—"But in case of there being two hospitals in one district, or in case of "there being no medical officer of the district, it shall be lawful for the Governor to appoint a "medical officer to such hospital at such salary as the Governor may decide; provided always, that "such salary does not exceed the sum of One hundred pounds per annum," shall be and the same are hereby repealed.

Governor may from time to time alter and determine Medical Districts.

II. The Governor shall have power by proclamation to appoint, and from time to time to alter and determine the medical district or districts for the treatment of the yaws disease in this Presidency.

A Medical Superintendent to be appointed.

III. The Governor shall have power from time to time to appoint a medical superintendent at a salary not exceeding Two hundred pounds per annum, who shall have the entire charge, management, and supervision of the yaws hospitals and the inmates thereof, and the medical superintendent so appointed shall have and exercise the same powers and authority as are vested in or upon the district medical officers under the provisions of the "Yaws Act, No. 17 of 1875."

Provisions of Section xx. Yaws Act, 1875, extended to 31st December, 1878.

IV. The provisions of the twentieth section of the "Yaws Act" for raising means for carrying out the objects of the Act shall be, and the same are hereby extended and continued to the thirty-first day of December, One thousand eight hundred and seventy-eight.

Passed the Legislative Assembly the fifteenth day of March, 1877.

H. A. Seignoret,
Clerk Legislative Assembly.

Dated at St. Kitts the tenth day of April, 1877, in the Fortieth year of Her Majesty's Reign.

Duly published in the town of Roseau, the nineteenth day of April, A.D. 1877.

Jos. Fadelle,
Pro. Marshal.

Rules and Regulations for the internal management of the Yaws Hospital framed under authority of the Yaws Act No. 17, 1875.

1. The hospitals are under the management and supervision of the Medical Superintendent of Yaws Hospitals.

2. The medical superintendent shall have the power of dismissing any officer, nurse or servant for breach of duty.

3. The medical officer shall visit the hospital twice a week and oftener if necessary.

4. The master shall reside in the hospital, and he shall not absent himself from his duty without special permission from the medical superintendent.

5. He shall keep a register of patients in which shall be recorded the name, age, sex, country, usual place of residence, previous occupation, time affected, treatment, result, date of admission, and date of discharge or death of each patient.

6. The master shall be responsible for the cleanliness and general discipline of the hospital, and shall have control over the nurses and servants employed therein.

7. The master shall keep an account of all stores received and issued, and of all bedding and clothing, and other articles issued in the hospital, and shall be held responsible for the proper disposal of such stores, bedding, clothing, and other articles.

8. The matron, nurses, and servants shall reside in the hospital, and shall not absent themselves from duty without special permission from the medical superintendent or master.

9. All lights shall be extinguished at 7.30 p.m., except when otherwise allowed by the medical superintendent.

10. No inmates shall be allowed to go beyond the bounds of the hospital.

11. Inmates shall not be allowed to receive visits from their friends or relations except by permission of the medical superintendent or master.

12. Inmates are not allowed to leave their wards between sunset and sunrise without special permission.

13. All inmates must follow out rigidly the medical treatment prescribed for them, and they must obey the officers and nurses.

14. All inmates are to behave themselves in an orderly manner, and in conversation they are not to speak noisily.

15. All complaints are to be referred to the master for decision, but there shall in all cases be an appeal from the decision of the master to the medical superintendent.

16. All the inmates are to be cleanly in person and habits, and are to assist the various officers when called upon to do so by the medical superintendent or master.

(signed) *H. A. Alford Nicholls*, M.D.,
22 January, 1881. Medical Superintendent, Yaws Hospital.

ST. LUCIA.

Yaws Prevention Ordinance, 1881.

(No. 64.)

31 December, 1881.

An Ordinance enacted by the Governor, with the advice and consent of the Legislative Council of St. Lucia, to prevent the Spreading of the Disease called "Yaws."

Short title.

1. This Ordinance may be cited as the Yaws Prevention Ordinance, 1881.

Interpretation of terms.

2. In this Ordinance, unless the context otherwise requires, "medical officer" means a medical officer appointed under the Medical Aid and Poor Relief Ordinance, 1871. "Hospital" means the hospital for the treatment of yaws patients established under this Ordinance.

The Yaws Hospital.

Providing of Hospital for Yaws patients.

3. The Governor shall procure, or cause to be erected, a suitable building to be used as a hospital for the reception of yaws patients, at such place as may be determined by the Governor in Council, and such hospital shall, if practicable, be enclosed within a boundary wall or paling.

Person in charge of the Hospital.

4. The colonial surgeon, or such other medical officer as may be appointed by the Governor, shall have charge of the hospital.

Appointment and salary of Keeper, &c., of the Hospital.

5. The colonial surgeon, or other medical officer in charge of the hospital, may from time to time appoint such keeper, nurses, and servants (approved by the Governor) as he may deem necessary for the hospital; and such keeper, nurses, and servants shall respectively be paid such salaries or wages as may be fixed by the Governor in Council.

Making of rules and regulations for the Hospital.

6. It shall be lawful for the colonial surgeon from time to time to frame such rules and regulations for the internal management of, and for securing cleanliness in, the hospital as he may deem proper, and such rules and regulations shall, when confirmed by the Governor in Council, have the force of law.

Persons suffering from Yaws.

Power to require person suffering from Yaws to go to the Hospital.

7. It shall be lawful for any medical officer, magistrate, minister of religion, or police or other constable, to require any person whom he may have reasonable cause to believe to be suffering from yaws, to repair, or be removed, in case of inability to repair thither, to the hospital.

Power to arrest and convey person suffering from Yaws to the Hospital.

8. It shall be lawful for any medical officer or magistrate who has reason to believe that any person suffering from yaws is in any house or place, to enter such house or place in the daytime to search for such person, or to issue a written authority to any police or other constable so to do: and if such person is found therein by such medical officer, magistrate, or police or other constable, such medical officer, magistrate, or police or other constable shall arrest and convey such person, or cause such person to be arrested and conveyed, to the hospital, there to be kept under treatment until he is cured of such disease.

Offences.

Punishment of person suffering from Yaws for doing certain things.

9. Every person suffering from yaws who—

(1.) Refuses to go or to be conveyed to the hospital; or

(2.) Leaves the hospital before being cured, or without the permission of the colonial surgeon or other medical officer in charge of the hospital; or

(3.) Bathes himself, or washes his clothing, in any river or stream, except at such place as may be appointed for such purpose by the colonial surgeon, shall, on being convicted thereof, be liable to imprisonment, with or without hard labour, for any term not exceeding three months.

10. Every person who— Penalty of person harbouring, &c., yaws patient.

(1.) Harbours or conceals, or removes, entices away, or receives, any person suffering from yaws who is under treatment in the hospital; or

(2.) Enters or visits the hospital without the sanction of the colonial surgeon or other medical officer in charge of the hospital, shall, on being convicted thereof, be liable to a penalty not exceeding five pounds.

11. Every inmate suffering from yaws who leaves the hospital without the permission of the colonial surgeon, or other medical officer in charge of the hospital, shall be arrested in any house or place in which he may be found by any police or other constable, and conveyed to the hospital. Arrest of Yaws patient quitting the hospital without leave.

12. Every person who obstructs or molests any person empowered to act under this Ordinance, in the execution of any duty imposed upon him by this Ordinance, shall, in any case which is not otherwise provided for, be liable, on being convicted thereof, to a penalty not exceeding five pounds. Penalty on person obstructing person acting under the Ordinance &c.

13. Every person who violates, or fails to comply with, any of the provisions of this Ordinance, or with any rule or regulation made under this Ordinance, shall, in any case which is not otherwise provided for, be liable, on being convicted thereof, to a penalty not exceeding five pounds. General penalty for contravention of the Ordinance, &c.

Miscellaneous.

14. Whenever it is made to appear to any medical officer that any child under the age of sixteen years, whose parent, or any other person whose wife, or husband, or parent, is able to provide for the medical care and treatment of such child or other person in the hospital, it shall be lawful for such medical officer to direct any police, or other constable, to prefer a charge or suit, before the magistrate against such parent, husband, or wife, for the amount of cost of such medical care and treatment, provided that the amount claimed shall not exceed one shilling per diem; and it shall be lawful for such magistrate, if he is satisfied as to the ability of such parent, husband, or wife to pay such amount, to order such parent, husband, or wife to pay the same, and, in default of payment, the magistrate may cause the same to be levied by distress on the goods and chattels of such parent, husband, or wife, and, if no sufficient distress can be had, may commit such parent, husband, or wife to the Royal Gaol for any term not exceeding one month, unless such amount and all costs shall be sooner paid and satisfied. Compelling parent, &c., to provide for child, &c., suffering from Yaws.

15. It shall be lawful for the Governor in special cases, on the recommendation of the colonial surgeon, to sanction, under certain condition the segregation of persons suffering from yaws, who may be under the treatment of any duly qualified medical practitioner. Segregation of persons suffering from yaws.

16. All sums and penalties imposed by this Ordinance may be sued for and recovered by any police or other constable, and, when recovered, shall be paid into the Treasury for the use of the Colony. Provided that the Governor may award any portion, not exceeding one moiety, of any penalty, when recovered, to any person who has afforded such information as has led to a conviction. Recovery and appropriation of penalties.

17. It shall be lawful for the Governor in Council from time to time, by Proclamation, to suspend the operation of this Ordinance, or of any part thereof, and for such period of time as may be deemed expedient, and again to revive the same or any part thereof. Power to the Governor in Council to suspend the Ordinance.

Regulations for the Management of the Yaws Hospital.

Framed under Section 6 of "The Yaws Prevention Ordinance, 1881."

Colonial Surgeon.

1. The institution shall be under the general supervision and control of the colonial surgeon, who shall also be the consulting medical officer.

2. He shall visit the institution as often as may be necessary.

3. All requisitions, on being made in writing by the medical officer in charge, must be submitted to the colonial surgeon, who will forward them with the necessary comments for the Governor's consideration.

4. In the absence of the colonial surgeon, the colonial assistant surgeon, resident in Castries, shall attend when assistance may be required by the medical officer in charge.

Medical Officer in Charge.

5. He shall have the immediate care and management of the institution and inmates—patients and staff. He shall see that good order and cleanliness are maintained, and that the keeper, nurses, and servants are attentive to their duties.

6. He shall visit daily and, so far as practicable, not later than 9 a.m., and at such other times as urgency may require. He shall, when called upon, accompany the colonial surgeon when visiting the institution.

7. He shall examine and verify the nature of the disease of each person, on his first visit after their admission. He shall carry out all suggestions in the treatment of patients that may at any time be given by the colonial surgeon, but shall otherwise have the immediate care and treatment of all patients.

8. He shall daily visit each inmate, superintending and instructing the nurses in dressing and bandaging of ordinary sores, &c., giving his personal attention to the more serious cases.

9. He shall keep case books, registers, &c., as may be found necessary and make such returns as may from time to time he shall be called for by the colonial surgeon.

Keeper.

10. He shall reside in the quarters allotted to him, and on no pretext absent himself from the premises without the special permission of the medical officer in charge. He shall be responsible for the cleanliness and good order of buildings, out offices and grounds; that discipline and good order prevail on the part of nurses, servants, and inmates, at once checking any irregularity or disorder that may be observed and reporting the same to the medical officer.

11. He shall visit the wards frequently by day and the male wards occasionally by night.

12. He shall accompany the medical officer on his visits, assisting in dressing and bandaging, when necessary, distributing and administering all medicines, spirits, &c., that may be ordered, and seeing that the medical officer's instructions are fully carried out.

13. He shall keep such books as may from time to time be found necessary.

14. On the expressed desire of any inmate to see a clergyman, he shall at once communicate the same to the desired clergyman, stating whether the case be urgent or otherwise.

Head Nurse.

15. She shall reside in the quarters provided for her, and shall not absent herself from the asylum on any pretext, without special permission from the medical officer.

16. She shall frequently visit the female wards by day, and occasionally by night, and see that the wards and bedding are clean and in good order.

17. She shall attend the medical officer on his visits, bringing the special condition of any patient since previous visit to his notice, assist in dressing and bandaging, distribute and administer such medicines, spirits, &c., as may be ordered; see that all the medical officer's instructions are carried out, and pay special attention to the sick and bed-ridden.

18. On the expressed desire of any inmate to see a minister of religion, she shall at once report the same to the keeper.

Assistant Nurses, Servant, and Cook.

19. They shall obey all orders of the keeper and head nurse, be diligent in their duties, kind and attentive to the sick, see that good order prevails, assist in maintaining it, and report the occurrence of any irregularities to the keeper.

20. They shall for any misconduct or disobedience, not punishable by dismissal, be liable to a fine for each offence not exceeding four days' pay, to be imposed by the medical officer in charge, subject to the sanction of the colonial surgeon.

Inmates.

21. Inmates must be cleanly in person and habit, orderly in conduct, and decent in conversation: they must submit to the medical treatment prescribed for them; they must obey the officers and nurses; they must not stray beyond the bounds of the Asylum nor receive friends or relations except by permission of the medical officer. The introduction of spirits or selling or battering provisions will on no account be allowed.

22. All inmates who in the opinion of the medical officer, are able to do so, must assist in the washing of clothing, wards, galleries, general cleaning and cutlassing of grounds and other petty duties tending to their own comfort and well being.

23. All complaints are to be referred to the medical officer and an appeal may be made from his decision to the Colonial Surgeon, or for representation, if so desired, to the Governor.

Confirmed by the Governor in Council this 3rd day of July 1889.

J. B. Cropper, Clerk of Councils.

GRENADA.

No. 2.—1883.

An Ordinance enacted by the Governor by and with the advice and consent of the Legislative Council of the Island of Grenada and its Dependencies.

[L.M.S.]

I assent,
William Robinson, Governor-in-Chief.

4th April, 1883.

Title. *To prevent the spreading of the disease called Yaws.*

Preamble. Whereas the disease called yaws is spreading in this colony, and it is necessary that provision should be made for arresting its progress, and, if possible, for extirpating the disease: Be it therefore enacted by the Governor, by and with the advice and consent of the Legislative Council of the Island of Grenada and its Dependencies, as follows:

Short title. 1. This Ordinance may for all purposes be cited as "The Yaws Prevention Ordinance, 1883."

Commencement of Ordinance. 2. This Ordinance shall come into operation and take effect from and after the date of the proclamation thereof.

Construction of terms. 3. In this Ordinance, unless modified by the context, the following words shall have the meanings assigned to them; that is to say, "medical practitioner" means any person qualified as a medical practitioner under the Imperial Acts 21 & 22 Vict., c. 90. "Minister of religion" means any clergyman or minister of any denomination; "hospital" means any building set apart for the treatment of yaws patients under this Ordinance.

4. The governor shall procure or cause to be erected suitable buildings to be used as hospitals for the reception of yaws patients at such a place as may from time to time be determined upon by the governor in executive council, and such hospitals shall, where necessary, be enclosed within a boundary wall or paling. Governor to procure buildings for Yaws Hospitals.

5. The colonial surgeon and such other medical officers as may from time to time be appointed by the governor shall have charge of the hospitals. Col. Surgeon and other officers to have charge of Hospitals.

6. It shall be lawful for the colonial surgeon to frame such rules and regulations, and from time to time to alter or amend the same, or to substitute others in lieu thereof, for the internal management of the hospitals, as he may deem proper, and such rules and regulations shall, when confirmed by the Governor in Executive Council, have the force of law. Colonial Surgeon to frame rules and regulations.

7. The colonial surgeon is empowered to appoint such keepers, nurses, and servants approved by the Governor as he may deem necessary for the hospitals, and such keepers, nurses, and servants shall be paid such wages as may be fixed by the Governor in Executive Council. Appointment of keepers, nurses and servants.

8. It shall be lawful for any medical officer, justice of the peace, minister of religion, or police or other constable to order any person whom he may have reasonable cause to believe to be suffering from yaws, to repair to, or in the event of refusal, to be removed to a hospital. Medical Officer, Justice of the Peace, &c., empowered to order removal to Hospital of Yaws Patients.

9. It shall be lawful for any medical officer or justice of the peace who has reason to believe that any person suffering from yaws is in any house or place, to enter such house or place, by force if necessary, at any time to search for such person, or to issue a written authority to any police or other constable so to do, such written authority to be in the form contained in the schedule to this Ordinance annexed, or to the like effect; and if such person shall be found therein by such medical officer, justice of the peace, police or other constable, such medical officer, justice of the peace, police or other constable, shall arrest and convey such person, or cause such person to be arrested and conveyed to the hospital, there to be kept under treatment until such person shall be cured of such disease. Medical Officer, or Justice of the Peace to enter house to search for Yaws Patients.

10. Every person suffering from yaws who shall leave any hospital before being cured, or who shall bathe himself or wash his clothing in any river or stream, except at such place or places as shall be appointed for such purpose by the colonial surgeon, shall be arrested wherever he may be found by any police or other constable, and conveyed back to the hospital, and shall on conviction for every such offence be liable to be imprisoned for any term not exceeding three calandar months, with or without hard labour. Penalty on Patients leaving Hospital or washing clothes at unpermitted places.

11. Every person who shall harbour or conceal, or who shall remove or entice away, or receive any person suffering from yaws who shall be under treatment in any hospital, or who shall enter or visit any hospital, without the sanction in writing of the colonial surgeon or other medical officer in charge of any such hospital, shall, on conviction for every such offence, be liable to a penalty not exceeding five pounds. Penalty on persons harbouring, or enticing away patients, or entering hospitals without leave.

12. It shall be lawful for the Governor in special cases, on the recommendation of the colonial surgeon to sanction, under certain conditions, the segregation of persons suffering from yaws who may be under the treatment of any duly qualified medical practitioner. Segregation of Yaws Patients.

13. Whenever it shall be made to appear to any medical officer that any person suffering from yaws, or the parent of any child under the age of 16 years, or the wife, husband, or parent of any other person who shall be so suffering is able to provide for the medical care and treatment of himself or such child or other person in the hospital, it shall be lawful for such medical officer or some one appointed by him for that purpose, to prefer a charge or suit before any police magistrate against any such person as aforesaid for the amount of the cost of such medical care and treatment, and it shall be lawful for such magistrate, if satisfied of the ability of such person as aforesaid to pay such amount, to order such person as aforesaid to pay the same, together with all costs. Cost of medical care of patients in hospitals, how provided for.

14. It shall be lawful for the Governor from time to time to cause to be framed rules and regulations for the carrying out the provisions of this Ordinance, including the compulsory registration of all houses in which there may be persons suffering from yaws, and such rules and regulations when approved by the Governor-in-Council and published in the Gazette shall have the force of law. Power for Governor in Council to approve of Rules and Regulations.

15. Any person suffering from yaws who shall commit any of the offences in this Ordinance mentioned, may be tried before the police magistrate of the district in which the hospital where such person may be is situated, and such trial shall take place at such hospital or at any other place appointed for that purpose by the Governor, and where an order of imprisonment is made against any person so offending, such imprisonment shall commence at such time as in the opinion of the medical officer the person so convicted is fit to undergo the same. Persons suffering from Yaws how tried and punished.

16. Every person who shall obstruct or molest any person empowered to act under this Ordinance in the execution of any duty imposed upon him by this Ordinance, shall on conviction be liable to a penalty not exceeding twenty pounds. Penalty for obstruction in execution of duty.

17. Every person who shall violate or fail to comply with any of the provisions of this Ordinance, or with any rules or regulations made under this Ordinance, shall, when not otherwise provided for, be liable to a penalty not exceeding twenty pounds. Penalty for breach of provisions of Ordinance or rules.

18. All sums and penalties imposed by this Ordinance may be sued for and recovered by any medical officer or any person appointed by him for that purpose under the provisions of the "Justices of the Peace Procedure Ordinance, 1879," or any Ordinance amending the same, and when recovered shall be paid to the treasurer for the public uses of the colony. Provided that the Governor may award any sum not exceeding one moiety of any fine when recovered to any person who shall have afforded such information as shall have led to a conviction. Procedure.

Power to suspend ordinance.

19. It shall be lawful for the Governor in Executive Council from time to time by Proclamation to suspend the operation of this Ordinance or any part thereof, and for such period of time as may be deemed expedient, and to again revive the same or any part thereof.

SCHEDULE.

Whereas I the undersigned have reason to believe that of at present suffering from the disease known as yaws, is in a house situated at in the parish of . This is to authorise you to enter the said house (by force if necessary); at any time to search for the said and to apprehend the said and safely have conveyed to the yaws hospital situate at there to be kept under treatment until the said shall be cured of such disease.

Medical Officer.

a Justice of the Peace.

Passed in Council this twenty-second day of February, in the year of Our Lord one thousand eight hundred and eighty-three.

C. Falconer Anton,
Clerk of Councils.

Duly proclaimed in the town of St. George, in the Island of Grenada, this sixth day of March, in the year of Our Lord one thousand eight hundred and eighty-three, and in the Forty-sixth year of Her Majesty's reign.

Henry Sharpe,
Provost Marshal.

SAINT VINCENT.

THE YAWS PREVENTION ORDINANCE, 1885.

(No. 5—of 1885.)

ANALYSIS.

1. Short title and commencement.

2. Construction of terms.

3. Governor to procure buildings for yaws hospitals.

4. Colonial surgeon and medical officers to have charge of hospitals.

5. Colonial surgeon to frame regulations.

6. Appointment of keepers, nurses, and servants.

7. Medical officer, justice of the peace, &c., empowered to order removal to hospital of persons believed to be suffering from yaws.

8. Medical officer or justice of the peace to enter house to search.

9. Penalty on patients leaving hospital or washing clothes at unpermitted places.

10. Penalty on persons harbouring or enticing away patients or entering hospitals without leave.

11. Segregation of yaws patients under private treatment.

12. Recovery of cost of medical care of patients in hospitals.

13. Power for Governor-in-Council to frame regulations.

14. Persons suffering from yaws, how tried and punished.

15. Penalty for obstructing persons in the execution of their duty.

16. Penalty for breach of provisions of Ordinance or regulations.

17. Procedure.

18. Power to suspend Ordinance.

SCHEDULE.

SAINT VINCENT.

No 5—of 1885.

An Ordinance to prevent the spreading of the disease called Yaws.

13th May, 1885

I assent,
William Robinson, Governor-in-Chief.
4th June, 1885.

Preamble. Whereas the disease called yaws is spreading in this colony, and it is necessary that provision should be made for arresting its progress and, if possible, for extirpating the disease. Be it therefore enacted by the Governor with the advice and consent of the Legislative Council of Saint Vincent, as follows:—

Short title and commencement. 1. This Ordinance may be cited as "The Yaws Prevention Ordinance, 1885," and shall come into force on its publication in the "Government Gazette."

Construction of terms. 2. In this Ordinance, unless modified by the context—

"Minister of religion" means any clergyman or minister of any denomination.

"Hospital" means any building set apart for the treatment of yaws patients under this Ordinance.

"Constable" includes any police or other constable.

Governor to procure buildings for Yaws Hospitals. 3. The Governor shall procure or cause to be erected suitable buildings to be used as hospitals for the reception of yaws patients at such place or places as may from time to time be determined upon by the Governor-in-Council, and such hospitals shall where necessary be enclosed within a boundary wall or paling.

Colonial Surgeon and Medical Officers to have charge of Hospitals. 4. The colonial surgeon and such other medical officers as may from time to time be appointed by the Governor shall have charge of the hospitals.

Colonial Surgeon to frame regulations. 5. It shall be lawful for the colonial surgeon to frame regulations, and from time to time to rescind, add to, or amend the same for the internal management of the hospitals, and such regulations shall, when confirmed by the Governor-in-Council, have the force of law.

Appointment of keepers, nurses, and servants. 6. The colonial surgeon shall appoint such keepers, nurses, and servants approved by the Governor as he may deem necessary for the hospitals, at such wages as shall from time to time be fixed by the Governor-in-Council.

Medical Officer, Justice of the Peace, &c., empowered to order removal to Hospital of persons believed be suffering from Yaws. 7. It shall be lawful for any medical officer, justice of the peace, minister of religion, or constable to order any person whom he may have reasonable cause to believe to be suffering from yaws to repair to, or in the event of refusal, to be removed to any hospital.

Medical Officer, or Justice of the Peace to enter house to search. 8. It shall be lawful for any medical officer or justice of the peace who has reason to believe that any person suffering from yaws is in any house or other place whatsoever, to enter such house or place at any time, and by force, if necessary, to search for such person or to issue a written authority in the form in the schedule to this Ordinance, or to the like effect to any constable so to do, and if any person shall be found therein who in the opinion of the medical officer or justice of the peace is suffering from yaws, such person may be arrested and conveyed to any hospital, there to be kept under treatment until cured of the disease.

Penalty on Patients leaving Hospital or washing clothes at unpermitted places. 9. Every person suffering from yaws who shall leave any hospital before being cured, or who shall, whilst under treatment, bathe himself or wash his clothing in any river or stream, except at such place or places as shall be appointed for such purpose by the colonial surgeon, shall be arrested wherever he may be found by any constable and conveyed back to the hospital, and shall on conviction for every such offence be liable to be imprisoned for any term not exceeding three calendar months with or without hard labour.

Penalty on persons harbouring or enticing away patients or entering Hospitals without leave. 10. Every person who shall harbour or conceal, or who shall remove, entice away, or receive any person suffering from yaws who shall be under treatment in any hospital, or who shall enter or visit any hospital without the sanction in writing of the colonial surgeon or medical officer in charge, shall for every such offence be liable on summary conviction to forfeit a penalty not exceeding five pounds and in default of payment to be imprisoned with or without hard labour for any term not exceeding three calendar months.

Segregation of Yaws patients under private treatment. 11. It shall be lawful for the governor in special cases on the recommendation of the colonial surgeon to sanction, under certain conditions, the segregation of persons suffering from yaws, who may be under the treatment of any duly qualified medical practitioner.

Recovery of cost of medical care of patients in hospitals. 12. Whenever it shall be made to appear to the medical officer in charge of any hospital that any patient under treatment in hospital, or the parent, husband, wife, or child of any such patient is able to provide for his or her medical care and treatment, it shall be lawful for such medical officer, or some one appointed in writing by him for that purpose from time to time, to prefer a complaint before the police magistrate of the district, in which such hospital is situated against any of such persons to recover the cost of such medical care and treatment, and it shall be lawful for such magistrate, if satisfied of the ability of the person complained to order such person to pay the same, and the like proceedings shall be had thereon as for the recovery of a small debt under the provisions of "The Small Debts Ordinance, 1879."

Power for Governor in Council to frame Regulations.

13. It shall be lawful for the Governor-in-Council to frame Regulations, and from time to time to rescind, add to, or amend the same for carrying out the provisions of this Ordinance, including the compulsory registration of all houses in which there may be persons suffering from yaws, and such regulations when published in the Government Gazette shall have the force of law.

Persons suffering from Yaws, how tried and punished.

14. Any person suffering from yaws, who shall commit any of the offences in this Ordinance mentioned, may be tried before the police magistrate of the district, in which the hospital where such person may be is situated, and such trial shall take place at such hospital, or at any other place appointed for that purpose by the governor and where an order of imprisonment is made against any person so offending, such imprisonment shall commence at such time as in the opinion of the medical officer, the person so convicted is fit to undergo the same.

Penalty for obstructing persons in execution of duty.

15. Every person who shall obstruct or molest any person empowered to act under this Ordinance in the execution of any duty imposed upon him by this Ordinance, shall be liable on summary conviction to forfeit a penalty not exceeding 20 *l.*, and in default of payment to be imprisoned with or without hard labour for any term not exceeding six calendar months.

Penalty for breach of provisions of Ordinance or regulation

16. Every person who shall commit a breach of any of the provisions of this Ordinance, or any regulations made under this Ordinance, shall, when not otherwise provided for, be liable on summary conviction to forfeit a penalty not exceeding 20 *l.*, and in default of payment to be imprisoned, with or without hard labour, for any term not exceeding six calendar months.

Procedure.

17. All penalties imposed by this Ordinance may be sued for, and recovered by any medical officer, or any persons appointed by him for that purpose, under the provisions of "The Summary Procedure Act, 1853," or any Ordinance amending the same, and when recovered shall be paid to the treasurer for the public uses of this colony.

Provided that the Governor may award any sum not exceeding one moiety of any fine when recovered to any person who shall have afforded such information as shall have led to a conviction.

Power to suspend Ordinance.

18. It shall be lawful for the Governor-in-Council from time to time to suspend the operation of this Ordinance, or any part thereof, and for such period of time as may be deemed expedient, and to again revive the same, or any part thereof, and notice of such suspension or revival shall be published in the "Government Gazette."

SCHEDULE.

SAINT VINCENT.

WHEREAS I, the undersigned, have reason to believe that of at present suffering from the disease known as yaws, is in a certain place to wit situated at in the parish of

This is to authorise you to enter the said place (by force, if necessary) at any time to search for the said and to apprehend the said and safely convey to the Yaws Hospital, situated at there to be kept under treatment, until the said shall be cured of such disease.

Dated this day of 18 .

Medical Officer, or Justice of the Peace.

Passed the Legislative Council the 24th day of April, 1885, and published in the "Government Gazette," this 4th day of June, 1885.

C. Fitzroy Clements, Clerk of Council.

TOBAGO.

(No. 3 of 1889.)

A REGULATION to make provision for the treatment of persons suffering from Yaws.

2nd August, 1889. *Henry Fowler*, Administrator.

30th August, 1889.

Be it enacted by the Commissioner of Tobago with the advice and consent of the Financial Board thereof as follows:—

Short title.

1. This Regulation may be cited as "The Yaws Suppression Regulation, 1889."

Interpretation.

2. In this Regulation the words "Medical Officer" means a medical officer appointed under "The Medical Aid Ordinance 1882."

Medical Officer to furnish gratuitous advice and medicine.

3. The medical officer in charge of each district shall furnish gratuitously advice and medicine to all persons suffering from yaws within his district, such medicine to be supplied to him, on his requisition for the same being approved by the Commissioner, from the Colonial Hospital.

The medical officer shall appoint stations.

4. The medical officer in charge of each district shall from time to time with the consent of the Commissioner appoint places and hours at which all persons suffering from yaws shall attend for treatment.

Personal attendance at stations or the sending a report to be compulsory on Yaws patients.

5. Every person over fifteen years of age suffering from yaws who shall neglect to attend for treatment at such times and places as the medical officer shall direct or being incapacitated by

illness or otherwise shall fail to send or cause to be sent a report as to his condition at such said times and places or who shall wilfully and persistently neglect to carry out the instructions of the medical officer as to the treatment or who shall bathe himself or his clothes in any river, pool, or stream except at such place or places as may be appointed for such purpose by the district medical officer shall on conviction before a stipendiary justice of the peace be liable to be imprisoned with or without hard labour for any term not exceeding three months.

Bathing forbidden except at selected places.

6. Every person being the father or mother of any legitimate child under fifteen years of age or the mother of any illegitimate child under fifteen years of age or any person having the custody or guardianship of any child under fifteen years of age who shall fail whenever such child is suffering or is suspected to be suffering from yaws to bring or cause to be brought such child to the district medical officer of the district in which such child resides, and in case such child cannot be brought, to give, or cause to be given a report respecting such child to such district medical officer, at such places and hours as the medical officer shall appoint, and to continue to bring, or cause to be brought, or to give or cause to be given a report respecting such child at such subsequent places and hours as the medical officer shall direct, or who shall wilfully and persistently neglect to carry out the instructions of the medical officer as to the treatment of such child, or who shall bathe, or permit to be bathed, any such child, or the clothes of any such child, in any river, pool, or stream, except in such place, or places, as the district medical officer shall direct, shall, on conviction before a stipendiary justice of the peace, be liable to be imprisoned, with or without hard labour, for any term not exceeding three months.

Parents and guardians responsible for children up to fifteen years.

7. It shall be lawful for any medical officer, or justice of the peace, who has reason to believe that any person suffering from yaws is in any house, or place, and wilfully evading treatment, to enter such house, or place, in the daytime to search for such person, or to issue a written authority to any police or other constable so to do, and if such person be found therein, by such medical officer, justice of the peace, police or other constable, such medical officer, justice of the peace, police or other constable, shall arrest, or cause such person to be arrested, and any such person so concealing himself and wilfully evading treatment; shall, on conviction before a stipendiary justice of the peace be liable to be imprisoned, with or without hard labour, for any term not exceeding three months.

Medical officer or Magistrate to enter house to search for yaws patients.

8. Every person who shall harbour or conceal any person suffering from yaws, and so enable such person to evade treatment, shall, on conviction before a stipendiary justice of the peace, for every such offence be liable to a penalty not exceeding five pounds.

Penalty on persons harbouring or concealing yaws patients.

9. Every person who shall obstruct or molest any person empowered to act under this regulation in the execution of any duty imposed on him by this regulation shall, on conviction (when not otherwise provided for) be liable to a penalty not exceeding five pounds.

Penalty for obstructing or molesting.

10. Any penalty recoverable under this regulation may be recovered before any stipendiary justice of the peace in a summary way, and in the event of the same not being paid forthwith the stipendiary justice may order the party liable to pay the same to be imprisoned, with or without hard labour, for any term not exceeding three months, unless such penalty and the costs of recovering the same and the charges of commitment, and conveying the party to prison (the amount of such costs and charges being stated in the commitment) be sooner paid; and when recovered such penalty shall be paid to the treasurer for the use of the island: Provided that the commissioner may award any sum not exceeding one-half of any such penalty when recovered to any person who shall have afforded such information as shall have led to a conviction.

Procedure.

11. It shall be lawful for the commissioner by proclamation to suspend the operation of this regulation, or any part thereof, and for such period of time as may be deemed expedient, and again to revive the same or any part thereof.

Power to suspend Regulation.

12. Nothing contained in this regulation shall interfere with the right of any person suffering from yaws to obtain medical aid from any duly qualified medical practitioner registered under the Medical Registration Ordinance 1885, and any person while under treatment shall be exempt from the operation of this regulation.

Patients to have right to consult Medical Practitioners other than District Medical Officer.

Passed the Financial Board this Eighteenth day of July in the Year of Our Lord One thousand eight hundred and eighty-nine.

James A. P. Bowhill, Provisional Clerk of the Board.

(E.)

HOSPITAL AND GAOL DIETARIES.

Colonial Hospital, Tobago.

Ordinary Diet.

Early Tea, 7 a.m.:—

Daily.—½ lb. of bread, 3 ozs. molasses in 1 pint tea, ½ oz. chocolate.

Breakfast, 10 a.m.:—

Monday, Wednesday, Thursday and Saturday.—¼ lb. salt fish, 1 lb. vegetables, ⅙ oz. butter, 4 ozs. molasses.

Tuesday.—¼ lb. salt fish, ½ lb. rice, ⅙ oz. butter, 4 ozs. molasses.

Friday.—¼ lb. salt fish, ½ lb. cornmeal boiled into coucou, ⅙ oz. butter, 4 ozs. molasses.

Sunday.—¼ lb. salt fish, 4 ozs. crackers, ¾ lb. vegetables, ⅓ oz. butter, 4 ozs. molasses.

Dinner, 4 p.m. :—
Monday, Friday and Saturday.—½ lb. salt fish, 1½ lbs. vegetables, ½ oz. butter.
Tuesday.—½ lb. mutton, 1½ lbs. vegetables, 1 oz. barley.
Wednesday.—½ lb. salt fish, ½ lb. cornmeal boiled into coucou, ½ oz. butter.
Thursday.—½ lb. fresh pork, 1½ lbs. vegetables, 1 oz. barley
Sunday.—½ lb. fresh beef, 1½ lbs. vegetables, 1 oz. barley.

Colonial Hospital, St. Vincent.

Convalescent Diet.

Extra Full.

6.30 a.m.—Tea, ⅛ oz.; milk, 6 ozs.; sugar, ¾ oz. to make 1 pint; bread, 4½ ozs.
10 a.m.—Milk, 6 ozs.; cocoa, ¾ oz.; sugar, 1 oz. to make 1 pint; bread, 9 ozs.; fish, salted, 4 ozs ; butter, ½ oz.
2 p.m.—Soup: meat, 4 ozs.; vegetables, 4 ozs. to make 1 pint.
Meat, cooked, 8 ozs.; vegetables, 1 lb.; bread, 4½ ozs.
6 p.m.—Tea, ⅛ oz.; milk, 6 ozs.; sugar, ¾ oz. to make 1 pint; bread, 4½ ozs.

Full.

6.30 a.m.—Tea, ⅛ oz.; milk, 2 ozs.; sugar, ¾ oz. to make 1 pint; bread, 4½ ozs.
10 a.m.—Milk, 2 ozs.; cocoa, ¾ oz.; sugar, 1 oz. to make 1 pint; bread, 4½ ozs.; fish,* salted, 4 ozs.
2 p.m.—Soup: meat, 4 ozs.; vegetables, 2½ ozs. to make 1 pint.
Meat,† cooked, 4 ozs.; vegetables, 12 ozs.; bread, 4½ ozs.; or rice, flour, cornmeal or farine, 3 ozs.
6 p.m.—Tea, ⅛ oz.; milk, 2 ozs.; sugar, ¾ oz. to make 1 pint; bread, 4½ ozs.

Middle.

6.30 a.m.—Tea, ⅛ oz.; milk, 2 ozs.; sugar, ¾ oz. to make 1 pint; bread or biscuits, 2½ ozs.
10 a.m.—Milk, 2 ozs.; cocoa, ½ oz.; Sugar, 1 oz. to make 1 pint; bread, 4½ ozs,; egg, 1 ; butter, ¼ oz.
2 p.m.—Soup: meat, 2 ozs.; vegetables, 2½ ozs. to make ¾ pint.
Meat,‡ cooked, 4 ozs.; vegetables, 8 ozs.; bread, 4½ ozs.; or rice, flour, cornmeal or farine, 3 ozs.
6 p.m.—Tea, ⅛ oz.; milk, 2 ozs.; sugar, ¾ oz. to make 1 pint; bread, 2½ ozs.

Colonial Hospital, St. Lucia.

High Diet.

Breakfast, 8.30 a.m.—Bread, ½ lb.; chocolate, 1 pint.
Dinner, 2 p.m.—Meat-soup, 1 pint; meat, without bone, ¼ lb.; vegetables, 1 lb., cooked.
Supper, 6 p.m.—Bread, ¼ lb.; chocolate, 1 pint.

Middle Diet.

Breakfast.—Bread ½ lb.; tea, 3 gills.
Dinner.—Meat soup, 1 pint.
Rice or vegetables, 1 lb., cooked; or farine, 6 ozs.; salt fish, ¼ lb.; olive oil, ½ oz.
Supper.—Bread, ¼ lb.; tea, 3 gills.

Low Diet.

Breakfast.—Bread, ½ pound; or arrowroot, in lieu, ½ pint; milk, 1 pint.
Dinner.—Bread, ¼ lb.; meat-soup or arrowroot, 1 pint.
Supper.—Bread, ¼ lb.; milk, 1 pint.

Chocolate shall contain ¾ oz. of well-ground cocoa, 4 ozs. of milk, and 1½ ozs. of sugar in every pint.
Tea shall consist of hot water and sugar, flavoured.
Arrowroot shall contain 1½ ozs. of starch in every pint.
Meat-soup shall consist of 2 ozs. pork, 3 lbs. meat, 20 ozs. pumpkin, 8 ozs. rice, 1 d. seasoning, salt and pepper as required, to every 20 pints.
1 pound cooked rice shall contain 4 ozs. raw rice.
N.B.—4 ozs. of bread, or 4 ozs. of farine extra, will be allowed to patients for work.

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* On Wednesdays and Fridays, instead of fish, butter, ½ oz.
† On Wednesdays and Fridays, instead of meat, fish, 6 ozs.
‡ On Wednesdays and Fridays, instead of meat, fish, 5 ozs.

Yaws Hospital, St. Lucia.

High Diet.

Breakfast.—Bread, ½ lb.; milk or tea, 3 gills.
Dinner.—Fresh meat, ½ lb.; soup, 1 pint; vegetables, 1 lb.
Supper.—Bread, ¼ lb.; milk or tea, 3 gills.

Middle Diet.

Breakfast.—Bread, ½ lb.; tea, 3 gills.
Dinner.—Meat soup, 1 pint; rice or vegetables, 1 lb.; * salt fish, ⅓ lb.; olive oil, 1½ ozs.
Supper.—Bread, ¼ lb.; tea, 3 gills.

Low Diet.

Breakfast.—Milk or arrowroot, 3 gills; bread, ½ lb.
Dinner.—Bread, ½ lb.; Meat soup or arrowroot, 3 gills.
Supper.—Bread, ¼ lb.; milk, 3 gills.

Colonial Hospital, Antigua.

Full Diet.

Early Morning.—Sweet hot water, 1 pint.
Breakfast, 9 a.m.—Bread, 4 ozs.; chocolate, 1 pint; milk, condensed, ½ gill; sugar, brown, 1 oz.

Dinner, 3 p.m.:
Sunday.—Meat, fresh, 6 ozs.; vegetables of two kinds, ¼ lb. of each; bread, 4 ozs.
Monday and Thursday.—Salt pork, 1 oz.; pease soup, 1 pint; bread, 4 ozs.; dumpling, one of 4 ozs.
Tuesday and Saturday.—Salt or fresh fish, 6 ozs.; rice or fungee, ¾ lb.; bread, 4 ozs.; pork, clear, for cooking salt fish, 2 ozs.
Wednesday and Friday.—Meat pudding, one of 1½ lbs.; Bread, 4 ozs.; vegetables of two kinds, ¼ lb. of each.

Supper, 6 p.m.—Chocolate, 1 pint; milk, condensed, ½ gill; biscuits, 3; sugar, brown, 1 oz.

Remarks.

Pease Soup.—To make 1 pint: peas, split, 2 ozs.; uncooked pork, 2 ozs., which is to be boiled in soup, and to supply to each patient the 1 oz. of cooked pork shown in the diet scale. Flour, wheaten, 1 oz., to thicken the soup.

Rice.—4 ozs. to make ¾ lb. cooked.

Dumplings.—Cornmeal, 1 oz.; flour, wheaten, 2 ozs.; to weigh about 4 ozs. when cooked. To be cooked in the soup.

Fungee.—Cornmeal, 4 ozs., to make ¾ lb. when cooked.

Meat Pudding.—Meat, fresh, 8 ozs.; flour, wheaten, 8 ozs.; lard, 2 ozs.; 3 small potatoes; 1 onion; to weigh, without basin, 1½ lbs. when cooked.

Sweet Hot Water.—Water, 1 pint; sugar, brown, 2 ozs.

Chocolate.—½ stick of chocolate to 1 pint.

Milk, Condensed.—3 teaspoonsful to 1 gill.

Leper Asylum, Antigua.

Full Diet.

Early Morning.—Sweet hot water, 1 pint.

Breakfast.—Bread, 4 ozs.; chocolate, 1 pint; milk, condensed, ½ gill; sugar, brown, 1 oz.

Dinner:
Sunday.—Meat, fresh, 6 ozs.; vegetables of two kinds, ¼ lb. of each; bread, 4 ozs.
Monday and Thursday.—Salt pork, 1 oz.; pease soup, 1 pint; bread, 4 ozs.; dumpling, one of 4 ozs.
Tuesday and Saturday.—† Salt or fresh fish, 6 ozs.; rice or fungee, ¾ lb.; bread, 4 ozs.; pork, clear, for cooking salt fish, 2 ozs.
Wednesday and Friday.—Meat pudding, one of 1½ lbs.; bread, 4 ozs.; vegetables of two kinds, ¼ lb. of each.

Supper.—Chocolate, 1 pint; milk, condensed, ½ gill; biscuits, 3; sugar, brown, 1 oz.

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* Meat is given every alternate week.
† When fresh fish cannot be supplied, meat, fresh, 6 ozs., to be used instead of salt fish and salt pork.

Colonial Hospital, St. Kitts.

Ordinary Diet.

Tea, 9 a.m. and 5 p.m.—Bread, 5 ozs. at each meal; 1 lb. sugar to each gallon of warm water. Allowance, 1 pint in the morning and 1 pint in the evening to each patient.

Dinner, 2 p.m.—Bread, 5 ozs.; mutton soup, consisting of 2 lbs. of mutton, 3 lbs. of sweet potatoes, 6 ozs. of barley, ½ oz. of herbs, and 2 ozs. of salt pork, to each gallon of broth. Allowance, 1 pint to each patient.

Monday.—Dumplings and salt fish; ½ lb. of flour mixed with salt and water and boiled with ½ lb. of salt fish.

Wednesday.—Potatoes and salt fish (given on Wednesdays to convalescent patients); 2 lbs. of boiled potatoes, ½ lb. of boiled salt fish, with melted pork and lard, to each patient.

Friday.—Bread, 2½ ozs.; soup, made of ½ lb. of pease, ½ lb. of flour, ½ oz. of herbs, 2 ozs. of salt pork, to each gallon of broth. Allowance, 1 pint to each convalescent patient.

Leper Asylum, St. Kitts.

Ordinary Diet.

Breakfast, 9 a.m.—Bread, 5 ozs.; sugar, 2 ozs.; milk, 3 ozs.; 1 pint hot water.

Dinner, 2.30 p.m.:

Sunday, Wednesday, Thursday, and Saturday.—12 ozs. potatoes, 6 ozs. mutton or beef, 5 ozs. bread, 1 oz. barley.

Monday.—12 ozs. potatoes, ½ lb. salt fish, 5 ozs. bread.
Tuesday.—½ lb. rice, ½ lb. salt fish, 5 ozs. bread.
Friday.—½ lb. cornmeal, ½ lb. salt fish, 5 ozs. bread.

Supper, 5 p.m.—Bread, 5 ozs.; milk, 3 ozs.; sugar, 2 ozs.; 1 pint hot water.

Roseau Infirmary, Dominica.

Common Diet.

7 a.m.—½ pint of milk and 4 ozs. of bread (the bread to be boiled with the milk), or ½ pint of arrowroot and milk.

Breakfast, 11 a.m.—½ pint of soup, made of 2 ozs. fresh meat, with vegetables, or rice, or barley.

Dinner, 4 p.m.:

Sundays.—4 ozs. stewed beef and 8 ozs. vegetables, either yams or tanias, or sweet potatoes or plantains.

Mondays and Fridays.—4 ozs. fresh fish and 8 ozs. farine or boiled rice.

Tuesdays and Thursdays.—4 ozs. goat mutton and 8 ozs. vegetables.

Wednesdays and Saturdays.—4 ozs. fresh fish and a pint of vegetable soup, containing 2 ozs. of rice or barley, and 6 ozs. vegetables.

Supper, 7 p.m.—½ pint of coffee or chocolate with sugar, and 4 ozs. of bread.

Yaws Hospital, Dominica.

Common Diet.

7 a.m.—8 ozs. bread, ½ pint coffee or chocolate.

11 a.m.—1 pint soup, containing 4 ozs. vegetables and 2 ozs. beef; bread, 4 ozs.

5 p.m., Sundays.—4 ozs. beef and 1 lb. vegetables.
Mondays, Fridays, and Saturdays.—4 ozs. fresh fish and ½ lb. of farine.
Tuesdays and Thursdays.—4 ozs. beef, ½ lb. farine.
Wednesdays.—4 ozs. fresh fish, 1 lb. vegetables.

Yaws Encampment at the Soufriere, Dominica.

Sundays.—For Adults.—½ lb. bread, 4 ozs. meat (either goat or beef), 3 ozs. salt cod fish (soaked), ½ lb. vegetables, 1 oz. chocolate, 1 pint milk, 4 ozs. syrup.

Week Days.—12 ozs. farine (cassava meal), ½ lb. fresh fish (ballahon, dolphin, flying fish, gars, or zorphie), ½ pint milk, 1 lb. vegetables (plantains, yams, or tanias); syrup, 4 ozs.

For Children.—6 ozs. farine, 4 ozs. fresh fish, ½ pint milk, ½ lb. vegetables; syrup, 4 ozs.

If fresh fish is unobtainable at all times, dried cod fish, well soaked in water, may be used as a substitute.

On Sundays children are to get half of each item with the exception of milk, 1 pint, and syrup, 4 ozs.

GAOL, ST. LUCIA.

(For prisoners not undergoing hard labour.) *

Tea.—6 a.m.—Bread, 2 ozs.; sugar, 1 oz.; warm water, ½ pint.

Breakfast, 11 a.m.—Bread, 8 ozs.; chocolate, 1 pint.

Dinner, 5 p.m.—Bread, 8 ozs.; vegetables, rice or coucon, 12 ozs.; salt fish, ¾ ozs.

GAOL, ST. KITTS.

(For prisoners not undergoing hard labour.)

Breakfast, daily.—6 ozs. wheaten bread; ½ pint hot water, sweetened.

Dinner:

Sunday and Thursday.—12 ozs. sweet potatoes; 3 ozs. salt pork, cooked.

Monday, Wednesday, and Saturday.—6 ozs. cornmeal, to be made into fungee; 3 ozs. salt fish, cooked; ½ pint lemonade.

Tuesday and Friday.—8 ozs. wheaten bread; 1 pint pease soup; ½ pint sweetened water.

(F.)

ADVICE to parents as to the rearing of infants; by *John Tulloch,* M.A., M.B.

1. Every intelligent person who comes to this island is struck by the large number of deaths among young children.

2. This is one reason why the population of Tobago does not increase more quickly from year to year.

3. The Government of this island, noticing this fact, has ordered its medical officers to attend children under eight years free of all charge, hoping that the deaths among them will be fewer in consequence.

4. The diseases which cause most deaths amongst children are diarrhœa, dysentery, and marasmus. These are all diseases of that part of the body which digests the food.

5. These diseases are caused chiefly by the use of wrong foods, and by over-feeding, and partly by causes which you cannot prevent.

6. If the children of Tobago were properly fed, many of those who die every year would live to become men and women.

7. The proper food for a child before its teeth are cut is its mother's milk. In most cases nothing else should be required.

8. Next to its mother's own milk comes milk from the goat, and next to that, milk from the cow, with water added and a little sugar. You must in each case ask the doctor how much water should be added to the milk.

9. It is wrong, in most cases, to nurse your child longer than 10 or 12 months.

10. Those parents who give their young infants tania, cassava, potato, corn starch, or tous-les-mois are doing them great injury, and are endangering their lives.

11. When the teeth are cut, or even when four or five have come through, you may use small quantities of these articles without injuring your infants.

12. Oatmeal or whole wheat flour, if good, and when well boiled with milk, may be given to infants of two or three months with safety.

13. Salt pork or salt fish should never be given to children, even in soup, until all their teeth are cut.

14. If possible, do not give your children these salt meats, even when they are past teething, as they are very hard to digest, and cause worms in the bowels.

* Prisoners sentenced for terms of less than six months receive smaller rations.

15. You should feed your infant regularly, say, every three or four hours. Never give it too much at one time.

16. Try to keep your children from eating fruit which is over-ripe, or which is not ripe enough.

17. During the dry season river water is likely to cause diarrhœa among children. To make such water safe, boil it first, then let it cool, and give it to your children to drink. Enough should be boiled every morning to serve as drinking water during the whole day.

18. Please notice that in what has been said you are asked to do nothing difficult or expensive, and that it is certain that your children will be stronger and healthier if you follow out these suggestions.

N.B.—These instructions have been prepared by one of the Government medical officers, and have been submitted to the Colonial Surgeon and the other Government medical officers, and they are now issued to parents in the hope that they will follow them in the rearing of their infant children.

By Command.
(signed) *G. C. M. Sealy,*
Acting Confidential Clerk.

Tobago, 28 August, 1883.

(G.)

HISTORY of a case of melanotic tumour in the sole of the foot, in which the diagnosis from a yaws granuloma of the sole was impossible without microscopic examination; by *R. A. Cleveland*, M.R.C.S.

Phabe Benjamin, aged 30 years, female, a labourer on the Brighton Estate, Cayon, St. Kitts, West Indies.

History of present illness.—About the commencement of this year she, while working in the cane piece, noticed a "burning" pain in the sole of the right foot; after a few days a small swelling appeared about the size of the finger nail. The skin over it commenced to "bark off," leaving a foul, black, protruding mass about the size of a sixpence; it was very tender and painful at night. From that time up to the present [18th November, 1891] it has continued to enlarge, and has given her great pain. She first applied a bush called "Physic Nut;" afterwards blue-stone and bread. The patient states that she noticed that the growth was black in colour previous to applying anything.

Previous history or injury.—None. (No history of syphilis.)

The patient's manner of life is fairly healthy; the house is kept cleaner than those of most of her class. Was better off during her husband's lifetime. Locality, fairly healthy. Moderate in food and drink.

Family history.—Married. Four children (two living, healthy, and two dead; one of fever and the other during dentition).

Present state.—The patient looks a fairly healthy and well-nourished black woman. No cutaneous eruption. Pulse: normal. Resp.: normal. Tongue: clean. Urine: normal. Mens. Hist.: regular. There is no marking of skin indicating previous sores; nor any enlargement of glands.

Near the inner border of the sole of the right foot is a foul protruding mass, oval in shape, measuring 1⅝ inches in length by 1 inch in breadth. The growth is quite black in places and mottled in others; it is nodular, and of the consistence of india-rubber. The skin of the margin is white, sodden with discharge, and everted. The surrounding skin is pigmented in places, but is healthy generally. There is no induration of surrounding parts.

The discharge is foul and sanious. The mass is tender to touch, and painful, most at night.

There is a tendency to hemorrhage from the growth.

Treatment.—Poultices were first applied with the idea of cleansing the sore and removing the growth.

The growth continued very painful and increased in size.

On 5th December, 1891, chloroform being given, the growth was gouged out and placed in alcohol, to send to Dr. Nicholls. There was slight hemorrhage. Dressings of iodoform and salicylic wool were applied, and after two days a lotion of boracic acid was used.

10th December.—The patient was visited to-day. She expressed herself greatly relieved from the pain, and had slept well since the operation.

On examination the sore was much cleaner, and not offensive. It has been converted into a fairly healthy granulation ulcer.

(H.)

TABLE showing the Death Rate of the Colony of the Leeward Islands.

ISLANDS.	Population, 1881.	Population, 1891.	Mean Population for the Decennial Period, 1881—1891.	Average Annual Number of Deaths, calculated on the Registration for the Decennial Period, 1881—1891.	Average Annual Death Rate per 1,000 of Population, calculated on the Registration of Deaths for the Decennial Period, 1881—1891.	Increase on the Death Rate of the Colony.	Decrease on the Death Rate of the Colony.
Antigua - - - - -	34,321	36,119	35,220	1,271	36·1	7·7	—
St. Kitts - - - - -	29,137	30,876	30,006	1,060	35·0	6·6	—
Nevis - - - - -	11,864	13,087	12,476	*413	*33·1	4·7	—
Anguilla - - - - -	3,219	3,699	3,459	*48	*13·9	—	14·5
Dominica - - - - -	28,211	26,841	27,526	436	15·8	—	12·6
Montserrat - - - - -	10,083	11,762	10,923	216	19·8	—	8·6
Virgin Islands - - -	5,287	4,639	4,963	*106	*21·4	—	7·0
The Colony of the Leeward Islands - -	122,122	127,023	124,573	3,540	28·4	—	- -

* In Nevis and the Virgin Islands the calculations are made from 1887 only, as no record of deaths was kept before. In Anguilla the calculations are made, for the same reason, from July 1883 only.

NOTE.—Barbuda and Redonda are left out of the table, as there has been no registration of the deaths in those islands. Their population in 1891 was, respectively, 580 and 120, bringing the total population of the colony to 127,723.

(I.)

BIBLIOGRAPHY.

As far as I have been able to ascertain from a careful study of the literature of yaws, bibliographical lists have been published by the following five authors, viz., Craigie, in 1836; Levacher, in 1840; Copland, in 1858; Hirsch, in 1885; and Numa Rat, in 1891. There is also a bibliography of yaws, compiled by Dr. Forbes, in the fourth volume of the Cyclopædia of Medicine, published in 1835. Hirsch's list was the most complete up to the time of the publication of his book, but he overlooked the works of several writers; the omissions, however, have been supplied partly by Numa Rat in the chronological bibliography attached to his essay.

It has occurred to me that it will be advisable to append to this report as complete a list of authors and their works as the circumstances will allow, in order to assist those medical officers who may wish to study the literature of the disease. The following bibliography may not be complete, but it is the fullest one that has yet been published. Of course, in regard to some of the earlier works, it cannot be said that yaws is really the disease referred to by the authors, inasmuch as syphilis and other maladies were often confounded with yaws, but these matters have been referred to at length in the body of the report.

H. A. Alford Nicholls.

LIST OF AUTHORS AND THEIR WORKS.

1535	*Oviedo*	La General y Natural Historia de Las Indias. *Sevilla.*
1643	*Piso*	De Medicina Brasilium. *Lugduni Batavorum.*
1665	*Breton*	Dictionnaire Caraibe François. *Auxerre.*
,,	*de Rochfort*	Histoire Naturelle et Morale des Isles Antilles de l'Amerique. 2nd Edn. *Rotterdam.*
1667	*du Tertre*	Histoire Generale des Antilles habituées par les François. 3 vols. *Paris.*
1707	*Hans Sloane*	The Natural History of Jamaica. 2 vols. *London.*
1718	*Bontius*	De Medicina Indorum. *Lugduni Batavorum.*
1724	*Labat*	Voyage du Pere Labat, aux Isles de l'Amerique. 2 vols. *The Hague.*
1740	*Astruc*	De Morbo Veneriis. *Paris.*
1742	*Dazille*	Observations sur les Maladies des Nègres. 2 vols. *Paris.*
,,	*Winterbottom*	An Account of the Native Africans in the Neighbourhood of Sierra Leone. *London.*
1744	*Hume*	A Description of the African Distemper called the Yaws. Edinburgh Medical Essays. Vol. VI. *Edinburgh.*
1750	*Hughes*	The Natural History of Barbados. *London.*
1759	*Hillary*	Observations on the Changes of the Air, and the Concomitant Epidemical Diseases in the Island of Barbadoes. *London.*
1760	*Swédiaur*	Traité Complet sur les Symptomes, &c., des Maladies Syphilitique. *Paris.*
1763	*Sydenham*	The Entire Works of Dr. Thomas Sydenham. Edited by John Swan, M.D. *London.*
1764	*Grainger*	An Essay on the More Common West India Diseases. *London.* (An edition of this work was edited by Dr. William Wright in 1802.)
1769	*Bancroft*	An Essay on the Natural History of Guiana. *London.*
1770	*Pouppé-Desportes*	L'Histoire des Maladies de Sainte Dominique. *Paris.*
,,	*Schilling*	Diatribe de morbo quem *Yaws* dicunt. *Ultrajecti.*
1776	*Arthaud*	Traité des Pians au Cap. François. *Paris.*
,,	*Raynal*	A Philosophical and Political History of the Settlements and Trade of the Europeans in the East and West Indies. Translated from the French of the Abbé Raynal by J. Justamond. 5 vols. *London.*
1777	*Bajon*	Mémoires sous forme de lettres, pour servir à l'histoire de la Guiane et de Cayenne. *Paris.*
1783	*Peyrilhé*	Précis Théorique et Pratique sur le Pian et la Maladie d'Amboine *Paris.*
1784	*Swédiaur*	Practical Observations on the More Obstinate Venereal Complaints. *London.*
1785	*Coreal*	Voyages aux Indes Occidentales. *Paris.*
,,	*Macpherson*	Dissertatio de Frambœsia. *Glasguæ.*
1788	*Hunter*	Observations on the Diseases of the Army in Jamaica. *London.*
,,	*Moseley*	A Treatise on Tropical Diseases. *London.*
1789	*Thomas*	Dissertatio de Frambœsia. *Hafniæ.*
,,	*Tode*	- ditto - - - ditto *Hafniæ.*
1790	*Retz*	Des maladies de la peau, &c. *Paris.*
1791	*Nissaeus*	Spec. de nonnul. in colon. Surinamensi observat. morbis. *Hardrov.*
,,	*Wright*	Dissertatio Medica Inauguralis de Frambœsia. *Edinburgh.* (This Thesis, which was submitted by Jonathan Anderson Ludford, was really written by Dr. William Wright, and it is given in his Selection of Papers on Medical and Botanical Subjects, published in *Edinburgh* in 1828.)
1793	*Gruner*	De Morbo Gallico Scriptores Medici et Historici. *Jena.*
1794	*Bryan Edwards*	History of the West Indies. 2nd Edn. 3 vols. *London.*
1796	*Hunter*	Observations on the Diseases of the Army in Jamaica. 2nd Edn. *London.*
,,	*Rodscheid*	Med. und. Chir. Bemerk. über Rio Essequibo. *Frankfort.*
,,	*Sprengel*	Beiträge zur Geschicte du Arzeneikunde. *Halle.*
1797	*Vanswieten*	De Morbo Yaws dicto et de Vena Medinensi Specimen. *Hallio.*
1799	*Thompson*	Practical Observations on the Diseases of the Army in Jamaica. *London.*
17*	*Lavoisien*	Epian et Yaws. In Dictionnaire Portatif de Médicine. *Paris.*
1800	*Moseley*	A Treatise on Sugar. With Miscellaneous Medical Observations. 2nd Edn. *London.*
1801	*Chisholm*	An Essay on the Malignant Pestilential Fever introduced into the West India Islands from Boullam, on the Coast of Guinea. 2nd Edn. 2 vols. *London.*
1802	*Campet*	Traité pratique des Maladies graves des pays chauds. *Paris.*
1803	*Collins*	Practical Rules for the Management and Medical Treatment of Negro Slaves in the Sugar Colonies. By a "Professional Planter." [Mr. Collins, of St. Vincent.] *London.*
,,	*Winterbottom*	An Account of the Native Africans in the Neighbourhood of Sierra Leone. 2nd Edn. 2 vols. *London.*
1804	*Chopitré*	Aperçu sur le Pian et sur les Maladies dont il est suivi. *Paris.*
,,	*Macé*	Dissertation sur le Yaws, Pian ou Frambœsia. *Paris.*
1805–7	*Willan*	Description and Treatment of Cutaneous Diseases. 2 vols. *London.*
1806	*Howard*	Practical Observations on the Venereal Disease. 2 vols. 2nd Edn. *London.*
1807	*Adams*	Observations on Morbid Poisons, Syphilis, &c. *London.*
1809	*Savarisy*	De la fièvre jaune, &c. *Napoli.*
1810	*Cullen*	Nosology: or, a Systematic Arrangement of Diseases. *Edinburgh.*

* The title page of my copy of this work is mutilated, and I cannot, therefore, give the exact date of its publication, but it was, I believe, about the middle of the 18th century.

1814	*Lunan*	Hortus Jamaicensis. 2 vols. *Jamaica.*
1816	*Alibert*	Framboesia. In Dictionnaire des Sciences Méd. *Paris.*
1817	*Bateman*	A Practical Synopsis of Cutaneous Diseases. 4th Edn. *London.*
,,	*Williamson*	Medical and Miscellaneous Observations relative to the West Indian Islands. 2 vols. *Edinburgh.*
,,	*Dancer*	The Medical Assistant, or Jamaica Practice of Physic. 3rd Edn. *Jamaica.* (The first edition was published in 1801, and the second in 1809.)
1819	*Thomson*	Observations and Experiments on the Nature of the Morbid Poison called Yaws. The Edinburgh Medical and Surgical Journal. Vol. XV.
1820	*Thomson*	A Treatise on the Diseases of Negroes as they occur in the Island of Jamaica ; with Observations on the Country Remedies.
1821	*Frank*	De morbo rubro, yaws, &c. Prax. Med. Univ. Vol. III. *Taur.*
,,	*Thomas*	The Modern Practice of Physic. 7th Edn. *London.*
1822	*Cullerier*	Yaws. In Dictionnaire des Sciences Méd. t. LVIII. *Paris.*
1823	*Stewart*	A View of the Past and Present State of the Island of Jamaica ; with Remarks on the Moral and Physical Condition of the Slaves. *Edinburgh.*
1825	*Good*	The Study of Medicine. 2nd Edn. 5 vols. *London.*
1826	*Lagneau*	Pian. In Dictionnaire de Médecine. t. XVI. *Paris.*
1827	*Ferrier*	Répertoire général d'anatomie et de physiologie pathologie. *Paris.*
,,	*Rankine*	Practical Observations on the Yaws. The Edinburgh Medical and Surgical Journal. XXVIII.
1831	*Boyle*	A Practical Medico-Historical Account of the Western Coast of Africa. *London.*
,,	*Mason*	A Descriptive Account of Framboesia or Yaws. The Edinburgh Medical and Surgical Journal. Vol. XXXV.
1835	*Kerr**	Yaws. The Cyclopædia of Practical Medicine. 4 vols. *London.*
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1839	*Frank*	Pathologie Interne. 2 vols. *Paris.*
,,	*Gregory*	Elements of the Theory and Practice of Medicine. 5th Edn. *London.*
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,,	*Maxwell*	Observations on Yaws, and its Influence in originating Leprosy. *Edinburgh.*
1840	*Levacher*	Guide Médicale des Antilles. 2nd Edn. *Paris.* (The first edition was published in 1834.)
1842	*Cazenave*	Manual of Diseases of the Skin ; from the French of MM. Cazenave and Schedel. By Dr. Thomas Burgess. *London.*
1843	*Waitz*	On Diseases incident to Children in Hot Climates. *Bonn.*
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,,	*Duncan*	Travels in Western Africa. *London.*
1848	*Paulet*	Archiv. gén. de méd. Août. *Paris.*
,,	*Rendu*	Étude topograph. et méd. sur le Brésil. *Paris.*
1853	*Guyon*	Recueil de Mém. de Méd. milit. XXIX., and Gaz. Méd. de Paris.
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,,	*van Leent*	Archiv. de méd. nav. Oct.
1868	*Huillet*	Archiv. de méd. nav. Jan.
,,	*Lancereaux*	A Treatise on Syphilis : Historical and Practical. Vol. I. New Sydenham Society. *London.*
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1871	*Huggins*	Lancet. Dec.
1872	*Bourel-Roncière*	Archiv. de méd. nav. Juill.
,,	*Pelvelli*	Annotaz. stor.-clin. sul pian. &c. *Bologna.*
1873	*Fox*	Skin Diseases. 3rd Edn. *London.*
,,	*Imray*	Memoir on Yaws in Dominica. Published in Milroy's Report.
,,	*Milroy*	Report on Leprosy and Yaws in the West Indies. *London.*
1874	*Paton Watt*	Report on the Prevalence of Yaws. *British Guiana.*
1875	*Anon*	Medical Record. Vol. I.
,,	*Carter*	Lancet. Vol. II.
1876	*Carter*	Notes on Caneotica. In Skin and other Diseases of India and Hot Climates generally. By Drs. Tilbury Fox and T. Farquhar. *London.*
,,	*Fox and Farquhar*	On certain Endemic Skin and other Diseases of India and Hot Climates generally. (Published under the sanction of the Secretary of State for India in Council.) *London.*
,,	*Keelan*	Lancet. Aug.
,,	*Milroy*	Medical Times and Gazette. Nov.
1877	*Milroy*	Lancet. Feb.
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,,	*Littré et Robin*	Art. Pian et Yaws. In Dictionnaire de Medicine. *Paris.*
1879	*Anon*	British Medical Journal. No. 988. Dec.
,	*Horton*	The Diseases of Tropical Climates. 2nd Edn. *London.*

* In his bibliography of yaws Dr. Forbes erred in attributing the article in the Cyclopædia of Practical Medicine to Dr. Joy. This error is the more curious as the article on yaws, with Dr. Kerr's name appended, and the bibliography of the disease, are both contained in the same volume (the 4th) of the Cyclopædia. Mr. Numa Rat has copied Dr. Forbes' error in his bibliography.

1879	*Morris* - - - - -	Skin Diseases. *London.*
,,	*Milroy* - - - - -	Medical Times and Gazette. Oct.
,,	*Rochard* - - - - -	Pian. In Dictionnaire de Médicine et de Chirurgie. *Paris.*
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1885	*Hirsch* - - - - -	Handbook of Geographical and Historical Pathology. New Sydenham Society's Translation. 2 vols. *London.*
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1887	*Christie* - - - - -	Art. Framboesia. In a Treatise on Diseases of the Skin. By T. McCall Anderson. *London.*
1888	*Encyc. Brittan* - - - -	Art. Yaws. Vol. XXIV. 9th Edn. *London.*
1890	*Tulloch* - - - - -	Report on Yaws. *Tobago.*
1891	*Rat* - - - - - -	Yaws: its Nature and Treatment. *London.*
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