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REPORT

Report on Leprosy and the Homeless Leper Asylum, Matunga, Bombay

1890–1897

BY

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REPORT
ON
LEPROSY

AND

THE HOMELESS LEPER ASYLUM, MATUNGA, BOMBAY.

1890-1897.

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P R E F A C E.

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The prolonged delay in the publication of this, the first report of the largest Leper Asylum in India, requires some explanation. When the institution was originally projected, it was scarcely expected that instead of its being a temporary shelter,—by the time that Sir Dinshaw Manockji Petit's Home at Trombay was ready—it would develop in time, not only into a permanent home, but would also be the means of solving a very intricate and vexed problem of administration, a problem that had hitherto successfully defied the best efforts of the Government of India to solve *viz*:—how best to deal with the Indian vagrant leper. With its consequent enlarged sphere of usefulness, the responsibilities and duties of those connected with it also proportionately increased. Moreover as the experiment was the first of its kind in India, it had to be approached with such extreme caution and circumspection, as to entail an amount of vigilance and labour scarcely possible of any detailed description. And, as if to add to all this, critics were not wanting, some of whom predicted insuperable difficulties in its management and consequent failure, whilst others tried to arouse imaginary fears in the public mind by stating that the leper asylum would lead to such a large influx of lepers into the city as would be a menace to public health.

Such then were the circumstances under which the asylum started on its beneficent work, and it has to be noted that the problem which it was intended to essay was fraught with exceptional difficulties. It was therefore to be expected that all the energies of those connected with it would be, as they actually were, directed towards the main and single object *viz*:—to see that the institution proved a success and a real home—an harbour of refuge—to the unfortunate outcastes whose lot was truly wretched.

To those not conversant with the state of the lepers in Bombay prior to the opening of the asylum, it would be impossible at this date to give any thing like an adequate idea of the improvement that has resulted in the condition of the vagrant leper. The difficulties that early beset its organisation, administration and a thousand and one details connected therewith absorbed almost all the available time of the staff. All the resources of the institution were brought to bear to teaching the unfortunate inmates habits of cleanliness and decency,—of which they had hardly any conception, of inculcating into them some principles of discipline without which no such institution could exist, and to which from their previous vagrant mode of life they were perfect strangers, and in fact to converting them from the squalid, filthy and foul-smelling lepers of the streets, into the clean, decent, and well-behaved inmates of the largest Asylum in India. Nor was this all. How best to make them happy and contented in these new and altered conditions of life, amidst environments to them so novel and so peculiar, how best to make amends for depriving them of their liberty—for they were virtually prisoners for life, and some of them felt this very keenly at first,—was not at all an easy task. But happily all these difficulties were surmounted in time and now the institution goes on the even tenor of its existence, like any other long and well-established institution. The time therefore that could be devoted to any extensive observations or research was naturally limited, and it was therefore not deemed expedient at first to formulate any hasty conclusions or crude generalisa-

tions from the imperfect and shortdate observations then available. The same however cannot be said after the lapse of seven years and the following REPORT ON LEPROSY AND THE HOMELESS LEPER ASYLUM, MATUNGA is presented with the full consciousness of its many defects and imperfections and in the hope that it would be looked upon with indulgence in the light of the facts above stated.

The report before its final publication had to undergo many vicissitudes; it was at first prepared upto the end of 1893 and could not be printed on account of some unavoidable causes. It was subsequently revised and brought upto the end of 1894, and even then it shared the same fate. Finally plague interfered with its revision and it was only during some spare but brief intervals between four successive epidemics, that it has been possible to revise it upto the end of 1897, and to include in it such further information on the subject as was available in India.

The whole question of Leprosy has become considerably altered within the last few years, and the BERLIN INTERNATIONAL CONFERENCE ON LEPROSY in 1897, has done much to further elucidate the disease, and put it on a proper scientific basis. The transactions of this Conference form, in the words of Dr. Phineas S. Abraham, the British Delegate, one of the prominent land-marks in the literature of leprosy, and will for long remain an authentic record on the subject. THE NATIONAL LEPROSY FUND has by its journals and prize essays, been also instrumental in collecting a large number of data from all parts of the world and has aroused great interest in the study of leprosy, so that instead of a few isolated workers, a large number of men are studying the disease in different parts of the world in its various phases. The outcome of this collective investigation is sure to be valuable and a promise of what it would eventually be was foreshadowed by the work of the Berlin Conference.

In conclusion it must be stated that whatever success the institution has achieved has been mainly due to its founder, H. A. Acworth Esq., I.C.S., C.I.E. Municipal Commissioner for the City of Bombay from 1890-1895, but for whose constant and vigilant care, advice, and supervision, it would not have been very easy for the Medical Officer to work the Asylum. Nor can the valued assistance rendered by Col. T. S. Weir, I.M.S. the late Health Officer, and Lieut. Col. K. R. Kirtikar I.M.S. the late acting Health Officer, in the early days of its organisation and its subsequent management be forgotten.

N. H. C.

SEPTEMBER 1900.

INTRODUCTION.

Long before the death of Father Joseph Damien De Veuster at Molokai in 1889, and the consequent revival of interest in the leper question in England, together with the raising of the National Leprosy Fund, the attention both of the Government and the public in Bombay had been drawn to the subject, and spasmodic efforts had been made from time to time to deal with the vagrant and other lepers but without much success. It would not be therefore out of place to give here a brief account of what had been done in this direction prior to the establishment of this asylum and the following facts are mainly derived from *A Resume of the Steps taken to Establish a Leper Asylum in Bombay and to Remove Lepers from the Public Streets*, from the Municipal Commissioner's Administration Report for 1891-92 :—

In 1883, the Roman Catholic Bishop Vicar-Apostolic of Bombay requested the Government to place at his disposal for a period of five years the premises of one of the old forts in the Island of Bombay, known as Sion, Matunga, Sewri, and Warli together with a portion of culturable land in the immediate vicinity with a view of converting the same into the head-quarters of a Leper colony or village. But Government whilst regretting their inability to comply with the request, expressed a hope that the project would not be abandoned, and that a suitable site would be found in some localities not far from Bombay and that they would be glad to assist in the projected benevolent scheme should an opportunity offer. This was in May 1884. For about four years after this, nothing seems to have been practically done. Early in 1888, Mr. F. Charles I. C. S. the acting Municipal Commissioner asked for and obtained from the Health Officer, Surg.-Lieut.-Col.-T. S. Weir I. M. S. a report as to whether any measures were possible to minimise the danger from the lepers that had congregated at the Dhurmshala at the north end of Duncan Road and elsewhere. The Health Officer stated that according to a recent decision of the Presidency Magistrate, he did not think the Police could interfere with the liberty of a leper, and suggested that the opinion of the solicitors should be obtained on the subject. After this, the subject appears to have been again dropped. Mr. Kirkham, the Educational Inspector, C. D. reported early in 1889 that a colony of lepers had taken up their quarters on the flags surrounding the large Nacoda tank, which is situated between two of the largest public schools in Bombay, and that the school authorities, the public and the Health Department had failed to effect their removal. Mr. Kirkham also on the 4th April 1889 brought forward before the Municipal Corporation a motion, which was carried, to the effect "That the Municipal Commissioner be requested to report what additional powers, if any, are required by the Health Department to enable it to deal effectively with the evil." The solicitors to Government expressed their opinion with reference to the colony of lepers at the Nacoda tank, that in all probability many of the lepers had rendered themselves liable to prosecution for committing a public nuisance and suggested, that if leprosy was an infectious disease, dangerous to life, Government might by Notification under section 12 of Bombay Act VI of 1867, determine it to be so, and that those who suffered from the disease should be removed to a sanitarium and further observed that the Municipality should be requested to see that no nuisance was committed near the tank which was in their custody.

Colonel Wise the acting Commissioner of Police in his report to Government in June 1889, stated that the city of Bombay was much infested by lepers and that they were steadily on the increase, and that by wandering about the streets and mingling with the inhabitants they were not only a great public nuisance, but a source of serious danger to the community and that urgent steps should be taken to remove them from contact with the public. He estimated the number then in the city between four and five hundred, about 90 per cent of whom were beggars, the rest being mostly supported by their relatives; a few, earning their living for themselves and a very few being well-to-do. The mendicants squatted by the side of the public roads or near temples and asked alms, lying about in the streets during warm weather and when it was cold and wet, seeking shelter either in the Dharamshala or in verandhas, in vacant corners of buildings. Most of them were miserable objects in all stages of the disease and several of them had attempted suicide by drowning. As to the prosecution of the lepers, Colonel Wise stated that they could be dealt with fully under section 424 of the Municipal act which runs as follows :—

“(1.) The Commissioner or any Police officer empowered by him in this behalf may on a certificate signed by the Executive Health Officer or by any duly qualified Medical Practitioner direct or cause the removal of any person who is in the opinion of such Executive Health Officer or other Medical Practitioner without proper lodging or accommodation or who is lodged in a building occupied by more than one family and who is suffering from a dangerous disease, to any Hospital or place at which patients suffering from the said disease are received for Medical treatment.

“(2.) The person if any, who has charge of a person in respect of whom an order is made under subsection (1) shall obey such order” This section presupposes the existence of a “Hospital or place” and gives power of removal only, but not of detention and as there was no provision existing for receiving the lepers, Col. Wise stated that the police were unable to move on account of the want of a place for accommodation and until the same was provided and that if a place were set apart for them, the City would be cleared in a short time. He also suggested the segregation of the sexes in any accommodation so provided. And further he accounted for the large increase in the number of lepers in the City to the wellknown generosity and charitable nature of the wealthy inhabitants who fed them daily and suggested that if some scheme were set on foot for their accommodation and maintenance the native gentlemen of Bombay would freely contribute to it—a prediction which was fully confirmed by subsequent events.

The Health Officer reported on the resolution of the Corporation in June 1889, and stated that there were about over 800 lepers then in the City and that there were in the Dharmshala at Byculla 78 men, 79 women and 12 children. That under the Municipal law the lepers could not practically be interfered with and that they wandered through the City, lived where they pleased, associated with the healthy and that they even sold in the streets. On inspecting a bakery he found a European leper living in it. He strongly urged that the only way of dealing with the lepers was by segregation and that they would have to be removed, for willingly they were not likely to leave the City, and that the answer he would give to the Corporation's resolution would be “the power to remove lepers, rich and poor, to a ‘place set apart for lepers’.”

In forwarding the Health Officer's report to the Corporation Mr. (now Sir Charles) Ollivant I. C. S. the Municipal Commissioner commented as follows :—

“ I imagine there can be little doubt that leprosy is a dangerous disease as defined in section 3 of the City of Bombay Municipal Act. 1888, and therefore the use of public conveyances by persons suffering from that disease is punishable under sections 428–431. The sale of articles by such persons is punishable under section 432 of the Indian Penal Code. Under section 424 of the same Municipal Act, such persons, if without proper lodging or if lodged in a building occupied by more than one family, may, upon Medical certificate, be removed to a special hospital or other similar place. The majority of such persons are beggars and are liable to be arrested and punished as beggars under the Bombay City Police Act.

“ These, as far as I am aware, are the only provisions of the existing law which can be used to place any restriction on lepers and even these are only fortuitously applicable, and in so far as they may be applicable, are besides totally inadequate. Persons suffering from this disease may be seen in almost all places of public resort, at the public wells, at the railway stations, and in the close vicinity of the markets. As regards those lepers who are paupers, no remedy for the present state of things can be applied, for in the absence of any special leper hospital no action can be taken by Municipal or Police officers, or by the magistracy, which will prevent these people from returning to their old haunts.

“ The only remedy lies in measures for special hospitals and compulsory segregation. For compulsory segregation fresh legislation is required, and I am happy to see that this subject is now engaging the attention of the Government of India. I append to this letter for the information of the Corporation, copy of a draft act which I have recently received. For special hospitals, retreats or asylums, special funds will be required to be provided either by taxation or charity, or both combined. I think that segregation should be insisted on equally in the case of rich and poor, such segregation as may be necessary to protect the public from the risk of catching the disease and from that disease being perpetuated. In the case of the well-to-do the segregation may be effected by family or private agency independently of any public asylums, but for the poor, public asylums are indispensable and for rich and poor alike there should be such a measure of control as will prevent the public health from being jeopardized and ensure the opportunity of proper treatment for the sufferers.”

It was on the 17th of June 1889, that the first meeting to the National Leprosy Fund was held in London, and funds began to be collected with the object of acquiring all possible information on the subject. And almost simultaneously, the Government of India were considering what legal measures should be adopted to promote the establishment of asylums and retreats for lepers and had circulated a draft bill to the Local Governments.

The Government of Bombay issued a resolution on 3rd August 1889 with reference to the lepers at the Nacoda tank, stating that as the tank was in the possession of the Municipality, the Municipal Commissioner for the City of Bombay should therefore be requested to take early measures towards the ejection of the lepers from that property and to see that they did not again resort to that place in future and to provide a suitable place for the purpose of removing them to a Hospital under section 424 of the Municipal Act. In the same month the Municipal Corporation considered the draft bill and resolved as follows :—

"That the Corporation learns with much satisfaction that the Government of India contemplate early legislation with the double object of preventing the spread of leprosy and ameliorating the present condition of lepers."

"That the Corporation further records its general approval of the principle of the Draft Lepers Bill and expresses its opinion that the object of the bill being to prevent the spread of Leprosy which has reached that stage at which it endangers public health, the words 'leprosy' and 'lepers' should be clearly defined in the bill."

In September 1889, the Commissioner further addressed Government on the subject, to the effect that the question of interference or non-interference should be decided not with reference to the position of the lepers, rich or poor, but solely in regard to the influence of the disease endangering public health, and that the leprous butcher or sweetmeat seller might be at least as great a cause of danger as the leprous vagrant who asked for alms. The vagrant whether leprous or not may be apprehended and punished for vagrancy and a further question arises whether provision should not be made in the bill for the segregation of the convict lepers.

On the 8th of January 1890, the Government of Bombay issued a resolution determining "black leprosy" to be under section 12 of Bombay Act VI 1867, an infectious disease, dangerous to life and under section I, notifying the EDULJEE FRAMJI ALBLESS LEPER HOME, AT TROMBAY and the DINSHAW MANOCKJI PETIT LEPER HOSPITAL AT RUTNAGRI as sanatoria for city of Bombay for cases of leprosy. The former institution had accommodation for 40 Christian patients and the latter, to reach which a sea voyage of 120 miles was necessary, about 100 patients of any class. In continuation of the above, another resolution was issued on the 31st of January 1890 directing the Police Commissioner to take steps under the Indian Penal Code, and the Bombay Municipal Act and the Bombay Act of 1867 to prevent the leper nuisance, as the above sanatoria had been provided for the lepers. On the day following the last resolution, Sir Dinshaw Manockji Petit. Bart. offered the sum of Rupees one lakh (100,000) for the erection of a leper home, subject to certain conditions, one of which was that the home should be equipped and maintained by those who were responsible by law for the maintenance and equipment of such institutions. The Corporation were accordingly addressed by Government and they in the reply stated "that without admitting such legal liability on the part of the Corporation as is implied in that letter, they are of opinion that the liberal offer of Sir Dinshaw Manockji Petit should be accepted on the conditions stated and that though the Corporation will be ready to undertake those duties with regard to maintenance of a leper asylum which devolved upon them under the Municipal Act, they venture to express the hope that Government may see its way towards making a substantial contribution towards the expenses of the institution" The Corporation further suggested that advantage should be taken of the visit of H. R. H. Prince Albert Victor of Wales and to invite His Royal Highness to lay the foundation stone of the proposed asylum. A committee was appointed by Government to report upon a suitable site with the result that the site at Trombay near the Albless Leper Home was selected and on the 25th of March 1890, the foundation stone of the "DINSHAW MANOCKJI PETIT HOME" was laid by H. R. H. Prince Albert Victor of Wales. It is to be regretted that although over ten years have elapsed since the foundation stone was laid, the institution has yet to see the light of day, as various causes have contributed to the delay in starting

it, and as the Matunga asylum has been doing the work which it was intended to fulfil. But before the new home could be got ready it was thought necessary to do something for the immediate amelioration of the condition of the lepers. Neither the Police, nor the Municipality could see their way in the matter as the only institution available was the Allbless Home at Trombay and that too could accommodate only 25 patients, whereas relief was required for at least three or four hundred of the worst cases.

Public sympathy was however greatly incited by the verdict of a coroner's jury on the body of a leper who had died in the street and by Lady Thompson's letter in the *Times of India* of the 19th June 1890. The letter graphically depicted the state of the lepers as they were then to be seen by the sides of the public roads &c. suggested that a temporary home should be provided for them until Sir Dinshaw Petit's asylum was ready and Lady Thompson offered to subscribe Rs. 500 if a subscription list were started to undertake the work.

The suggestion was readily taken up by the Municipal Commissioner H. A. Acworth Esqr. i. c. s. who made inquiries with a view to see whether it would not be possible to provide such a temporary home. A number of the wealthier citizens were seen during the following five or six weeks and their sympathy was enlisted by him in this charitable work. At the same time in consultation with the Executive Engineer Mr. Rienzi Walton and the Health officer, Surgeon Lient-Col. T. S. Weir of the Municipality, he caused plans and estimates to be prepared of a set of removable buildings calculated to accommodate two hundred lepers of both sexes. The cost was expected to reach Rupees 60,000 without making any allowance at all for the land to build on. A site for the asylum was also selected for the temporary asylum at Dharavi in the North of the Island. Before any effective appeal could be made to public charity, a number of details had to be settled, chief among those being whether there existed any power of compulsorily removing lepers to any home or asylum which might be erected and detaining them there and whether adequate provision could be made for the maintenance and medical treatment there. Mr. Acworth was able to prove that the requisite legal authority was actually in existence and as regards the second, he determined that if requisite sums for the erection of the buildings and the first provision of furniture, clothing and other accessories could be made forthcoming, the right course would be to appeal jointly to the Government of Bombay and the Municipal Corporation of the City to undertake the charges of maintenance.

On the 26th of July 1890, Mr. Acworth convened a meeting of influential citizens at the residence and with the permission of Sir Dinshaw Petit Bart, the Right Rev., Dr. Mylne, Bishop of Bombay presiding. A large committee was appointed to collect subscriptions and administer the funds with Messrs. Hurkisondas Nurotamdas, the late Muncherji Nowroji Banaji, H. A. Acworth and the Honorable Mr. R. M. Sayani as honorary secretaries. A sum of Rupees 11,410 was subscribed at the meeting and subsequently His Excellency the Governor of Bombay, the Right Hon. Lord Harris wrote a letter to the Commissioner intimating his sympathy with the movement and subscribing Rupees one thousand. Subsequently other meetings of the general committee were held, Honorary Secretaries and Honorary Treasurers were appointed and a working Committee was formed; the Secretaries were requested to appeal for subscription and the Government and the Municipal Corporation were appealed to undertake the maintenance of the proposed home. The Commissioner had in the meantime made further investigation for a suitable site with the result that the site at

Matunga upon which the asylum now stands was selected and the honorary secretaries had made up their minds to proceed with the erection of the asylum as soon as Rupees 40,000 had been collected. As the ground belonged to the Municipality, there was no expense in acquiring it and as there were formerly military barracks on the site, the plinths of several of them were in fair preservation and thus a good deal of expense in construction was saved. Mr. Acworth was indefatigable in his exertions to collect subscriptions and his labours were amply rewarded as shown by the fact that by the time the asylum was started on the 7th of November 1890, over Rupees 58,000 had been collected. By far the larger proportion of the funds was obtained by his personal solicitation in every quarter, almost every house in the City, so that not a house nor a shop from which a ten Rupees subscription might reasonably be extracted was overlooked. In this labour of love Mr. Acworth was ably assisted, particularly by Mr. Harkisondas Narotamdas, the late Mr. Ghelabhai Haridass, the late Mr. Muncherji Nowroji Banaji, the Hon'ble Fazalabhai Vishram, Mr. Haji Sulleman Abdool Wahad, Mr. Rahimtoola Khairaz, Mr. Rutanshaw Dadabhai and Mr. Chutoorbhooj Naranji. The subscriptions gradually but steadily increased and by December 1890, over Rs 71,000 were subscribed. During 1892 and 1893 more funds were collected and on the 31st March 1898, the total amount subscribed for the Homeless Leper Fund stood at Rs. 1,33,018-10-8. This included a special donation of Rs 20,000 from the late Bai Dinbai Nusserwanji Manockji Petit for the construction of a special Hospital ward and lavatories for female inmates. Almost the whole of this fund has been expended in building and equipping the asylum, leaving a balance of Rs 6,426-4-11 on 1st April 1898. To this further additions have been made to the extent of Rs 107-13-0 by subscriptions, and further expenditure has been incurred amounting to Rs 2,501-0-10, leaving a balance on hand of Rs 4033-1-1 on the 1st of December 1899. Some of the Native Princes subscribed handsomely to the fund, notably H. H. the Maharaja Gaekwar, Rs 10,000, H. H. the late Thakor Shaeb of Bhownuggar Rs 5,000, H. H. the Rao of Cutch, Rs 3,000 and H. H. the Aga Khan Rs 2,500. The work of constructing the asylum was under the supervision of the late Mr. Rienzi Walton, late Executive Engineer to the Municipality and by the 6th of November following, accommodation was made ready for the reception of two hundred inmates. On the 7th of November 1890, THE HOMELESS LEPER ASYLUM MATUNGA became *au fait accompli*. Thus, whilst the Government of India was still hesitating to take steps in the matter and had practically shelved the general question of legislation (by their despatch to the Secretary of State for India, dated 22nd July 1890) pending the report of the Indian Leprosy Commission then appointed by the National Leprosy Fund in England, and whilst the Leprosy Commission was on its way to India and ere their advent to these shores, the public charity of Bombay stimulated and guided by Mr. Acworth had practically solved, not only for itself but also for the Government of India, the question of the best way of dealing with vagrant lepers. And it was indeed a source of gratification to the public of Bombay that their work in behalf of these unfortunates was properly appreciated by the Leprosy Commission and that they pointed to the Matunga Leper Asylum as an example of what could be done for ameliorating the condition of vagrant lepers. Further the citizens of Bombay would be pleased to learn that the Government of Bengal have subsequently passed a Leper Bill and that the experience gained in Bombay has been utilised by them for the purpose. The Government of India also followed with an Act in 1890. Nor is this all. Various Provincial Governments and Native States

now look up to the Matunga Asylum for all information connected with the organisation, management &c. of analogous institutions, so that Bombay as the *Urbs Prima in Indies*, might well take credit to herself for thus boldly and successfully solving such a serious administrative problem and setting an example to all India, thanks mainly to the timely initiative of Mr. Aeworth.

REPORT ON LEPROSY. AND THE HOMELESS LEPER ASYLUM.

MATUNGA.

I. Situation of the Asylum.

1. The Asylum is situated about $1\frac{1}{2}$ miles from the Dadar station and lies to the east of the Matunga Road, and about two miles north of Government House, Parel. To the west and south lie stretches of rice-land leading to the Matunga salt works, and beyond these, the harbour. It occupies a somewhat higher level than the fields adjacent with a natural drainage into them, and is completely hidden by trees from the public highway which leads out of the city. A road connects the asylum with the same. The total area of grounds enclosed and unenclosed, Municipal, and leased from Government at a nominal rental, is about $11\frac{1}{2}$ acres. It is near enough to the city proper for efficient supervision and for the convenience of visitors, while at the same time, as justly said by Dr. Weir, "it is anatomically twenty miles from it."

II. Admission of Patients and their Immediate Care.

2. On the morning of November 7th, 1890, about 50 vagrant lepers were collected by the Health Department and the Police at various centres and were thence removed in Municipal carts to the Infectious Diseases Hospital at Arthur Road where Surgeon-Major K. R. Kirtikar, the Acting Health Officer certified them as suffering from "black leprosy" and as being without proper lodging or accommodation and that they should be removed to the leper sanitarium at Matunga. They were then sent to the Asylum under police escort, and were on arrival taken charge of by the Medical Officer. Their condition was most abject and helpless. They were literally covered with rags, hardly any having a clean piece of clothing on, and their sores and wounds were in all stages of disintegration, tied up in equally filthy rags or exposed. The first thing that was done on their arrival was to separate them in groups according to their castes and sexes, inspect their belongings—chattels, boxes, &c., and to remove from their possession all filthy and tattered rags and to destroy the same by fire. Each leper was provided with a cake of carbolic soap and enough warm water was supplied for a thorough good wash—the like of which he had not had perhaps for years—and a clean suit of cotton clothing was given to each. They were allowed to retain possession of brass or copper cooking vessels or boxes containing betelnut or tobacco or in some cases opium and whenever a clean piece of chudder or a bundee was found, the patient was allowed to retain the same. The only relieving feature, perhaps, in all this mass of filth and wretchedness and in marked contrast with it, was to be found in the possession of tiny gilt paper boxes, bearing the names of the principal chemists in Bombay, and containing iodoform, which showed that these people invested a part of their begging proceeds in iodoform, in the healing properties of which, all of them seemed to have great faith.

3. The patients were then taken to their respective wards and beds assigned to them, and their dinner which had been kept ready prepared was served to them in plates, spoons being provided for those that had no fingers. Here however the first difficulty arose. Some of them refused to eat the food out of the plates, and wanted plaintain leaves or leaf-plates. The latter were soon procured and after a great deal of persuasion most of them finished their meals. Some of them cried (especially the females) and would not touch the food and a few threw away their dinner. By the evening however they quieted down and took their supper. One Mahomedan, a big burly Borah was inclined to the violent and abused the *sirkar* for the zoolum. He escaped the same night.* But the rest took their position quietly but not without mute protest.

4. As some violence and escapes were apprehended, a Police guard consisting of 4 Policemen was kept on duty, night and day, but except some grumbling there was no actual violence or opposition. As to escapes, the policemen were not able to prevent them on account of the large area of the place. A few tried to mix with the work people and escape as such, but did not succeed in their attempt.

5. On the 10th of November, a second batch of 55 lepers was sent to the asylum, and then a few during the rest of the month, until the 30th, when the number stood at 131. By the middle of December the number was 152 and by the end 205, so that within seven weeks of its opening, the asylum contained more than its full complement. The Dharmshala† at Duncan Road was practically emptied during Christmas, when under the supervision of Dr. T. S. Weir, the Health Officer and the medical officer, most of the inmates were removed to the asylum.

6. Within a short time, there was an actual reaction in favour of the institution, when the lepers began to see that they were being kindly treated and good food and even luxuries provided for them. This increased when they realised that their companions in distress outside had also followed them to the asylum, so that the whole fraternity which had become temporarily disorganised by their first enforced removal, was reformed and all the old associations and friendships renewed within the asylum.

7. Soon after the patients came in, some of their friends and relations appeared to claim them and to undertake their maintenance and look after them. After due investigation locally, and at times lengthy correspondence with the different collectorates from which the patients had originally gravitated down to Bombay long long ago, some were discharged under the care of their guardians, and a few were actually seen to the Railway station and sent off, their train fare and a small allowance for food on the way being paid from the Asylum Funds. This helped not a little in securing the goodwill of the patients.

8. A few days after the asylum was started, the patients commenced to feel the want of some little luxuries which they had been accustomed to, notably tobacco, opium, and ganja. Tobacco was at once supplied to them and instructions were issued that each patient got daily six beedeas (country cigarettes) or two drachms of tobacco. As regards opium, opinions differed at first, but it was deemed advisable to give small quantities of the drug to those who were

* This patient sought voluntary admission a few months later and became a well behaved inmate.

† Rest house.

accustomed to it. It was administered in pill form, (each pill of half a grain) and in no case did the total quantity exceed 4 grains in 24 hours. Ganja was put a stop to at once, but a few patients used to receive it through their friends. It might be noticed by the way, that none of the patients asked for country liquor or spirits.

III. Voluntary Admissions and Increase of Accommodation.

9. Within six months of the opening of the asylum, applications for voluntary admissions became very numerous and patients had to be refused for want of accommodation. However provision was soon made for taking in about 70 more patients. Most of the admission then became voluntary, and by the end of 1891, the asylum held over 250 patients. During 1892 the number kept between 250 and 270 and by the end of 1893 it reached to almost the full figure of accommodation about 290. During the greater part of 1894, the asylum had 300 inmates. In 1895, 1896, and 1897 the asylum had almost always the full number of patients (300), and many had often to be refused admission for want of room. When this happened, they would squat down for days together on the road near the entrance of the asylum, until vacancies occurred by deaths or discharge.

10. Nearly 90 per cent. of the patients now in the asylum are voluntary admissions and only occasionally a stray leper is arrested by the police and brought in. At rare intervals a few are brought by the police in an almost dying condition and they usually succumb within a day or two of admission.

IV. Administration.

11. ARRANGEMENT OF PATIENTS :—The patients are arranged according to their caste and sex. The Maratha Hindoo (Males) are located in two wards each holding 42 patients. They also occupy one half of another block, the other half being assigned to the Mahars and Chamars (low castes). The Christians (mostly from Salsette) and Mahomedans (males) occupy one half each of another block. One ward has been assigned to the Maratha Females, a part of which is also used by Mahomedan and Christian women and children. A separate ward of 24 beds is occupied by the Mahar and Chamars females and children. All children under ten are kept with the Females.

12. CLOTHING, BEDDING, VESSELS &c. :—Each patient is provided with an iron cot, which is taped with country made yarn tape, one quilt, one blanket, one sheet, and one straw pillow. The clothing of the male inmates, in fair weather, consists of one cotton jacket, a pair of trousers, one cap, and one pair of chapples, (sandals) and one towel. During the cold weather, he has a suit of warm clothing. The females are provided with sarces and cholis one each, and during cold weather they have a flannel jacket. They also have caps, chapples and towels. Two suits of clothing of each kind suffice generally per patient per year. The vessels given to each patient are as follows :—one brass plate, one china cup, one tinpot, one earthen lota, and one earthen chati. Those with ulcerated fingers or without them, have spoons provided. One cake of Calvert's Carbolic soap is given to each patient monthly. The females receive also one wooden comb and cocoanut or teel oil and sikakari (soap beans) for the hair. They are also provided with glass or copper-brass bangles yearly.

13. DIET AND COOKING :—The dietary was first modelled on the scale of the ordinary diet in the other Native Hospitals in Bombay, but as it did not quite suit the circumstances of the asylum, it had to be varied from time to time until the

following scale was arrived at, which fairly satisfies all the ordinary requirements of the inmates. The cost of each diet, exclusive of the pay of cooks, is 3 annas per head per day.

SCALE OF DIETARY.

	Break-fast.	Dinner.	Supper.
Monday ...	Rice 3 ozs. Milk 4 ozs. Sugar $\frac{1}{2}$ oz. to make conjee or Tea $\frac{1}{6}$ oz. Milk 2 ozs. Sugar $\frac{1}{2}$ oz. Baker's Bread 4 ozs.	Rice 8 ozs. Toor Dhall 3 ozs. Vegetables 2 ozs. Onions $\frac{1}{2}$ oz. Ghee $\frac{1}{2}$ oz. Sweet oil $\frac{1}{2}$ oz. Curry stuff $\frac{1}{6}$ oz. Salt $\frac{1}{6}$ oz.	Rice (Patni) flour 8 ozs. Vegetables 3 ozs. Onions $\frac{1}{2}$ oz. Sweet oil $\frac{1}{2}$ oz. Curry stuff $\frac{1}{6}$ oz. Salt $\frac{1}{6}$ oz. or Tea $\frac{1}{2}$ oz. Milk 4 ozs. Sugar 1 oz. Baker's Bread 12 ozs. } * Wheaten Flour 8 ozs. or Baker's Bread 12 ozs. Mutton 6 ozs. Ghee $\frac{1}{6}$ oz. Onions $\frac{1}{2}$ oz. Curry stuff $\frac{1}{6}$ oz. Salt $\frac{1}{6}$ oz.
Tuesday ...	Do.	Do.	Same as on Monday
Wednesday ...	Do.	Do.	Same as on Monday
Thursday ...	Do.	Do.	Rice (Patni) flour 8 ozs. Toor Dhall 3 ozs. Onions $\frac{1}{2}$ oz. Curry stuff $\frac{1}{6}$ oz. Salt $\frac{1}{6}$ oz. Sweet oil $\frac{1}{6}$ oz.
Friday ...	Do.	Do.	Same as on Monday.
Saturday ...	Do.	Do.	Same as on Tuesday.
Sunday ...	Do.	Do.	Same as on Monday.

For those suffering from intercurrent ailments, milk diet is prescribed. Extras are also allowed to the patients such as meat, fruit, milk, &c. No stimulants or spirits are used except medicinally and the average cost of which comes to from Rupees 8 to 10 per month only. Cooking for the patients is done by four (purdashee) brahmin cooks and one Maratha cook. The latter is employed for cooking mutton, &c. The dietary is so arranged, that the cooking done by these men does equally well for the Hindoo, the Mahomedan or the Christian. Three meals are served daily, breakfast (tea and bread or conjee) at 7 A.M., dinner at 12 noon, and supper at 5 P.M.

* This is taken on all the days except on Mutton days, Tuesdays and Saturdays.

In addition to the above daily dietary 6 Beedees or 2 Drachms of tobacco to each head.

" " " 3lbs. of Fire wood per head per day.

When fresh fish is in season and of good quality, it is occasionally allowed in lieu of mutton.

14. SEGREGATION OF SEXES :--The system of segregation adopted is not quite strict, for beyond the inmates, males and females, being located in separate wards there is no other check to their associating. Nor is such strict segregation necessary in the light of what is now known about the sexual relations amongst lepers. Very often a person becoming affected with leprosy separates from a wife or husband, as the case may be, and more often than not, enters into marital relations with a leper. And it has been further observed that the unions are not fruitful as the leper is not as a rule prolific. It has been said by some that lepers in the early stages of the disease have greater sexual desire, but such has not been observed. The leper male suffers from a kind of chronic orchitis probably leprosy, and thus analagous to syphilitic orchitis and the female from leprosy ovaritis. As the main object of segregating the sexes is to prevent the propagation of the disease by heredity, the knowledge that the leper is not prolific and that a very small proportion (about 5 per cent.) of the issue of lepers develop leprosy, must as a matter of course lead to less weight being now attached to the strict segregation of the sexes.

15. MARRIAGES AND ISSUES :--The experience gained at this asylum fully corroborates the views expressed by the late Dr. Beaven Rake, Superintendent of the Trinidad Leper Asylum and President of the Indian Leprosy Commission, that the marriage of lepers is decidedly preferable to promiscuous immorality. And although the latter has not prevailed to any extent in this asylum, there are no restrictions placed in the way of patients intermarrying among themselves.

Moreover these marital contracts are entered into not so much for the enjoyment of sexual relations as with the object of receiving care and nursing by either party, at the hands of the other during serious illness. Within the nine years that the asylum has been in existence, only seven children have been born and in all cases both the parents were afflicted with anæsthetic leprosy. The children were puny and weakly but showed no traces of leprosy at time of birth. Five of them died subsequently from some infantile affections without developing leprosy. It would have been desirable to have them removed from their parents but it was not feasible and besides, there is no institution on this side of India where the children of leper parents are received. The fact of such an extremely small birth-rate justifies the lines along which the system of segregation has been adopted in the asylum.

The experience of the Matunga Asylum has been corroborated by similar observations in other parts of the world. Hansen relates the instance of the descendants of 160 Norwegian lepers who emigrated to the United States of America, and all their offspring (limited as they must have been) remained free from the disease to the third generation. "Of all the descendants, not a single one has become leprosy."

Dr. Koch of Trinidad states that at Maracaibo Island (Venezuela) marriages have been permitted between lepers for the last 15 years, and only two births have occurred during the period, both the children having been born healthy.

In Hawaii, 2864 lepers, had only 26 children among them, and of whom only 2 developed leprosy.

And at the Matunga Asylum, 1600 lepers show only seven births in nine years.

Those instances therefore prove that the birth-rate amongst married lepers is

extremely limited and that the risk of transmitting leprosy by heredity—(no congenital case of leprosy having been authentically recorded up to now) to the offspring of the leper is infinitesimal.

16. CONDUCT AND DISCIPLINE :—The police guard which was posted in the early days of the asylum was dispensed with, within a short time and only two purdashee ramosees engaged in their place. It must be admitted that considering all the circumstances, the patients have behaved extremely well and have been docile and amenable to discipline. There were however one or two petty outbreaks of violence during the first year but on the discharge of the ringleaders they soon ceased. No means of punishing the refractory patients are available beyond solitary confinement and conjee diet. But this even is hardly ever now required. There are no chronic offenders as complained by Dr. Rake in his reports, and if any patient persistently shows defiance of orders, he is discharged. Nor do the patients quarrel amongst themselves, but are as a rule very gentle and kind to each other.

17. OCCUPATION :—It was some months, before the patients so to say became acclimated to their new surroundings, as at first they would do nothing beyond eating their three meals a day and looking on with listlessness and apathy which is so characteristic a feature of leprosy. In time, they commenced to take interest in what was going on around them and took to some gardening in the spaces between the wards. Tools, seeds, and other materials were provided, and they laid out and neatly arranged the grounds with foliage and flowering plants and fruit trees notably the plantain ; some vegetables were also grown, which they were allowed to retain and cook separately for themselves. Some of them were then persuaded to take work as hamals or dressers in the wards and to look after their general cleanliness. Each one was paid Rs. 2-8-0 for looking after one half ward and thus gradually the healthy servants were replaced by the lepers and with consequent saving in the establishment charges. There are now 13 such leper hamals, and one leper ayah ; one leper patient repairs the clothing, &c., and receives Rs. 5 per month. There is also a leper school-master, a leper Mhola and a leper Muccadam each receiving Rs. 5. As there was some risk as well as difficulty in getting barbers from out-side to shave the patients, it was deemed advisable to furnish some of them with the necessary implements and to pay them a small sum per head and the system has been continued up to the present.

18. AMUSEMENTS :—The patients are provided with cards, and games such as Indian chess (Chopat), &c. Some of them have Musical talents and get up, off and on religious concerts, dramatic entertainments, Indian burlesques &c., among themselves. The children also are provided with toys and games.

19. RELIGION AND RELIGIOUS OBSERVANCES :—

(a) HINDOOS.—A temple has been erected in the asylum grounds containing the usual idols and other accessories including religious books, &c. A Brahmin, from Dadar attends for the daily worship and is paid Rs. 5 monthly. The patients are allowed small sums of money,—the males to make Gunpatis and the females, to make Gowries. They observe all Hindoo holidays including the fast days on which in lieu of the ordinary rations, they receive dry food, fruit, dates, milk cocoanut &c. During the Dewali, Holi, & Coconut and other holidays they are given some extras from which they make native confectionery.

(b) MAHOMEDAN.—A mosque provides for the religious wants of the Mahomedan inmates. One of the patients acts as a Mhoola and is paid Rs. 5 for the

same. The inmates observe the Ramzan fast and all the Id holidays and for the latter they receive special rations and extras. A small gratuity is distributed every year to provide for the cost of making a tazia and for which the Police Commissioner is kind enough to grant a permit. Books are also provided for the religious ceremonies.

(c) CHRISTIANS :—A small chapel for the Roman Catholic inmates is provided. It is furnished with all the usual accessories of a Catholic Chapel. It was built, like the temple and the mosque, out of special donations. A priest attends every week for the mass and on other days the patients say prayers by themselves. A small harmonium has also been kept in the Chapel. Christmas and Easter are the principal holidays observed by the Catholic inmates, and for the latter a small gratuity is every year distributed among them.

20 THE CHILDREN :—All children under the age of ten are kept with the females. A school is provided for all of school going age in a specially built school-room and under a leper school master who teaches Marathi and rudiments of geography, arithmetic &c. A swing is provided for them in the compound. As often as funds admit, toys and games are distributed and at Christmas time they are given fruits, sweetmeats &c., from monies specially contributed for the purpose by some kindly disposed ladies and gentlemen in the city. The school now receives a grant-in-aid from the Joint Schools Committee and examinations are held yearly by the Deputy Inspector of Marathi Schools in Bombay. Prizes in the shape of books, toys, games, articles of jewellery were distributed by Mrs. Acworth in March 1894, from a special subscription raised by her from her friends in Bombay and elsewhere. On two other occasions prizes were distributed by the late Sir Jamsetji Jeejibhoy Bart. and by the Very Reverend L. G. Mylne, late Bishop of Bombay.

21. DISCHARGE OF PATIENTS :—Those who voluntarily wish to go away from the asylum or those whose friends undertake to look after them are as a rule discharged.

A few improve so much that they find their life in the asylum rather irksome and are discharged on application to proceed to their native country. Some of them however return when there is a periodic recurrence of the disease.

22. PERMISSION TO VISIT FRIENDS :—At first this was strictly refused as it proved often to be a pretext to go and beg in the city. The friends of the patients were always allowed to come and see them. Latterly however some of them are allowed leave to go and see their friends and as a rule they always return within the period of leave given; a few overstay the leave and hardly any take an unfair advantage of the concession by running away. Some patients that used to receive a small monthly pension from some charitable persons in the city are allowed every month to go for the purpose.

23. PRESENTS OF CLOTHES, SWEETMEATS, FRUITS, ILLUSTRATED AND OTHER NEWSPAPERS, BOOKS &c. :—Several Hindoo gentlemen have time after time distributed dhoties or bandis to males and sarees to the females. They also occasionally send down sweetmeat and fruits and which are greatly appreciated by the patients. The proprietors of the "*Times of India*" have been kind enough to send gratis a copy of their daily issue. Amongst the vernacular papers the "*Gujarati*" is sent weekly. The *Catholic Examiner*, the *Jam-e-Jamshed*, the *Gul-Afsan*, the *Dnyan Vardakt* &c. are at times received.

24. **ESTABLISHMENT** :--This was at first arranged on lines some-what similar to those of Government Hospitals in Bombay. But all the superfluous establishment was gradually reduced, some times the duties of two posts being amalgamated with a little extra pay, and as the lepers commenced to show both willingness and aptitude for work, the healthy servants were got rid of and replaced by them. The paid establishment as existing on December 31st 1896 including the leper servants consisted of 1 Medical officer, 1 resident hospital assistant, 1 Clerk and compounder, 3 ward boys, 1 ayah, 5 cooks, 4 peons, 2 dhobies, 1 leper school-master, 1 leper Mhoola, 1 leper tailor, 1 leper chapel servant, 3 leper ayahs, and 16 leper ward servants, with an aggregate cost of Rs. 497 per mensem.

25. **MAINTENANCE** :--The institution is maintained at the joint expense of Government and the Municipal Corporation, Rs. 10 per head per month being allowed, Rs. 5 per patient being contributed from each source upto 300 patients. At first sanction was granted by Government and the Municipal Corporation for maintaining only 200 inmates, but this was subsequently increased during 1891 upto 270, and in 1892 upto 300.* This allowance includes all charges for establishment, dieting, clothing Medicines, taxes, repairs, &c. The maintenance grant just suffices for all the requirements of the institution, and leaves only a narrow margin for savings. All the items of expenditure have been frequently revised, and brought down to the lowest limits consistent with due efficiency and the result of nine year's working on this basis, has been a saving to the accounts of the maintenance grant to the extent of Rs. 10,356-4-8 upto 1st December 1899.

V. Buildings and Grounds.

26. **WARDS** :--There are in all six wards, four of them being 100 feet long, the fifth 57 feet, and the sixth 157 feet. They are all 30 feet in breadth and 15 feet high in the centre and eight feet on the sides. All are alike in structure having half brick walls, plastered internally and an 8 feet corrugated galvanized iron longitudinal partition wall in the centre, wrought iron frame work, a damp proof floor plastered with cement, a ridge ventilator and tile roofing. There are two venetian windows and one panel door, one on each side of a bay of 13'-3" and at the southern end of the wards a roofed enclosure, with water connection has been provided to serve as a night privy. All the blocks are placed parallel to each other with large open spaces between, except one block which is at right angles to the rest and all these occupy what might be called the southern half of the asylum grounds.

26. (A) **THE JAMSETJI NUSSEERWANJI PETIT HOSPITAL WARD** :-- This ward which was constructed and furnished out of a special donation of Rs. 20,000 given by the late Bai Dinbai, widow of the late Nusseerwanji Maneckji Petit, in memory of her son, the late Jamsetji N. Petit, is built on a different plan to the rest and is intended to accommodate 50 patients. It is a pukka built building, with plastered walls, a verandah, and Indian Patent stone flooring. It is divided horizontally into two sections, the larger being utilised for male and the smaller for female patients. The opening ceremony of this building was performed by L. R. W. Forrest Esq., in the presence of a large gathering on the 11th June 1894. This ward was designed and constructed under the supervision of Khann Bahadur Muncherji C. Marzban C.I.E., Executive Engineer, Bombay Municipality.

* Any increase in the number of inmates beyond the sanctioned strength of 300, is subject to the sanction and approval of Government and the Corporation.

27. ISOLATION WARD :--The isolation ward is 31 feet by 30. It contains six back-to-back compartments each 14 feet 9 inches by 7 feet 3 inches for patients who require isolation, and two strong cells each 12 feet 7 inches by 8 feet for refractory lepers. The first resembles, in every respect, the ward attendants' quarters except that the division walls are of half brick masonry and the roof is covered with corrugated galvanized iron sheets. The walls of the two cells are constructed of rubble masonry 15 inches thick, and carried up to the corrugated galvanized iron covering of the roof, including the ridge ventilator.

28. COOK-HOUSE :--It is 30' x 30' and similar in structure to the wards and has a corrugated iron roofing. There are two rows of *chulas* (fire places) built on a raised masonry plinth and it has a nine inch division wall six feet high. In each row there are eight chulas and four built boilers or coppers are provided one in each corner. There are two doors on each side of the cook house. On its northern side it is provided with a large washing trough with pavement and roof.

29. WASHING PLACES :--The washing places consist of ten compartments each 4' x 4' in two back to back rows. The whole is covered by a wrought iron water tank. Each compartment is supplied with water from a wrought iron pipe connected with the tank and worked by a balance stop-cock which is opened by a chain. These compartments are plastered with cement to a height of 3'-6" from the ground and each has a masonry raised seat in a corner near the water pipe and a corrugated iron screen 6' x 2'. As the female inmates were greatly inconvenienced on account of the distance to the latrines &c., from their wards, special latrines and washing places alongside their ward were constructed during 1894 and a pucca-roofed passage was provided joining the wards with the same. The cost of this was defrayed out of a grant made by the late Bai Dinbai, widow of the late Nussarwanji Maneckji, Petit.

30. LATRINES :--There are two rows back to back with a three feet passage between them. Each row has ten seats 3'-6" deep and 3' wide with a 7' high screen in front and 9' at the back and is covered with corrugated iron roof. They are constructed of timber framing and half brick wall, plastered internally. The foot plates are made of wrought iron and the pans of galvanized iron plates. A two inch nozzle at the lower end of the pans carries the liquid sewage into a stone-ware gully trap connected with a six inch pipe sewer.

31. URINALS :--The urinal has eight seats arranged in two back to back rows and is constructed on the self flushing water system used in Bombay.

32. DHOBIE GHAT :--This is built of masonry and stone and a corrugated iron room is constructed along side for the bhathi.

33. MORTUARY :--A small domed-roof mortuary with two tables and water connection has been provided at the south east corner. All the buildings described above, except the cook house, occupy the southern half of the grounds and are separated by a road leading from east to west, thus dividing the grounds into two parts which are separated by a barbed wire fencing.

34. HOSPITAL ASSISTANT'S QUARTERS AND DISPENSARY :--They are built on the same plan with appropriate alterations in size and internal arrangements.

35. SERVANTS QUARTERS :--There are in two blocks each 30' x 28' and divided into eight compartments with corrugated galvanized iron partitions. Each com-

partment is 15' x 7' and has a door in front. The roof is galvanized iron with ridge ventilator ; separate washing places, latrines and urinals have been provided for the servants.

36. **SCHOOL ROOM** :—This is a well-built red brick building with a high plinth, and corrugated iron roof. It is located on an open space outside the original compound. Its dimensions are 30' x 20' and it cost about Rs. 1,800.

37. **SWEEPER'S HUTS** :—These are provided at a cost of about Rs. 150 at the north east corner.

38. **OTHER BUILDINGS** :—These include the chapel the mosque, and the temple, all built out of special donations.

39. **THE GROUNDS** :—The centre road separates the asylum into two halves and has passages at right angles to it, leading to the spaces between the wards. Most of the space excluding the passage, both between the wards, as well as near the Hospital Assistant quarters, Dispensary and servants' quarters has been laid out as a garden with turf, foliage and flowering plants.

VI. Water-supply, Drainage, Conservancy, and Lighting.

40. **WATER-SUPPLY** :—This is derived from the Vehar main which runs along the main road by means of a three inch pipe. The supply is unfiltered and always plentiful and delivered with sufficient pressure.

41. **DRAINAGE** :—The sullage from the wards, cook house and servants' quarters used to be carried by means of stoneware pipes into a percolating cesspool situated on some land to the south of the asylum and through which it percolated into the neighbouring fields. Another percolating cesspool existed at the south east corner which received all the sullage from the washing and bathing places, latrines and urinals and the dhobie ghat ; all the sullage passed from this cesspool also into the fields beyond. Both percolating cesspools were provided with hoppers which were filled with chloride of lime and the sullage passing through them corroded a part of the lime, thus ensuring partial disinfection. This system has been done away with. The sullage has now been diverted by new pipes and connection to the settling tanks of the sewage farm, thus obviating the nuisance from percolation into the neighbouring fields.

42. **SEWAGE FARM** :—Mr. C. C. James Acting Drainage Engineer of the Municipality having prepared a scheme for treating the sewage with lime and then running it into settling tanks, and subsequent discharge of the clear effluent on to the fields, the same was sanctioned. The treatment with lime was subsequently given up as it interfered with the crops. Additional land for the sewage farm has been bought up in the vicinity so that the full amount of sewage may be disposed of. The area of the farm is about $3\frac{1}{2}$ acres, and it has proved a success financially as well as on sanitary grounds. The crops grown are fodder crops for cattle, like lucerne, guinea-grass, karbi etc. ; rice and vegetables are also grown and utilised for the inmates of the asylum.* The work on the sewage farm is done by the inmates who are paid a small daily allowance.

* The practice which has been lately introduced of selling to the public, flowers, fruits, vegetables etc. grown on the leper asylum grounds and sewage farm and handled by lepers, is to be strongly deprecated on sanitary grounds. It is to be hoped that it will be put a stop to, and the articles utilised for the consumption of the inmates as was done upto 1897.

43. **CONSERVANCY** :—The latrines were so constructed as to leave the solid excreta in the pan, the urine and water draining away, so as to allow of their removal by the hand and carriage to the nearest Municipal night soil depôt. The work is looked after by three sweepers. This also has now been altered, and all the solid, as well as the liquid matters are conveyed to the sewage farm.

44. **LIGHTING** :—This is done by means of Hink's hurricane lanterns suspended at some height just about midway in each half ward and the system has proved both economical and satisfactory, doing away with the lanterns originally constructed and fixed in the wards at either end.

VII. Disposal of the Dead.

45. All the HINDOOS that die in the asylum are cremated by the inmates according to the Hindu customs and after appropriate ceremony in a place set apart at the extreme east corner of the grounds. The rites incidental to cremation are performed by the patients themselves and one khandi (28 maunds) of firewood is allowed per corpse at a cost of Rs. 4-8-0.

46. **MAHOMEDANS** :—A bier and pall are provided for the Mahomedans and the corpses are removed to the cemetery at Marine Lines by bearers who are sent for from the city and are paid at the rate of about Rs. 7 per corpse, to defray the charge of conveyance and all incidental expenses.

47. **CHRISTIANS** :—The Roman Catholic dead are removed from the asylum for burial at the expense of their fund, all arrangements being made for the purpose by the Rev. Father Peters S. J. The Protestants have a pauper funeral at the expense of the asylum funds.

VIII. Statistics.

48. **ADMISSIONS, DISCHARGES, AND DEATHS** :—The asylum had 134 patients admitted by the end of November 1890 and 90 more were admitted during the following month making a total of 224, of whom one was discharged, 9 escaped, and 3 died and there were remaining on 1st of January 1891, 207 patients. During 1891, 209 were admitted, making the total number 415 of whom 57 were discharged, 12 escaped, and 99 died, thus leaving 247 patients on 1st of January 1892. During 1892, 213 patients were admitted, making the total number of patients treated 460, of whom 39 were discharged, and 103 died. The year 1893, opened with 268 patients and 200 were admitted during the year, the total treated being 468, of whom 94 were discharged, 88 died, and 286 remained on the 1st of January 1894. During the year 1894, 201 patients were admitted the total treated thus being 487, of whom 119 were discharged, 80 died, and there remained 288 on the 1st of January 1895.

There were 195 admissions during 1895, and with the 288 remaining, the total treated during the year amounted to 483, of whom 81 were discharged and 102 died and 300 remained. During 1896, there were 147 admissions, the total treated amounting to 347 : of whom 61 were discharged and 86 died, leaving a balance of 300 at the end of the year. The admission in 1897 numbered 190, and the total treated 490 of whom 86 were discharged and 104 died, and there remained 300 on the 1st of January 1898.

The following table shows the particulars of admissions, deaths, discharges etc., year by year from 1890 to 1897 :—

TABLE I.
Showing the Admissions, Deaths, Discharges etc., from 1890 to 1897.

Year.	Admissions.	Discharges.	Absenties.	Deaths.
1890 (Nov. & Dec.)	224	1	9	8
1891	209	57	12	99
1892	213	89	.....	103
1893	200	94	.....	83
1894	201	119	.....	80
1895	195	81	.....	102
1896	147	61	.....	86
1897	190	86	.....	104
Total ...	1,579	588	21	670

The total number of admissions during these years, was therefore 1579. There were 588 patients discharged, 670 died and 21 absconded. A few out of the admissions, were re-admissions from some of the discharged patients.

The daily average number of patients from 1891 to 1897 was as follows :—

1891	...	...	228·70
1892	...	...	226·49
1893	...	...	282·05
1894	...	...	294·74
1895	...	...	298·85
1896	...	...	300·00
1897	...	...	296·71

The following table shows the particular in detail month by month—admissions, discharges, deaths and remaining—from November 1890 to December 1897:—

TABLE II.
Statistics from month to month from November 1890 to 31st December 1897.

1890.

Month.	Remain- ing.	Admitted.	Total	Daily ave- rage of sick.	Discharg- ed.	Absented or other- wise.	Died.	Remain- ing.
November ...	...	134	134	114·91	1	1	1	131
December ...	131	90	221	151·58	...	8	7	206
Total ...	...	224	...	133·24	1	9	8	...

1891.

Month.	Remain- ing.	Admitted.	Total.	Daily ave- rage of sick.	Discharg- ed.	Absented or other- wise.	Died.	Remain- ing.
January ...	206	17	223	198.74	10	...	10	203
February ...	203	8	211	202.57	5	...	4	202
March ...	202	6	208	196.64	8	...	7	193
April ...	193	29	222	201.08	3	4	5	210
May ...	210	35	245	224.35	...	2	6	237
June ...	237	15	252	238.06	7	...	3	242
July ...	242	9	251	242.96	6	...	9	236
August ...	236	20	256	238.45	3	...	8	245
September ...	245	13	248	244.88	...	2	13	243
October ...	243	10	253	246.01	5	...	6	242
November ...	242	34	276	353.66	1	4	8	263
December ...	263	13	276	256.10	9	...	20	247
Total ...	...	209	...	228.70	57	12	99	...

1892.

January ...	247	14	261	253.74	3	...	4	254
February ...	254	22	276	263.02	2	...	12	262
March ...	262	15	277	260.51	11	...	13	253
April ...	253	30	283	272.72	3	...	3	277
May ...	277	8	285	274.06	10	...	6	269
June ...	269	18	287	264.02	16	...	8	263
July ...	263	7	270	262.04	6	...	5	259
August ...	259	15	274	260.16	9	...	11	254
September ...	254	23	277	256.08	5	...	7	265
October ...	265	18	283	260.08	11	...	14	258
November ...	258	28	286	254.35	7	...	10	269
December ...	269	15	289	268.94	6	...	10	268
Total ...	...	213	...	266.49	89	..	103	...

1893.

Month.	Remain- ing.	Admitted.	Total.	Daily ave- rage of sick.	Discharg- ed.	Absented or other- wise.	Died.	Remain- ing.
January ...	268	17	285	268.80	5	...	7	273
February ...	273	10	283	267.14	24	...	6	253
March ...	253	31	284	257.01	9	...	9	266
April ...	266	27	293	272.08	11	...	4	278
May ...	278	22	300	286.19	5	...	1	294
June ...	294	8	302	290.10	...	...	11	291
July ...	291	9	300	290.09	2	...	4	294
August ...	294	14	308	295.13	3	...	6	299
September ...	299	9	308	297.73	11	...	3	294
October ...	294	16	310	289.74	13	...	17	280
November ...	280	23	303	282.29	5	...	8	290
December ...	290	14	304	288.22	6	...	12	286
Total ...	...	200	...	282.05	94	...	88	...

1894.

January ...	286	21	307	266.93	10	...	8	289
February ...	289	21	310	289.92	9	...	8	293
March ...	293	23	316	293.61	11	...	10	295
April ...	295	18	313	297.46	13	...	5	295
May ...	295	26	321	295.97	15	...	7	299
June ...	299	7	306	300.00	2	...	4	300
July ...	300	10	310	300.00	5	...	5	300
August ...	300	9	309	300.00	8	...	1	300
September ...	300	17	317	300.00	5	...	12	300
October ...	300	12	312	298.51	9	...	7	296
November ...	296	23	319	297.33	18	...	4	297
December ...	297	14	311	296.83	14	...	9	288
Total ...	...	201	...	294.71	119	...	80	...

1895.

Month.	Remain- ing.	Admitted.	Total.	Daily ave- rage of sick.	Dis- charged.	Absented or other- wise.	Died.	Remain- ing.
January ...	288	19	307	293.69	4	...	7	296
February ...	296	15	311	293.07	7	...	9	295
March ...	295	25	320	299.58	7	...	13	300
April ...	300	27	327	300.00	14	...	13	300
May ...	300	14	314	300.00	9	...	5	300
June ...	300	8	308	300.00	2	...	6	300
July ...	300	10	310	300.00	4	...	6	300
August ...	300	9	309	300.00	2	...	7	300
September ...	300	11	311	300.00	5	...	6	300
October ...	300	18	318	300.00	8	...	10	300
November ...	300	17	317	300.00	5	...	12	300
December ...	300	22	322	300.00	14	...	8	300
Total ...	...	195	...	298.85	81	...	102	...

1896.

January ...	300	12	312	300.00	6	...	6	300
February ...	300	11	311	300.00	2	...	9	300
March ...	300	18	318	300.00	11	...	7	300
April ...	300	19	319	300.00	7	...	12	300
May ...	300	17	317	300.00	4	...	13	300
June ...	300	9	309	300.00	4	...	5	300
July ...	300	7	307	300.00	4	...	3	300
August ...	300	7	307	300.00	3	...	4	300
September ...	300	16	316	300.00	8	...	8	300
October ...	300	7	307	300.00	3	...	4	300
November ...	300	14	314	300.00	7	...	7	300
December ...	300	10	310	300.00	2	...	8	300
Total ...	...	147	...	300.00	61	...	86	...

1897.

Amouth.	Remain- ing.	Admitted.	Total.	Daily ave- rage of sick.	Discharg- ed.	Absented or other wise.	Died.	Remain- ing.
January ...	300	13	313	300.00	5	...	8	300
February ...	300	9	309	300.00	3	...	6	300
March ...	300	11	311	298.29	17	...	6	288
April ...	288	20	308	293.65	2	...	12	294
May ...	294	23	316	293.80	18	...	4	294
June ...	294	21	315	295.12	9	...	11	295
July ...	295	15	310	298.72	2	...	8	300
August ...	300	4	304	297.80	8	...	5	291
September ...	291	10	301	290.09	...	...	11	290
October ...	290	21	311	293.13	4	...	13	294
November...	294	23	317	300.00	8	...	9	300
December...	300	21	321	300.00	10	...	11	300
Total ...	...	190	...	296.11	86	...	104	...
Grand Total ...	...	1,579	...	...	588	21	670	...

49. CASTE AND SEX OF PATIENTS :—No Europeans have been treated in the asylum. Six Eurasian males were admitted during 1891 and 1892. Only one Parsi patient (a female from Surat) was treated in 1891. The Maratha Hindus formed the bulk of the patients treated, and averaged 66.43 per cent of the total. Mahomedans stood at 9.32 per cent; Christians (mostly from the Salsette) 10.61 per cent.; Low caste Hindus (Mahars and Chamars) 13.41 per cent. and other castes 0.23 per cent :—

TABLE III.

Showing the proportion of the Various Castes.

CASTES.	PERCENTAGE.
Hindus (Marathas) ...	66.43
Mahomedans ...	9.32
Christians ...	10.61
Hindus (Low-caste) ...	13.41
Other Castes ...	0.23
Total ...	100.00

As regards sex, males formed 66.84 per cent. of the total; females 30.65 per cent. and children 2.51 per cent :—

TABLE IV.

Showing the proportion of sexes amongst all castes.

SEX.	PERCENTAGE.
Males ...	66.84
Females ...	30.65
Children ...	2.51
Total ...	100.00

The following table gives the detailed numbers of the sexes in each caste, year by year. The calculations have been made on the *total treated* during each year, and not on the *total admissions*.* There is thus of necessity a repetition of those remaining year after year, but the percentages given above are free from any errors incidental to this :—

* As the annual returns are forwarded in this form to Government, the table has been retained unaltered.

TABLE V.

Showing the Castes and Sexes of the Patients Treated.

	Total Treated.	Males.	Females.	Children.	Europeans.			Eurasians.			Hindoos.			Musulmans.			Parsis.			Salsette Christians.			Mahars and Chamars (Low Caste Hindus.)		
					M.	W.	C.	M.	W.	C.	M.	W.	C.	M.	W.	C.	M.	W.	C.	M.	W.	C.	M.	W.	C.
1890	224	157	65	2	...	...	...	2	0	0	110	43	1	16	3	0	...	...	...	10	2	0	21	17	1
1891	415	291	116	8	...	...	...	4	0	0	195	78	5	31	7	0	0	1	0	30	8	2	33	22	1
1892	460	301	150	9	...	...	...	...	...	0	212	91	7	31	11	0	...	...	...	31	13	2	23	35	0
1893	468	303	156	9	...	...	...	...	...	0	208	96	6	37	10	0	...	...	...	28	16	2	30	34	1
1894	487	324	150	13	...	...	...	...	...	0	219	96	10	40	8	0	...	...	...	26	18	2	39	28	1
1895	483	315	154	14	...	...	...	...	...	0	210	98	10	35	6	1	...	...	...	35	17	2	35	33	1
1896	447	293	139	15	...	...	...	...	...	0	189	87	10	35	7	1	...	...	...	40	22	3	29	23	1
1897	490	338	135	17	...	...	...	...	...	0	231	84	12	34	10	1	...	...	...	37	23	0	36	21	1
...	3,474	2,322	1,065	87	...	...	...	6	0	0	1574	673	61	259	62	3	0	1	0	237	116	16	246	213	7

50. **DISCHARGES:**—The total number of patients discharged was 588, as shown in Table I. Most of the patients discharged had improved considerably during their stay in the asylum; some of them returned to their native villages or were taken care of by friends, whilst others went on long pilgrimages to the various shrines in the Presidency and sometimes beyond. A few of them again returned after varying periods, on account of the usual exacerbations of the affection, and were readmitted. A small but fractional number of the inmates had to be compulsorily discharged on account of disobedience and unruly conduct.

51. **ABSENTEES:**—In the early days of the institution about 21 patients escaped, and could not be traced. Usually those who overstayed their leave turned up penitent, and were readmitted. It was not unusual for some of the inmates to show signs of nostalgia or home-sickness, and when, after inquiries, it was found that they had a home to go to, and that their application was not a pretext to go and beg in the city, they were allowed leave to go. The vagrant and begging life, to which they had been accustomed for long periods, did show occasional traces of breaking out again amongst those granted short leave, and many were the tales of woe and discomfort in the asylum, that they poured out into sympathetic ears in the city, in order to excite compassion, and at the same time to obtain some cash. But in spite of all that, they did return to the asylum, after their begging fit was over and when they realised the uncertainties of a begging life, with the comforts and regular meals of the asylum.

IX. Deaths and Death-Causes.

52. The total number of deaths during the period was 670. The percentage of mortality varied from year to year, the lowest having been 16·42, per cent. in 1894, and the highest 23·85 per cent. in 1891. The average mortality to the total treated was 19·28 per cent.

The following table shows the total number treated, and other particulars :—

TABLE VI.

Showing the statistics of the Patients treated with the mortality rate ect.

Years.	Beds available.	Total Treated.	Discharged.	Absented.	Died.	Percentage of Mortality.
1890	200	224	1	9	8	21·42
(Nov. & Dec.)						
1891	270	415	57	12	99	23·85
1892	270	460	89	...	103	22·39
1893	300	468	94	...	88	18·80
1894	300	487	119	...	80	16·42
1895	300	463	81	...	102	21·11
1896	300	447	61	...	86	19·23
1897	300	490	86	...	104	21·22
...	...	3,474	588	21	670	19·28

The following table shows the details of mortality month by month, and year by year. It appears that the total mortality fluctuates considerably during the seasons, and that lepers are more prone to die just about the time that there are sudden and violent seasonal changes. The highest monthly mortality was during March, October and December, being 65, 71, and 85 respectively. During March east winds prevail to a great extent in Bombay; October is the month,—humid, and specially malarial—after the cessation of the monsoon, and during December the cold weather sets with a wide range of temperature—there being generally a difference of between 10° to 15° between the maximum and minimum. Lung troubles, sudden congestions, suffocations etc., are more prevalent during December and carry away the largest number of patients.

During May, June, July and August, the mortality is fairly even, showing that the lepers bear the heat of May, and the moist heat of the early monsoon fairly well :—

TABLE VII.

Deaths in Each Month Since 1890.

Months.	1890			1891			1892			1893			1894			1895			1896			1897			Grand Total.
	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	
January ...	...	...	...	7	3	10	4	...	4	4	3	7	7	1	8	5	2	7	3	8	6	6	2	8	50
February ...	...	...	...	3	1	4	7	5	12	4	2	6	5	3	8	6	3	9	4	5	9	6	...	6	54
March ...	...	...	...	7	...	7	8	5	13	8	1	9	9	1	10	12	1	13	5	2	7	3	3	6	65
April ...	...	...	...	3	2	5	2	1	3	3	1	4	4	1	5	8	5	13	9	3	12	10	2	12	54
May ...	...	...	...	6	...	6	6	...	6	...	1	1	4	3	7	4	1	5	5	8	13	3	1	4	42
June ...	...	...	...	2	1	3	4	4	8	9	2	11	3	1	4	3	3	6	2	3	5	8	3	11	48
July ...	...	...	...	7	2	9	5	...	5	3	1	4	2	3	5	3	3	6	1	2	3	7	1	8	40
August ...	...	...	...	7	1	8	11	...	11	6	...	6	1	...	1	5	2	7	3	1	4	4	1	5	42
September ...	...	...	...	11	2	13	7	...	7	2	1	3	10	2	12	4	2	6	6	2	8	6	5	11	60
October ...	...	...	...	5	1	6	8	6	14	13	4	17	3	4	7	6	4	10	1	3	4	11	2	13	71
November ...	1	...	1	8	...	8	8	2	10	5	3	8	2	2	4	7	5	12	4	3	7	6	3	9	59
December...	7	...	7	17	3	20	8	2	10	6	6	12	5	4	9	4	4	8	5	3	8	8	3	11	85
Total ...	8	...	8	83	16	99	78	25	103	63	25	88	55	25	80	67	35	102	48	38	86	78	26	104	670

53. **DEATH-CAUSES** :—The principal death causes were diarrhoea* (colliquative muco-enteritis) and exhaustion† (leprous marasmus). They accounted for nearly 80 per cent. of the total mortality. Colliquative muco-enteritis is perhaps the most common and most frequent complication in leprosy on this side of India and it is so intractable to treatment, that sooner or later it carries away the patient. It occurs independently of any errors of diet, for except in a few cases, patients do not obtain anything deleterious from out-side, and develop the diarrhoea in the ordinary course of the disease. Most of the usual remedies give only but temporary relief. Marasmus, which accounts for nearly 35 per cent. of deaths, is the result of the long continued action of the toxins generated by the lepra bacillus. It is frequently associated with, and generally follows on the exacerbations of leprotic fever, and a few such exacerbations within a short period land the patient in the marasmatic condition from which it is difficult to rouse him, and under which he eventually sinks. All the vital functions seem to show thorough exhaustion and life exists in a more or less vegetative form, until death releases the patient.

The other death causes are insignificant; dysentery accounting for 5·5 per cent. and suffocation, gangrene, phthisis, and valvular disease of the heart for about 2 per cent. each. The following table shows all death-causes, the number of deaths, and percentage in each.

TABLE VIII.
Showing the Death-Causes and Per Centages.

Death-Causes.	Number.	Percentage to Total mortality.
Diarrhoea (Colliquative muco-enteritis) ...	302	45·13
Exhaustion (Leprous marasmus) ...	233	34·80
Dysentery ...	37	5·53
Suffocation... ..	18	2·68
Gangrene ...	19	2·83
Phthisis Pulmonalis ...	15	2·24
Pneumonia... ..	6	0·89
Valvular diseases of the Heart ...	14	2·00
Acute Bronchitis ...	4	0·59
Bright's Disease ...	9	1·35
Remittent Fever ...	6	0·89
Acute Rheumatism ...	1	0·14
Peritonitis ...	1	0·14
Cirrhosis of the Liver ...	1	0·14
Burns... ..	1	0·14
Suppurative Inflammation of the knee joint ...	1	0·14
Hæmaturia... ..	1	0·14
Hemiplegia	1	0·14
Total ...	670	100·00

* Hillis gives (*Leprosy in British Guiana*) the percentage of deaths from exhaustion at 42 per cent and from diarrhoea at 36 per cent.

† Statistics from the Norway Leper Asylums (Hansen) show the following percentages of principal death causes :—

	Per Cent.
Marasmus or Exhaustion	45·7
Phthisis Pulmonalis	12·00
Diarrhoea	10·08
Suffocation	9·3

54. THE CAUSES OF HIGH MORTALITY :—It cannot be denied that the mortality has been very high, and various causes have contributed to it. Most of the cases admitted were in an advanced stage of the disease and therefore with a shorter expectation of life and succumbed in the natural course of the affection. Ever since the asylum was started, large numbers of lepers have been brought either by their friends, or by the police, in a moribund condition and most of whom have died within two or three days ;— all that the institution could do for relief consisted in some small comforts to these unfortunates and to easing in the best possible manner their euthanasia. Admission was never refused to such, even at the risk of increasing the apparent mortality of the institution, and even when, there was no accommodation. Another contributory cause lay in the habits of the patients, who would always refrain from complaining about their ailments in time, lest they be placed upon a restricted diet. It was only by a sort of gradual training that they learned to value and ask for prompt redress. It is however satisfactory to note that the mortality is showing some decrease, but the experienced gained during these years do not warrant the hope of a larger reduction, for as is so well known and as will be shown hereafter, there is a certain term of expectation of life in a leper after the disease has once set in, and no known method of cure or treatment can avert the end, or prolong life very long.

55. The following table will not prove uninteresting as showing the vital statistics and longevity of lepers even under the best conditions of a confined leper population :—

1890.—It appears that of the 224 patients admitted in November and December 1890, 8 died during these two months, 57 died in 1891, 41 in 1892, 17 in 1893, 3 in 1894, 3 in 1895, 3 in 1896, none in 1897, and 1 in 1898. Thus in the course of eight years and 2 months, 133 lepers out of 224 succumbed to the disease ; 89 were discharged, and there remained only 3 in the asylum on the 31st of December 1898.

1891.—Of the 209 patients admitted in 1891, 42 died during the same year, 30 in 1892, 10 in 1893, 8 in 1894, 9 in 1895, 2 in 1896, 3 in 1897, and 1 in 1898, so that the total deaths amounted to 105, out of 209 in the course of eight years 78 patients were discharged and there remained in the asylum on the 31st of December 1898, only 15.

Thus the total number of lepers admitted from 7th November 1890 to 31st December 1891 was 433, and it appears that 238 out of them, *i. e.* nearly 55 per cent succumbed within 8 years of their admission.

1892.—During 1892, 213 patients were admitted, of whom 32 died during the year, 22 died in 1893, 11 in 1894, 16 in 1895, 6 in 1896, 4 in 1897 and 3 in 1898—making a total of 94 deaths in seven years : during the same period 101 patients were discharged, and there remained only 18 in the asylum at the end of 1898.

1893.—There were 200 admissions in 1893, of whom 39 died during the year, 17 died in 1894, 14 in 1895, 7 in 1896, 6 in 1897 and 2 in 1898—the total deaths

in six years amounting to 85 ; the discharged patients numbered 89, and there remained 26 only in the asylum at the end of 1898.

1894.—During 1894, the admissions totalled 201 : of whom 41 died during the year, 27 died in 1895, 15 in 1896, 11 in 1897, and 5 in 1898—the total deaths in five years being 99 : there were discharged during the same period 82, and only 20 remained in the asylum at the end of 1898.

1895.—195 patients were admitted during 1895, of whom 36 died during the year, 26 died in 1896, 12 in 1897, and 8 in 1898, the total deaths in 4 years amounted to 82 ; 80 patients were discharged during the period and 33 remained in the asylum on 31st December 1898.

1896.—The admissions in 1896, numbered 147 ; of whom 28 died during the same year, 21 died in 1897, and 7 in 1898 ;—the deaths in three years amounting to 56 ; during the same period 54 patients were discharged, and 37 remained in the asylum at the end of 1898.

1897.—During 1897, there were 190 admissions ; of whom 48 died during the year, and 14 in 1898 :—the deaths in two years numbering 62 ; 61 patients were discharged during the periods, and 67 remained in the asylum on 31st December 1898 :—

TABLE IX.

Statistics of all the patients admitted as existing on 1st January 1899.

	1890.		1891.		1892.		1893.		1894.		1895.		1896.		1897.		1898.		Remaining on	Total.
	Dis- charged.	Died	Dis- charged.	Died.	Dis- charged.	Died.	Dis- charged.	Died.	Dis- charged.	Died.	Dis- charged.	Died.	Dis- charged.	Died.	Dis- charged.	Died.	Dis- charged.	Died.	1st Janry. 1899.	
1890. Admissions.—224	12	8	32	57	24	41	5	17	9	3	2	3	...	3	4	...	...	1	3	224
1891. Admissions.—209	37	42	30	30	4	10	7	8	3	9	2	2	3	3	3	1	15	209		
1892. Admissions.—213	35	32	52	22	9	11	5	16	...	6	...	4	...	3	18	213				
1893. Admissions.—200	31	39	43	17	10	14	1	7	4	6	...	2	26	200						
1894. Admissions.—201	51	41	21	27	6	15	3	11	1	5	20	201								
1895. Admissions.—195	38	26	30	26	9	12	3	8	33	195										
1896. Admissions.—147	19	28	32	21	3	7	37	147												
1897. Admissions.—190	31	48	30	14	67	190														

X.—Epidemics.

56. The institution has been happily free from any epidemics. A mild wave of influenza spread over it in 1891, attacking some, and carrying away a few, but without causing any notable disorganisation.

The plague has most fortunately spared the asylum, and during the last 4 epidemics, it has escaped unscathed. During the first epidemic—that of 1896-97, all the villages—especially Wadala—round about the asylum, were sorely afflicted, and had to be vacated, the asylum alone remaining isolated and immune. This could be attributed solely to its situation, and good sanitary condition, coupled with perfect isolation. No communication between the institution and the villages was allowed during the period, and strict isolation was enforced, so-much-so that for months together, no lepers were allowed to visit the city to see their friends; nor were any of the healthy servants or their families allowed outside the asylum limits. It is impossible to say how long such immunity can last, or what changes there may be in the factors that have hitherto protected the asylum. That leprosy *per se* may account for this immunity is hardly possible, in as much as lepers have been known to suffer from plague, and two such were admitted into the Arthur Road Hospital within the last three years; both the cases proving fatal. It is to be hoped, however, that the institution will be spared any such calamity in the future, as it has been in the past. But extreme care and vigilance will have to be exercised, if plague has to be kept out of the institution, for it is not difficult to conceive, looking to the nature of leprosy, and the general condition of lepers, how it would affect them, and carry them off in large numbers.

XI.—Intercurrent Diseases and Complications.

57. To give anything like a detailed and succinct account of the intercurrent ailments that develop in the course of leprosy, would not be possible within the scope of the present report. All that need be said here is that lepers are in no way exempt from those diseases that human beings are subject to, and if anything, they are more susceptible and prone to catarrhal affections of the air passages and respiratory and digestive systems, and are more liable to catch chills and become affected at the change of the seasons.* The months of April, May June and July are those when there is the least sickness amongst them, when mortality is also lower.

58. **LEPROUS OR LEPROTIC FEVER :—**Amongst the list of complications and intercurrent diseases, leprous or leprotic fever holds the first place.

A patient suffering from tubercular or anæsthetic leprosy in a quiescent state and being fairly healthy otherwise, suddenly gets rigors followed by fever which is of a more or less remittent type, and lasts variously from a week to a fortnight or longer. If in a tubercular patient, it is found that fresh tubercles appear on parts where they were non-existent, or else there is increased swelling and infiltration in parts already diseased such as the face, fingers, toes, &c. With the subsidence of the fever, the swellings get less and the patient gradually improves, but some permanent traces of the attack always remain, so that he

* To those interested in these, the special works dealing with leprosy are available; all that has been attempted here, is a brief resume of the principal systems.

becomes as it were, more leprous and remains so for some time until a fresh attack. In some cases there is a periodic attack once in three or four months and every time the patient improves but with traces of increased mischief. This leprous fever is not so common in anæsthetic leprosy, but when it does occur, it is more persistent and exhausts the patient and at times carries him away. If he recovers some traces of the mischief always remain especially in the shape of contraction of the flexor tendons of the upper and lower extremities and permanent disfigurement by contracture. In one case of this nature the recovery was marked by a permanent darkening of the skin of the face which was not anæsthetic and of a lighter shade before the attack. Whatever the type of leprosy, the immediate result of such exacerbations is great prostration and debility, from which it takes long for the patient to regain his previous condition. In many cases this never occurs, the patient becomes more prone to other complications or dies through sheer exhaustion and marasmus and if such attacks recur at frequent intervals, the patient has no time for recuperation and dies of marasmus. The points therefore to be specially noted as regards the leprous process are, a quiescent period with even general improvement in the disease, followed by irregularly periodic attacks, always ushered in by rigor and high temperature, and always leaving the patient weak with increased traces of the disease. In this connection, the leprous process bears a marked analogy with tuberculosis and syphilis in both of which, periodic attacks occur in the same way with renewed activity of the disease, and always followed by an equally quiescent period, but leaving some permanent trace behind.

59. GENERAL DISEASES:—Amongst the general diseases, syphilis, acute rheumatism and occasionally scurvy were observed.

60. DISEASES OF THE NERVOUS SYSTEM :—These included lancinating pains, anæsthesia, hyperæsthesia, peripheral neuritis, paralysis of the extensor tendons leading to wrist-drop, wasting of the limbs &c., melancholia, mania, and sometimes epilepsy. Melancholia prevails to some extent among lepers, and although the existence of acute mania has been denied by some observers, it is by no means absent. It has been noticed in about six cases; the patients are extremely violent, with at times suicidal or homicidal tendencies. Otherwise the form is generally destructive *e. g.*, tearing of clothes, articles of bedding, breaking utensils and vessels, and at times the energy developed is so great that patients have been seen wrenching off iron bars from the gratings of windows, and breaking the grated door of their cells. Only two of these cases proved amenable to treatment. In one of them, however there were periodic outbursts accompanied by great fury and tendency to destruction.

61. DISEASES OF THE NOSE, PHARYNX, AND LARYNX :—Ulceration of the nose, commencing with the mucous membrane, and gradually going deeper and deeper, involving the cartilages, and eventually the bones, with sinking of the bridge of the nose is very characteristic in advanced cases. The vitality of the parts becomes distinctly lowered and maggots form an easy nidus for their development; erysipelas also supervenes from infection. It is this process that bears a striking analogy to syphilis, and has led some observer to declare that leprosy is nothing else, but an altered phase of syphilis. Although the existence of this chronic and destructive inflammation of the nose, with its extension at times to the palate, has long been known as one of the features of leprosy, its importance

as a diagnostic sign, and as one of the means of disseminating leprosy, had remained long unrecognised, and it was the researches of Jeanselme, Koch and others that first drew attention to the subject. These observations were further confirmed by Dr. Sticker at the Matunga Leper Asylum, and as they bear on the questions of early diagnosis of the disease, and its dissemination by the discharges from the affected parts, they will be discussed in a subsequent section. It may be stated here, that a sub-acute inflammation of the nasal mucous membrane is one of the earliest sign of leprosy, and it is present, when there is nothing to show the existence of the disease in other parts of the body.

Pharyngitis, laryngitis, acute and chronic, with destructive inflammation and erosion of the soft parts, and cartilages of the larynx, hoarseness, aphonia, and suffocation are only some of the affections incidental to leprosy.

Inflammation of the ear, with perforation of the tympanum is by no means unusual.

62. DISEASES OF THE RESPIRATORY SYSTEM:—The most common are bronchitis, acute, and chronic, pneumonia, pleurisy and phthisis pulmonalis. The constant association seen between the latter and leprosy as in Norway and elsewhere has not been observed.

63. DISEASES OF THE DIGESTIVE SYSTEM:—Diarrhoea (colliquative muc-enteritis) is the most common and most fatal complication as described under the section dealing with death-causes. Dysentery is less frequent and not so fatal.

64. DISEASES OF THE SECRETORY SYSTEM:—Acute Bright's disease is occasionally observed, and in one case, it seemed to supervene on excessive feeding on cucumbers. Other forms of Bright's disease are also met with.

65. DISEASES OF THE CUTANEOUS SYSTEM:—Scabies, eczema, ringworm, psoriasis and pruritus are very common. In some cases the skin presents an ichthyotic condition. Gangrene is often observed, in both the upper and lower extremities, and it generally starts from diseased and necrosed bone, or any other unhealthy ulceration. Burns are very common and extensive on account of anaesthesia, and lepers burn themselves extensively without being aware of the same. It is only the smell of the charring tissues that occasionally draws their attention to something being wrong.

66. DISEASES OF THE EYE:—The eye becomes affected early in leprosy and the process of inflammation and destruction advances gradually in a variety of forms, but always steadily towards the worse, leading to total disorganisation and in many cases to total blindness. Not a single structure from the eyelids to the retina and optic disc escape the process, the lens even not excepted, as it becomes cataractous. Much however could be done in the early stages to retard the progress of these changes, with appropriate and timely surgical aid. As regards blindness, Leloir says that about 9 to 10 per cent of lepers in the Norway Asylums were blind; the late Dr. Vandyke Carter stated that from 5 to 6 per cent of Indian lepers suffered from blindness, and this has been about the average at the Matunga Asylum. The diseases affecting the eye in leprosy have been described by Pollock* in his small work. Dr. G. Armauer Hansen now announces† a comprehensive work on the subject by two Norwegian authors. (Dr. Borthen and Lie). The various affections

* *Leprosy as a Cause of Blindness*.—C. Fred. Pollock. Churchill, 1889.

† *British Medical Journal*, November 8th, 1899.

are well described and illustrated by much colour drawings. "The clinical descriptions are excellently completed by the anatomical researches of Dr. Lie "says Dr. Hansen," and Dr. Lie has found something quite new ; he has in an old maculo-anæsthetic patient whom I myself regarded as quite healed, found lepra bacilli in sclera, cornea, iris, corpus ciliare, and choroidea. This tells us (1) that the maculo-anæsthetic patients are not, at least always, cured, when it may appear to be the case, and (2) that the affections in the deeper parts of the eyes in maculo-anæsthetic patients such as uveitis, cyclitis, described in the clinical part, most probably are due to the direct working of the lepra bacillus. This we did not know before, and I myself have not even suspected it."

67. DISEASES OF BONES AND JOINTS :—Caries and necrosis of bones with the destruction and consequent absorption of the phalanges of the fingers and toes which are such marked features in leprosy deserve only to be mentioned here as also the resulting mutilations or auto-amputations. The gait also becomes affected, and there is want of co-ordination, so much so that the patients when seen from a distance appear as if suffering from locomotor ataxia.

68. DISEASES OF THE LYMPHATIC SYSTEM :—These manifest themselves by chronic or sub-acute lymphangitis, enlargement, and infiltration of the lymphatic glands, and their suppuration. The latter process is very tedious, and unless the enlarged glands are totally extirpated, the pus burrows between the skin and subcutaneous-cellular tissue, with large tracts of sinuses. This lymphatic mischief is also one of those developments of the leprosy that have a striking analogy to similar processes in syphilis and tuberculosis.

XII.—The Leper Asylum as a Focus of Contagion.

69. When the question of segregating lepers in asylums was being discussed, and steps were being taken to establish this asylum, it was thought in certain quarters that such an asylum would become a focus of infection and the means of disseminating leprosy around it. The critics had arrived at this conclusion from *a priori* reasoning and without the help of any facts to substantiate the same. Any such fears have now been dispelled and the experience gained at the Matunga Leper Asylum for over nine years has fully justified the action of those who succeeded in establishing such an institution. If there were any such results the Matunga Leper Asylum as a test case ought to have afforded some instances of the same. It has to be remembered that it is situated on the main arterial road leading to the city and in close proximity to a fairly large village, from which it is separated by barely 500 yards, and that no complaints of any nuisance arising from such close proximity have been made throughout the period, nor have the patients in any way contributed towards exciting the fears of the people. And although there is no regular communication between the patients and villagers, yet the latter are not loth to bring articles of food, sweetmeats &c. for sale to the inmates. It may also be noted that people are at present more alive to the dangers of communicating with lepers, and the fact, that in the face of such knowledge, they are not deterred from bartering their wares with lepers, is enough to show that the proximity of the leper asylum has in no way interfered with them. No case of leprosy has been observed in the village since the establishment of the asylum, nor has any been attributed to it.

70. The Leprosy Commissioners in their report state that the statistical details of the three censuses afforded sufficient evidence against the assumption of

the spread of leprosy around an asylum as a possible centre of infection. They also state that at Tarn Taran, the lepers inhabit a separate quarter of the town in continuity with the rest, but leprosy does not seem to have anyway become diffused among the healthy population although this leper quarter has been in existence for many years. It is an almost universal opinion, say the Commission, of scientific and intelligent men in India, that the spread of the disease has never been known to take place from a leper centre to its neighbourhood ; still it seems there are some who entertain such an opinion, and they may well cease to hold it in view of the facts and opinions stated above.

XIII.—Increase of Lepers in and around the Asylum.

71. The increase in the number of inmates of an Asylum has been used as an argument that leprosy is rapidly spreading in India. But it is scarcely realised that the Asylum is to the leper, specially distasteful, and the fact that they resort to such Asylums in numbers is more a test of their increased popularity than an evidence in favour of an increase of the disease. Just as the leper becomes more educated and recognises the advantages of such institutions, he naturally resorts to them. The Leprosy Commission mentioned in their report that this Asylum has been quoted by Mr. Tebb to establish the increase of the leper population in India. But nothing could be further from the facts. The reason why many applicants were refused admission was, not that the establishment of the Asylum had suddenly sent up the ratio of leper population in India, but because, there was no further room to accommodate the applicants, who had been attracted to the place as a home of refuge and rest.

72. But the critics again question whether it is advisable to make such Asylums attractive so as draw towards and into them an influx of lepers from various quarters. The reply would be that it is the duty of those responsible for the management of such institutions, to make them as attractive as possible, not so much with the object of drawing in more patients, as from the desire of making the lives of these unfortunate inmates pleasant and comfortable under such distressing circumstances. They have to remember that here was a class of population that had committed no sin against society, nor transgressed any of its laws, and yet in response to public feelings and sentiment, and albeit danger to public health, it had consented of its own accord, or been compelled, to immure itself in life-long prison because of its being afflicted with such a dire disease. Is it not therefore incumbent, —nay, would it not be otherwise cruel and inhuman, on the part of those responsible for the management, to make the institution as comfortable as possible and those connected with the Matunga Leper Asylum would willingly plead guilty to the charge, so long as they had the satisfaction to see that their action did not involve any danger to those round about it.

73. That the presence of an Asylum in a district often attracts a number of lepers from neighbouring regions is a fact, but this Asylum has not contributed to the result. There are no doubt a few applicants who have to be refused on account of want of room, but this has in no way thrown on the charity of the city, a large number of vagrant lepers. Some of them seek admission after a time, so that at present Bombay holds very few vagrant lepers at large and even some of them find shelter at the Dharmshala at Duncun Road.

74. There can be no better evidence to show that this Asylum is now well-known and freely resorted to on account of the comfort and the care bestowed upon

the patients, than the fact that several patients have resorted to it for treatment from beyond the Hindu Kush—from Badakshan, Roshan, Shignan, and Wakhan—practically from North Western and North Eastern Afghanistan and the Pamirs. It may be mentioned incidentally that from the information given by these patients, it appears that there are about a thousand lepers in these districts scattered in groups in various villages. Some of these patients have improved so much that they have returned to their homes, thanks to the liberality of His Highness the Aga Khan, whose followers most of them are. Shignan, Wakhan and Roshan are now (1899) in Russian territory, and not under the Ameer. A leper Asylum is now being projected by the Russian Government at Tashkend in Russian Turkestan under Dr. S. Marc.

XIV.—The Types of Leprosy.

75. For all practical purposes leprosy must be considered as a distinct entity in which its various forms merge from one into the other. The three types usually recognised are the anæsthetic, the tubercular and the mixed. The proportion in which they occur is generally as follows:—the largest number of lepers are anæsthetic, then follow the mixed and lastly the true tubercular. Strictly speaking, however, it may be said, pure tubercular leprosy hardly exists as such, if the patient lives long enough. For almost invariably the tubercular form has engrafted upon it more or less anæsthesia and the case then becomes one of mixed leprosy. This opinion is fully corroborated by the late Dr. Beaven Rake in his report of the Trinidad Leper Asylum for 1892 in which he states “that cases of tuberculated leprosy are those of which *have not lived long enough* to become mixed.” He also says that “the mixed variety has long been recognised as a connecting link between the other two forms of leprosy and it is a noteworthy fact that a case of tuberculated leprosy, if the patient lives long enough, generally develops more or less anæsthesia and the nerves after death are frequently found to be infiltrated with leprous growth.”

76. Just as it is common for tubercular leprosy to become mixed *i. e.*, anæsthetic, the converse is very rare and Dr. Rake states in the report quoted above that he has very seldom seen such cases. Leloir has mentioned three such cases in his work. In this Asylum, out of the large number of cases treated, only one such case has been observed. The patient, a Native Christian girl, aged about 9 years was admitted for cutaneous anæsthetic leprosy. She had large discoloured anæsthetic patches on both the lower extremities. She continued more or less in the same state for about two years. It was observed that following on an attack of leprous fever, tubercular infiltration of the face, fingers and toes appeared. Although only 12, she had a prematurely aged look, the nose and the ears became thickened and she presented the aspect of a tubercular leper. Strange to say, the patches with which she was admitted all disappeared and the skin regained sensibility, but new patches appeared on the trunk, chest, and abdomen. This was the only case in which a change of type from the anæsthetic to the tubercular was observed.

77. The Indian Leprosy Commission give the following percentages of the various types:—Anæsthetic 56·6, Tubercular 12·2, Mixed 31·0. The following tables shows the sexes and percentages in the various types*—in 1600 cases of leprosy:—

* Danielssen and Boeck state that in Norway anæsthetic leprosy forms 33·3 per cent of total cases, tubercular, 51·1 p. c., and mixed 15·1 p. c.

TABLE X.

The Types of Leprosy according to Sexes and Per Centage of each Type.

Types.	Males.	Female.	Children.	Total.	Per Centage of Each Type.
Anæsthetic	412	210	18	640	40·00
Tubercular	560	181	17	758	47·37
Mixed	173	20	9	202	12·63
Total... ..	1,145	411	44	1,600	100·00

It will be observed that the tubercular variety forms 47·37 per cent. of the cases, then anæsthetic with 40·00 per cent, and lastly the mixed type with 12·63 per cent. This proportion is somewhat different from that arrived by the Indian Leprosy Commission, but approximates that given by Danielssen and Boeck. The large proportion of tubercular cases can only be accounted for by the fact, that many of them were early cases, and they had not lived sufficiently long to develop anæsthesia.

The proportion in which the sexes existed in the various types of leprosy is shown by the following table :—

TABLE XI.

Per Centage of Sexes in Various Types of Leprosy.

Sexes.	Anæsthetic.	Tubercular.	Mixed.
Males	64·37	73·88	85·64
Females	32·81	23·88	9·90
Children	2·82	2·24	4·46
Total... ..	100·00	100·00	100·00

The children show a very low percentage varying from 2·24 to 4·46 : males show the highest percentage (85·64) in the mixed type and the lowest (64·33) in the anæsthetic : females however show a wide divergence, the lowest rates 9·09 per cent in the mixed variety, and the highest 32·81 in the anæsthetic.

XV.—The Age of the Onset of Leprosy.

78. Leprosy is a disease of early adult life, as the largest number of cases occur between the ages of 15 and 40 ; above and below these two age limits, its incidence is much less. The earliest age at which a patient was seen in this Asylum was about three years, and the disease has hardly ever been noticed under two. Although ignorant friends of patients often state that they observed the disease at the time of birth, their testimony is scarcely reliable. No case of congenital leprosy has been observed up to now, and seven infants, born of leprosy parents in the Asylum were all healthy at the time of birth. The following table gives in quinquennial periods the time of the onset of leprosy 1600 cases :—

TABLE XII.

The Age of the Onset of Leprosy in Quinquennial Periods in 1600 Lepers.

Type of Leprosy.	No. of Cases.	1—5	5—10	10—15	15—20	20—25	25—30	30—35	35—40	40—45	45—50	50—55	55—60	60—65
Anæsthetic	640	7	11	36	45	72	89	119	150	71	39	24	13	5
Tubercular	758	7	12	63	79	89	106	154	107	57	43	18	16	3
Mixed... ..	202	2	5	21	11	52	30	52	27	17	10	7	1	2
Total	1,600	16	28	120	135	186	225	325	239	145	92	49	30	10

XVI—Leprosy in Children.

79. It is only at an early age that it is possible to trace the influence of heredity or contagion and hence records of young lepers help not a little in elucidating this question. Two tables are here appended, one supplying the particulars of leper children in the Asylum upto twelve years of age, and the other of those between 12 and 20. It will be noticed that the earliest age at which leprosy appears is about two years and no case has been observed in the Asylum under that period. The parents of the patient No. 18 were lepers before his birth and his friends who were also in the Asylum stated that they had observed some marks of disease on the patient at the time of birth. It is not however possible to rely on such evidence and although the case has been put down as a doubtful case of congenital leprosy, the writer of this report is not inclined to consider it as such.

80. In only 5 cases out of 26 was one or other of the parents leprosy before the child was born and in one instance only were both the parents leprosy. In the case of the rest, that is those in whom one or the other parent became leprosy after the birth of the patient, heredity could lay no claim on the development of the disease, but contagion would no doubt have a prominent share, especially if the parent or parents had not separated themselves and had lived together as joint members of a family. In the second table there are 62 cases of leprosy between the ages of 13 and 20, and in three of whom one parent was leprosy before the birth of the patient and in three others both the parents were so.

TABLE XIV

Particulars of the Family History &c. of Leper Children in the Asylum.

No.	Names.	Age.	Sex.	Type of Leprosy.	Duration of Leprosy.	Family History ; Father & Mother lepers before or after birth.	Age at which disease appeared
1	Ladee Kima ...	8	F	Tubercular	3 years	.. .. .	5 years
2	Bastow Lawrence...	10	M	Mixed	6 months	Brother & sister	9½ "
3	Morbai Madhavrao ...	12	M	Mixed	1 year	Father, before birth.	11 "
4	Boodia Ladgia ...	9	M	Tubercular	1 year	Parents & elder & younger brother after birth	8 "
5	Ganoo Ladgia ...	8	M	Tubercular	2 years	Parents and elder-brother after birth.	6 "
6	Dhukee Dhanojee ...	8	F	Anæsthetic	5 years	Father and mother	3 "
7	Jejus Enos Proy...	12	M	Tubercular	1 year	... .. .	11 "
8	Yeswant Tawro ...	7	M	Anæsthetic	4 years	Father, after.	3 "
9	Issak Haskal ...	7	M	"	2 "	Mother, before.	5 "
10	Vishram Govind ...	7	M	Tubercular	1½ "	... .. .	5½ "

No.	Names.	Age.	Sex.	Type of Leprosy.	Duration of Leprosy.	Family History ; Father and Mother lepers before or after birth.	Age at which disease appeared
11	Lawro Bhowania ...	8	M	Anæsthetic	4 years	Father, after.	4 years
12	Balia Luccaram * ...	8	M	"	6 "	... ..	2 "
13	Succaram Mahadu ...	8	M	"	4 "	Mother, before.	4 "
14	Balee Rama ...	9	F	Tubercular	4 "	Father, after.	5 "
15	Bhogee Deoji ...	9	F	"	4 "	" "	5 "
16	Bhiki Laximon ...	9	F	Mixed	2 "	... ..	7 "
17	Kalee Mahadu ...	9	F	Anæsthetic	3 "	Father, mother and brother after.	6 "
18	Shankar Rama ...	9	M	Tubercular	7 "	Father, before.	6 "
19	Domia Desa* ...	10	M	"	3 "	Sister	3 "
20	Jai Bhiku ...	10	F	Anæsthetic	7 "	Mother, before.	7 "
21	Anee ...	10	F	Mixed	7 "	Uncle	3 "
22	Daya Dhurma ...	10	F	"	5 "	... ..	3 "
23	Morton Lawance ...	10	F	"	11 "	Brother	5 "
24	Mahadu Ramji ...	11	M	Anæsthetic	5 "	Father and mother, before.	Com. onset ?
25	Bahadoo Khandoo ...	11	M	Mixed	5 "	... ..	6 years
26	Bhawoo Bhowania ...	12	M	"	7 "	Father, after.	5 "

TABLE XV

Particulars of Lepers between the ages of 12 and 20.

No.	Names.	Age.	Sex.	Type of Leprosy.	How Long Ill.	Family History.	Age at which disease appeared
1	Sakaram Ralla ...	14	M	Tubercular	3 years	... ..	11 years
2	Bhojee Ratina ...	15	F	"	2 "	... ..	13 "
3	Francis Samon Lobo ...	15	M	"	2 "	... ..	13 "
4	Damodar Dhuku ...	18	M	"	2 "	... ..	16 "
5	Boodia Dhandia ...	13	M	Anæsthetic	1 year	Mother, before birth.	12 "
6	Ramjee Hiroo ...	15	M	Tubercular	3 years	... ..	12 "
7	Pandoo Fakiria ...	20	M	Anæsthetic	3 "	... ..	17 "
8	Hoosen Mahomad ...	20	M	"	4 "	... ..	13 "
9	Bhagoo Deonak ...	18	M	Tubercular	1 year	... ..	17 "
10	Maru Eslay ...	18	F	Anæsthetic	1 "	... ..	17 "

*This was one of the worst cases of leprosy in the asylum. The child was undersized for his age and his face and in fact the whole body was a mass of tubercles in various stages of ulceration. It is said that the child used to play about with a leper before he developed the disease.

No.	Names.	Age.	Sex.	Type of Leprosy.	How Long Ill.	Family History.	Age at which disease appeared.
11	Ramchandra Ganpat	16	M	Anæsthetic	5 years	...	11 years
12	Gopal Killa	20	M	Tubercular	3 "	...	17 "
13	Chandrabaja Narayen	18	F	Anæsthetic	2 "	...	16 "
14	Balia Sakaram	13	M	"	4 "	...	9 "
15	Nagoo Pandia	13	F	Mixed	4 "	Mother, after birth.	9 "
16	Bania Malek	13	M	Tubercular	2 "	Uncle, after birth.	11 "
17	Hoosen Emamsab...	13	M	"	2 "	...	11 "
18	Budia Ladgia	15	M	"	4 "	Father, after birth.	11 "
19	Mangol Ladgia	15	M	"	1 year	Parents and 2 brothers after birth...	14 "
20	Polia Komlia	20	M	"	5 years	...	15 "
21	Gungaram Pandoo	14	M	"	6 "	...	8 "
22	Mahadoo Ragheo Mandali.	15	M	"	2 "	...	13 "
23	Gunia Deojee	18	M	"	8 "	...	10 "
24	Sk. Rahim Hasson	20	M	Anæsthetic	3 "	...	17 "
25	Mankoo Babajee	13	M	Tubercular	5 "	...	8 "
26	Zojel Jawoo	20	M	"	10 "	...	10 "
27	Baya Bhajia	13	F	"	4 "	Father, after birth.	9 "
28	Rama Mahadoo	13	M	Anæsthetic	2 "	...	11 "
29	Doonim Rozar	18	M	"	12 "	...	6 "
30	Pandoo Fakiria	20	M	"	3 "	...	17 "
31	Sarpia Jagoram	14	M	"	6 "	...	8 "
32	Gopia Mohadia	14	M	Tubercular	7 "	...	7 "
33	Bhaji Ramjee	20	F	"	1 year	...	19 "
34	Hoosenalli Mohamodalli...	20	M	Anæsthetic	2 years	...	18 "
35	Ramchandra Vithoo	20	M	Tubercular	4 "	...	16 "
36	Pedru Fromis	20	M	"	6 "	Mother, after birth.	14 "
37	Maruti Ramjee	20	M	"	3 "	...	17 "
38	Rama Bapoo	14	M	"	1 year	...	13 "
39	Maruti Subhand	15	M	"	4 years	...	11 "
40	Roza Zrozer Rodrick	20	F	"	1 year	Father, after birth.	19 "
41	Sania Dayoram	20	M	"	6 years	...	14 "
42	Rama Nuthu	15	M	"	2 "	Brother, before birth.	13 "
43	Bapoo Bhiwa	15	M	Anæsthetic	5 "	Brother, after birth.	10 "

No.	Names.	Age.	Sex.	Type of Leprosy.	How Long Ill.	Family History.	Age at which disease appeared
44	Abdool Laloo ...	15	M	Anæsthetic	4 years	Father leper before birth ...	11 years
45	Esmail Dawood ...	15	M	"	3 "	... ..	12 "
46	Kashinath Laximon ...	20	M	"	1 year	Brother leper.	19 "
47	Ramjee Chapajee ...	15	M	Tubercular	2 years	... ..	13 "
48	Rama Gunajee ...	20	M	"	2 "	... ..	18 "
49	Chimia Maruti ...	18	M	Anæsthetic	6 "	... ..	12 "
50	Pirojee Bhim ...	18	M	"	7 "	... ..	11 "
51	Babajee Arjoon ...	20	M	"	3 "	... ..	17 "
52	John Feruxn ...	13	M	Tubercular	5 "	... ..	8 "
53	Dhondoo Luximan ...	20	M	"	3 "	... ..	17 "
54	Bala Bhola... ...	20	M	"	3 "	... ..	17 "
55	Sita Kala ...	20	F	"	12 "	... ..	8 "
56	Essa Govind ...	18	F	"	2 "	... ..	16 "
57	Bhendia Laljee ...	15	M	Anæsthetic	2 "	Father, after birth.	13 "
58	Parashvram Holkar ...	20	M	Mixed	1 year	... ..	19 "
59	Sk. Rahim Sk. Hoosen ...	20	M	Tubercular	2 years	... ..	18 "
60	Ithu Kashia ...	14	F	Anæsthetic	3 "	... ..	11 "
61	Ramjee Hiroo ...	16	M	Mixed	2 "	... ..	14 "
62	Janoo Govind ...	20	M	Tubercular	2 "	... ..	18 "

XVII.—Expectation of Life in Leprosy.

81. The average duration of life of a leper may be put-down at about 11 years. In tuberculated leprosy, death occurs earlier and most of the patients succumb within 8 to 10 years of the onset of the disease. The anæsthetic cases are longer lived and their expectation of life is about 13 years. The following table shows the duration of life at time of death and it will be observed that the majority of patients die before 13 years and a few only survive after that time and they are as a rule anæsthetic cases. They may go on to 20 years or more. The table shows 27 cases of anæsthetic leprosy that survived the above limit, one patient dying 43 years after the onset of leprosy :—

TABLE XVI.

Duration of Leprosy at Time of Death in years.

Total Number of Death.	Under 1 year.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	43
670	5	9	33	62	60	77	42	57	41	20	10	82	4	37	17	9	28	4	3	6	—	14	8	2	1	1	5	5	1	—	1	1	1	1

XVIII.—Leprosy in other Countries.

82. Leprosy has been known to exist from ancient times and it has been recorded that it prevailed in Egypt in 3000 B. C., in India and China in 400 B. C., in Spain and Italy in 60 B. C., and it is supposed to have been brought to England in the year 60 B. C. The recent revival of interest in the subject has brought to notice a host of workers from all parts of the world, and the National Leprosy Fund in England, and the International Lepra Conference in Berlin in 1897, have been the means of bringing together a vast mass of information. Newman, Impey, Phineas S. Abraham, Cantlie, Sir J. Y. Simpson, Sir Joseph Fayrer, Ehlers, J. Ashburton Thomson, Goldschmidt, Kitasato, and the Indian Leprosy Commission, together with a large number of isolated workers in different parts of the world have been instrumental in throwing a flood of light on the prevalence of leprosy in ancient and modern times. A brief review of the subject would not be therefore out of place in this report, as it would afford material for comparison between the social and physical conditions existing in different parts of the world where leprosy prevailed, and still prevails, and India. And with this object the following summary has been prepared from the works, essays, reports etc., of some of the writers above named :—

Leprosy in the British Empire.*1.—Leprosy in Great Britain.*

83. Leprosy, says Newman,* was once endemic in Great Britain. So long ago as 950 A. D., it was a valid cause for divorce in England. It prevailed throughout and from the tenth to the sixteenth century, but declined gradually during the fifteenth and sixteenth centuries, so much so that in 1547 most of the leper houses in England were declared to be empty. It existed in various proportions to the population, and it was estimated that the highest ratio was 40 per 10,000 of population. Considerable doubt has however been known upon this high rate, and it is believed and reasonably so, that many skin diseases and syphilis were included under leprosy and treated as such in these early times. The disease reached its zenith in the thirteenth century, and by 1434 it was steadily declining. In Scotland, leprosy was present to the commencement of the seventeenth century, and in Ireland to the eighteenth.

84. Ample provision seems to have been made by the priesthood for the segregation and care of lepers during those times. *Leper hospitals* existed at the gates of the principal cities in Great Britain, and it is estimated that they numbered about 200. Lepers were not allowed entrance within the city walls. These institutions were not strictly hospitals. "They were ecclesiastical, and not medical; refuges, but not places for treatment; palliative but not radical." Segregation was not strictly enforced, and Jonathan Hutchinson maintains that it is a mistake to believe that anything like effective segregation was practised. "The isolation enforced was so slight, irregular and intermittent that its effects upon the decline of leprosy is too little taken into account. The chief function of the numerous leper hospitals was charitable, and protective, rather than strictly medical isolation and segregation.

85. THE RULES OF SOME OF THESE HOSPITALS were no less peculiar, than interesting and they illustrate the horror and virtual contempt in which all lepers were held. All those who were afflicted had to humble themselves below all other men. They had to wear a habit suitable to their infirmity, viz:—a tunic, and a upper tunic of russet cloth, a hood, and a black cloak, stockings, and flat shoes with upper leathers about their ankles. Only bachelors were admitted, and if any leper had been married, he had to part by consent, and to take a vow of chastity. If he was found to transgress the latter injunction, he was expelled from the institution. All lepers were compelled to go to church regularly, and to behave amongst themselves in brotherly love. No one was allowed to go beyond the prescribed bounds. No entrance into any bake-house, or brew-house was permitted. They were not allowed to touch anything because it was held that persons under such distemper were not to handle what was for the common use of men. Disobedient members of the hospitals were punished at the discretion of their prior or prioress by corporal correction *per ferulam modo scholarium!* And offenders who refused to submit to the usual discipline were reduced to bread and

* Newman:—"On the History, of the Decline and Final Extinction of Leprosy as an Endemic Disease in the British Isles."—Leprosy Prize Essay of the National Leprosy Fund, London.—New Sydenham Society.

water, and after the third offence were liable to be ejected from the hospital. As people did not like the sight of lepers, and were afraid of contagion, separate arrangements had to be provided for them in churches. A *Hagioscope*, *leper window* or *squint window* was provided through which they were able to take part in religious ceremonies.

86. THE LEGAL AND SOCIAL STATUS OF THE LEPERS was also well determined. The leper paid no tithes, and had no claims or rights in common law courts. He was disabled to fill any public, judicial, or responsible post and was disqualified from making a will or inheriting property. He was dead in the eye of the law. The solemn ceremonial for the burial of the dead was performed over him on the day on which he was separated from his fellow men and consigned to the leper hospital. In short, he was from that moment regarded as a man dead amongst the living and legally buried, though still breathing and alive.

87. THE PHYSICAL AND SOCIAL CONDITIONS IN ENGLAND during the leprosy period have been described by Sir J. Y. Simpson and Sir Joseph Fayrer. They state that the sanitary condition of Europe in the fourteenth century was such, that fourteen plagues prevailed on the Continent. In England, the food consisted of salted provisions, rye bread, and practically no corn. Cultivation and gardening of vegetables was not taken up till the sixteenth century. In all the towns of Europe, the streets were unpaved, and ill-constructed. Filth was thrown into the streets. Vaults and common sewers were non-existent and drains ran above ground. Scavenging was imperfectly understood or neglected. The water supply was deficient, and the streets narrow, preventing free circulation of air. Internal domestic arrangements of the houses were injudiciously placed, and there was great overcrowding.

The streets of London were filled with filth and garbage. The houses of the people were wooden or mud houses, small, and dirty, and without drainage or sanitation. The floors were of earth or clay and were covered with rushes, straw and other rubbish which were occasionally renewed, but underneath those lay unmolested an ancient collection of beer, grease, fragments of fish, spittle, the excrement of dogs and cats and everything that was nasty. Close by the door stood the "misen," a collection of every abomination; streams of filth from which polluted the houses, and neighbourhood, including any river at hand. People lived in a crowded state and knew little of decency, cleanliness or order. The standard of existence and morality was very low. In the 14th and the 15th century, soap was scarcely used at all, and it was a luxury to the labourer who could barely afford to buy any. He lived in dirt, slept upon heaps of decayed vegetable matter, and had no fresh vegetables to eat. Only a few cabbages could be obtained and also onions, parsnips, carrots and some kind of beet or turnip. Potatoes had never been heard of in the 13th century. Meat was scarce, and for months people consumed salted meat and fish that had suffered from keeping. There was much storage of salt food in Mediæval England, and in the Midlands, away from the coast, much salted fish was eaten. In fact, fish was a great article of consumption. The bacon generally used was rancid, and ham was alive with maggots. White bread was a great delicacy. The clothing consisted of skins and woollen stuffs. As the condition of the people improved by trade, commerce, and

new industries, corn and vegetables began to be cultivated, and fresh meat was obtainable, a reaction set in against fish diet. And with the general improvement in the condition of the people, physical, and sanitary, the excessive use of salted meat, salt fish, as well as fresh fish began to decline and this decline was coeval with that of leprosy.

Dr. Newman's Conclusions:—

88. As a result of his researches, Dr. Newman formulates the following conclusions :—

1. That the disease designated "leprosy" which was prevalent in England during the middle ages was true leprosy (Elephantiasis Gracorum), though it is evident that many other diseases were not infrequently misdiagnosed as leprosy.
2. That leprosy was existent in England many years anterior to the Crusades (*i. e.* before 1095).
3. That the Crusades had little or no effect *per se* in spreading the disease in England.
4. That it was generally supposed from the eleventh century that leprosy was a *contagious* and *hereditary* disease, and that it depended very largely upon these two characteristics for its extension in England; but that it would appear from historical and collateral evidence that such was not the case in any appreciable degree.
5. That a large number of institutions of a charitable, ecclesiastical or municipal character, were established in the endemic areas throughout the British Islands, for the more or less exclusive use of lepers. That these institutions were occupied by lepers, voluntarily, or involuntarily, (*i. e.* by more or less compulsory residence—*De Leproso Amovendo*), and that certainly not less than 200 existed. That in a certain degree they were establishments for the purpose and object of segregation, but whether that was so or not, they in no case and at no date actually did serve as such. "Strict segregation"—if we are to trust to historical evidence—never was carried out in England.
6. That the endemic disease reached its zenith in the thirteenth century or earlier, and declined till final extinction in the eighteenth. (In England, it approximately disappeared in the sixteenth century).
- 6*a*. That probably the Famine (1315) and Black Death (1349) materially assisted in extermination of lepers in the fourteenth century.
7. That the disease being diffused neither by contagion nor heredity, has *under favourable hygienic circumstances* a tendency to die out. Hence, the decline and final extinction of endemic leprosy was due, not to segregation, but to this general tendency under favoring circumstances, *viz.*, to a general and extensive social improvement in the life of the people, to a complete change in

the poor, and insufficient diet, (which, it is evident, consisted far too largely of bad meat, salt, putrid and dried fish,* and an almost entire lack of vegetables), and to agricultural advancement, improved sanitation and land drainage.

8. That of all the unfavourable circumstances, it would appear that the food of the people was largely responsible for the prevalence in the human tissues of the lepra bacillus, either by containing and thus introducing the bacillus, or by assisting in its growth and action in the tissues.

89. Coming to more modern times, after the total extinction of leprosy in Great Britain in the 16th and 17th centuries, D. Phineas S. Abraham† says that the total of all cases observed, reported and recognised between 1887 and 1897 did not exceed 100, and that almost all the cases that developed leprosy during those years had acquired the disease by residing in leper countries. One of the most recent cases‡ recorded is that by J. Ross MacMahon. The patient was aged 35, without any family history of leprosy. He had never left the British Isles, and had contracted the disease in England. The possible source of infection suggested by the reporter was infection from common lodging houses, where the same bed-sheet is made to do duty for several people, and one might have been used by a leper previously. Only four cases of leprosy have been reported from Scotland during the same period, and three from Ireland. As regards the prevalence of the disease in the Army, Dr. Abraham has been able to trace only 3 cases, one in a private and two amongst officers.

2. *Leprosy in India.*

90. The Indian Leprosy Commission estimated the total leper population in India at 100,000 souls. This was by no means an exact, but only a probable estimate, and was based upon the Census of 1891. India has undergone considerable changes for the worse since then, and the effects of two of the most widespread famines in the century, combined with the ravages of plague, cholera etc., must have made a considerable reduction in the number of lepers. The last census will demonstrate how far the above factors have prejudicially affected the leper population, inasmuch as the leper is extremely susceptible to deterioration from physical causes; and destitution, and privation for any length of time carries him off sooner, than the healthy.

3. *Leprosy in other Parts of the British Empire.*

91. The following are some of the other parts of the British Empire where leprosy prevails at present. Approximate figures are given, and the date for which they were available :—

<i>Straits Settlements</i>	...	96	(1893)
<i>South Africa. (Robben Island Asylum)</i>	...	659	(1894)

* I am not in a position to make any more definite statement regarding the fish hypothesis further than this :—The diet of the English people during the leprous period included a large quantity of stale fish, and it would appear that this obnoxious fish diet lessened at or about the same period, that leprosy declined. I am not qualified to judge of the etiological relation between the two, nor do I think I have been able to produce evidence sufficient to authorise a decided conclusion in favour of the fish hypothesis, as the *sole cause of leprosy*. I feel no doubt that, in conjunction with other dietaries and conditions, it played some part in the prevalence of the disease.

† Transactions of the International Leprosy Conference in Berlin, 1897.

‡ Lancet, September 16th, 1899.

<i>Mauritius</i> :—	...	...	519 or 762 ? (1879)
			458 (1887)
Port Louise Asylum	...	...	200 (1888)

*Australia** :—

New South Wales	...	...	70 (1885—1894)
Queensland	...	...	48 " "
Victoria	...	...	45 " "
Western Australia	...	...	2 " "
Northern Territories	...	...	19 " "
Fiji Islands	...	...	21 (1891)

Canada :—

New Brunswick	...	...	5 deaths (1871)
			36 cases (1875)
			4 deaths (1881)
			25 cases (1885)
			22 " (1889)
British Columbia	...	...	9 " (1899)
Nova Scotia	...	...	6 "

West Indies :—

Jamaica	...	...	450 (1890—91)
Leeward Islands	...	...	172 (1891)
Barbadoes	...	...	99 (1871)
"	...	...	108 (1881)
"	...	...	156 (1891)
St. Vincents	...	...	62 (1891)
St. Lucia	...	...	32 (1891)
Granada	...	...	21 (1891)
Trinidad	...	...	102 (1871)
"	...	...	149 (1881)
"	...	...	225 (1891)
British Guiana	...	...	650 (1891)
<i>Cyprus</i>	...	...	100 (1870)

Leprosy in Norway.

92. Leprosy has been existing in Norway for a considerable period, and together with Iceland they are the only two countries in Europe where it is endemic, at the present day. Prompt measures of isolation and segregation have had considerable effect in keeping it within bounds, and the results of these measures are now apparent in the steady diminution of the disease. In 1885, the registered leper population was 1377, and 522 of the lepers were under segregation. In 1890, the number declined to 960, the number of lepers segregated being 507. There has been a steady diminution in the leper population which numbered about 2847 in 1856, and only 960 in 1890.

* Dr. J. Ashburton Thomson :—Transactions of the International Leprosy Conference in Berlin 1897,

Leprosy in Iceland.

93. Ehlers* describes the extent to which leprosy prevailed in Iceland and states that in 1651, four asylums existed in the country. Leprosy prevailed to a great extent in the land, and there was considerable reduction in the number of lepers on account of the ravages of small-pox and measles. An epidemic of small-pox in 1707, carried away a third of the population and an epidemic of measles in 1846 inflicted great havoc. These contributed to the decrease of lepers. The population in 1870, was 69,763. Only 43 lepers were known to exist in 1872, but the number estimated in 1889 was 144, which Ehlers considers to have been much below the mark. In 1895, there were 159 lepers, and in 1897 about 200. The chief cause of the prevalence of leprosy is due to the peoples' physical and social condition. "Absolute want of cleanliness, plus Hansen's bacillus, which finds its true paradise for leprosy in the hut of Icelfander," are the most important factors in keeping up the affection.

Leprosy in South Africa.

94. It is said that leprosy is prevalent amongst the Hottentots. So long ago as 1756, leprosy was found amongst the white population and 2 Dutch lepers were observed in Cape Colony. Impey† states the number of lepers in South African Colonies to have been 1750 in 1894. In 1889, it was computed that there were 600 lepers in Cape Colony. The Asylum at Robben Island was opened in 1816, and from that period to 1845 over 400 lepers were admitted. From 1845 to 1894, the admissions numbered 1697, with 375 discharges and 776 deaths.

Leprosy in Australia.

95. No record of lepra among the aborigines in any explored part of the country are extant, says Dr. J. Ashburton Thomson,‡ although they are susceptible to the disease. Whilst considering the ætiological details of the country, he says that the food is plentiful, varied and wholesome. The nearness to sea and rivers seems to have no influence on the prevalence of leprosy. The sanitary condition of towns never approach to what could be supposed to have a determining influence in respect of leprosy. The climate is dry: the rains are of a tropical character: the municipal regime is orderly: there is total absence of malaria: continuous sunshine and people mostly lead an out-door life. All these, the author believes, are not likely to deteriorate the public health, so as to have any casual relation with leprosy. On the other hand, he holds that overwork, filth, foul odours and starvation stand in no appreciable relation to the prevalence of leprosy, thus differing from Hansen§ who lays great stress upon these factors.

96. The first white native leper was observed in 1862. There is not much communication between the Chinese and the Whites. A few Chinese have close association with low white women, and in their progeny which numbered about 2,000 in 1891, no leprosy could be traced. According to the author, there has

* Dr. E. Ehlers :—On the Conditions under which Leprosy has declined in Iceland, and the extent of its former and present Prevalence—Leprosy Prize Essay—National Leprosy Fund—New Sydenham Society, 1896.

† Dr. S. P. Impey :—Leprosy in South Africa :—Leprosy Prize Essay—National Leprosy Fund—New Sydenham Society, 1896.

‡ Dr. J. Ashburton Thomson :—A Contribution to the History of Leprosy in South Australia—Leprosy Prize Essay—National Leprosy Fund—New Sydenham Society, 1897.

§ Hansen and Looft—Leprosy in its Clinical and Pathological Aspects. 1895.

been no recent increase of leprosy in Australia, and the increase is only apparent from better registration and more attention being directed to the disease.

97. Thomson lays down the following provisional conclusions resulting from his inquiries into the prevalence of leprosy in Australia :—

- (a) "Although lepers were imported to Victoria steadily during a long term of years, and in considerable numbers, and although they remained entirely unrestricted in their movements among the whites, no Victorian native white who had never left the colony has ever been attacked. Moreover the disease died away in Victoria quite independently of restrictive measures against the liberty of lepers which in fact were first taken only in March 1893."
- (b) "Although coloured aliens of many different races, all of which have furnished cases of leprosy in Australia, have been imported during many years, and in large numbers to all the better populated part of the country which extends along the coast line from about 146th degree of East Longitude easterly, and then northerly towards Cape York : and although native whites who had never left their colony have been attacked at various places, in New South Wales and Queensland, there is no evidence, and no good reason for surmising that any such native white has been attacked who lived South of the 35th parallel of South Latitude."

Leprosy in Hawaii.

98. The literature in connection with the prevalence of leprosy in Hawaii is simply voluminous. The various reports of the Board of Health dating since 1880, together with the investigations of a host of observers have thrown much light upon the origin and prevalence of the disease. Cantlie,* and Ashburton Thomson† are the two most recent contributors on the subject, and as their views and results of their inquiries are so diametrically opposite, it would not be out of place to refer to them here. Hawaii is isolated in mid-ocean and is 2350 miles from San Francisco. Cantlie says that there was no indigenous leprosy in the islands and that it originated from contagion, from the Chinese immigrants who were attracted about 1848 to the Californian Gold fields, and that in 1856 Hawaii was in constant communication with California, Chili, and China. "Throughout the whole of this long investigation it has been proved, and over and over again, that the Chinese are not only the probable introducers of leprosy, but the chief victims. Here in Hawaii, the case is reverse; yet even here the Chinese form the largest proportion of lepers of other than Hawaiian blood." The Board of Health was established in 1850, and in 1863, Dr. Hillebrand reported the rapid spread of the new disease called by the natives "illai Pake" i.e. Chinese disease. In 1864, the President of the Board of Health reported the spread of the disease to the other island of the Hawaiian group. Cantlie quotes the authority of Dr. C. B. Wood, and Dr. R. Oliver who say that heredity seems to have played no part in the spread of leprosy in these islands, and that no case of congenital leprosy has been recorded. They hold that simple contact never seems harmful, and that healthy wives and husbands live with their leprous partners for years, and some over 20 years, and yet escape contagion, but the majority succumb at last.

* Dr. J. Cantlie—On Leprosy in China etc.—Leprosy Prize Essay—National Leprosy Fund—New Sydenham Society, 1897.

† Dr. J. Ashburton Thomson—Transaction of the International Leprosy Conference in Berlin, 1897.

They consider that arm to arm vaccination "undoubtedly" helped to spread the disease. A census of the lepers in Hawaii in 1894, gave the total number at 1152, and included the following races :—

Native Hawaiians	...	...	...	...	...	1,011
Half-Castes	...	...	...	...	...	91
Chinese	...	...	...	...	...	26
Americans	...	...	...	...	...	5
Germans	...	...	...	...	...	4
English	...	...	...	...	...	3
Irish	...	...	...	...	...	1
Portuguese	...	...	...	...	...	5
Spanish	...	...	...	...	...	2
Canadians	...	...	...	...	...	1
Russians	...	...	...	...	...	1
Negroes	...	...	...	...	...	1
South-Sea Islanders	...	...	...	...	...	1

Total.....1,152

99. Ashburton Thomson has arrived at altogether different conclusions to those of Cantlie. He says that foreigners have gradually increased in Hawaii from 2119 in 1853 to 49,278 in 1890, and that the Hawaiians have decreased during the same period from 71,019 to 40,622. He states that the Hawaiians had from older times communications with the inhabitants of many other leprosy areas both by immigration of them and by visiting their countries and does not believe that the Chinese imported leprosy in Hawaii, and that it is probable that it existed more or less amongst the population of all the islands, certainly 60 to 70 years before its presence was recognised. Rev. W. P. Alexander is reported to have observed the first case of leprosy in an Hawaiian in 1838. Dr. Hoffmann also observed in 1840. In 1867, the disease was identified officially and Thomson thinks that early cases were not recognised, or if recognised, they were not mentioned for fear of injuring the commercial prospects of the islands.

100. As the lepers were fed, clothed and looked after in the leper Settlement at Honolulu etc, natives are said to have laid themselves out to acquire the disease so that they may have not to work for the rest of their lives, if they become leprosy—once being admitted into the Settlement. Dr. Smith, Physician to the Board of Health wrote in 1892, that to be a leper was a desideratum, if not on the outside, at least at the Settlement, "Let me state that I can at any time get 20 or 25 *Koknas* (healthy attendants or helpers on lepers) to submit to inoculation with a view to contract the disease to the end that they may be endowed with the privileges, and supplied with the rations of the regular lepers." Unfortunately, says Thomson, no advantage was taken of the facilities for the experiment thus pointed out, and the amateur attempts of the natives did not succeed, otherwise the knowledge would have spread widely. Dr. Zambaco Pacha says that the monks of Mount Athos failed after making every attempt to contract the disease by tending the lepers. The *Koknas* or helpers remained for years with the lepers, in their huts, sharing their rations etc, and after the death of their relatives staying on with others. Their numbers varied between 186 in 1890 to 105 in 1895, and it is reported that 51 became leprosy in 30 years. And Thomson, who entertains strong views about the non-communicability of

leprosy, although he is the Medical Officer of Health of a Colony, that has passed the most stringent acts extant against lepers, thinks that evidence not conclusive. He says that the Settlement at Molokai was made on land belonging to the aborigines, who were purchased out of their holdings and that some remained for over 30 years, and were in free communication with the lepers, and yet only six cases occurred amongst them. This experiment, he concludes, is conclusive against communicability and indirect infection. But the number that remained is not stated, except from 1888 to 1895, during which period it works out to an average of 47, and it is not possible therefore to state what proportion these six bear to the whole.

101. Isolation, says Thomson, was never carried out in detail with steadiness, and thoroughness, and only a proportion of lepers were isolated, and that the number of lepers in the Settlement varied from time to time depending upon the activity of the agency for tracing the cases. The increase in the number of lepers from 655 in 1885 to 1087 in 1895 he ascribes to more stringent measures. It is said that about 100 whites had leprosy, and that as soon as leprosy developed in them, they left the country in order to avoid confinement.

102. As regards the influence of vaccination in spreading leprosy, Eduard Arning states that indiscriminate vaccination was responsible for the unusually rapid spread of the disease, and Wood and Oliver support him. Thomson however holds another view, stating that the data are insufficient and "that the alleged diffusion of leprosy by vaccination can neither be proved, nor denied (except as to the latter on the ground that leprosy is not inoculable from lepers.)"

Leprosy in Madeira.

103. Dr. Jules Goldschmidt has recently published a monograph, a synopsis of which appears from the pen of J. Ashburton Thomson in the *Lancet*.* Leprosy was common at the beginning of the nineteenth century, but it declined during the latter half, and again began to increase during the last 30 years, concurrently with a greater increase in the population. Between 1830 and 1894, the number of admissions in the lazaret was 224. The average number of admissions from 1840 to 1861 was 24 : from 1861 the number of admission has fallen and during the last 15 years, only two fresh cases were admitted. At present there are 70 lepers, the proportion to population being 6 per 10,000. Goldschmidt says that as association between mother and child is closer than between father and child, and hence false heredity is often seen when the mother is a leper, than when the father is attacked.

Leprosy in New Caledonia in 1898.†

104. The French penal settlement of New Caledonia is situated off the Eastern coast of Australia. Fifty years ago leprosy did not exist. The estimated native population was 39,000 and it was alleged that there were 4,000 to 5,000 lepers. This is probably erroneous as other skin diseases have been included in it. As regards leprosy amongst the white population, the first case was reported by Dr. Fome in 1888 ; from cases by Dr. Legrand in 1890 ; 37 by Dr. Grall in 1894, and 92 by Mons. Auché in 1898. From 1888 to 1898, 132 cases of leprosy

* The *Lancet* : September 30th 1899.

† The *Lancet* : September 16th 1899.

were reported in a convict population of 10,500. It is estimated that the proportion is greater in the free Europeans. Mons. Anche emphasises the virulence and extreme vitality of the bacilli which infect the pituitary mucous membrane, and he thinks these play an important part in the dissemination of the disease.

Leprosy in China, Indo-China etc.

105. Dr. J. Cantlie says that not one-third of China is under the ban of leprosy. "Alleviation but no cure is the reply from all corners of the Far East: the West echoes the same: and as through all the dim centuries, so at the close of the nineteenth, civilised and uncivilized man confronts each other with the canker of incurable leprosy in their midst." From an exhaustive study of the evidence on the subject collected by him from China, Indo-China, Malaya. The Archipelago and Oceania, he formulates the following conclusions:—

1. Leprosy is a specific disease, bearing a close analogy ætiologically and bacteriologically, to tuberculosis, amounting in some points to identity.
2. It is not proved that leprosy is diffused by hereditary transmission, but the evidence is not strong enough to prove that it may not be so distributed.
3. Leprosy may arise in a leprous country independently of personal contagion.
4. Leprosy is to be feared as an inoculable disease, but there is no direct proof that it is such.
5. Vaccination is not believed by any natives of the Far East to be a factor in the spread of leprosy, except in a few cases where the idea has been suggested by Europeans.
6. Inoculation of small-pox is a common practice throughout China, but the geographical distribution of leprosy is totally independent of the frequency of the practice.
7. Leprosy in the Far East is centred in the South-Eastern Provinces of China,—Kwantung and Fokien.
 - (a) Three-fourths of the coolie emigrants from China are from these provinces, and the spread of leprosy in the Malay Peninsula, the Dutch, Spanish, and Portuguese East Indies, and in Oceania is in all cases coincident and concurrent with the residence of coolies from these provinces.
 - (b) In no instance over this vast area has any native race acquired leprosy, except where Chinese coolies have settled.
 - (c) There seem to be no native names for leprosy in the aboriginal languages, except in Malay, over the area named, though there are loan words.
 - (d) The aborigines ascribe leprosy to the Chinese immigrants, and in several cases the name used shows the belief in the Chinese origin of the disease.
 - (e) Leprosy disappears in some countries with the departure of the Chinese coolies, as in North Borneo.
8. The distribution of leprosy is independent of any geological, geographical or climatic conditions.

9. Overcrowding, poverty, and bad food, but especially the first, render the individual susceptible to leprosy.
 10. The eradication of leprosy is to be effected by improving the hygienic conditions of the centres of leprosy.
 11. Lepet villages, by which is meant quarters set apart for lepers to find shelter in, but from which they can go at will to beg in the public streets, and engage in work, do not show beneficial results as regards the check of the disease.
 12. The British Government would be conferring a great service to humanity were a closer inspection of Chinese emigrants, travelling by British ships insisted upon. The shipping lines of other countries especially German, might be invited to co-operate.
 13. The British Government with the co-operation of the French, German, Spanish, Dutch, and Portuguese, the powers holding possessions in the Far East and Oceania, to which Chinese emigrants flock, might effectually check, or at least arrest, the spread of leprosy by a monthly inspection of coolies on plantations, in coolie quarters, whenever Chinese congregate.
 14. Deportation and not segregation is the proper method of dealing with the Chinese leper in (to him) foreign countries.
 15. Segregation of Chinese lepers in an asylum in any country free of leprosy will in time render that country a fresh focus of leprosy infection.
 16. The great traffic centre of Hong-Kong ought to be rigorously dealt with as regards leprosy by the Colonial Government. In the meantime lepers beg in the streets, live in coolie quarters, and dwell in secluded spots in several parts of the island. In seven years 1888-95, a minimum calculation shows from 600 to 700 lepers to have been unknown to the Government in the island of Hong-Kong.
106. The physical and social conditions in China are somewhat similar to the Mediæval English. The Chinese are an essentially agricultural people. They consume much pork, fish and shell-fish, but little beef is eaten. Clothing consists of silk, cotton and linen. There is a marked similarity to Mediæval England in the condition of houses, and streets, and leper hospitals. Buying and selling from lepers is allowed and there is no ban to begging.
107. Mr. Sydney B. J. Skertchly of H. M.'s Geological Survey has prepared a paper for Dr. J. Cantlie on the influence of geological formation and climate in its influence on the spread of leprosy, in which he lays down the following conclusions as a result of his inquiries :—
1. Leprosy is not dependent upon climate.
 2. Leprosy is independent of geological structure.
 3. Leprosy shows a marked avoidance of the Negroid and Indonesian races.
 4. Leprosy is most common among the Chinese, and much less so among the Malays.
 5. Leprosy has only spread where European plantations or other industries have been started.
 6. The Europeans certainly did not introduce it : the Malays could hardly have done so : the Chinese coolie could easily have brought it.

7. Kwantung and Fokien are the hotbeds of leprosy, and the chief recruiting ground for coolies.

Finally I think Mr. Cantlie's suggestion that the Chinese have spread leprosy through the greater part of these regions might be stated much more strongly than he has seen fit to do.

Leprosy in Japan.

108. The latest information about leprosy in Japan is that furnished by Kitasato.* He gives records of 208 cases observed from 1894 to 1897, and states that 43 of them were tubercular; 63 anæsthetic, and 102 mixed. The age periods of the patients reveal the fact that only 1 leper each was found between the ages 5 to 10 years and 10 to 15 years respectively. The largest number existed between the ages of 20 and 40.

A Comparison of the Physical and Social Conditions in England, China, India and Iceland.

109. Newman† compares the physical and social conditions in England, China, India and Iceland and states that the conditions of Mediæval England (from the 10th to the 15th centuries) and those at present existing in China, India and Iceland are similar.

As regards *Climate*, it is widely different.

The Physical Conditions also vary. Leprosy exists in mountains, table-lands, plains and valleys. The damp and marshy regions have it most, and the smallest proportion to population has been found to be in the driest areas in India. The leper ratios in England, India, China and Iceland vary inversely with the dryness of the Climate.

Density of Population :—All the four countries have crowded populations. Leprosy was more common in the cities in England [but this may have been due to the attractions of charity.] In Iceland it is found most in the thickly populated south coast. Leprosy has not increased in India in proportion to the increase of population.

Agriculture :—All the four countries are similar: England, India and China have however agriculture as the chief employment.

Social Conditions :—Poverty, want of sanitation and diet have some remarkably common features in all. Poverty extreme in all four: sanitation little or nothing, and diet insufficient.

Predisposing Conditions :—Certain predisposing conditions are essential in order that leprosy should become endemic, says Newman. Granting the presence of the bacillus in some form or other, such conditions must exist as to enable the parasite not only to enter the body, but also to grow and thrive in it. If special predisposition is admitted by all in tuberculosis, why should it not be recognised in leprosy also, pertinently asks Newman. Raymond ‡ says in whatever country

* Dr. Kitasato :—Leprosy in Japan—Transactions of the International Lepra Conference in Berlin 1897.

† Prime Essay.

‡ Raymond—Condition of Europe in Middle Ages (quoted by Newman).

an uncultivated soil, a marshy surface, and a humid atmosphere has been found together with a diet generally consisting of a salted, semi-putrid, insufficient or indigestible aliment and composed mainly of animal flesh or fish, with a small proportion of nutritious vegetable matter—there from the earliest times human life has been shortened by the multiplication of pestilential fevers, and cachexias of a leprous and scorbutic nature. Ehlers states that too monotonous a diet, breaks down the resisting power of the organism as to diseases of every kind, but it can never create a specific and infectious disease.

XIX.—The Alleged Increase of Leprosy.

110. Except at a few places like Hawaii &c., leprosy shows a marked and steady decrease and this applies equally to India; for from the returns of the census of 1891, it is seen that the ratio of lepers per 10,000 of population has decreased from 5·4 in 1872, to 4·8 in 1891, and that there was an absolute decrease of 4,604 lepers in India within the last decade. Mr. Tebb, however, in his work on the *Recrudescence of Leprosy and its Causation*, challenges this statement and tries to show that the statistics are fallacious. He states that the census figures are not correct because leucoderma which was formerly included under the heading of white leprosy has been excluded from the census of 1891, and also because a large number of cases of leprosy were suppressed by the lepers' friends on account of the rumour that all lepers at large were to be segregated and lastly because many cases were missed on account of the difficulty of diagnosis in the early stages. In reviewing this work, the writer of this report stated elsewhere* as follows:—For purposes of argument we may concede that the exclusion of a large number of cases of white leprosy would show an apparent decrease in the number of lepers, but we hold that the number would be more than counterbalanced by the alleged increase in the number of the leper population, if leprosy has increased so enormously as the author would lead us to believe. However, there is nothing to show such an increase, nor is the number stationary, as the Leprosy Commission is inclined to believe, but as we shall point out later on, it has decreased, both absolutely and relatively. With regard to the second contention of suppression of cases, we gather from Mr. Tebb's remarks in his work that he is in complete ignorance about the social condition of the leper in India, otherwise he would not have made a statement that the poor and outcast leper would be secreted by his friends from the gaze of the census enumerator, lest he be removed to an asylum. Our experience in Western India is quite the reverse. For, no sooner does a man or woman or child, amongst the masses, show the slightest sign of leprosy, from that very moment the individual becomes a social outcast, so much so, that the poor and the afflicted leper, knowing his own unfortunate position, and of his own accord, leaves his hearth and home and all that he holds dear in this world, and thus separates himself completely from his family. Many are the painful histories we have had to record of the desertion of the husband by the wife or vice versa and of children by their parents, who are left on the streets, picked up, adopted and reared by other lepers. Such being the practice, we fail to see how Mr. Tebb's contention about suppression could hold good. Nay, still further, the leper outcast wanders far and wide, away from his village and his people, and he could not have by any possible means gravitated down to his native place to be secreted by his friends during the census enumerations. Mr. Tebb's last contention is about the

* Indian Medico-Chirurgical Review, June 1893.

difficulty of diagnosis in early stages and in season and out of season there crops up in his work and in his communications to the press, a statement of Mr. Acworth's, the late Municipal Commissioner of Bombay, that there are plenty of lepers in the Matunga Asylum who could not be identified as such unless they were completely stripped and examined by a trained eye. No one can dispute this statement. But those who have become lately conversant with the extreme sensitiveness of the people as regards the supposed contagiousness of leprosy, are fully aware, as to how, on the slightest suspicion of leprosy—say a slight thickening of the skin over the eyebrows or of the fingers, or a discoloration of the skin, all possibly unconnected with leprosy—the man is at once rushed off to a specialist for diagnosis, and we have had several such cases. If there are any mistakes at all, they are on the wrong side, and more often people who are not lepers, but suffering from skin disease, &c., are mistaken for and counted as such. That such is actually the case is amply borne out by the Leprosy Commissioners who, in the course of their investigation, had 125 patients (out of the total of 2,487 examined) presented to them as suffering from leprosy, whereas they were suffering other diseases. Here too, therefore, Mr. Tebb's contentions break down.

“But that is not all. From the official statistics supplied to him by the Census Commissioner, the author ought to have noticed that several areas about which there were no statistics of leprosy forthcoming during the census of 1881, have been included for the first time in the census of 1891 *e. g.*, Aden, Upper Burmah, Quetta, Andaman, Rajpootana, Cawnpur, Travancore and the Central Provinces States. These places give a total leper population of 7,449. If we deduct 7,449, plus 4,604 (the decrease shown by the census of 1891,) from the total leper census of 1891, then area for area, there would be a total decrease in the number of lepers to the extent of 12,053, and the total number excluding the areas not enumerated in 1891, would be 1,15,003. And when this decrease is considered in relation to the increase in the population of India within the last decade, the leper ratio becomes still lower. But all this seems to have been entirely ignored by the author. We therefore contend that the author has failed to prove satisfactorily that leprosy has increased in India, nay, on the other hand, there is sufficient testimony to show that the disease is on the decrease.”

111. So far as the Bombay Presidency is concerned, it shows a marked diminution in the number of lepers from 7·8 per 10,000 in 1872, to 5·3 in 1881 and 4·7 in 1891. As regards Bombay City, although Mr. Tebb refers to it as a centre where leprosy has enormously increased, it may be confidently stated that such is not the case. Very few lepers have been born in or developed the disease within the city.

112. All recent information tends to favour the view that leprosy is slowly but steadily on the decrease, and that its total extinction is merely a question of time. One has only to compare the state of Great Britain in the middle ages (notably the 12th, 13th and 14th centuries) with what it is at present, in order to realise how such a disease is gradually stamped out and becomes extinct. All who have studied the history of leprosy in Great Britain are familiar with the fact that the position of a leper in that country during the time was much worse than that of the poor and out-cast leper in India at present. Leper houses and homes abounded all over the country and no sooner was a person declared to be a leper, he lost all civil rights, all titles to property, and was shunned by all. He was driven out of his hearth and home, and after he had been taken to a church, he was clothed in

a shroud and his funeral ceremony was performed in his presence, showing thereby that as soon as he became a leper he was practically dead to this world. Stringent rules were enforced against him, after he was taken to a leper house, and he was provided with a particular uniform without which he was not allowed to stir out of the boundaries of the leper house. Nor could he walk freely in the streets. He had a bell given to him to warn all passers by, to shun him, so that there may be no contact and risk of contagion. In fact, he was looked upon as dead to this world and as a source of contagion which it was advisable for all to shun. At TRINIDAD* the latest available figures show that leprosy has not increased relatively to the population, but if anything it has slightly decreased. In NORWAY* there were 29,000 lepers in 1856, whereas they numbered only 1,195 in 1885, although during this period there was no law compelling the isolation of lepers. In three of the STATES OF NORTH AMERICA* (Wisconsin, Iowa, Minnesota) where Norwegians have been immigrating for the last 50 years, it has been found that upto 1892, the disease has been strictly limited to the immigrants and has never appeared in the descendants of lepers, nor in any one born in the states. Dr. Gronvald states that of about 160 lepers, who have immigrated into these states, 13 are alive and that of all the descendants of these lepers including the great-grand children of some of them, not a single one has become leprosy. The facts stated above conclusively show that leprosy is a disease which has a tendency to gradually decrease and that its total extinction is merely a question of time and it is to be hoped that segregation would in the long run tend to the same result.

XX.—Leprosy and Vaccination.

113. No where perhaps more than in India are the people so prone to put the *post hoc, ergo propter hoc* and if there was the slightest ground for the alleged transmission of leprosy by vaccination some evidence at least ought to be forthcoming by this time. All testimony however points the other way and of the large number of lepers examined by the Leprosy Commission as well as by the writer, in no single instance has vaccination been accused of propagating leprosy. In reviewing Mr. Tebb's work in the journal above quoted the writer of this report stated as follows:—"Here again, we can confidently say that, so far as India is concerned, the author has failed to substantiate his theory. Before any proof of the alleged increase by vaccination can be accepted, it has to be shown that leprosy is an inoculable disease. When, therefore we find Mr. Tebb confidently asserting that there is much agreement and hardly any dissent on the inoculability of leprosy, we must say that the facts known at present do not warrant such an assertion. If acting on such insecure premises, the author builds his theory, the whole superstructure must fall to the ground. He has still further to prove that leprosy is, and can be inoculated by vaccination. Vaccine pustules on the healthy skin of a leper have been shown not to contain any leprosy bacilli, and they are found very sparsely, and not often, only on pustules on leprosy skin; and it stands to reason that, if arm-to-arm vaccination is practised, even the most ignorant vaccinator would hesitate before using the lymph from such a source. Some even doubt the probability of leprosy infection even after inoculation with the leprosy bacilli contained in the lymph. When this ground is cut beneath their

* Dr. Beaven Rake's Report for 1892.

† Ibid.

feet, and when it is shown that one leper infant is found in proportion to 100,000 lepers, (that is there is a probability of there being one infant leper only in the whole India leper population) Mr. Tebb and his followers shift their ground and say, that as leprosy is an insidious disease, and as the hereditary taint does not show itself in very early life, on account of a long incubation period, extending over a series of years, in arm-to-arm vaccination, a perfectly apparently healthy child with the supposed dormant hereditary taint would infect the healthy. There is no evidence to prove that such is the case. It has been conclusively shown by the Leprosy Commission, that so far as India is concerned, they have not been able to find that leprosy is hereditary or that even its predisposition is so. Secondly, they deny the existence of the long incubation period of several years, and in the face of these, we decline to accept the author's dictum. Mr. Tebb does not know that calf lymph is almost universally used in all the large cities in India, that the largest proportion of those vaccinated are from such centres, that only a relatively small proportion of the population in India is protected by vaccination and that every year, only about 30 to 40 percent, of the infants born are vaccinated. It is therefore hardly conceivable that leprosy could be propagated by vaccination. The author imputes something more than neglect to the Leprosy Commission for not having paid that amount of attention to the relation between leprosy and vaccination which he thinks, it deserved, but we fail to see the ground of the complaint. The subject has been sufficiently treated in two places. And lastly we have had opportunities of examining about 900 lepers and in not one instance has vaccination been even hinted at or referred to, as a possible cause of leprosy after frequent and searching enquiries."

114. Dr. Phineas S. Abraham in *A Note on Vaccination and Leprosy* communicated to the *Journal of State Medicine* for April 1893, discusses the same subject and expresses views which are at one with those quoted above. He concludes his paper as follows:—"Surgeon-Major Pringle the Sanitary Commissioner in the North-West Provinces, has called attention to the fact that between the years 1864 and 1884 at least 2,00,000 individuals in the plains between the rivers Ganges and Jumna, a district where leprosy was not particularly common—were vaccinated with lymph brought from Gurhwal—a district where leprosy was very common. If leprosy were disseminated by vaccination, and as the lymph came from a leprous place, we might very well expect that the disease should have increased in the former district; but as Drs. Rake and Buckmaster have pointed out, the recent census returns do not show any such increase.

"Considering the long period of time during which the question has been before us, and the numerous observers in all parts of the world who have been looking for cases and evidence to prove a casual relation between vaccination and leprosy, it is surprising how few instances have been found in any way to support the alleged connection. Those cases moreover, which have been adduced cannot be taken as absolutely conclusive, for the existence of the disease in every one of these may be accounted for in other ways, inasmuch as they have all been resident for longer or shorter time in countries where the disease is endemic. But even if we admit these few-and-far-between cases, it is difficult to understand how any intelligent person, whose judgment is not strangely warped can study the facts we have

at present at our disposal, and maintain that the spread of leprosy is due to vaccination ! ”

115. It will be clear, therefore, that the charge of propagating leprosy by vaccination does not hold good, and that notwithstanding a number of alleged cases reported elsewhere, there has been no authentic case on record—a case from which all elements of doubt as regards contagion and heredity have been excluded, to show that leprosy is a disease communicable by vaccination.

XXI.—Diet in Relation to Leprosy.

116. Special attention has been paid to trace any casual relation between the diet of the patients and the development of leprosy. Water, salt, and fish have been suggested as having some relation to leprosy, but all investigation has failed to show that either water or the want of salt have anything to do with the propagation of the disease. Mr. Jonathan Hutchinson is of opinion that fish has something to do with its causation. It is a popular belief among some natives of India that undue or prolonged use of fish, leads to a number of cutaneous affections, or aggravates the same, but so far as the writer is aware, in no case has the consumption of fish been brought forward as causing leprosy. A large number of fish was examined by the Leprosy Commission without detecting any bacilli. Most of the patients in the Matunga Asylum are Hindoos belonging to the sea-board of Konkan and most of them, if not habitual eaters of fish, have at least been using it as an article of food, and in no instance have they attributed or even suggested leprosy to fish. Even if fish had any deleterious effect in leprosy, the experiments conducted at this asylum by giving fish to the inmates have produced negative results. Although patients in Northern and Central India are not fish eaters, leprosy prevails amongst them and the ratio of lepers to the total population is higher than in the fish consuming districts of Western India. All evidence therefore tends to confirm the conclusion of the Leprosy Commission that the consumption of fish is not the cause of leprosy.

117. Mr. Jonathan Hutchinson* reiterates, however, his opinions on the subject and says—“Paganini is said to have delighted his auditors by his skill in fiddling on one string. Like him, I have but a single string to my fiddle, for, in comparison with this, all other departments of the leprosy question seem to sink into insignificance. It is to be feared however that I may not have his success in giving satisfaction to those who hear me. I may be charged with monotony, or even with pertinacity in the face of facts.” And then he proceeds to repeat the arguments with which all leprologists have been for long familiar. A much closer inquiry than what Mr. Hutchinson contemplated as feasible, has since been made, and with negative results, and with due deference to his high authority, it must be admitted that in the present state of our knowledge, it cannot be affirmed that fish diet has any casual relation with the spread of leprosy.

XXII.—Relation of Leprosy to Other Diseases.*1.—Leprosy and Syphilis.*

- 118. Some authorities are of opinion that leprosy is nothing else but a modified form of syphilis and one of the exponents of this hypothesis was the late Sir William J. Moore, late Surgeon-General with the Government of Bombay, who considered leprosy to be a phase of inherited syphilis. Clinical experience however is altogether against this theory and the records of this institution show several cases where lepers had contracted syphilis after the development of leprosy and it has not at all been unusual to notice both syphilis and leprosy in the same patient concurrently. Very often patients have been brought as lepers showing hardly any signs of the disease, but covered with secondary cutaneous syphilides. Under appropriate treatment all the manifestations of syphilis have disappeared, leaving the leprosy eruption as distinct as in any other uncomplicated case. This has been especially noticed in the case of the Afghan patients in whom both the diseases have been observed to run together. The writer therefore is in complete accord with the conclusion of the Leprosy Commission that it is impossible to regard syphilis as having any real or specific influence on the production of the disease or as acting otherwise than by lowering the general tone of the system and thereby rendering it more liable to attack by or hastening the progress of leprosy.

2.—Leprosy and Tuberculosis.

- 119. That leprosy and tuberculosis run concurrently in the same patient has been often observed and it is also true that pulmonary tuberculosis runs a more rapid course amongst lepers. But the proportion of patients so affected is not very large and there have been only 7 deaths from phthisis in the asylum during the last three years. One of the most striking resemblances between leprosy and tuberculosis has been noticed in the case of the enlargement of the lymphatic glands both in the axilla and the groin. But unlike tuberculosis, a large number of glands are seen to become enlarged almost simultaneously so that there appear large nodulated tumours and some of the glands gradually break down and thus makes way for itself by long and sinuous sinuses opening in the pectoral muscles or low down in the thigh.*

3.—Leprosy and Kidney Disease.

- 120. The connection noticed by the late Dr. Beaven Rake between leprosy and kidney disease has not been so much in evidence here. The proportion of cases of kidney disease is not greater than met with elsewhere and it is quite possible that in the absence of pathological work, its incidence has been overlooked or has been masked by other and more acute symptoms.

4.—Leprosy and Skin Diseases.

- 121. Psoriasis, eczema, scabies and pruritus almost always accompany leprosy. The first is at times very pronounced, the whole body being covered with its characteristic eruption. In other cases, itching of the most troublesome kind persists for long periods, resisting all ordinary treatment. Scabies is kept well under check in the asylum and it is found that most of the skin affections which complicate the disease, except pruritus, yield to treatment.

* In two male lepers suffering from anæsthetic leprosy, hypertrophy of the mammary glands was observed, and in one, a small quantity of milky fluid could be pressed out.

5.—*Leprosy and Lupus.*

122. No case of leprosy and lupus combined in the same patient has been observed in this asylum. Only one case of extensive lupus of the face was sent to the asylum as a case of leprosy.

6.—*Leprosy and Ainhum.*

123. Ainhum is a peculiar disease affecting the little toe of one or other foot and affects both the healthy and the leper. It is characterised by the formation of a deep furrow all round the base of the toe, which gradually deepens so that the toe becomes freely movable, on account of the interstitial absorption of the bone. It has been marked more in the West Indies than in India. Only about five or six cases have been observed in this asylum and one of whom was shown to the Leprosy Commission. He was a Hindoo boy aged ten. The little toe of the left foot was seen to be enlarged, the outline was convex, and the skin thickened and completely anæsthetic. There was a furrow all round the base of the toe extending nearly half through it except on the dorsum. It could be freely moved about, the bone having been absorbed. The skin beyond the furrow was thickened and painful. The other cases observed had almost the same characters. The Leprosy Commission observed that the occurrence of ainhum in any individual should however always suggest a most careful examination for anæsthesia and other leprous symptoms and the suggestion is no doubt of practical use.

XXIII.—*Leprosy and the Opium Habit.*

124. The following note on the opium habit amongst lepers was contributed by the writer of this report to the *Indian Medico-Chirurgical Review*:—The mass of evidence already collected by the Royal Commission on Opium consists of a series of observations continued through a long period of years. Any fresh evidence likely to throw some additional light on the connexion between opium and disease would not be out of place, as it embraces some systematic observations that have been carried on at the largest leper asylum in India during the last three years.

125. Soon after the asylum was established, our attention was attracted to the fact that the lepers had learnt, through what may not inaptly be called intuition, to appreciate the virtues of certain drugs to which they had resorted, not for luxury but from dire necessity. Amongst their repertoire, opium, iodoform and ganja held the foremost place. It was not at all uncommon when searching their baggage to find tiny, elegant looking paper boxes bearing the labels of some of the well known firms of European chemists, containing iodoform—a sad contrast with their other wretched and squalid belongings. Opium, too, held a not insignificant place in the affections of some of them, whilst a small proportion were devotees to ganja. The latter was at once put a stop to, but as the plant could be easily grown, it was soon found flourishing in the vicinity of some of the wards; and as its moderate use did not in any way interfere with the discipline of the institution and satisfied the only craving of some of these patients who were virtually prisoners for life, it was not deemed advisable to interfere with its use, and we have had no cause to regret this concession. Opium, we could not stop altogether, but we gave them the pure drug in smaller quantities than what they

considered to be their proper dose—the bazaar drug to which they had been accustomed being far from pure, and generally adulterated.

126. This naturally led us to inquire into the reasons of the opium habit, and we found that none of the patients had taken to the drug from mere luxury. The principal reasons assigned by them were—diarrhœa, dysentery, colic, chronic cough, fevers, pains of anæsthetic leprosy, and as a hypnotic. The drug, they said had certainly prolonged their life and made their existence less miserable, besides, acting as a prophylactic against bowel complaints. When admitted into the asylum, these opium habitues had better physique than some of their less fortunate brethren.

127. *The number of Opium eaters* :—The average strength of the asylum for the last two years has been about 275 and during the period the number of opium eaters has never exceeded beyond 25, that is, about 9·09 per cent. This ratio has fluctuated from time to time. At present there are only about a dozen opium-eaters amongst nearly 290 inmates, the proportion being 4·13 percent only.

128. *Their Caste and Sex* :—The opium habit is confined to the Hindoos and Mahomedans only ; a native Christian taking opium is an extremely rare occurrence.* As to the sex, males are more addicted to the drug than females, the ratio being nearly 4 to 1.

129. *The Quantity of Opium Consumed* :—The patients named various quantities as their daily dose, but when the pure drug was given they appeared to be satisfied with much less. That the quantity of the drug was small would be seen from the fact that even with a daily average of 25 opium eaters the largest quantity used on any one day was never more than 60 grains—an average of about 2·4 grains per day per patient. It was put up in the form of pills, each containing $\frac{1}{2}$ grain and the daily quantity was taken by the patients in divided doses during the day. There has been no tendency on the part of the patients to increase the dose and their daily number of pills remain more or less stationary. It must however be stated that some do not take more than 1 to 2 grains per day whilst others go over 3 to 4 grains ; but in no case is the number of pills increased except under exceptional circumstances.

130. One notable instance of the surreptitious use of opium in larger doses came to our notice. The patient was working as a hamal in the wards and the pills for distribution among the patients were under his charge. Some of the patients having been discharged, or having died, he continued to draw the same number of pills and so accumulated a stock of them. He had some diarrhœa and to check it, he commenced to take the pills, the daily dose being at first only 3 grains which was gradually increased to 22 grains per day within a period of six weeks. No ill effects were observed in him. The man continued to do his ward work and worked in the garden attached to it all day, with increased vigour and seeming none the worse for it. In fact, he seemed to thrive on the drug. On the above facts being known, the quantity was at once cut down to about 3 grains per day without in any way interfering with his general health.

131. *Conclusions* :—A careful study of the opium habit in lepers leads to but one conclusion—that the drug is one of the most potent means of alleviating the sufferings of these unfortunate patients. It acts in every way to their advantage,

* Only one native Christian, an old man of about 60, used to take about 1 grain opium per day

prolongs life, assuages pains, prevents or relieves intestinal troubles to which they are greatly prone and conduces to their general health and well being."

XXIV.—Hereditary Transmission of Leprosy.

132. In considering this vexed question in which not a few elements of doubt and mistakes enter, it would be as well to follow the distinction between "*false heredity*" and "*true heredity*" as laid down by the Indian Leprosy Commission. The term "*false heredity*" refers to such patients as are born of fathers and mothers absolutely healthy, though they afterwards become lepers, whereas "*true heredity*" refers to those alone born of leprous parents. As the subject has been exhaustively dealt with by the Commission it is hardly necessary to enter into it fully once again. Suffice it to say, that the records of this asylum fully bear out the conclusions arrived at by the Commission as regards heredity. And for the following reasons :—No authentic congenital case has ever been recorded, nor has any been declared as such, although over 900 patients have been examined. Secondly true hereditary taint has been found to exist in only 7.66 of all cases, the Leprosy Commission recording the same at from 5 to 6 percent.* They also found that amongst 2,371 lepers examined by them, 264 that is 11.1 percent had a family taint irrespective of the fact whether the parent or parents were leprous at the time the child was born. The records of this asylum show a slightly higher percentage about 13 percent, which is about 2 percent higher. Thirdly several children have been admitted for leprosy whose parents have remained perfectly healthy. Fourthly marriages amongst lepers being not prolific, there are comparatively fewer births and of those born from leper parents, only a small fraction, that is from about 5 to 6 percent develop the disease. The six children born in the asylum of leper parents are still healthy, and lastly, facts so far as collected at present do not lend any support to the view that there is even an hereditary predisposition amongst the offspring of lepers. The above facts therefore clearly establish that leprosy cannot be included amongst the category of hereditary diseases like syphilis and tuberculosis. And even when both the parents are leprous before the birth of the child, and the child subsequently develops the disease, the element of contagion ought largely to enter into consideration, and in such cases the writer is inclined to attach greater weight to contagion than to heredity. †

XXV.—The Communicability of Leprosy.

133. The main interest in the leprosy question has long been centred in the subject of the communicability or contagiousness of the affection. Time after time various views have been held on the subject and the Indian Leprosy Commission have come to the conclusion "that though they consider leprosy an infectious disease caused by a specific bacillus and moreover also a contagious disease, they are of opinion that there is not sufficient evidence that leprosy is maintained or diffused by contagion ; indeed under the ordinary human surroundings the amount of contagion which exists is so small that no legislation is called for on the lines

* Leloir examined the history of 107 cases, and was able to trace heredity in 47 but the proportion seems to be too high.

† Hansen quotes the instance of the descendants of 160 Norwegian lepers who emigrated to the United States of America, all their offspring remained free from the disease to the third generation. Koch of Trinidad says that at Maracaibo Island (Venezuela) marriages have been permitted between lepers, and in 15 years only 2 births have occurred, and both children were healthy.

In Hawaii, 2865 lepers had between them 26 children, of whom only 2 developed leprosy.

either of segregation or of interdiction of marriages, with lepers." And yet in the face of this conclusion, the Commission recommend that "the sale of articles of food and drink by lepers should be prohibited and that they should be prevented from practicing prostitution, and from following such occupations as those of barber and washerman, which concern the food, drink, and clothing of the people generally quite apart from the dread of a possible infection" !

134. In support of this conclusion, they contend that the degrees of contagiousness of infective diseases differ greatly, depending partly on the unequal liability of the healthy body to be invaded by germs, and partly on the resistance and quantity of germs leaving the diseased body. Again, the channels of infection might not offer a suitable soil for the growth of the germs, and finally, the human body may possess protective means offering obstacles to the attacking germ. A disease may thus scientifically be grouped amongst the infective and contagious diseases, and yet practically and clinically hardly deserve the name. The Commissioners regret that, without in the least underestimating the importance of bacteriological and animal experiments, the modern advances in these have led observers to take a one-sided view to the disregard of the evidence derived from clinical and epidemiological experience. They state that the bacteriologist, in experimenting upon highly susceptible animals easily runs the risk of arguing beyond his premises and of drawing conclusions from his experiments, which he applies without sufficient reserve to the natural mode of infection. And further they believe that it is quite impossible for bacteriology alone, without the aid of clinical and epidemiological observations, to deduce the ætiology of an infective disease. A susceptible animal may easily be infected by experiment, and the case may be quite different with man. They illustrate the above arguments by citing tuberculosis. The tubercle bacillus is widely distributed throughout space without any loss of vigour, but tuberculosis is not so extensive in proportion, because the conditions necessary for its multiplication and proliferation do never exist in the ordinary human surroundings. Its diffusion depends on its transmission from one individual to another, and secondly, on the fact that the bacilli may remain dormant in full possession of their virulent properties for a considerable time without ever showing any signs of proliferation. They are in fact true parasites. From these facts one would be inclined to assume that tuberculosis must be a highly contagious disease. But it is by no means so. Healthy persons living in the immediate neighbourhood of phthisical patients by no means all become infected or perhaps only slightly more than if the chances of infection were less. This is due to the disposition of an individual which according to Flügge, governs the mode of diffusion of tuberculosis. The Commissioners state that the introduction of the bacillus into the human body is not sufficient to bring about the infection without the necessary individual predisposition.

135. They further state that they have not been, in the course of their inquiry, able to trace home even one case of direct contagion and that cases brought forward as such have broken down on further investigation. But it may be reasonably asked in how many cases of tuberculosis, a disease less insidious and more acute in its course, and with its channels of infection comparatively more widespread and universal—is contagion or infection brought home, and that too in intelligent and civilised communities ? Can there be any wonder then, that in leprosy, which is so sparse as compared to tuberculosis, and which is in many

cases disregarded or neglected until its graver manifestations appear, and in which the channels of contamination exist also abundantly, as will be shown hereafter, that it was not possible to trace a case home, especially when the intelligence or rather the want of it, is considered in the masses of the population and their apathy and habit of live and let live, and above all, the ignorance of even the simple principles of personal hygiene? Again, as Dr. Thin in his recent work on leprosy says, the great number of instances in which healthy persons may associate for years with lepers and yet remain unaffected cannot invalidate the evidence of contagion, if in a certain number of cases it is clear that leprosy has been conveyed from one person to another and he relates about 68 various authorities, and instances in which it has been shown that leprosy has been so conveyed by contagion. Day by day evidence is accumulating in favour of communicability, and the late Dr. Beaven Rake himself has recorded a case of the communicability of leprosy, in his report of the Trinidad Leper asylum which was written subsequent to the report of the Leprosy Commission. Dr. Donovan of the Spanish Town asylum at Jamaica has also lately recorded the case of an asylum servant having contracted leprosy.

136. The records of this asylum show only one case in which there can be no reasonable doubt that leprosy was communicated by contagion. The son-in-law of an old Hindoo Maratha female aged about 50, developed leprosy. The man was living apart, a long distance from the mother-in-law (who had no indirect or direct family history of leprosy) with his wife and children. Subsequently leprosy appearing in the daughter, the old woman went to live at her son-in-law's to look after the children. About six months after, she showed signs of leprosy and the disease also appeared in two of the children. The man died and the old woman, her daughter and two grand-sons were admitted into the asylum.

137. The Leprosy Commission state that in a family, contagion has the widest play, and that it has been found that the disease does not spread sufficiently amongst the members of one family to warrant the conclusion that it is contagious to any extent. But contagion can only have the widest play if the leper lives with the family, which as has been shown above he does not do as a rule. Again, how is the fact that several members of one family develop the disease one after the other, to be explained? There have been several other instances of members of the same family contracting the disease similarly. For instance there are at present in the asylum four members of a family consisting of a husband, wife, a son and a daughter. It seems that in this case the eldest son (since deceased) first developed the disease and died within one year. During his lifetime the mother became affected, subsequently the father (both advanced in age) and they were in turn followed by a son and a daughter. Examples like this could be multiplied and tend to show that although leprosy might not in the abstract be considered as dangerously contagious, yet when one member of a family forms a focus of infection, there are many chances, nay almost absolute certainty, of other members becoming affected, if they all live in the same family and associate closely with the afflicted member just as if he were healthy,—susceptibility of course being an important factor.

138. Another instance of contagion, but in a different way might here be quoted. A young Frenchman, aged about 20, and of European and untainted parentage, was admitted into this asylum for tubercular leprosy. His mother

having died soon after giving birth, a native wetnurse was engaged for him. After the child was weaned, she was still retained in the family for about 5 or 6 years. Subsequently it was found that she had some signs of leprosy and her services were dispensed with, and when she was seen a couple of years later she was a confirmed leper. The patient later on showed the initial lesions of leprosy. There was no reason to doubt the correctness of the information, which if true proves further that leprosy is communicable through the milk of diseased lepers and it was believed in this case that the woman was suffering from leprosy when nursing the child.

139. This conclusion of the Leprosy Commission about contagion gave rise to much discussion and the Executive Committee of the National Leprosy Fund dissented from it. The late Sir Andrew Clark, Sir William Guyer Hunter, the late Sir James Paget, Sir Joseph Fayrer, Mr. Jonathan Hutchinson, and other members of the Executive Committee expressed their disagreement with that part of the conclusion which says that "the extent to which leprosy is propagated by contagion and inoculation is exceeding small."

140. In a country like India where leprosy prevails to such an extent and where the channels of contagion, known and unknown, are many and various, there are inherent difficulties in the way of tracing the time, place and mode of infection. The people are as a rule careless and do not complain about their maladies, especially skin diseases, which they allow to run on for years at times, and until the same have advanced very far, and even though the sources of infection may be in the neighbourhood or even constantly recurring, their habits of carelessness and apathy would lead them to disregard any such danger of infection. This is not a bare assertion, for instances may be quoted where lepers have been seen engaged in various trades that come in intimate contact with the healthy. Hawkers of sweetmeat and fruit, and dealers in other articles of food and drink, tailors, barbers, washermen labourers, hack gharry-drivers, cartdrivers &c. are some of the avocations they follow. And is it possible that where the chances of infection are so widespread and varied that the ignorant masses in India would in any case be able to take note of, and recollect a possible source of infection? The writer of this report has examined several workmen, clerks in offices, who are lepers and who continued to work as such, long before it was found out that they suffered from leprosy. A well known medical man of this city sent over to the writer, for examination, the son of his washerman who was washing his clothes and on examination the man was found to be suffering from leprosy.* It may be noted that these instances were observed in the city of Bombay where leprosy has engaged so much of public attention and in the years 1893.

141. From the facts and arguments stated above, the writer of this report feels constrained to differ from the conclusion of the Indian Leprosy Commission and would maintain that contagion plays a more important part in the dissemination of leprosy than what has been assigned to it by the Leprosy Commission. He believes that with the varied sources of contagion, both human and through articles of food and drink, clothing, eating and drinking vessels, the scissor or the razor of the barber and, probably even the agency of insects like flies and mosquitoes, the channels of infection are multifarious, and not easily traceable and

* A washerman suffering from anæsthetic leprosy was also once observed at the Municipal Dhole-ghat at Mahaluxmee, but has since disappeared.

that in this country the difficulties are very great and evidence is not at all reliable on account of the careless habits of the people. He further holds that leprosy affords greater chances of communicability in members of one family and in those coming in intimate contact with lepers, if they do not take sufficient precaution to avoid the danger and that wherever the disease remains long in one family, it would be possible to trace want of due precaution in the healthy in communicating with the diseased members.

142. Since the above was written, the Berlin Conference has done a great deal towards the solution of this important question. Koch believed for a long time that the destructive processes which are of so frequent occurrence in the nose of the leper had some casual relation to propagating leprosy, and further research and study by him, his assistants and other observers have confirmed this opinion. The discharges and secretions from the nose have been examined and found to contain Hansen's bacilli, and hence one more hitherto unrecognised source of infection has been discovered; and many observers now hold that these secretions and discharges are a potent,—perhaps the most potent, and most dangerous, because not easily perceptible,—source of infection from the diseased to the healthy. This fact the Indian Leprosy Commission did not know, and it throws an important side light on the mode of propagation of leprosy in India, where the habits of personal cleanliness of the lower classes of the population are so notoriously imperfect and insanitary.

143. Although the general consensus of opinion at the Berlin Conference was in favour of the communicability of leprosy, there were some expressions of views totally against it, and amongst the contributions in the latter category was one from J. Ashburton Thomson who holds such strong views on non-communicability. He says that we must look for the true habitat of the virus in the surroundings of man and not in the diseased body and contests that the disease is communicable from the leper to the healthy. Poverty, starvation, bad hygienic conditions, says he, in no way make people more susceptible to leprosy than other disease, and in support of this contention he quotes, Hirsch, Jonathan Hutchinson, Beaven Rake and M. Leoroy de Mericourt. With regard to the steadily diminishing number of lepers in Norway, he says that no special measures, except imperfect control, have been in force since 1856, nor have the social and hygienic conditions improved in any way. Hansen's testimony of the communication of leprosy from the sick to the healthy is also not convincing to him. He gives the following explanation about the decline of leprosy in Norway:—Leprosy prevailed in the country since the 13th century, it being an ancient endemic seat of leprosy. There was an exacerbation of the essential conditions during the earlier half of the present century, and hence leprosy began to become more common. After 1856, a remission of those essential conditions occurred and hence the disease became less and less evident, and began to show signs of reverting to the slight degree of prevalence, which alone was believed to have obtained during the first two decades of the century.

Ashburton Thomson thinks that the above explanation accounts for the decrease of leprosy in Norway and also Great Britain. The explanation is no doubt ingenious, but at the same time hypothetical, and it fails to specify what those *essential conditions* were, that contributed to the spread and decline of leprosy. If poverty, starvation, bad hygienic conditions etc., have no casual

relation, then search must be made for these *essential conditions* in other directions but the author does not state where, and how they are to be reached, and what they probably are.

144. But on the other hand, evidence of a more positive, and demonstrable character is accumulating day by day, showing the communicability of the disease from the sick to the healthy. Cantlie says that excluding sexual intercourse, the disease is communicated only after prolonged and intimate contact. Patrick Manson* says that assuming the cause of leprosy to be the *lepra bacillus*, which is very refractory to cultivation, growing in a medium which exists only in the bodies of certain human beings, this medium is not present in every man, nor in those in whom it is produced is it present at all times, but only intermittently. The *lepra bacillus* escaping in some unascertained way from the body of an infected individual falls on the un-infected. If it falls on a suitable soil *i. e.* a person capable of producing the necessary cultivating medium, it either finds the medium immediately and at once proceeds to development, or not finding the medium at the time, it remains dormant, until in due course, a supply of this is sooner or later elaborated. Should it fall on the unsusceptible *i. e.* a person in whom the cultivating medium is never produced, the parasite dies.

145. Thin† describes how after the advent of a leper from the Philippines in 1850, in a village called Parcent in the province of Alicante in Spain, he infected several people, and how the infection spread from person to person, until there occurred 65 cases in the village upto 1887. Leprosy then spread into the neighbouring towns from Parcent, which became a focus of infection. A mother gave her son to a wet-nurse who was leprous and the infant soon showed symptoms of the disease. This case corroborates the case of the French leper quoted above.

Macnamara‡ relates an instance where one of the children of an attendant at a leper asylum in British Guiana developed leprosy from contagion from intercourse with lepers.

146. As regards the communicability of leprosy by cohabitation between lepers and healthy, instances are not many and the testimony of some writers point to complete immunity from infection.

J. Ross MacMahon|| says that he knows 3 male lepers, and one female leper, who are married and have been cohabiting with healthy partners for years without imparting infection to them. Azuero says, women do not shrink from cohabitation with lepers, and he has never known a case in which they were infected by coitus with them, but numerous authenticated cases where healthy males contract leprosy by cohabiting with leprous women. He has observed 40 cases, and Carrasquilla over 100 cases, in which the husband or the wife remained un-affected by the other's disease, throughout a long married life.

* Quoted by Justin Foley Donovan in the Transactions of the Berlin Conference.

† The *Lancet*, January 16th, 1892.

‡ The *Lancet*, March, 1892.

|| The *Lancet*,—September 16th, 1899.

XXVI. Non-Contagiousness of Anæsthetic Leprosy.

147. Himself a strong segregationist, Impey* contends that it is unnecessary to segregate lepers that are harmless. The case for the non-segregation of cases of anæsthetic leprosy is thus advocated by him :—

Cases of anæsthetic leprosy are non-contagious and therefore harmless. All the tissues of the body except the nerves, are immunised or in some way protected against the bacillus lepra, and that is why the bacilli do not grow in these tissues; nor are they found in any internal organs. Hansen is mistaken in thinking otherwise. The bacilli being in the nerves do not leave the body. No bacilli are found in the secretions, nor in the discharges from wounds in anæsthetic leprosy. The latter are due to nerve destruction, and are not themselves leprosy: the bullæ which form at the seat of disease do not contain bacilli, which are found nowhere except in an excised nerve in anæsthetic leprosy. The bacilli set up neuritis, which destroy the nerves, and then they cease to exist. The disease lasts about 4 years and not 10 as he believed once. We have no more right, he says, to call patients who are suffering from the effects of leprosy, lepers, than we have to say that because a man is pitted by small-pox, he is suffering from variola. It is possible for self-cured cases of anæsthetic leprosy to be re-infected with nodular leprosy as the immunity does not last long. Impey considers it not only inhuman but illegal to keep self-cured patient of anæsthetic leprosy in a leper asylum, as they run the risk of their getting re-infected with tubercular leprosy.

There is much truth in the arguments of Dr. Impey, and it is to be hoped that other observers would support his contention as regards the non-communicability of anæsthetic leprosy. If it is once proved, and authoritatively declared that anæsthetic leprosy is non-communicable, a great step in advance will have been made, and the necessity of segregating the cases will cease, except perhaps during the initial activity of the affection.

XXVII. Spontaneous Recovery from Leprosy.

148. A certain numbers of lepers are self-cured, says Impey. In a few cases the disease is cured spontaneously, not from the effects of external application or internal treatment, but from causes at present unknown, which exist within the body itself; the system throws off the disease, and it cures itself. He says that the course of leprosy is rapid, but a few live much longer than the rest, and it is these few long-lived cases, that are free from disease and that the self-cured cases exist only in the anæsthetic form. Medical treatment is powerless to cure this type of leprosy, but it is occasionally self-cured. On the other hand, tubercular leprosy is never self-cured, but it would be possible, Impey believes, to try and cure it by the introduction into the system of other bacilli which have antagonistic effects, and which being more active, and acute, push the less active lepra bacillus to the wall and bring about inflammatory affections. Measles arrests the disease: small-pox temporarily keeps it in abeyance and erysipelas always causes the tubercles in the part affected to subside.

* Transactions of the Berlin Conference, 1897.

149. The case with regard to anæsthetic leprosy, and the changes consequent on the disease are thus described by Impey :—Anæsthetic leprosy is due to the disease of the nerves, the affected nerves being thickened and soft on account of the sheath being injected and swollen by inflammatory exudations. There are acute neuralgic pains in this stage : the pains extend to the fingers ; the nerve is highly sensitive, although sensation in the parts supplied by it may be partially diminished. Later on, the nerve becomes smaller, firmer, and nodulated from contraction of the inflammatory products : the contraction causes pressure upon the nerve fibres and their subsequent destruction. The nerve fibres become at first irritated, causing contraction of fingers and toes, and then anæsthesia supervenes from their destruction. In the last stage, the nerve fibres are destroyed and a fibrous band remains. The nerve supply of the parts is thus destroyed, and is totally lost in the extremities, atrophic changes take place leading to necrosis of bones, and their ultimate removal by absorption or ulceration. In a typical case, both the hands and feet are equally affected : both the seventh nerves are paralysed. The drain on the system by necrosis and ulceration is very great, and only a few patients survive it ; and in them the necrosis ceases, the ulceration stops, and the wounds heal, though of course the lost parts are not restored. The disease in these self-cured cases does not break out again : the anæsthesia is complete and permanent, but the ulceration has ceased never to return. A perforating ulcer is always present in many of these self-cured cases, but this is due not to any active leprotic process, but to the presence of necrosed bone which may be large in size or deep seated, and would naturally take a long time to be thrown out. If the diseased bone is removed, the ulcer heals completely, and although the patient may be self-cured to all outward appearances, the perforating ulcer may go on for a long time.

150. “ *At what point does a patient cease to be a leper,*” asks Impey ?, and he replies, “ *when the leper bacillus leaves the body.*” He considers the maximum duration of anæsthetic leprosy to be four years, and holds that with few exceptions all cases that exceed this period are no longer lepers. In the Robben Island Asylum, out of 965 lepers admitted from 1871 to 30th June 1894, 402 died, and in the latter, 2 lived longer than 11 years in the hospital. There were 101 cases, that had been in hospital longer than 11 years, and 72 of them had no ulcers ; the hands and feet had suffered to variable extents, as of all them had severe ulcerations that had now stopped. In one case only was true leprotic ulceration active. In 28, perforating ulcers were present. The ulcer remains very long, and in some cases upto 30 years, after all symptoms of leprosy have disappeared. If the cicatrices and stumps be examined, the appearances are not those of arrestation merely, but of cure. The tissues do not appear infiltrated and thickened by inflammatory products, the skin is firm, though supple ; it is normal in colour or pale, but never red or irritable. If the parts are injured in any way, the wounds heal readily as in ordinary healthy tissues, and the health of the patients is good. Thin records that in Norway during a period of 25 years, 4891 lepers have died, and 107 become self-cured. If the perforating ulcer is conceded to be not necessarily a sign of leprosy, then 15 per cent. of anæsthetic cases become self-cured : otherwise only 7 per cent. says Impey. None of these self-cured cases die of leprosy. The leper bacillus is not found in sections of tissues of self-cured cases, as it has been killed by the contraction of nerve tissues after inflammation.

151. In the Matunga Asylum, examination of 330 lepers (August 1900) showed that there were 101 cases of anæsthetic leprosy in whom the leprosy process had virtually ceased.

The following table gives the duration of leprosy, and the presence and absence of perforating ulcer :—

Duration of Leprosy.				Number.	Perforating Ulcer Present.	Perforating Ulcer Absent.
Under	...	...	5 years.	16	8	8
Between	...	...	5-10	44	28	16
„	...	...	10-20	32	22	10
„	...	...	20-30	6	5	1
„	...	...	30-40	2	1	1
„	...	...	40-50	1	...	1
Total				101	64	37

Out of 101 cases, 64 had perforating ulcer, although all leprosy processes had ceased in them. Most of these cases were more or less mutilated, those under 5 years being less so ; and in only a few the fingers and toes had remained contracted without any loss of bones through caries or absorption.

XXVIII. The Bacteriology of Leprosy.

152. To name simply the various observers who have devoted their attention to the study of the bacteriology of leprosy, would fill pages. It is beside the purpose of this report to give anything like an adequate or exhaustive review of the subject, and hence only a few contributions, and such only as were easily accessible in English have been utilised for this brief and imperfect sketch. The Indian Leprosy Commission made an exhaustive investigation and the presence or absence of the lepra bacillus in the tissues and secretions is given by them as under :—

Blood Lepra Bacillus absent.

Blister fluid :—

(a) Over tubercles	...	„	„	present.
(b) Over anæsthetic patches	...	„	„	absent.
(c) Over normal skin	...	„	„	absent.
Vaccination Pustule	...	„	„	absent.
Juice from leprosy tubercles	...	„	„	present.
Discharge from tubercular ulcers	...	„	„	present.
Do. do. anæsthetic do.	...	„	„	absent.
Saliva (if tongue ulcerated)	...	„	„	present.
Nasal Secretions	...	„	„	present.
Secretions from the Throat and Larynx	...	„	„	present.

<i>Vaginal mucus</i> (by Kalindero)	...	Lepra	Bacillus	present.
<i>Menstrual Discharge</i> (Kalindero and Babes)	"	"	"	present.
<i>Urine</i>	"	"	"	absent.
<i>Fæces</i>	"	"	"	present (rarely.)
<i>Sputum</i>	"	"	"	present.

As regards the presence of the lepra bacillus in nature, they examined water, and earth, and out of 100 cover glass preparations of the latter, the lepra bacilli were found in 10 only, but it was not possible to say whether they were alive or dead. No bacilli were found in huts inhabited by lepers, or from graveyards where leper bodies had been buried. Fish, crustacea and flies were examined with negative results.

153. *Examination for Lepra Bacilli in the Organs of a child born of leprous parents*:—Dr. O. R. Voight* relates that a child born of leprous parents died in his leper asylum when 5 weeks old, and microscopic examination of the skin, spleen, lymphatic glands, liver, kidneys and lungs did not reveal any bacilli.

RAPID METHOD OF BACTERIOLOGICAL DIAGNOSIS.

154. The following rapid method of bacteriological diagnosis is given by Dr. L. J. Alvarez †:—

Remove a bit of skin or other tissue: wash it in normal saline solution: triturate thoroughly in a mortar until a homogeneous solution is made, adding during trituration enough saline solution to keep the specimen from drying. Transfer a small quantity to a thin coverglass, dry it in air, fix it over a Bunsen's burner or spirit lamp, stain with carbol fuchsin warming it over the flame for 2 or 3 minutes: wash in water, and then decolorise, and stain again with Gabbets solution of methylene blue and sulphuric acid for 30 seconds, wash again in water; dry with blotting or filtering paper, and mount in Canada balsam. Examine now with immersion lens, and the bacilli will appear purple in a blue field. If the bacilli are very few in the skin or tissue, add more saline solution, to the triturate, and put it in a centrifugal machine, or in a conical glass for 24 to 48 hours.

CULTIVATION OF THE BACILLUS LEPRÆ.

155. Dr. Carrasquilla ‡ stated at a meeting of the National Academy of Medicine, Bogota, that he had succeeded in cultivating the bacillus lepræ on sloped solidified human serum, and on beef bouillon prepared according to the method of Thoinot and Masselin. The bacillus was then cultivated from serum to serum, and from bouillon to bouillon and pure cultures were always obtained. He observed the bacillus in motion in two stages of its development as long slender bacilli which move in an undulatory manner, and as short coarse, almost elliptic bodies moving rapidly in a straight line. In the latter, he fancied he had observed flagellæ, but he was not positive as to that. Carrasquilla's results do not entirely accord with those of Prof. Spronuk of Utrecht who has also claimed to have cultivated Hansen's bacillus. Prof. Campana of Rome has also convinced

* *Tratch*:—*Journal of Cutaneous and Genito-Urinary Diseases*, July 1899.

† *Transactions of the Berlin Conference* 1897.

‡ *British Medical Journal*:—July 1st, 1899.

himself that he has successfully cultivated the bacillus. Carrasquilla* in a later communication again reverts to the subject, and concludes that the bacillus he has succeeded in cultivating is the Hansen's bacillus because (1) it resists discoloration by 30 per cent. nitric acid; (2) there was no reason to believe that any other organism was introduced when the tubes were inoculated; (3) the filtered fluid from the cultures when injected into horses produced the same reaction as serum from the leper's blood; (4) the serum of horses subjected to injections of culture filtrates produces the same reaction in lepers, as the serum from horses injected with serum of leper's blood; (5) the bacillus stains in the same way as Hansen's bacillus. He hopes to succeed in inoculating animals with the cultured bacillus and so prove his point.

THE LEPRA BACILLUS.

156. Lawrence Herman communicated some recent observations on the lepra bacillus, to the Berlin Conference, of which the following is a brief resume:—

Large masses of various shapes and thickness are found in leprous tissues, sometimes cylindrical, and at others branched, long or short. They consist of bacilli so closely aggregated together, that in the denser masses separate bacilli are not to be seen. There is no evidence of cellular structure in the masses, no cell wall, and rarely nuclei are seen, but coarse short bacilli which lie usually very regularly disposed, with their length following the longitudinal axis of the masses, and close together. Occasionally they may be transversely arranged or even radiating. This arrangement in masses and bundles is characteristic of the bacillus lepræ. The bacilli stain as a rule uniformly, but there are some which take only a faint colour and also stain blue. This change is not due to degeneration, but indicates some subtle change in the process of its growth, as is shown by the examination of nodules at an early period of growth or during a fresh exacerbation of the leprous eruption with high fever. These bacilli which stain so differently occur irregularly disposed in the mass. They are the more recent and active bacilli, whilst the other are older (mature) and not decolourised by nitric acid. The further life history of the bacilli is not settled: they may break down, become absorbed or may become transformed into brown masses of granular appearance (Neisser and Hansen). The masses of bacilli occur within free spaces, and they probably lie loose in them, or but loosely enclosed. They are found in the connective tissue, in the interfascicular lymph spaces, in the liver; in the blood vessels, and it is possible that blood and lymph spaces also contain them. Both forms, the recent and the mature occur in masses and both are capable of penetrating the walls of the blood vessels and lymph spaces, in which they lie; the more recent bacilli are seen to penetrate in greater profusion. It appears probable that the bacilli develop in and spread through the blood and lymph vessels and lymph spaces, and that they find their way from these into the tissues, where they grow and develop still further, apparently in great profusion, often to form masses of considerable size. These masses it is probable do not grow further and are not in an active state but stationary. Some say that in this condition, the bacillus is dead. It may be inert or stationary, but it is impossible to regard it as dead, as it has the same reaction to stains etc. If dead, it would show evidence of degeneration and death, and would be absorbed and cast off.

It is possible that it is devoid of growth, as hitherto all experiments have been unsuccessful with it; and all activities in future should be directed towards cultivating the recent bacilli.

- 157. If the above views are correct and are confirmed by further observation, they would not only explain the failures that have almost universally attended all efforts to cultivate the lepra bacillus, (except Carrasquillo's) but would also point to the direction in which all future efforts should be concentrated *viz* :—the separation of the mature from the recent bacilli, and further investigations with the latter, both for purposes of inoculation experiments, and for the preparation of an active antileprous serum.

• THE MODE OF INFECTION IN LEPROSY.

158. Phineas Abraham * says that the bacillus might enter the system through the alimentary canal, or the aërial passages or the skin, as in tuberculosis. Often the first symptoms are observed in connection with the nasal and laryngeal mucous membrane or there may be general constitutional disturbance before any local signs develop. Prof. Babes † considers that the proof of the presence of the bacilli in the hair follicles, and on the surface of the skin, as well as in various secretions, suggests the possibility of infection from direct contact, although cases are wanting in which this direct infection has been proved. The mode of infection is probably through wounds or through the ducts of glands, perhaps also through the tonsils, the nasal mucous membrane, and the conjunctiva. The mode of infection in nerve leprosy is even more obscure.

THE NASAL ORIGIN OF LEPROSY.

159. Prince A. Morrow ‡ in his System of Genito-Urinary and Cutaneous Diseases, discusses the question of the nasal origin of leprosy. "Contrary to what is usually taught" says he "I believe that the first manifestations of leprosy are in the majority of cases determined towards the mucous membranes of the pharynx and upper air passages. According to my observation, alteration of the voice, betrayed by a slight husky or rough phonation, rhinitis with an abnormally free nasal secretion, sometimes epistaxis, and an increase in the salivary secretion, are amongst the earlier signs of leprosy. At a more advanced age, when there are leprous deposits on the mucous surface with involvement of the cartilages and bones, the characteristic harsh raucous voice, and the difficult sniffing respiration from obstruction of the nostrils, are almost invariably concomitants. In the vast majority of cases I believe that the vehicles of the virus through which contagion is affected, are the secretions of the mouth, and the nose, and that the port of entrance is the mucous membrane of the respiratory and intestinal tract with secondary infection through the blood or lymphatic system." Morrow suggests as a measure of prophylaxis, disinfection of buccal and nasal secretions.

160. Other observers have been at pains to trace the early influence of leprosy in these parts, and their observations are of special interest as drawing attention to methods by which the disease can be recognised in its early stages and hence more properly isolated. Jeanselme and Laurens § examined the air passages of 25 lepers, and in 15 they discovered affections of the nose and throat. "These

* Transactions of the Berlin Lepra Conference, 1897.

† *British Medical Journal* : September 24th, 1898.

‡ *Journal of Cutaneous and Genito-Urinary Diseases* :—June 1899.

§ *British Medical Journal* :—July 23rd, 1899.

regions are therefore affected in 60 per cent. of the cases. These statistics referred only to the cutaneous or mixed form, and not to the nervous. From the examination of 153 lepers in India,* Sticker found the leprosy bacilli present in the nasal secretion 128 times. He believes that the initial lesion of this disease is a specific ulceration of the cartilaginous septum, and that this is often present in the latent stage of leprosy for years before the appearance of the first tubercles in the skin or the development of the first nervous symptoms. This primary lesion in the nose remains an active centre of infection throughout the course of the disease, as the bacilli are constantly being thrown off in great numbers in the nasal secretion, which is consequently the chief source of danger. The bacteriological researches of Jeanselme and Laurens on this subject have demonstrated the bacillus of Hansen in the mucus of leprosy rhinitis, and when there is epistaxis, it is found in the blood. According to these authors, occasional but persistently recurring epistaxis may be one of the first symptoms of leprosy, and they suggest that it may be as indicative a symptom in leprosy as hæmoptysis is apt to be in pulmonary tuberculosis. In this they confirm Sticker, who argues that as tuberculosis generally finds its first lodgment in the apices of the lungs, so leprosy most commonly originates in the nostrils. The first external manifestation of leprosy may, indeed, be a common chronic rhinitis—a persistent coryza, with formation of crusts in the nostrils and occasional epistaxis. With the progress of the disease the conformation of the nose becomes altered. When the cartilage of the septum gives way, the bridge of the nose collapses, and the nostrils may assume the form of the *nez en lorgnette*. A rhinoscopic examination shows the mucous membrane of the septum to be swollen and ulcerated, so that the slightest touch with a probe brings on hæmorrhage. As the ulceration deepens perforation of the septum takes place. This is circular or elliptic, and quite regular. When recent the margin is thick, callous, and bleeds readily; when old standing the circumference is sharply defined, and the mucous membrane thin, pale, and cicatricial, or it may even appear normal. Leprous tubercles are often found in the pituitary membrane. The sense of smell is not noticeably affected, but anaesthesia of the mucous membrane is observed, either in connection with the presence of tubercles or quite independent of any local manifestation. Often the entire mucous membrane of the septum is quite insensitive to touch. The thermic sensibility is always more affected. In connection with this subject we would refer those interested to the admirable macroscopic and microscopic observation by Dr. Paul Bergengrun, of Riga, on leprosy as it affects the upper air passages. They were shown by the late Professor Kanthack at meetings of the Pathological and Laryngological Societies last year."

THE BACILLUS LEPRÆ AND THE TUBERCLE BACILLUS.

161. Important characteristics distinguishing the bacillus of leprosy from that of tuberculosis appear from the pen of Dr. E. Jeanselme†. He says "that while the bacillus of tuberculosis and that of leprosy possess almost the same form and almost identical reactions, they are nevertheless distinguished by the following important characteristics: (1) In leprosy the number of bacilli infiltrating the tissues is enormous, so great that the mass of bacilli constitutes an important part in the volume of the leprosy nodule. (2) The bacilli of leprosy are rarely separate from one another, but almost always exist as colonies, the appearance of

* At the Matunga Leper Asylum, in 1897.

† *Presse Medicale* :—April 8th 1899 :—quoted by the *University Medical Magazine* :—September 1899.

which may be likened to a bunch of cigars or to an ear of corn. (3) The bacillus of Hansen cannot be cultivated by any known means. The numerous experiments of Campana, Leloir, Arning, Ducrey, Kanthack, Barclay, and others have been varied beyond number; all known methods have been tried and all have failed. In several instances in which the effect appeared to be successful, examinations of the culture showed only the bacilli of tuberculosis. (4) The bacillus of Hansen cannot be inoculated in animals. It is impossible to enumerate the various experiments that have been made without result in the endeavor to transmit leprosy to different kinds of animals. (5) The cells that are invaded by the bacillus of Hansen give only a weak reaction. We never find in leprosy nodules the grouping which belongs to the elementary tuberculous follicle. (6) The resistance of the bacillus of Hansen to physical and chemical agencies is less than that of the bacillus of Koch. According to the observations of Schaeffer, the bacillus of leprosy, left five or six days in a solution of sulphuric acid, 5 to 100, is no longer colored; while the bacillus of tuberculosis will still retain its coloring matter when it has been subjected to the same treatment for eleven or twelve days. (7) The leper and the tuberculous subject do not react in the same way when submitted to injections of tuberculin. In spite of these differences the analogies are such that we cannot help asking if the bacillus of leprosy and that of tuberculosis are not the issue of a common ancestor. Although it may be impossible to verify this hypothesis, it is certain that, at the present time, they represent two distinct species. We are totally ignorant as to the habitat of the bacillus of leprosy when outside the human organism. It has been sought in vain in the soil, even in cemeteries of lepers, and in the foods which have been considered as favorable to the development of leprosy.

162. Prof. Victor Babes* believes that the bacilli of leprosy and tubercle are related: he thinks that this is proved by the former reacting to stains and by its association with a substance of the nature of tuberculin, and by the fact that a leper reacts generally and locally to tuberculosis. Clubshaped and branched forms are seen in both. The intimate structure of leprosy bacillus is distinguished from that of the tubercle bacillus by special colour tests, and by the special colony formations. He has not been able to cultivate the lepra bacillus.

XXIX.—The Treatment of Leprosy.

163. In discussing the question of the treatment of leprosy it may be as well to make a distinction between the cure of the disease and simple amelioration in its manifestations. The term cure could only be applied when all the manifestations have disappeared and the disease has been eradicated from the system, so that there can be no recurrence and the patient would on examination be declared perfectly healthy. Such a result is however a great desideratum and notwithstanding the vauntings of various native vairs or hakims, who pretend to eradicate the disease, no such achievement has been performed. All that they do, and all that scientific treatment is at present capable of doing—with perhaps less annoyance and discomfort to the patient than when treated on the native plan—is to so improve the patient by removing some of the manifestations of the disease, and temporarily checking its onward course, as to give him as it were breathing time, and enable him even for a short period to go about in a fairly

* British Medical Journal :—September 24th, 1896—review of Prof. Babes' work.

good state of health, and if possible to earn his livelihood. Thus far and no further does our present knowledge go, and all that is being said beyond it, must be received with extreme caution, not to say suspicion, whether it emanates from a scientific enthusiast or from a native charlatan.

164. Medical and surgical measures are undoubtedly useful in the treatment of leprosy, not so much as specifics to eradicate the disease, as to give temporary relief, and no "bacillus hunt" has proved useful or seems likely to be, so long as the disease is recognised to be dependent not upon the bacillus alone, but upon the power of resistance of the patient as well. Hence all measures tending to improve his general health, and thereby fortifying the system against the inroad of the bacillus, give better and more appreciable results, than direct germicidal treatment however powerful. And this is the way in which most of the so-called specifics act, for no one has hitherto shown that they are capable of destroying the bacillus.

165. The treatment of patients in this asylum was at first beset with peculiar difficulties, especially when it is noted they were removed to the institution under compulsion. For a long time any systematic treatment was out of question, and when the patients realised and openly said that they were prisoners for life, and did not intend to leave the institution till released by death, and that it mattered little to them whether they improved or not, it must be acknowledged that this was hardly the frame of mind in which it could be possible to induce them to do anything. So long as their wants were supplied, their sores dressed, and any urgent complications relieved, they were satisfied and did not ask for anything more. Gradually however, some of them were brought under treatment and the results of the observations are summed up as follows :--

166. The treatment may be divided into medical and surgical. And the former again into tonic or prophylactic and "specific." Under the former may be included iron, arsenic, codliver oil, strychnine, and the various hypophosphites, and these when used in appropriate cases, do a great deal of good towards improving the general health of the patient, and have been largely utilised. And it may be stated that these tonics are extremely valuable adjuncts in the treatment of leprosy, almost, if not to an equal extent as in tuberculosis. The "specific" treatment may now be considered under separate heads.

167. *Chaulmoogra Oil*:—This oil has been extensively used both alone and in combination with strychnine as recommended by Dr. Hillis of British New Guinea, and patients of their own accord asked for it as they had great faith in its virtues. Dr. Beaven Rake in his report for 1889 says that the chief results from the use of the oil are increase of perspiration, decrease of tubercles, improved appetite and sense of wellbeing, increase of sensation, and increased suppleness of skin and lessening of pains in the joints. These results were fully borne out by an extended series of observations and it has been noticed that the patients as a rule tolerate the oil well, only in a few instances diarrhoea or vomiting occur. It is generally administered pure and sometimes as a mixture. It can be taken for a very long time and patients do not tire of it. But it can in no sense be considered a specific, for all that it does is to give temporary relief and it is powerless to cure or even to check the recurrence of the affection. Still it is a valuable adjunct to treatment.

Gynocardate of Magnesia has been recommended of late, as a substitute for the pure oil.

Tourtoulis Bey of Cairo has been experimenting with subcutaneous injections of Chaulmoogra oil and he relates * the case of a patient in whom this method was tried, as internal administration in various forms produced vomiting, nausea etc. Tubes containing 5 grammes of sterilised oil were used. The improvement became marked after 50 injections. The patient received 193 injections of 5 grammes each in 1895; 106 in 1896; 87 in 1897; 50 in 1898, and 33 during the first five months of 1899. Then he refused to have any more as he considered himself cured. In six years he had 584 injections equal to 2,720 grammes of the oil. The injections were made on the outer side of the upper and lower limbs with a long needle introduced subcutaneously. They gave rise to but slight pain and no abscesses. Hallopeau at the *Soc. Derm. et Syphil.* where this paper was discussed, said that Jeanesclme and he had injected the oil in 10 c. c. doses a week in buttocks, but that on a severe outbreak of nodules they gave it up. Du. Castel is trying the method at St. Louis.

168. *Gurjun oil*:—The effects of this oil are not so good as those of the above, and its nauseous taste has come in the way of its extended use in this asylum. It was used for a short time only, and had to be discontinued as the patients refused to take it. A few who persisted for a time gave it up at last in disgust.

169. *Kowli Oil (Hydnocarpus Wightiana)*:—The late Dr. Bhow Daji of Bombay introduced this oil for the treatment of leprosy and it is said that he used it with great success in combination with other drugs. The oil was given an extended trial but without any appreciable results. Moreover for a long time, it was administered to all the inmates of the asylum, a small quantity being mixed with the cooked vegetables, and for some months the patients took it in this form but no improvement was specially noticed in any case.

170. *Salicylic Acid and its Compounds, Salicylate of Soda and Salol*:—Arning's treatment with salicylate of soda internally and salicylic acid dissolved in oleic acid (10 p.c.) externally is undoubtedly of use especially in anæsthetic leprosy. In many cases the discoloured patches of skin regain their colour, and anaesthesia also disappears, but the treatment is at the best but palliative. Moreover salicylic acid whether in the form of the soda salt or the phenol salt (salol) seems to exert a decided influence on the course of the disease. In all cases of leprotic fever accompanied by infiltration, swellings, and the appearance of fresh tubercles, these salts seem to possess the power of controlling and even in some cases, postponing, if not altogether aborting these periodic attacks. The soda salt is almost universally used in all such cases and with decided benefit. Salol was given an extended trial, and the results arrived at coincide entirely with those of Surg. Maj. H. D. Cook of the Madras Leper Asylum viz:—that salol cannot be regarded as a curative agent in the treatment of the affection. But at the same time it is a palliative and an extremely valuable one, and its use deserves still further trial. It is more efficacious than the soda salt in controlling the manifestations of the periodic exacerbations and in

* *Annales de Derm. et. Syphil.*—July 1899 :—*British Medical Journal*—Epitome :—November 11th 1899.

many cases its extended and free use (upto 45 grs. per day) has resulted in postponing them for long periods. In several cases where all other treatment seemed to have no effect on the course of the disease and where the attacks used to recur with a regular periodicity, the administration of salol has checked the frequency and even the intensity of such when they occurred after long periods, and in fact patients have learnt to put much faith in its action. But it has its limit of action and cannot be considered a specific in any sense.

171. *Unna's Treatment* :—The results obtained by this treatment which created such a sensation some years ago appear to have been no better than those obtained by simple vaseline and it cannot be denied that the advantages of the treatment have been greatly overrated. In fact, chaulmoogra oil and arsenic give better results than ichthyol, resorcin, chrysarobin, or pyrogalllic acid.

172. *Dr. Goldschmidt's Treatment with Europhen* :—Dr. Goldschmidt of Madeira has lately advocated the use of Europhen—an iodine compound manufactured by Bayer and Company of Elberfeld—which he has used hypodermically with some success. He is very enthusiastic on its efficacy as a curative agent and cites some cases in support. It was given a trial, as a 5 per cent application in oil, but so far as could be seen, it did not fulfil the hopes held out by him.

173. *Dr. Carreau's Treatment with Large Doses of Chlorate of Potash* :—This treatment was tried in over a dozen cases, but did not bear out the expectations raised. The salt was administered both in large single doses (100 to 120 grains) in the morning and also smaller divided doses during the day. Further trials have also given similar disappointing results.

174. *Aristol and Dermatol* :—Aristol solution in oil (5 per cent) was given an extended trial but without any marked results. Dermatol is a good healing powder and seems to act well in controlling the intactable diarrhoea of leprosy. Both these drugs cannot be said to have any specific effect.

175. Various other drugs have been recommended from time to time by different observers :—

1. Fleming* recommends Acid Carbolic, externally and internally. For internal use one to four minims several times a day, and for external application, a solution consisting of 8 parts of oil or glycerine to 1 of carbolic acid.
2. Prof. Liebrieoh of Berlin suggests Cantharidinate of Soda. *
3. Dr. Dominique Fornara † treats leprosy by subcutaneous injections of Airol, (a combination of bismuth, iodine and gallic acid) containing 1/10th per cent. of the drug with distilled water and olive oil. For external application he uses vaseline alb. 9 parts to airol 1 part.

* Indian Medical Gazette.

• British Medical Journal—December 5th 1896.

† Transactions of the Berlin Conference, 1897.

4. Dr. Radcliffe Crocker * is in favour of treating leprosy with intramuscular injections of Perchloride of mercury. He has treated five cases with subsequent marked improvement. The injections are made perpendicularly into the buttock once a week. The solution for the injections consists of 3 grains of the mercury salt, dissolved in half an ounce of water; the dose for each injection is $15\frac{1}{2}$ minims or 1 c. c. and the injections are made with a Pravaz syringe. One case received 60 injections, and another 45. None of the patients have suffered from salivation, even when a quarter grain of the sublimate was injected twice weekly, for many months. No depressing effects are apparent. The patients lose their apathy and become comparatively bright and cheerful. In the cases thus treated, hard nodules from a small to a large pea size appear in different parts of limbs, but unlike ordinary lepra nodules, they are hard to the touch, sometimes cutaneous, sometimes subcutaneous. They persist for a few days or weeks; at times for many months. They never number more than half a dozen; and are sometimes tender at first, but become painless later. It is not possible to say, how far the results may be permanent, and perhaps as in syphilis it may be necessary to resume treatment after intervals. This line of treatment deserves an extended trial at the Matunga Leper Asylum. †

Treatment of Leprosy with Antivenene.

176. Dr. Isadore Dyer of New Orleans related at the Berlin Conference his experiences with Calmette's antivenene in the treatment of leprosy. He said that there was a belief among the natives of South America and West Indies that the bite of a venomous snake would cure leprosy. || He was led to use antivenene in leprosy from Carreau's monograph, and he gives the results of the treatment of 5 cases :—

“The treatment employed was administered as follows :—

- I. Calmette's antivenene (cobra presumably) was used throughout, courteously supplied by the laboratory at Lille, through the New Orleans agents. The serum was an amber-colored liquid of the consistency of very thin syrup, somewhat sticky. It was dispensed in vials tightly sealed, each containing 10 c. c.
- II. The serum was given subcutaneously and dermatically by means of hypodermic syringes, the Pravaz antitoxin pattern being for the most part employed.
- III. The dose varied from 1 c. c. to 11 c. c.

* The *Lancet* :—August 8th 1896 and Transactions of the Berlin Conference, 1897.

† 5. Major Maitland relates (*Lancet* : Oct : 31st 1896) two cases that were benefited by the thyroid gland. Two glands were taken daily by one patient from June 3rd to September 15th; the glands were administered pounded raw with sugar and water. No symptoms of thyroidism were noted. Dr. Alvarez has seen good effects in the œdema of leprosy from the administration of thyroid extract, two and half grain-three times a day.

|| In India, the belief is that snakes do not bite lepers.

- IV. The injections were made every second day at first ; subsequently every day.
- V. For the most part the injections were made in the gluteal muscles and into the skin in this region. Injections were also made into the interscapular space. Exceptionally (see cases below) the injections were made into selected leprous lesions themselves.
- VI. During the period in which this treatment was employed, no local treatment whatsoever was allowed ; no restrictions upon diet were made.
- VII. No other medication was employed except during an interval of five days (twelve days in one case), while waiting for more serum. Then 1/60 of a grain of strychnin was given three times a day to each patient, in order to keep them under observation. Four of the five patients however, had taken strychnin over long periods previous to the serum injections.
- VIII. All observations were made under my personal supervision or direction, at the Eye, Ear, Nose and Throat Hospital at first, later at the Polyclinic, in New Orleans. Dr. Floyd Stewart, one of my clinical assistants, and Dr. H. J. Dupuy, of the Eye, Ear, Nose and Throat Hospital Staff, have aided me in the observation and detail of this work.
- IX. Sterilization of needles and syringes, with antisepsis of hands, was made a routine practice.

177. *Results* :—Below are reported in minute detail the observations upon each case at the time each injection was made. In my opinion, the results thus far justify the report before you, although the experiments have been crude, and are as yet but begun. Summarized the results are as follows :—

Case I.—Injections from May 29 to August 3, and from August 23 to August 29. The total number of injections, 42 ; the total amount of serum injected, $27\frac{1}{2}$ c. c. ; maximum injection, $7\frac{1}{2}$ c. c. ; minimum injection, 1 c. c.

Constitutional effects: cold sweats twice a day ; subsequently once a day, the only reaction. Improvement began after the fourth injection. The changes particularly noticed were in the disappearance of infiltration from the face, the resorption of tubercles on the face and of the ears, the restoration of the eyelids from the ectropion, and the return of a normal and natural expression.

Wherever local injections were made into individual lesions, the lesions disappeared.

Case II.—Injections proved of no benefit. The patient suffered pain at each injection, seemed to grow anæmic, lost weight so long as injections were continued. The treatment was for these reasons not systematically given. Injections were made from May 29 to August 3, and from August 23 to August 30. Total number of injections, 28 ; total amount injected 48 c. c. ; maximum injection, 5 c. c. ; minimum injection, $1\frac{1}{2}$ c. c.

Case III.—Total number of injections, 17 ; total amount injected, $38\frac{1}{2}$ c. c. ; maximum injection, 3 c. c. ; minimum injection, $1\frac{1}{2}$ c. c.

Injections made from June 28 to August 3, and from August 23 to August 29.

Improved steadily from fifth injection. No reaction from the treatment. Lesions have practically disappeared. Patient has regained the full use of forearm and hand, which were affected. Except for a faint rosiness where the lesions were, and occasional stiffness of two fingers there is no evidence of the original disease.

Case IV.—Patient had been under treatment previously nine months without improvement.

Injections were made from July 7 to August 3, and from August 23 to August 30.

Total number of injections, 18 ; total amount injected, $48\frac{1}{2}$ c. c. ; maximum injection, 5 c. c. ; minimum injection, 1 c. c.

The eruption occurring in characteristic macular patches afforded excellent opportunity for observation. The lesions have lost all of the original livid coloring ; they have broken in contour ; the borders being now quite irregular and fading rapidly from the edges. The macules are made up of greyish, irregular spots distributed over an area of skin healthy in color ; the infiltration in these patches has gone ; sensation, at first absent, has returned, so that the injections are painful. Patient has now sufficient use of hand to allow active work, formerly impracticable.

Case V.—Improved after the first injection. The eruption on the face particularly notable in improvement. Injections made from July 21 to August 3, and from August 23 to August 30. Total number of injections, 10 ; total amount injected, 52 c. c. ; Maximum injection, 11 c. c. ; minimum injection, 1 c. c.

This case had never had treatment of any sort before injections were begun.

178 *Comment.*—In four out of five of these cases treated, there has been marked improvement. In one, a practical disappearance of the lesions present and of other evidences. In only one case was there negative evidence ; in this one, the age and frailty of the patient must be considered.

It is my purpose to continue this experimentation thus satisfactorily begun. I propose using stronger and stronger serum until it shall be practicable to employ the venom itself, more or less attenuated. In conducting the experiments herein reported, difficulties existed which should be noted. In the first place, there was the difficulty of getting patients to report regularly. Owing to the state law compelling the isolation of lepers, although it is not enforced, such persons as are afflicted with this disease tend rather to avoid observation than to seek it. The leper home, the state institution for the detention of lepers, is at present more of an asylum than a hospital, and the opportunity of experimenting there was not at my command. More than this, the limited supply of serum compelled discrimination in the selection of cases, and in the administration of the remedy."

TREATMENT OF LEPROSY BY CHEMICAL LIGHT RAYS.

179. The recent application of Finsen's treatment of lupus with chemical light rays, suggests the possibility of experimenting with this method in leprosy. Although leprosy is a much more widely diffused affection than lupus, yet the treatment may be made applicable to recent cases, and also to such old cases, as show a specially localised virulence as on the face or extremities. Finsen has succeeded in proving by experiment that the chemical rays have bactericidal properties, that they produce inflammation of the skin, and that they penetrate through it. And as electric light or sun light may be utilised with equal results, it would not be difficult to make up locally a simple apparatus for use with the latter. The success that the treatment has met with in lupus both in England and on the Continent, promises some amelioration, if not absolute cure, in leprosy and it would be certainly advisable to make a few observations with such ample material at hand at the Matunga Leper Asylum.*

180. *Creolin* :—The external use of this preparation has been of great advantage and it has entirely superseded carbolic acid. There is no antiseptic which so well reduces the sickening smell of leprosy gangrene as creolin. Besides this, it heals indolent and callous ulcers by promoting healthy granulations, and when applied in full strength to ulcerating tubercles and exuberant granulations it acts as a caustic and promotes rapid healing. This is especially observed in the granulating stumps of fingers and toes. It is now the only antiseptic used in the asylum and is no doubt a valuable adjunct both for treating leprosy and for curing some of its cutaneous complications.

181. *Treatment by Native Drugs* :—The establishment of the asylum brought forward a number of native vaidas and hakims with their vaunted specifics for the cure of leprosy, and in deference to the wishes of several well-known and influential persons, lay and medical, interested in the subject, a prolonged trial was given to various kinds of native treatment, but with results entirely negative. In only a few cases did the patients show some slight improvement but not more than what was usually seen even *without treatment* under ordinary conditions in the asylum.

182. *Surgical Treatment* :—Minor surgery as a rule and major surgery in some cases, afford valuable help in the treatment of leprosy. The surgical measures of relief consist of incisions to relieve tension, and of abscesses and sinuses, amputations of fingers and toes, removal of diseased bones or cartilages &c. Major operations like amputations of limbs are required in cases of gangrene, but as most of these cases come into the hospital in the last stage, and when all hope of even temporary relief has passed, it has often been deemed advisable not to interfere with them.

THE SERUM TREATMENT OF LEPROSY.

183. The name of Dr. Juan de D. Carrasquilla of Bogota, Republic of Columbia, South America, has become associated with the serum treatment of leprosy. He has made several communications on the subject to various scientific bodies, and many observers related their experiences with this treatment at

* For fuller details, *vide*, British Medical Journal, September 30th, 1899.

the Berlin Conference. The method of the preparation of the serum, together with some observations made at the Robben Island Asylum, Cape of Good Hope, were placed before that body, by Drs. W. H. Atherstone and R. S. Black. Subsequent to Carrasquilla's communications, Drs. C. Lawrence Herman and Phineas S. Abraham, have made some investigations, the results of which were also placed before the Conference.

184. *The method of preparation of Carrasquilla's Serum* was as follows :—An actively leprous subject was bled, the blood allowed to cool and a clear serum was drawn off. The patients were selected for bleeding during the period of leprous exacerbations when the blood is supposed to contain great toxic properties. But Dr. Carrasquilla could not always obtain the patients in this condition and therefore he had to bleed some well marked cases. If the patient is severely affected, the serum appears to be cloudy or greenish coloured and has an unpleasant smell : if not, it is clear and can be easily preserved. The patients were bled to the extent of 250 c. c. and when the serum had separated from the clot, it was preserved with camphor in the usual way. This human serum was then injected into the horse, the animal receiving 3 injections at intervals of 10 days each. It was bled 10 days after the last injection, after which the process of injection was repeated as before. The quantity injected into the horse each time was 30 c. c., so that it received 90 c. c. of the human serum before each bleeding. After each bleeding the serum gets stronger, and if 20 c. c. was the dose administered to a patient after the first bleeding, only 5 c. c. would suffice after the later bleedings. This strong serum preserved with camphor is the anti-leprous Serum of Carrasquilla's.

185. *Carrasquilla's Results* :—He began by injecting 1 to 3 c. c. gradually increasing to 5 c. c., and injecting on every alternate day. He sums up the results as follows :—

1. Re-establishment of sensation.
2. Discolouration of blotches.
3. Disappearance of œdemas.
4. Disappearance of tubercles.
5. Healing of ulcerations.
6. Shrinking of face.
7. Cessation of the morbid process from the first injection.

These results were described by the author in the first report that he made in November 1895, from observations conducted on 15 patients, who had received 90 to 100 c. c. of the serum per month.

186. In his second report published in June 1896, with further observations on 100 cases, he reasserts in emphatic terms the benefit of the treatment, but does not report a single case as actually cured after nearly a year's treatment. He lays special stress on a febrile reaction occurring after the fifth or sixth injection accompanied by high fever, rigors, profuse perspiration and rapidity of the pulse. This crisis he asserts to be a necessary concomittant of the efficacious action of the serum.

187. In a third report dated 16th December 1896, Carrasquilla contents himself by stating that the treatment is highly beneficial, that it arrests the disease, and effectually relieves the patient, but he does not go so far as to say that a cure has been obtained though he had by this time treated 200 cases.

188. Drs. Atherstone and Black treated 2 cases with this serum, and 2 with that prepared by Dr. Herman, but are not able to make any definite statement from such limited observations. Dr. Alvarez* treated 14 cases with Carrasquilla's serum, and only 2 of whom improved. Dr. J. Ashburton Thomson* states in his report of Leprosy in New South Wales, that 2 cases were treated with it, and that it was not found to produce the least improvement, but on the contrary the disease continued to progress. He considers it inefficacious. These observations are too few to draw any conclusions from, and we shall have to await any definite conclusion on the value of Carrasquilla's serum until further and more extended observations have been published.

189. Drs. Atherstone and Black in concluding their remarks on Carrasquilla's serum drawn attention to the fact, that as leprosy is an extremely protracted disease, the toxins produced by the lepra-bacilli, which exist in such great abundance, must be extremely weak, otherwise the disease would be rapid and fatal, and that therefore the antitoxin method of treatment even if successful would require a very protracted course of treatment. Moreover fallacies are apt to occur in the deductions, as the cases often tend to improvement and arrest by themselves or by purely hygienic means. Still experiments should be allowed to go on for a year or 18 months before a definite opinion could be expressed. In their two reports dated May and September 1897 respectively, they do not record any definite success. They suggest that as frequent injections make the skin tender, and abscesses form, it would be better to dry and solidify the serum, and administer it by the mouth especially as the treatment is likely to be a protracted one. Carrasquilla has thought of this, and is making some experiments in this direction.

190. *Herman's Serum* :—Lawrence Herman has prepared a new serum, the methods of preparation and observation with which have been published in the Transactions of the Berlin Conference :—

“The laboratory experiments and the preparation of the serum in connection with this enquiry have been conducted by Dr. Herman in Dr. Klein's laboratory. Dr. Abraham is responsible for the clinical part of the enquiry, as regards the patients in London.

We have to thank Dr. Klein, who kindly accorded every encouragement and assistance, and aided by his valuable advice at almost every stage.

Remembering the richness of the nodules in bacillary bodies in an almost pure cultivation, it seemed that they would yield the most likely substance to produce a serum, active in germicidal and immunising properties. The most feasible method of preparation seemed to be, therefore either to excise a leprous nodule and to make an emulsion of it, or to obtain exudation from nodule by pressure ; and in either case to employ this material for the purpose of inoculating an animal.

* Transaction of the Berlin Conference, 1897.

† The *Lancet* :—February 17th 1900.

One of us (Dr. Herman) had already communicated with Dr. Carrasquilla, of Bogota, and Professor Kitasato, of Tokio, who we knew were engaged in a similar direction. Courteous replies were received from these gentlemen. Professor Kitasato was not prepared to make any statement as to his investigation. Dr. Carrasquilla forwarded his memoir, descriptive of the method employed by him to make his serum, and recorded the favourable results obtained by its use. He also, with great courtesy and kindness, sent a small quantity of the serum prepared by him.

It is right to say that these experiments were in progress some three months before learning the details of Dr. Carrasquilla's method, which indeed differs widely from that recorded in this paper.

191. A suitable patient having been chosen, a nodule, free from suppuration, was carefully disinfected with lysol, then washed, first with alcohol and finally with sterilized water. The nodule was then clamped and incised freely, and the clamp slowly tightened to force out as much fluid as possible.

The clamp used was devised by one of us (Dr. Abraham). It has blades horizontally flattened, and curved on the flat, with a curved indentation on the inner edge of each blade. The blades are brought together and kept fixed by a screw near the proximal or hinge end of the instrument.

The exsudation was sucked up into small capillary pipettes. When a sufficient amount had been collected in the pipette so that it was half full, a small quantity of sterilized normal salt solution was sucked up. This gives the exsudation more fluidity, and renders it more easy to expel the material when required for use. The ends of the pipette were carefully sealed in the flame, care being taken to avoid applying heat to the liquid. The pipette was then put away in sterilized cotton wool.

In this way, from twelve to twenty pipettes were filled from the patient at each sitting, the number depending much on his good-will and endurance. The incisions rapidly healed and never caused any trouble or inconvenience.

It is interesting to note here that we invariably found that the operation had a beneficial effect, the nodules subsequently shrinking and disappearing.

As a rule, it was necessary to keep the pipettes for at least twenty-four hours before it was possible to use them; on two occasions it was necessary to keep them for a week or ten days; but generally the inoculation of the horse was made, with material in as fresh a state as possible.

192. The horse, which was selected as the most convenient animal to use for the purpose, received a preliminary injection of 1 c. c. of Mallein, and, as no reaction ensued, the first inoculation with leprous material, was made on August 12th 1896.

The pipette was emptied into a sterilized small glass vessel, the fluid mixed with a fresh quantity of sterilized salt solution, and injected, with antiseptic precautions, under the skin at the root of the neck at a part which had been previously shaved and disinfected.

The injections were repeated in increasing quantities every week or fortnight, whenever material was available. During four and a half months the horse received altogether ten injections, the last two consisting of the fluid contained in twenty-four and twenty-five pipettes respectively.

At the end of the tenth injection no further material was obtainable, in consequence of an intercurrent illness of the patient, and the inoculations of the horse had to be abandoned for the time.

The following table shows the date of inoculation :

1896 August	8	= 1 c. c. Mallein.
" "	12	= Leprosy exsudation injected.
" "	19	"
" "	25	"
" Sept.	8	"
" "	15	"
" "	25	"
" Oct.	13	"
" "	29	"
" Nov.	10	"
" Dec.	24	"

The inoculations were not followed by any very noteworthy reaction, and the general health of the animal did not suffer. He fed well and remained in good condition, while there was hardly any febrile disturbance. His daily temperature fluctuated between 99° 9 and 100° F., and never rose beyond 101° 1 F., which it did only on one occasion, namely, after the first inoculation.

The injection was followed by a small and painful swelling, which, after the first day, was warm to the touch, and slowly disappeared in two or three days.

On one occasion only, when some fifteen pipettes of exsudation were injected did any considerable swelling and œdema result; this lasted some six days and then gradually disappeared.

On the 8th of December, four weeks after the ninth inoculation, the horse was bled from the Jugular vein, and two litres of blood drawn off.

The serum was allowed to separate in the usual way, filtered through a Chamberland filter, and decanted into sterilized 10 c. c. bottles, into which a small crystal of thymol was placed.

On the 17th February of this year the bleeding was repeated and two litres of blood again taken. This was treated in the same way.

The serum having been in each case tried on Guinea-pigs in 1 c. c. injections, and found to produce no reaction or untoward symptom, observations were commenced on patients suffering from the disease, and a portion sent to the Robben Island Infirmary, Cape of Good Hope.

193. Before drawing any deductions as to the use of this serum, it is only right to say, that it was prepared, after a comparatively small number of inoculations had taken place, as a sample, to observe its effect on some patients under observation. The inability to procure a larger quantity of leprous material for inoculation prevented the development of the investigation.

The above experiments are obviously, therefore, incomplete, and we shall not attempt to base upon them any final conclusions as to the value of serum-therapy in leprosy.

We know quite well that patients suffering from that disease sometimes lose for a time, one or more of its manifestations, and that they often express themselves as "feeling better," especially after trying some new remedy.

But, making due allowance for this, one of the Robben Island cases, nevertheless, shows that this man, profoundly affected, not able to leave his bed, and suffering from wrist-drop, was so much improved after treatment that he was able to get up, his wrist-drop disappeared, and improvement of his tactile sensibility set in.

While, of the London cases, both suffering from nodular leprosy—one very advanced, the least that can be said is that they are no worse after than before treatment; one patient is perhaps in some respects better.

The local and general reactions which followed the injections of the serum were well marked, as shown by swelling and pain at the site of injection, followed by swelling and heat of the face and skin. That the treatment produced no more marked effect on the nodular cases is perhaps not to be wondered at, as nodular leprosy is undoubtedly a more severe form of the disease; more energetic and continuous treatment would perhaps be therefore required.

194. Still, on the whole, we do not feel discouraged, and we may hope that a more extended trial of this method of treatment will give better results; especially where it is possible to obtain larger quantities of material for preparing a more active serum, on the lines indicated in this paper.

We have felt justified, however, in making these experiments, even though they might prove to be futile, inasmuch as the disease of leprosy is still practically incurable by any therapeutic means at present known to medicine. We believed that an attempt at the preparation of a leprous antitoxin was desirable, and we beg to submit, at any rate, that such a substance is more likely to be preparable on some such lines as we have adopted. Our results so far are now brought forward as a possible help to other observers who may have the opportunity or desire of experimenting in the same direction, and who may perhaps be able to improve upon our methods."

195. The above represents the facts known about the application of serum treatment to leprosy till the end of 1897. No newer observations have been available since then. Of the two methods, Carrasquilla's and Herman's, the latter appears to be promising of better results as the substance injected into the horse, consists of matter derived from fresh and active tubercles. And knowing as we do, the protracted nature of leprosy, it is but reasonable to assume that the toxins dissolved in the serum of a leper, could hardly be so very potent as to produce sufficient reaction in the animal injected, as fresh juice from tubercles would. Both the serums however deserve further and extended trials.

GENERAL AND SANITARY TREATMENT OF LEPROSY.

196. From his investigations in China, Cantlie believes that leper patients, if looked after and fairly well fed, improve without medicine or special treatment of every kind. Ten cent's worth of food daily will do more for a leper than

medicines, although iron and cod liver oil help materially. That good food and clothing will not only prolong a leper's life, but apparently stay the advance of the disease is abundantly proved, and the same has been observed in the majority of patients at the Matunga Leper Asylum, where under regular regime, and generally sanitary measures, the patients improve wonderfully.*

197. Dr. Horder, who is quoted by Cantlie insists that a leper should remain in his hospital at least six weeks every year. The patient is confined to bed, provided with good food, and iron and cod liver oil. He gains in weight, the ulcers heal, cough and fever, if any, disappear, and he returns to his native place much improved. In this way, he says, he can alleviate almost all symptoms. He holds that no disease is more amenable to simple hygienic rules than leprosy and Cantlie agrees with this. The experience of the Matunga Leper Asylum fully bears this out, and patients often resort to it for short periods to get relief for their most distressing symptoms, and improve marvellously under good food, tonics, and simple hygienic conditions.

CONCLUSIONS AND SUGGESTIONS FOR TREATMENT.

198. In concluding this section on the treatment of leprosy, the writer regrets that owing to the conditions under which the Matunga Leper Asylum was conducted—as an *Asylum*, and not as an *Hospital*, he could not devote any time to pathological or bacteriological work, both on account of want of time, and pressure of other duties, and the absence of necessary means and appliances. He had therefore to confine himself to such clinical and therapeutical observations, as he could do under the peculiar circumstances narrated in the opening paras of this section, and which he has embodied in this report. And as no post-mortem examination was allowed, the difficulties were all the greater. Just at the time, that the newer methods of treatment described in the last few sections, were announced, the claims of plague had become so paramount, that leprosy had to be ignored for the time being, and ultimately as plague work led to the severance of his connection with the institution, he had no opportunity to test the newer methods of treatment. It is to be hoped however that with increased facilities his successor would initiate the observations, and amongst the various methods of treatment, he would suggest that the four following should have an extended trial :—

1. Radcliffe Crocker's Treatment.
2. Treatment with Anti-venene.
3. Treatment by Chemical Rays of Light.
4. Serum Treatment.

The first and the second could be easily undertaken, as they require no special apparatus : the appliances for the third could be made locally and sun light is always available. As regards the fourth, there is no reason why some serum should not be made also locally, as there is now a well-equipped Municipal Laboratory with a complete scientific staff and the funds of the asylum can well bear the expense of a couple of horses for experimental purposes.

* Cantlie mentions a curious custom prevalent in China, called "selling off" leprosy by sexual intercourse. A healthy wife co-habits with a leper husband and in order that she may not develop leprosy, she co-habits with another healthy man, with a view to impart to him the infection, she may have received from her diseased husband. And so sexual intercourse is considered to be a medium of preventing leprosy infection. This practice is very common in Canton.

XXX. The Indian Leprosy Commission.

ITS CONCLUSIONS.

199. As the result of its investigations on leprosy in India, the Leprosy Commission formulated the following conclusions* :—

1. Leprosy is a disease *sui generis*: it is not a form of syphilis, or tuberculosis, but has striking ætiological analogies with the latter.
2. Leprosy is not diffused by hereditary transmission, and for this reason, and the established amount of sterility among lepers, the disease has a natural tendency to die out.†
3. Though in a scientific classification of diseases, leprosy must be regarded as contagious, and also inoculable, yet the extent to which it is propagated by these means is exceedingly small.¶
4. Leprosy is not directly originated by the use of any particular article of food; nor by any climatic or telluric conditions, nor by insanitary surroundings, neither does it peculiarly effect any race or caste.
5. Leprosy is indirectly influenced by insanitary surroundings, such as poverty, bad food, or deficient drainage or ventilation, for these by causing a predisposition increase the susceptibility of the individual to the disease.**
6. Leprosy in the great majority of cases originates *de novo*, that is from a sequence or concurrence of causes and conditions dealt with in the report, and which are related to each other; in ways at present imperfectly known.‡

PRACTICAL SUGGESTIONS.

200. The following were the practical suggestions recommended by the Commission :—

1. Segregation:—Voluntary or Compulsory. Complete compulsory segregation is absolutely impracticable in India. They considered it impossible to advise compulsory partial isolation. They advocate voluntary isolation as the only adequate measure coupled with permission to marry among lepers.
2. Sale of articles of food and drink by lepers should be prohibited: they should be prevented from practising prostitution, and from following such occupations as those of barber and washerman, which concern the food, drink, and clothing of the people generally, quite apart from the dread of a possible infection.

* Hansen took strong objections to the conclusions of the Indian Leprosy Commission, and an able critique from his pen appeared in the *Lancet* of October 28th 1893.

† Hansen considers this as a rather rash conclusion.

¶ Hansen says that the Commissioners were unable to trace the probably hidden and insidious ways by which the contagion is spread.

** Hansen thinks that predisposition has not been proved. "This is merely transforming ignorance into assumption." Any human being can become leprosy or tuberculous provided living bacilli are introduced in a favourable manner and on a suitable place.

‡ Hansen does not consider this straightforward: he says the Commissioners ought to have said that it is not known how leprosy is spread.

3. Municipal authorities should be empowered to frame by-laws preventing vagrants suffering from loathsome diseases from begging in or frequenting places of public resort or using public conveyances.
4. The existing asylums near large towns should be enlarged: new should be built where they do not exist and authorities should have power of ordering lepers infringing the regulations either to return to their houses, or to enter an asylum.
5. The Commissioners would in no case suggest an Imperial Act specially directed against lepers as such, as they are far less dangerous to a community than insane or syphilitic people.
6. By-laws in large towns would encourage emigration of lepers into the country, where experimental leper colonies or farms may be started in several districts.
7. Children born of leper parents on these farms should be removed to orphanages.
8. The Commissioners believe that neither compulsory, nor voluntary segregation would at present effectually stamp out the disease, or even markedly diminish the leper population, under the existing conditions of life in India. It can only be hoped that by means of improved sanitation, and good dietetic conditions a diminution of leprosy will result. The Commission agree with most authorities that the decline of leprosy in Europe has been due principally to improved hygienic habits and surroundings and increased material prosperity.

**THE RESOLUTION OF THE GOVERNMENT OF INDIA ON THE REPORT
OF THE INDIAN LEPROSY COMMISSION.**

201. The following Resolution was issued by the Government of India on the report of the Indian Leprosy Commission in April 1895 :—

The question whether it would not be possible for the State to take a more direct part in the prevention or treatment of leprosy in India, has been for some years under the consideration of the Government of India. In the Resolution dated the 26th September 1888, the Governor-General in Council observed that so far as has been ascertained at the census of 1881, there were 131,618 lepers in British India, that these figures did not in all probability afford a true measure of the disease, and that about 1 per cent only of lepers actually known to exist came under organised relief in institutions maintained by charity or assisted by Government. It was stated that the great majority of lepers preferred to be the objects of local charity, and appeared to disapprove of the small amount of restraint to which they were liable in institutions maintained for their treatment. The Governor-General in Council was of opinion that the absolute segregation of the sexes and the confinement for life of all affected by leprosy, which his Excellency in Council was then assured was the only effectual measure for stamping out the disease, would not only be repugnant to public opinion, but would be impracticable in India. After a careful consideration of the subject the Governor-General in Council came to the conclusion that, for the time at all

events, the State could not attempt more than the encouragement of the grant of medical and charitable relief to lepers in voluntary hospitals and leper asylums. His Excellency in Council expressed the opinion that in such institutions the necessity of strictly segregating the sexes should invariably be kept in view, and desired that this condition should be enforced in the case of every institution for the relief of lepers receiving aid from public funds, and that every effort should be made to induce the supporters of institutions of the kind maintained by voluntary contributions to adopt a similar rule.

2.—Subsequently, upon a further examination of the question, the Governor-General in Council considered that some additional measures might be taken with the object of promoting the establishment of asylums or retreats for lepers, and giving legislative sanction to the retention of lepers in such retreats. His Excellency in Council accordingly directed the preparation of a Bill providing for the detention of lepers at their own request in accordance with the voluntary system adopted in regard to habitual drunkards by the Statute 42 and 43 Vict., Cap. 19 and authorising magistrates to arrest and commit to retreats persons proved to be lepers who might be found asking for alms or wandering about without any employment or visible means of subsistence. The Bill contained a provision requiring the segregation of the sexes at retreats, and protecting a leper from being sent against his will to a retreat where attendance at any religious observance or at any instruction in religious subjects was obligatory upon the inmates. In inviting the views of the local authorities upon the provisions of the Bill on the 15th June 1889, the Government of India requested the local Governments and Administrations to state, whether, in the opinion of persons qualified to judge, leprosy was on the increase or not.

3.—The replies showed that very great uncertainty existed as to the cause and character of the disease of leprosy, and the opinions of those consulted differed very much upon these points. The opinion was expressed, by many of the highest medical authorities consulted, that the disease is not contagious except by inoculation, and that the part played by inoculation in determining its spread, is very small. It then became a matter for the consideration of the Government of India whether it would not be desirable to introduce the Bill in an amended form, on the one hand limiting its application to persons suffering from the disease in an advanced and specially dangerous stage, and, on the other hand, extending the power of arrest and compulsory detention, so as to cover all such dangerous lepers who might after warning persist in coming out and mixing with the public. The conclusion at which the Government of India then arrived was that there was no safe basis even for an enactment of this restricted description. At the time the English National Leprosy Fund, formed under the presidency of His Royal Highness the Prince of Wales for the purpose of perpetuating the memory of Father Damien, who died of leprosy contracted during his work among the lepers of Hawaii, contemplated the appointment of a Leprosy Commission to visit India, and the Government of India, after communicating their views to Her Majesty's Secretary of State for India, decided to await the recommendations of the Commission.

4.—The Commission, which consisted of five gentlemen of the medical profession, three (Beaven N. Rake, Esq., M.D., L.R.C.P., M.R.C.S., Geo. A. Buckmaster, Esq., M.D., A. A. Kanthack, Esq., M.D., M.R.C.P., F.R.C.S.) selected in England by

the National Leprosy Fund in conjunction with the Councils of the Royal College of Physicians and the Royal College of Surgeons, London, and two (Surgeon-Major A. Barclay, M.B., Surgeon-Major S. J. Thompson, D.R.H.) Officers of the Indian Medical Service—deputed by the Government of India, commenced its investigations in the winter of 1890-91. The Commissioners unanimously reported their opinion that:—(1) leprosy is a disease *sui generis*; it is not a form of syphilis or tuberculosis, but has striking ætiological analogies with the latter; (2) leprosy is not diffused by hereditary transmission, and for this reason, as well as because of the large extent of sterility among lepers, the disease has a natural tendency to die out; (3) though in a scientific classification of diseases leprosy must be regarded as contagious and also inoculable, yet the extent to which it is propagated by these means is exceedingly small; (4) leprosy is not directly originated by the use of any particular article of food, nor by any climatic or telluric conditions nor by insanitary surroundings, neither does it peculiarly affect any race or caste; leprosy is indirectly influenced by insanitary surroundings, such as poverty, bad food, or deficient drainage or ventilation, for these by causing a predisposition, increase the susceptibility of the individual to the disease; and (6) leprosy in the great majority of cases originates *de novo*, that is, from sequence or concurrence of causes and conditions, dealt with in the Report, which are related to each other in ways at present imperfectly known.

5.—The Commissioners observed that “the presence of a leper in a healthy community is a source of danger no greater than the presence of an individual suffering from tuberculosis. Both diseases are contagious in an equal and minimal degree. The amount of ulceration which exists in both diseases is to some extent a measure of the danger of contagion.” They held that their conclusions as to the nature of the disease did not justify any recommendation for absolute segregation, and for the same reasons they found it impossible to advise compulsory partial isolation. They advocated the adoption of a voluntary isolation as extensive as local circumstances would allow, and suggested that, if marriages among lepers were permitted, this plan might be more easily carried out. They stated that they would in no case suggest an Imperial Act, especially directed against lepers as such, for the reason that they considered lepers to be far less dangerous to a community than insane or syphilitic people.

6.—The Commissioners made the following recommendations for the regulation of leprosy and lepers in India, which they considered could be effected by means of Municipal bye-laws:—(a) that the sale of articles of food and drink by lepers should be prohibited; and that they should be prevented from practising prostitution, and from following such occupations as those of barber and washerman, which concerns the food, drink and clothing of the people generally, quite apart from the dread of a possible infection; (b) that the best policy in dealing with the concentration of lepers in towns and cities is to discourage it, and that to this end the Municipal authorities should be empowered to pass bye-laws preventing vagrants suffering from leprosy from begging in or frequenting places of public resort, or using public conveyances; (c) that asylums should be built near towns where they do not already exist, and that the authorities should have the power of ordering lepers infringing the Municipal regulations either to return to their homes or to enter an asylum and (d) that competent medical authority should always be consulted before action is taken under such bye-laws.

- 7.—The report of the Commission was considered by a Special Committee consisting of two members, the Hon. Geo. N. Curzon, M.P., then Under-Secretary of State for India, (Chairman), Edward Clifford, Esq., nominated by the Executive Committee of the National Leprosy Fund, two Members (Sir Dyce Duckworth, M.D., L.L.D., G. A. Heron, Esq., M.D., F.R.C.P.) nominated by the Royal College of Physicians and two members (Jonathan Hutchinson, Esq., L.L.D., F.R.S., N. C. Macnamara, Esq., F.R.S.) nominated by the Royal College of Surgeons. It was also considered at the same time by the members (Baron Ferdinand de Rothschild, M.P., (Chairman), the Bishop of London, the late Sir Andrew Clark, Bart, F.R.S., President, Royal College of Physicians; Sir James Paget, Bart, F.R.S.; Sir Joseph Fayrer, K.C.S.I., M.D.; Sir W. Guyer Hunter, K.C.M.G., M.D., M.P.; Sir Algernon Brothwick, Bart, M.P.; Sir Edward Lawson, Bart.; Sir Somers Vane, F.R.S., C.S.S.) of the Executive Committee of the National Leprosy Fund. As the result of this consideration a memorandum was prepared by the members of these two Committees accepting the conclusions of the Commissioners except—(3) that the extent to which leprosy is propagated by contagion and inoculation is exceedingly small; and (6) that leprosy in the majority of cases originates *de novo*, that is, from a sequence of concurrence of causes and conditions dealt with in the report, and which are related to each other in ways, at present, imperfectly known. These Committees declared themselves unable to accept the view that segregation in any case of leprosy in India is either impracticable or undesirable, and stated that they would be sorry if the Government of India were encouraged by the report of the Commissioners to refrain from taking the necessary steps in the direction of such segregation of lepers as might be found possible. They stated that their opinions on segregation were in accord with those of Dr. Vandyke Carter, *viz.*, that it should be effected—(i) by erecting plain asylums at certain centres, each of which would be a refuge common to several districts, and a place of detention, under due management and supervision; (ii) by founding leper colonies, or village communities, mainly of the affected, who, while allowed more liberty of movement, should yet be prevented from mingling with the peasantry around; (iii) by requiring the strict isolation in suitable separate lodgment of leprosy subjects retained in their homes at the express wish of friends; and (iv) by giving legislative authority to take up the vagrant sick, to remove the sorely diseased who are insufficiently guarded at home, and at times to enforce continued isolation of the infected until medical sanction of liberty be granted.

While reserving these opinions the Committee gave a general approval to the recommendations of the Commissioners enumerated above in paragraph 6, though they did not concur in the opinion that Municipalities would be necessarily or universally the best means of effecting the object of providing for the regulation of lepers and leprosy in India. They wished to go much further than the Commissioners in controlling the action of lepers, and urged that Government of India should take the necessary steps in the direction of such segregation of lepers as might be found possible. The late Sir Andrew Clark, Sir W. Guyer Hunter, Sir James Paget, Sir Joseph Fayrer and Mr. Jonathan Hutchinson dissented from the opinion expressed in the body of the report of the Special Committee on the subject of the contagion of leprosy, believing that the evidence of the spread of leprosy by contagion, is not sufficient to justify the compulsory segregation of lepers and that there is no adequate reason for prohibiting the marriage of the lepers. Sir Dyce Duckworth also expressed a somewhat similar opinion.

The Surgeon-General with the Government of India has also stated his concurrence with the finding of the Commissioners upon the issue whether leprosy is contagious or not, and this view has found favour generally among the authorities in this country. The Governor-General in Council, while regarding with every respect the opinion of the eminent gentlemen upon the Special Committee and the Executive Committee of the National Leprosy Fund who dissented from the finding of the Leprosy Commissioners regarding the contagious character of the disease, is constrained to accept the conclusion of the Commissioners upon this matter, fortified as it is by the views of the distinguished medical authorities just cited, and by the general opinion of those in India who are qualified to pass judgment on it. His Excellency in Council accordingly feels assured that the extent to which the disease is propagated in India by contagion is small, and holding this opinion is unable to approve of the compulsory segregation, either absolute or partial, of lepers except under the special circumstances which are detailed *infra* in paragraph 10.

8.—The local Governments and Administrations were requested to offer their opinion for giving practical effect to the recommendations of the Commissioners. There is complete unanimity of opinion in favour of the first recommendation that lepers should be prohibited from engaging in certain trades. This recommendation cannot, indeed be directly justified on the conclusion of the Commissioners regarding the question of the contagiousness of leprosy, but it appears to the Government of India that, as the Lieutenant-Governor of the Punjab observes “It is amply justified on the ground that there is a certain danger in allowing lepers with running sores to engage in those trades, and the people of the country, and, indeed, it may be said, of any other country, would be struck with dismay if they discovered that the articles they used or consumed had been handled by such lepers.” There is, in fact, the Government of India are advised, danger of septic poisoning from any such running sore or ulcer.

The question arises whether the prohibition in respect of the trades in question should be confined to Municipalities or made of general application. The majority of the Local Governments and Administrations would, for the present at least, proscribe lepers from engaging in trades only in Municipal areas, upon the broad ground that the enforcement of the prohibition would be impracticable in agricultural villages, and that the members of village communities, who are fully cognizant of the most trifling details connected with the every-day life of their fellow-residents in a village, are well able to protect themselves. The object is to protect the public from dealing unwittingly with leper tradesmen, and the Governor-General in Council thinks that this can be adequately secured if the prohibition is confined to Municipalities and to the larger fairs and religious and other gatherings which are held outside the limits of towns. His Excellency in Council has, therefore, decided that, for the present at all events, the prohibition should not apply except to lepers in and near Municipalities and at the large fairs and similar gatherings. As the Government of India abstain strictly from regulating prostitution no bye-law or Act dealing with the prohibition against lepers following certain trades or callings should extend to that of prostitution by leper women.

In the opinion of the Governor-General in Council the question of amending the Municipal Acts in the Provinces where they are at present deficient in this respect should be taken into consideration. In connection with this point it

appears to his Excellency in Council that section 55 of Act XV of 1883, in the North Western Provinces and Oudh cannot, as urged by the Lieutenant-Governor of the North-Western Provinces and Chief Commissioner of Oudh, be held to refer to this matter, and that section 85 of Act XVIII of 1889, in the Central Provinces, which the Chief Commissioner of the Central Provinces considers would enable Municipal Commissioners to prohibit, as a public nuisance, lepers from publicly exposing their sores or from engaging in trade, does not provide for it with sufficient precision.

9.—The second recommendation of the Commissioners was directed against the prevalent custom of mendicant lepers to leave their homes and crowd into the large centres of population. The Commissioners held that vagrant and indigent lepers scattered about the country are not a source of serious danger, and their proposal that Municipal authorities should be empowered by bye-laws to prevent vagrants afflicted with leprosy from begging in or frequenting places of public resort or using public conveyances in towns and cities was dictated by the expectation that the effect of such bye-laws in large towns would be an emigration into the surrounding country, and a furtherance of the scheme for establishing experimental leper colonies or farms in the rural districts. With the exception of the Government of Madras and the Chief Commissioner of Assam, the local Governments and Administrations are generally in favour of sending to and retaining in asylums vagrant pauper lepers who congregate in towns. It has been forcibly urged to the Government of India that this question, as well as that of prohibiting lepers from engaging in certain trades, has an administrative as well as a medical aspect, and that action such as the Commissioners proposed is justified by the loathsomeness of the disease, by the circumstance that those suffering from it very commonly obtrude their sores upon the public with a view to forcing people to give them money, and by the fact that people in India are commonly struck with horror at the approach of a leper, and are apt to yield to his importunity, in order to induce him to move on. In deference to the sentiments of the community generally, the Government of India agree that steps should be taken to prevent mendicant lepers from obtruding their deformities on the public gaze in towns and cities. The experience gained in Bombay since the establishment of the Leper Asylum at Matoonga shows that regulations having this object may, if intelligently and energetically carried out, be expected to be productive of great benefit to the leper community as well as to the general public.

The Commissioners recommended that the authorities in towns should be empowered to order a leper infringing the regulations either to return to his home or to enter an asylum. This recommendation is generally accepted except, by the Government of Madras, which would limit the power of enforcing obedience to the bye-laws to the actual expulsion of lepers from towns and cities, and by the Chief Commissioner of Assam on the ground that he is not prepared to recommend compulsory detention in asylums. The view which approves itself to the Government of India and to the majority of the local Governments and Administrations, is that vagrant lepers in Municipalities should be dealt with in much the same way as vagrant lunatics are dealt with under the provisions of Act XXXVI of 1858, *viz.*, that such persons should be brought before a medical officer and a magistrate and sent to an asylum by an order of the latter if found to be suffering from the disease and without relatives who can properly care for and treat them.

The Governor-General in Council considers that, for the present at all events, it will be sufficient to take power to deal with vagrant lepers in this manner in Municipalities and their immediate neighbourhood.

10.—The Commissioners recommended that leper asylums should be built near towns where they do not already exist, and the memorandum of the Surgeon-General with the Government of India, circulated with Home Department letter of the 15th of September, 1893, contained detailed suggestions for the establishment and location of additional asylums throughout the country. The Surgeon-General was of opinion that requirements would be met if on an average one asylum was provided to each revenue division. A suggestion of the Commissioners, intended to be ancillary in the rural districts to the establishment of asylums in the immediate neighbourhood of towns was that leper farms in rural tracts where lepers with their wives and families could cultivate the soil, might be productive of practical good. They considered that comparatively few children would be born, and proposed that they should, if possible, be removed to orphanages from which they would be discharged as soon as they could support themselves.

This part of the subject appears to the Government of India to need further consideration by the local Governments and Administrations. The Governor-General in Council considers that in each division or some convenient area an asylum, or an asylum and a farm, should be maintained so as to accommodate the lepers who may be found vagrant in the Municipalities in the division or area, and his Excellency in Council is of opinion that the additional expense which may be necessary for the purpose should be met jointly by the Municipalities and District and Local Boards of the division or area. The Government of India will be glad if the Local Governments and Administrations will take the matter into their consideration at an early date, in order to determine to what extent additional accommodation will be required, how the cost of providing and maintaining such accommodation should be divided among the local bodies and whether any amendment of the law relating to Municipalities and District and Boards is necessary for the establishment of such asylums and farms outside the limits of Municipalities and for the proposed division of the cost. The Government of India are inclined to think that it may not be necessary to legislate, as was proposed in clause 4 of the Bill circulated in 1889, for the voluntary admission of lepers in asylums, but they would have no objection to the adoption of such a provision in any Province in which the Local Government or Administration thinks it would be useful.

11.—The fourth recommendation of the Commissioners was that competent medical authority should always be consulted before action in regard to lepers is taken. With this view the Government of India entirely agrees. But the Commissioners did not suggest a definition of the terms "leper" and "leprosy" which could be adopted for the purpose of the provisions to be made in the different laws and bye-laws. In the opinion of the Government of India the terms should for this purpose be defined, as in the Bill at present before the Legislative Council of the Lieutenant-Governor of Bengal, which is alluded to in the preamble of this Resolution, so as only to include cases in which ulceration has actually commenced. The Governor-General in Council considers that the public interests do not require that action should be taken against persons attacked with the disease

who have not reached that stage. In any case in which it is proposed to enforce the bye-laws against a person who appears to be affected with ulcerous sores, a preliminary to such action will be that he should be examined by a competent medical authority.

12.—The enquiry mentioned in paragraph 2 of this Resolution which was instituted into the question whether the disease of leprosy is on the increase or not in this country, was taken up by the Leprosy Commissioners. At the time when the report was issued the returns for the census of 1891 had not been fully revised, but they were sufficiently complete to enable the Commissioners to make an elaborate examination of the statistics given in the last three censuses taken in India regarding the distribution of lepers in the country. The conclusion at which they arrived was that the alarm about the increase of leprosy in British India is altogether groundless; that the figures available, though unfortunately consisting of only three sets, pointed strongly to a decrease in the number of these unfortunate people, and in any case to the disease not being on the increase; that the number of lepers had been greatly overstated, 110,000 being perhaps nearest the truth, and that leprosy could therefore not be regarded in the light of a general danger. The final statistics of the Census Commissioner for India showed the number of persons described as lepers at the census of 1891 to be 112,636, of whom 31,069 were females. Mr. Baines thought it possible that a good deal of the decrease in the numbers of lepers returned in 1891 from tracts in which they were formerly remarkably high, might be nominal, and due to greater accuracy of diagnosis, and the Governor-General in Council is inclined to agree with him that it is impossible to say for certain whether the disease of leprosy in this country is on the whole stationary or not. His Excellency in Council, however, sees no reason to dissent from the general conclusion of the Commissioners that leprosy does not prevail in India to such an extent as to constitute a general or universal danger, and that the means by which we must look forward to secure its diminution are improved sanitation and better dietetic conditions.

13.—The legislation which is required to carry out the decision of the Government of India in paragraphs 8, 9 and 10 of this Resolution will be effected in local Legislative Councils in the Provinces where they exist and for other Provinces by the Governor-General in Council. The Bill cited in the preamble has already been introduced in the Council of the Lieutenant-Governor of Bengal, and the Governments of Madras, Bombay and the North-Western Provinces and Oudh should now proceed to legislate, either by means of a separate Bill or by such amendment of the Municipal law as is necessary to bring it into accord with the principles which have been accepted by the Government of India. The Governor-General in Council will be glad to receive in due course from the Lieutenant-Governor of the Punjab and the Local Administrations proposals for effecting the changes in the law which will be required in the Provinces administered by them.

14.—The Governor-General in Council cannot conclude this Resolution without placing on record his appreciation of the able and exhaustive manner in which the Leprosy Commissioners conducted their enquiry. Two of them, the Governor-General in Council regrets passed away before His Excellency in Council had had an opportunity of publicly acknowledging their labours. Surgeon-

Major Barclay died at Simla of typhoid fever while the Commissioners were still engaged in their investigations, and Dr. Beaven Rake at Trinidad in August, 1894. Finally, the Government of India desire to express on behalf of the Empire their thanks to the Committee of the National Leprosy Fund for devoting a portion of the subscriptions raised in memory of the late Father Damien to the investigation of the disease of leprosy throughout India."

STATE INTERVENTION FOR THE PREVENTION AND TREATMENT OF LEPROSY IN INDIA.

202. Under this heading the present writer reviewed * the above Resolution in the course of which he showed how inconsistent the action of the Indian Government and the Leprosy Commission was when compared with their conclusions. The criticism then made, holds good upto to-day, and if anything, it has been further confirmed by the conclusions of the Berlin Conference. Ample evidence now exists to show that leprosy can be conveyed from person to person without any ulceration, † as was stated by the writer, and his contention that the definition of a leper adopted by the Indian Government was unhappy and inconclusive, has also received corroboration. We now know that a leper without any external ulceration but with chronic rhinitis or other inflammatory process in the nose, or throat is a much more potent and insidious source of infection than a leper with visible ulceration. And as the Indian Government's definition excludes from its perview all except those having such ulceration, it stands to reason, that the definition is not only unsound but likely to be injurious in practice. It would be injurious, harmful, and oppressive, in addition to its being unnecessary in the case of lepers with evident ulcerations, who suffer from anæsthetic leprosy, as it has been shown that a anæsthetic leper with ulceration is not dangerous to the community, as the discharges from his sores do not contain any lepra bacilli.

The following is the text of the review above mentioned:—

"Whether the State should not take a more direct part in the prevention and treatment of Leprosy in India, which was alleged to have increased to such an extent as to be an "Imperial danger" was a question that had been for some years under the consideration of the Government of India, and the recent Resolution on the subject, the full text of which we published in our last issue, takes us back to the year 1888, when the Leprosy question attracted a great deal of attention both in India and in England. It may be assumed that so far as the Indian Government are concerned, they have arrived at a decisive conclusion as to how far State intervention is justifiable and what measures they consider practicable for dealing with this by no means easy administrative problem. The inquiries which the Government instituted in 1888 and subsequent years resulted in eliciting such conflicting evidence and views on the nature and contagiousness of the affection that they hesitated, and rightly so, in pushing forward a bill providing for the detention of lepers at their own request on a voluntary system and authorising magistrates to arrest and commit to retreats persons proved to be lepers who might be found asking for alms or wandering about without any"

* *The Indian Medico-Chirurgical Review* edited by N. H. Chokey :—May and June 1895.

† By this term the Government of India, and the Leprosy Commission meant *external* ulceration only.

employment or visible means of subsistence. They, therefore, considered the advisability of modifying the bill and restricting its application, but even under these considerations they could not arrive at a safe basis for working out the bill.

Just about this time, the English National Leprosy Fund appointed a Commission to inquire into the question, and as we have already fully dealt with the Report of the Commission, as well as discussed their unanimous conclusions, we need not refer to them again. But although the Commission declared that leprosy was not contagious, as the term is understood ordinarily, and observed that the presence of a leper in a healthy community was a source of danger no greater than the presence of an individual suffering from tuberculosis, they made certain recommendations for the regulation of leprosy and lepers in India and which, at first sight, appeared to be not in consonance with their conclusions. They suggested that Municipal bye-laws should be framed (1) prohibiting the sale of articles of food or drink by lepers and preventing them from practising prostitution and from following such occupations as those of barber and washerman; (2) preventing vagrant lepers from begging in and frequenting places of public resorts, or using public conveyances; (3) recommending the building of Asylums near towns and empowering Municipal authorities to compel lepers infringing the regulations either to return to their homes or enter an Asylum; and (4) lastly that in every case competent medical authority should be consulted before action is taken under such bye-laws. Some of the conclusions and recommendations were warmly disputed by authorities in England and though some of them were men of very great eminence in the profession, whose opinions were not at all to be despised, the Governor-General in Council while regarding with every respect their opinion, is constrained, says the recent Resolution, to accept the conclusion of the Commissioners upon this matter, fortified as it is by the views of medical authorities in India. Influenced by these considerations, His Excellency in Council feels assured that the extent to which the disease is propagated in India by contagion is small and is therefore unable to approve of the compulsory segregation either absolute or partial, except under certain reservations. All the Provincial Governments are unanimous and in favour of the recommendation of the Commission prohibiting lepers from engaging in certain trades. But the Government of India are constrained to admit that this recommendation cannot be directly justified on the conclusion of the Commissioners regarding the question of contagiousness of leprosy and they try to get out of this rather awkward predicament in a way which is just as unconvincing as it is unsatisfactory. They quote in support the opinion of the Lieutenant-Governor of Punjab who observes "it is amply justified on the grounds that there is a certain danger" (what certain danger?—contagiousness?) "in allowing lepers with running sores to engage in those trades, and the people of the country, and indeed, it may be said of any other country, would be struck with dismay if they discovered that the articles they used or consumed had been handled by such lepers." This then appears to be the *raison d'être* of the Government of India's acceptance of the recommendation of the Commission. Lepers could not be dangerous, if leprosy is not contagious; and having declared leprosy to be non-contagious, it seems absurd to provide for such restrictions. Of course, there is the danger of septic poisoning, but it is not more—and the Commission and Indian Medical authorities have yet to show that it is more—from

lepers, than from any ordinary sore or ulcer, and surely the Government of India and its expert advisers could not be unaware of the fact that hundreds and thousands of those who engage in such trades have sores and ulcers of various kinds and still medical literature hardly ever records cases of septic infection from such sources. It appears to us, however, that the importance of the element of contagion in leprosy has been minimised by the Commission and we hold that although the recommendation prohibiting sale of articles of food, drink &c., is perfectly justifiable, it has not been supported by that evidence and reasoning that it ought to have been. It has been declared, for instance, that leprosy cannot be contagious—if at all it is—unless it has advanced to the ulcerative stage. But such is not necessarily the fact, and ample evidence exists to shew that leprosy can be conveyed from person to person without any ulceration. But on this we shall speak later on. So far as the application of this recommendation is concerned, it is to be restricted to Municipalities and to the larger fairs and to religious and other gatherings which are held outside the limits of towns, as enforcement would be impracticable in agricultural villages and because the members of village communities who are fully cognisant of the most trifling details connected with the every-day life of their fellow residence in a village are well able to protect themselves. This is as it should be. By a strange irony of fate, the question of the Contagious Diseases Acts comes up in relation to leprosy where prostitutes are concerned, for the Commission recommend that lepers should be prevented from practising prostitution and, says the Resolution, as the Government of India abstain strictly from regulating prostitution no byelaw or Act dealing with the prohibition against lepers following certain trades or callings should extend to that of prostitution by leper women. And which means, that although a barber or a washerman or vendor of articles of food or drink could be prohibited from being a possible source of danger to the healthy, the unfortunate leper, plying prostitution, is to be allowed free liberty to propagate both syphilis and leprosy. We make a present of this interesting fact to the philanthropists of Exeter Hall.

In our last issue we shewed how inconsistent with the conclusions of the Leprosy Commission was the first recommendation—prohibiting lepers from engaging in certain trades—almost unanimously agreed to by the various Provincial Governments and adopted by the Government of India in their Resolution of last April. Proceeding further with the consideration of the other recommendations, we find that the second recommendation is directed against the prevalent custom of mendicant lepers leaving their homes and crowding into large centres of population. And although the Commissioners believed that the vagrant and indigent lepers were not a source of danger, still they recommended that Municipal authorities should be empowered by bye-laws to prevent vagrants afflicted with leprosy from being in or frequenting places of public resort or using public conveyances in towns and cities!—Yet another inconsistency. But they said that, they recommended this provision under the expectation that such bye-laws would have a deterrent effect and would be the means of causing an emigration into the surrounding country and thereby furthering the scheme for establishing leper colonies or farms in the rural districts. Rather a farfetched explanation and hardly borne out by our experience in Bombay. It is true that

some vagrant lepers did leave the city just about the time the Matunga Leper Asylum was established, for fear of being detained therein, still there was nothing like an exodus, and as soon as they came to learn that their incarceration in the asylum was for their ultimate good and that they were being carefully, kindly and humanely looked after, they returned in large numbers, and instead of begging in the city, as hitherto, sought refuge in the asylum. But fresh arrivals into this city do and will continue, so long as charitably disposed people would assist them, and so long as the asylum can afford a home to but a limited number. The Resolution says that it has been forcibly urged to the Government of India that both the above recommendations have an administrative as well as a medical aspect, and that the action such as the Commissioners proposed was justified by the loathsomeness of the disease, by the circumstance that those suffering from it commonly obtrude their sores upon the public with a view to forcing people to give them money, and by the fact that people in India are commonly struck with horror at the approach of a leper and are apt to yield to his importunity in order to induce him to move on. And therefore in deference to the sentiments of the community generally, the Government of India agree that steps should be taken to prevent mendicant lepers from obtruding their deformities on the public gaze in the towns and cities. They cite in support—notwithstanding the Indian Army Sanitary Commission foreboding all sorts of evils arising from the congregation of lepers in an asylum—the experience gained in Bombay since the establishment of the Leper Asylum at Matunga which, says the Resolution, shows that regulations having this object may, if intelligently and energetically carried out, be expected to be productive of great benefit to the leper community as well as to the general public. That the argument supporting this proposition is sound both in theory as well as in practice, is amply supported by the Resolution which acknowledges the great good that the Leper Asylum at Matunga has been and is doing. But strange to say, that though the Government of India took over seven years to settle the question and required the assistance of a Special Commission to help them in the elucidation of the problem, this problem was practically solved for them in this city by the intelligent and energetic action of its Municipal Commissioner, H. A. ACWORTH ESQ., I. C. S., C. I. E., whose labours in this behalf might have been fittingly acknowledged in the Resolution, especially when it admits that the initiative and the steps adopted by Mr. Acworth have been justified by the results and have the approval of the Government of India.

As to how vagrant lepers should be compelled to enter asylums proposed to be provided for them, the Government have very properly and wisely directed that vagrant lepers in Municipalities should be dealt with much in the same way as vagrant lunatics, viz., that such persons should be brought before a Medical Officer and a Magistrate and sent to an Asylum by an order of the latter, if found to be suffering from the disease and without relatives who can properly care for and treat them. It is considered sufficient for the present to take power to deal with vagrant lepers in this manner in Municipalities and their immediate neighbourhood. No doubt some such step would be requisite at first to compel vagrant lepers to enter asylums, but the experience at Bombay fully justifies the hope that it would not be needed long, and that no sooner the lepers come to learn that they were

being well treated in such asylums, they would resort to them voluntarily and without any compulsion.

The third recommendation of the Commission was that leper asylums should be built near towns where they do not already exist, and that leper farms in rural tracts where lepers with their wives and families could cultivate the soil, might be established and be productive of practical good. They further suggested that as lepers are not productive and as comparatively few children would be born, segregation of the sexes was not essential and that the few children of leper parents should, if possible, be removed to orphanages from which they would be discharged as soon as they could support themselves. The Surgeon-General with the Government of India was of opinion that all requirements would be met, if on an average, one asylum be provided to each revenue division, and we believe that if each revenue division has one such asylum located in a central place, it would fully meet all present requirements and the number might be subsequently increased if necessary. As regards leper farms or colonies, the cost of keeping and maintaining such would, we think, be prohibitive, and all the necessities of the case *i.e.*, of keeping lepers and their wives and children together would be fully met if they are provided for, as in the Matunga Asylum, and intermarriages amongst them encouraged, leading thereby to greater contentment and less risk of promiscuous intercourse. The latter was for long, a source of great trouble and vexation in the Trinidad Leper Asylum which was under the charge of the late Dr. Heaven Rake, the President of the Commission. All who are interested in the leprosy question, would no doubt recollect, that, at one period some of the highest authorities on the question thought that segregation of the sexes must be made an essential feature of all schemes for leper asylums, but the labours of the Commission, coupled with the experience gained at the Matunga Asylum show that segregation of the sexes is not necessary and that marriages between lepers do not lead to an increase in the number of lepers to such an extent as to be a menace or danger to the public. Whether asylums or farms be fixed upon, the Government say, that the additional expenses will have to be provided for jointly by the Municipalities and District and Local Boards of the Division or Area. The Government of India are inclined to think that it may not be necessary—and we do not think it will be—to legislate for the voluntary admission of lepers in asylums, but they have no objection to the adoption of such a provision in any province in which the local Government or Administration thinks it would be useful. It would certainly be advisable to do so, for if vagrant lepers seek voluntary admission they should not be refused,—rather they should be encouraged to do so, as it would save enormous trouble to the police, the magistrate and the medical officer, the service of all of whom, be it remembered, would be necessary before a vagrant could be compulsorily sent to an asylum.

The fourth recommendation of the Commission was that competent medical authority should always be consulted before action in regard to lepers is taken and the Government of India entirely agree with this view. But as it seems the Commission did not suggest a definition of the terms “leper” and “leprosy,” which could be adopted for the purpose of the provisions to be made in the different

laws and bye-laws, the Government had to make one for themselves. And we believe Government have not been happy in their choice of a proper definition, for they have excluded all cases of leprosy in which ulceration has not commenced. We do not consider the definition happy inasmuch as we have every reason to believe that leprosy can be conveyed from person to person without the presence of external ulceration, and that the various secretions of a leper, be he ulcerated or not, together with the articles of food, drink, clothing and personal use that come in actual contact with his body or person are not altogether free from danger, and that legislation along such lines is merely a half measure and would not be productive of such good as is expected from it. Moreover the various insidious ways in which leprosy could be propagated remain just as they were and hence a leper can engage in all the trades and occupations prohibited in the first recommendation so long as he remains free from visible ulceration and thereby become a no less source of danger to the public. People would and do certainly object to deal with a leper and when Government have gone so far in legislating "in deference to the sentiments of the community generally," they might well have gone a step further and applied the legislation to all lepers, whether ulcerated or not. We say they have taken a serious responsibility on themselves in adopting such a narrow and restricted definition.

The last point referred to in the Resolution is the extent to which leprosy prevails and whether it is on the increase or not in India. We have already fully dealt with this question in reviewing Mr. Tebb's work on the *Recrudescence of Leprosy and its Causation* in a former issue.* The Resolution concludes with a graceful tribute to the able and exhaustive manner in which the Leprosy Commissioners conducted their inquiry and we join our regret with that of the Viceroy-in-Council that two of them Dr. Beaven Rake and Surgeon-Major Barclay have joined the majority, long before Government had an opportunity of publicly acknowledging their labours."

XXXI. Leprosy Legislation in India.

THE LEPROSY ACT, 1896.

203. Following on the above resolution, the Government of India introduced and passed in 1896, "*A Bill to provide for the Segregation of Pauper Lepers, and the Control of Lepers Following Certain Callings.*"

The following is the text of the Leprosy Act of 1896 :—

"Whereas it is expedient to provide for the segregation of pauper lepers, and the control of lepers following certain callings, it is hereby enacted as follows :—

Title, Extent and Commencement.

1. (1) This Act may be called the Lepers Act, 1896.
- (2) It extends to the whole of British India; but
- (3) It shall not come into force in any part thereof until the Local Government, with the previous sanction of the Governor-General in Council, has, by notification in the local Gazette, declared it applicable thereto.

* Vide Indian Medico-Chirurgical Review, Vol. I. No. 6, June 1893.

Definitions.

2. In this Act, unless there is anything repugnant in the subject or context,—

(1) “leper” means any person suffering from any variety of leprosy in whom the process of ulceration has commenced ; and

(2) “ pauper leper ” means a leper—

(a) who has in a public place solicited alms or exposed or exhibited any sores, wounds, bodily ailment or deformity with the object of exciting charity or obtaining alms, or

(b) who is at large without any ostensible means of subsistence.

Appointment of Leper Asylums by Local Government.

3. The Local Government may, by notification in the local Gazette, appoint any place to be a leper asylum for the purposes of this Act and define the local areas from which lepers may be sent to such asylum, and may, in like manner, alter or cancel any such notification.

Appointment of Inspectors of Lepers and Superintendents of Asylum.

4. The Local Government may appoint, either by name or by virtue of his office, any Medical Officer of the Government to be an Inspector of Lepers and any person to be a Superintendent of a Leper Asylum with such establishment as may, in its opinion, be necessary, and every officer or person so appointed shall be deemed to be a public servant within the meaning of section 21 of the Indian Penal Code.

Constitution of Board.

5. The Local Government shall constitute for every leper asylum appointed under section 3, a Board consisting of not less than three members, one of whom at least shall be a Medical Officer of the Government.

Arrest of Pauper Lepers.

6. Within any local area which has been notified under section 3, any police-officer may arrest without a warrant any person who appears to him to be a pauper leper.

Person Arrested how to be dealt with.

7. Every person arrested under the last foregoing section shall forthwith be taken before an Inspector of Lepers, who,—

a) if he finds that such person is not a leper within the meaning of section 2, shall give him a certificate in Form A set forth in the schedule, whereupon such person shall be immediately released from arrest ;

- b) if he finds that such person is a leper within the meaning of section 2, shall give to the police-officer in whose custody the leper is, certificate in Form B set forth in the schedule, whereupon the leper shall, without unnecessary delay, be taken before a Magistrate having jurisdiction under this Act.

Procedure with regard to Pauper Leper.

8. When it appears to any Magistrate authorized in this behalf by the Local Government, upon the certificate in writing, in Form B set forth in the schedule, of an inspector of Lepers, that any person is a leper, and if it further appears to the Magistrate that the person is a pauper leper, he shall, after recording such further evidence (if any) as he may think fit to require and his order thereon send the pauper leper in charge of a police-officer, together with an order in Form C set forth in the schedule, to a leper asylum, where such leper shall be detained until discharged by order of the Board constituted for the asylum under section 5.

Practice by Leper of Certain Occupations.

9. Whoever, being a leper, pursues within any local area which has been notified under section 3, any of the following acts, namely,—

- a) practises as a medical practitioner, or works as a barber, washerman, watercarrier, baker, confectioner, tailor, draper, haberdasher or domestic servant;
 - b) sells any food, drink or drug intended for human consumption;
 - c) bathes at a public well or bathing-place or takes water from any public drinking fountain, well, hydrant, tank or reservoir; or
 - d) rides in any public conveyance;
- shall be punishable with fine not exceeding fifty rupees :

Provided that when any person is accused of an offence under this section, the Magistrate before whom he is accused shall cause him to be examined by an Inspector of Lepers and shall not proceed with the case unless such Inspector furnishes a certificate, in Form B set forth in the schedule, in respect of such person.

Conviction after Previous Conviction.

10. Whenever any leper who has been convicted of an offence punishable under the last foregoing section, is again convicted of any offence punishable under that section, the Magistrate may, in addition to, or in lieu of any, punishment to which such leper may be liable,—

- a) require him to enter into bond, with one or more sureties, binding him to depart forthwith from the local area notified under section 3 in which he is, and not to enter that or any other local area so notified until an Inspector of Lepers shall have given him a certificate in Form A set forth in the schedule; or
- b) may send him in charge of a police-officer, with an order in Form D set forth in the schedule, to a leper asylum, where such leper shall be detained until discharged by order of the Board appointed for the asylum under section 5.

Re-arrest of Escaped Lepers.

11. Whoever, having been sent to a leper asylum under an order of a Magistrate in Form C or Form D set forth in the schedule, escapes from or leaves the asylum without the permission in writing of the Superintendent thereof, may be arrested by any police-officer without a warrant, and upon arrest shall be forthwith taken back to the leper asylum.

Inspection by Board.

12. The Medical Officer and one or more other members of the Board constituted for any leper asylum under section 5 shall once at least in every quarter, inspect the leper asylum for which such Board is constituted, and shall see and examine, as far as circumstances will permit, every leper detained therein under the provisions of this Act and the order for the admission of every leper so detained since the last visit of the Board, and shall enter in the book to be kept for the management and condition of the asylum and the lepers so detained.

Order of Discharge by Board.

13. The Medical Officer and not less than two other members of the Board constituted for any leper asylum under section 5 may at any time, by order in writing in Form E set forth in the schedule, and signed by them, direct the discharge from the leper asylum of any leper detained therein under the provision of this Act.

Appeals.

14. Any person other than a pauper leper in respect of whom an Inspector of Lepers has issued a certificate, in Form B set forth in the schedule, declaring him to be a leper, or has refused to issue a certificate in Form A set forth in the schedule, may appeal to such officer as may be appointed by the local Government in this behalf, and the decision of such officer shall be final.

Power of the Local Government to make Rules.

15. The Local Government may, by notification in the local Gazette make rules,—

- a) for the guidance of all or any of the officers discharging any duty under the Act;
 - b) for the management of, and the maintenance of discipline in, a leper asylum; and
 - c) generally for the carrying out the purposes of this Act;
- and may, in like manner, alter or cancel any rules so made.

204. It seems that in the Leprosy Act, the Government of India have adhered to the same definition of a leper as in their Resolution, and they call "any person suffering from any variety of leprosy in whom the process of ulceration has commenced," a "leper." In the light of our present knowledge of the disease, the Act will require amendments in the following directions :—

1. The definition will have to be altered so as :—

- (a) to exclude all cases of anæsthetic leprosy, with or without ulceration*
- (b) to include all cases of tubercular leprosy in whom the process of ulceration has commenced, or in whom there is some affection of the nose, mouth or throat present.

2. Section 9, referring to the trades and callings which are prohibited to a leper, should include leper prostitutes, as recommended by the Indian Leprosy Commission.

XXXII. The International Lepra Conference in Berlin, 1897.

CONCLUSIONS.

205. The Conference arrived from their deliberations to the following conclusions :—

1. The Conference accepts the *Bacillus Lepra* as the virus of Leprosy. (Hansen and Neisser.)
2. The conditions under which the bacillus grows and develops are still unknown ; and also the way of its invasion into the human system ; there is a probable unanimity as regards its mode of subsequent dissemination in the system.
3. The elimination of the bacillus is through the skin, nasal and buccal mucous membranes as proved by evidence.
4. Leprosy is acknowledged to be a contagious disease.
5. Every leper is a danger to his surroundings, the danger varying with the nature and extent of his relations therewith, and also with the sanitary conditions under which he lives.
6. Although among the lower classes every leper is especially dangerous to his family and fellow-workers, cases of leprosy frequently appear in the higher social circles.
7. The theory of the heredity of leprosy is now further shown to have lost ground in comparison with the at present generally accepted theory of its contagiousness.
8. The treatment of leprosy has only had palliative results upto the present time.
9. Serum-therapy has so far been unsuccessful.
10. In view of the virtual incurability of leprosy, and the serious and detrimental effects which its existence in a community causes, and considering the good results which have followed the adoption of legal measures in Norway, the Leprosy Conference as a logical issue of the theory that the disease is contagious, has adopted the following resolution proposed by Dr. Hansen, and amended by Dr. Besnier :—

* If Impey's views are further confirmed as regards the non-contagiousness of anæsthetic leprosy : it has been proved to a certainty that the bacillus is not present in the ulcerations of anæsthetic leprosy, and hence ulcerations in them are not dangerous.

1. In such countries where leprosy forms foci or has a great extention, we have in isolation the best means of preventing the spread of the disease.

2. The system of obligatory notification, of observation and isolation as carried out in Norway is recommended to all nations with local self-Government or a sufficient number of physicians.

3. It should be left to the legal authorities after consultation with the medical authorities to take such measures as are applicable to the special social conditions of the districts.

266. Thus within a year of the passing of the Leprosy Act, and within three years of the deliberations of the Indian Leprosy Commission, a body of scientists from all parts of the world have almost unanimously and most unequivocally declared leprosy to be a contagious disease. This long-debated, and long-pending question has at last found a practical solution, and it is to be hoped that it has now received a peaceful quietus from which it will not be disturbed unless any startling proofs to the contrary develop in the future. The Conference has recognised the bacillus lepræ as the *causa causens* of leprosy. It has determined that it is eliminated from the system through the skin, nasal, and buccal mucous membranes. It has declared that a leper is a danger to his surroundings. It has given adherence to the gradual lessening importance of heredity as a factor in the propagation of the disease, and it has recommended that in notification, observation and isolation, we have the best means to prevent the spread of leprosy. The measures, therefore, which the Indian Government have adopted since 1896, on "sentimental" grounds, have at last received scientific sanction, although they have been partial and limited in their scope. And now it is to be wished that having the high authority of the Berlin Conference, the Indian Government would proceed to put into operation their Leprosy Act of 1896,—with such amendments as the deliberations of the Conference have shown to be necessary, throughout the districts where leprosy is endemic. This consummation however devoutly to be anticipated, appears to be impractical under the present financial conditions of India, and the leprosy question shall have to be relegated to a distant future until the effects of plague, and famine have had time to wear off.
