

Report on leprosy and the Trinidad Leper Asylum for the year 1892.

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REPORT ON LEPROSY

AND THE

TRINIDAD LEPER ASYLUM

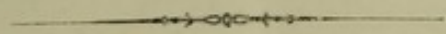
FOR THE YEAR

1892.

BY

BEAVEN BAKE, M.D., London.

MEDICAL SUPERINTENDENT.



TRINIDAD :

THE GOVERNMENT PRINTING OFFICE, PORT-OF-SPAIN.

1893.



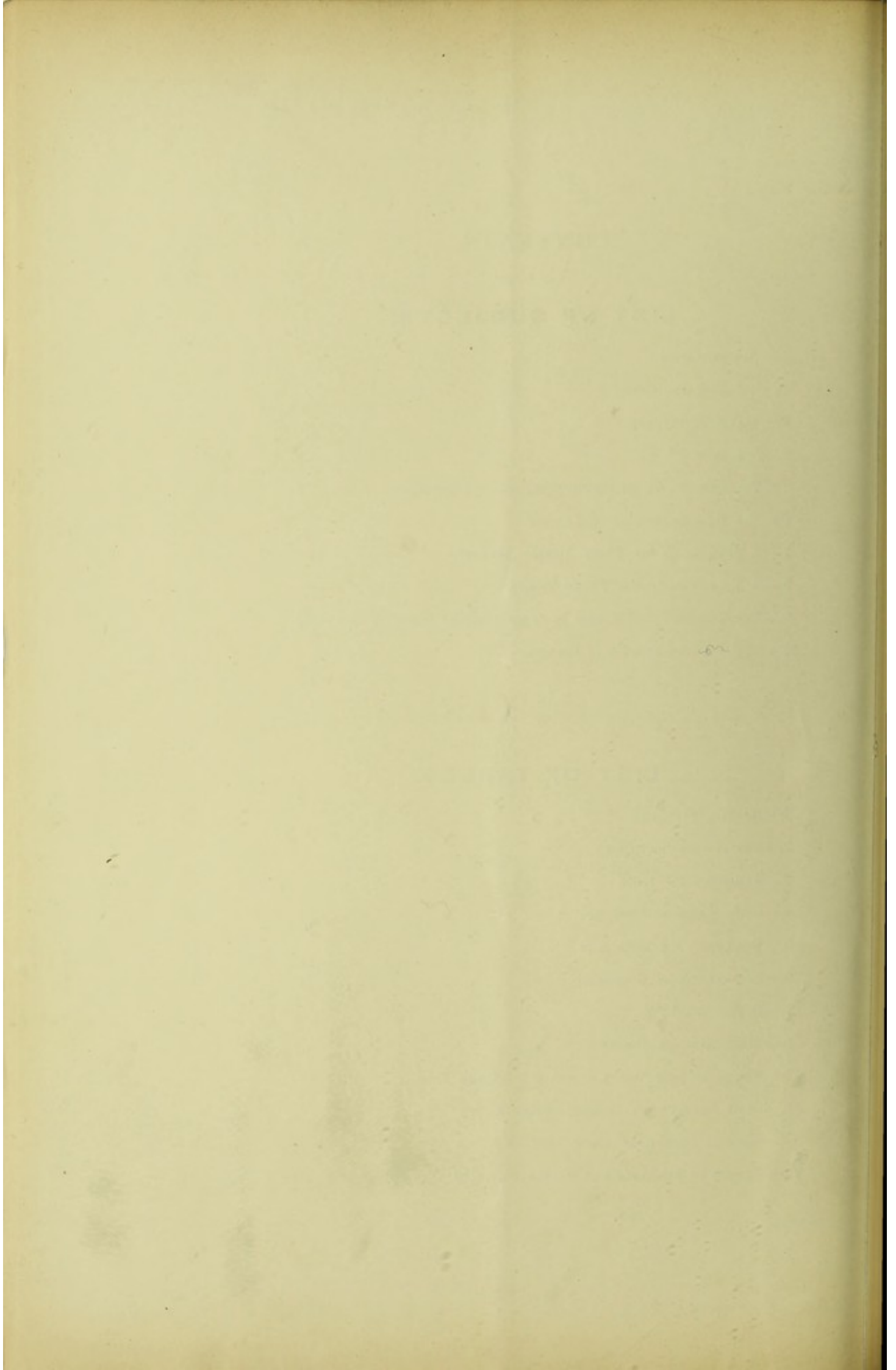
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REPORT OF THE

COMMISSIONERS OF THE

LAND OFFICE

FOR THE YEAR

1880



REPORT.



REPORT ON LEPROSY

AND THE

TRINIDAD LEPER ASYLUM FOR THE YEAR 1892.

MARAVAL,

24th February, 1893.

SIR,

I have the honour to forward for the information of His Excellency the Governor a Report on Leprosy and the Trinidad Leper Asylum for the year 1892.

The subjects which call for notice will be taken in the order in which they stand in the Table of Contents.

1.—ADMINISTRATION.

My sincere thanks are due to Dr. Koch for the able manner in which he carried on the work of the Asylum during my absence of one year and eight months. Apart from the tangible records which he has left behind him, the testimony of the Sisters and patients affords ample evidence of his zeal and energy.

The conduct of the inmates has on the whole been fairly good during the year. One man was sentenced, at the Criminal Sessions, to two years' imprisonment for seriously wounding another inmate with a cutlass, and three women were discharged for disorderly conduct. It will be seen on reference to Table I. that 247 patients were under treatment at the Asylum during the year. The above discharges therefore only represent a percentage of 1.6 on the number treated.

There are certain chronic offenders, chiefly amongst the women, who persistently break the Rules, and who are constantly being discharged and readmitted from year to year. This state of things seems unavoidable. Minor punishments are usually inflicted first, but as the offenders nearly always either refuse to submit to punishment, or repeat the offence immediately afterwards, no alternative is left but discharge from the Asylum. This measure is no doubt deplorable on some grounds, but the importunity with which those discharged seek re-admission shows that dismissal from the Asylum is, as Gavin Milroy said it ought to be, the greatest punishment possible.

I have reason to believe that much immorality still goes on between inmates of the Asylum, and lepers and others in Cocorite Village. This evil is common in large institutions of the kind. I have read of it especially in British Guiana and Hawaii. It must I fear continue until either the Asylum is made virtually a prison—a proceeding which does not appear to be justifiable in the light of our present knowledge—or the most incorrigible of the lepers are allowed to marry and settle in some suitable isolated position such as an island. Lepers are not prolific as a rule, and it has been shown that very few of their children contract the disease. In any case the marriage of lepers is decidedly preferable to the promiscuous immorality which now exists. Father Damien married several couples at Molokai, and spoke well of the result. In British Guiana a leper couple were married the other day, and in Mucurapo two former inmates of the Cocorite Asylum have been living quietly since their marriage about two years ago.

During the year the Government has sanctioned the payment of small gratuities to those of the female patients who are able and willing to make articles of clothing for the institution. This measure has proved highly satisfactory, for while it provides suitable and profitable employment for the women, and materially helps to keep them out of mischief, the saving to the Institution thus effected is very considerable, for the amount paid represents only a very small fraction of the usual contract prices for making these articles of equipment.

For many years the men have been similarly employed in gardening, the Government buying the produce for consumption in the Asylum, and paying half the usual price. The total crop reaped last year was the best on record.

There is no doubt that suitable employment is a most important factor, not only in preventing disorderly conduct, but also in the treatment of the disease.

On two occasions the patients with the help and supervision of the Sisters have got up small tableaux with considerable success, and a Christmas tree was provided for them at the end of the year. I gratefully acknowledge the kindness of the following friends in England and Trinidad who contributed books, newspapers and toys, or subscribed to the Christmas tree:—Lady Broome, Mrs. Chantrell, Mrs. Tanner, Mrs. Horsford, Mrs. Hunter, Mrs. Campbell, Mrs. Cunningham, Miss Roper, Miss Duck, Miss Mayo, Miss Dyett, Miss Wehekind, Miss Woodlock, Mr. Gatty, Mr. Fenwick, Mr. Clifford, Dr. Crane, Dr. Koch, Father Rabanit, Mr. Johnston, Mr. Besson, Mr. Bock, Mr. Rapsey, Messrs. Todd and Son, Miller Bros., Glendinning and Hendy, the Children of St. Paul's, Knightsbridge, the Secretary of the Volunteer Sergeant's Club.

2.—BUILDINGS AND GROUNDS.

Of the numerous additions, alterations and repairs which have been mentioned as necessary in former Reports, only one has been accomplished during the past year. I refer to the enclosure of the land round the female ward. The restraint thus imposed on the women, together with their employment in needlework, as already pointed out, has been decidedly beneficial, though there is still much room for improvement.

Several members of the Legislative Council visited the Asylum in the course of the year to investigate the questions of urgently needed increased accommodation for the Sisters, and of the new Chapel. It is to be hoped that as £6,000 has been voted out of the contemplated loan, for additions, alterations and repairs at the Asylum, the work will soon be put in hand. The overcrowding in the Sisters' quarters is most serious. Some of their bed-rooms are situated above the store-room, and as this room has to be used for keeping the recently reaped vegetables, as well as the ordinary stores, the mixed effluvia rising from the fermenting mass, and penetrating through the chinks in the floors of the rooms above can be better imagined than described. Other bed-rooms are over the Chapel, and an odour which even incense is powerless to subdue ascends during a crowded service. The health of the Sisters is thus seriously endangered, and the necessity for an infirmary in cases of illness amongst them is more and more felt as their numbers increase. The proposed erection of two new wards will entail the addition of two more nurses to the staff.

The Asylum badly wants painting throughout. No painting except in the new buildings has been done for ten years to my certain knowledge, and probably for a much longer time. It would be an economy to paint the building, especially the older parts, which are beginning to decay, and neatness and cleanliness would be greatly promoted thereby.

3.—WATER SUPPLY AND DIET.

Owing to the exceptional rainfall in 1892—the heaviest known since the commencement of registration thirty-one years ago—the want of water has not been so keenly felt at the Asylum as during previous years.

The fact however remains that the water supply is inadequate for the present Asylum during an average dry season, and will be entirely insufficient when the proposed new wards are built. The spring in the hill above the Asylum has dwindled considerably of late years since the surrounding land has been cleared. It would be well if the law on the subject of cutting down trees and brushwood in the neighbourhood of sources of water supply were more stringent.

The dietary on the whole has been satisfactory during the past year. There are certain chronic grumblers who are never satisfied, and who refuse good food which they would be only too glad to get outside the Asylum. At the same time the fact must not be lost sight of that an Asylum is far more difficult to manage than a Hospital in the matter of diet. Patients in the former stay in for years, while Hospital patients count their residence by days or weeks. No wonder that many Asylum patients, especially those suffering from a depressing disease like leprosy, tire of a fixed diet. Considerable latitude is therefore given them in the way of small extras and alterations, and probably as much success is attained, as can be expected under the circumstances.

4.—STATISTICS.

A satisfactory feature in the general Statistics is the decreased number of discharges: 10 against 18 in 1891. As residence in the Asylum is purely voluntary on the part of the patients, this decrease shows an increased appreciation of the advantages of the Institution. Of the 10 patients discharged, 3 have since been readmitted, one is in the Royal Gaol for 2 years, and one was sent out because she was found not to have leprosy. Thus only 5 lepers remain at large from last year.

The deaths have been 25, as against 26 in 1891, and 25 in 1890. The percentage of deaths is slightly less than last year, but greater than the year before—10·12 against 10·27 in 1891 and 10·00 in 1890. Two of those who died were not lepers, but were sent into the Asylum in the last stages of other diseases.

Five patients died within a month of entering the Asylum—three of them within a fortnight. It is hardly fair to transfer so many dying patients to the Asylum from the Hospitals, for nothing can be done for them in the way of treatment, and the mortality returns are unduly raised.

Of those admitted, 21 were natives of Trinidad, a considerably higher proportion than last year, and 11 were Indian immigrants. Two of the Trinidadians were Creole Coolies. There were 7 readmissions. Three of those admitted were not lepers. Of these one was discharged, one died and one is still in the Asylum, as until now he has seemed too weak to be moved.

The number of patients at the end of the year was 212, there being then 4 empty beds in the female ward. For some time during the year all the women's beds were occupied.

As usual tuberculosis and kidney disease were responsible for a large proportion of the deaths.

The greatest mortality was in December, in which month 5 died. This was probably only a coincidence, a number of old chronic cases happening to die together. In the two preceding months there were no deaths. On taking the total number of deaths in each month for the past 11 years, it will be seen that they are very evenly distributed. The healthiest months would seem to be October and June in which the deaths for the whole period are only 13 and 17 respectively.

The times of change from the wet to the dry season and *vice versa*, which are usually considered unhealthy in Trinidad, do not seem to affect the mortality at the Asylum, for January and May only show 18 deaths each, for the 11 years. Lately however there has been so little difference between the seasons all the year round, that it would not be expected that the death returns would vary much.

There was no epidemic disease in the Asylum in 1892, and the intercurrent diseases shown in Table X. are trifling. Of a total of 133, 56 were cases of malarial fever. The surgical operations also were less than in previous years, and both medically and surgically, 1892 may be considered an exceptionally healthy year at the Asylum.

The stretching of the supraorbital was done in a chronic anæsthetic patient, who is subject to attacks of severe supraorbital neuralgia, and who now asks for the operation when the pain becomes bad. Though the nerves are thickened, the stretching always gives relief.

5.—THE QUESTION OF THE COMMUNICABILITY OF LEPROSY.

The communicability—or contagiousness as it is commonly called—of leprosy is still much discussed, and by no means the last word has been said on the subject. There are probably few bacteriologists who would deny the possibility of leprosy being communicated, but the matter appears in a very different light when viewed from a practical stand-point.

As an impartial observer, I think it my duty to record here the following case which has come under my notice during the past year, and which seems to suggest a possible communication of the disease. Of course due allowance must be made for concomitant variations, as was pointed out in other Reports:—

J. R., aged 49, consulted me at Diego Martin on July 5th, 1892, for a perforating ulcer of the foot. On examining him further, I discovered anæsthesia of the upper extremities, and decided that he was an anæsthetic leper. He then told me that five years ago, he was living for six months with M. A. T., a notoriously bad character who had previously been discharged from the Leper Asylum for misconduct. At that time he said he was healthy. About two years after he left the woman, ulcers formed on his feet, and he lost sensation in his hands.

At the time I examined him I had entirely forgotten that I had ever seen the man before, but some months afterwards when I was looking through the register of out-patients for other purposes, I happened to come upon his name under date of July 21, 1890. He was entered in the register as a doubtful case of leprosy, and as living at Mucurapo. Thus an unexpected corroboration was afforded of the patient's statement as to dates, for at that time, according to what he told me, he must have had initial symptoms for about six months. From the entry in the register it is clear that these symptoms were not sufficiently pronounced to justify more than a doubtful diagnosis.

The value of this case is of course only fractional, for no evidence is positive in a country where leprosy is endemic, but for the reasons given above I have little doubt that the sequence of events occurred in the order, and with the intervals which the patient described to me.

It is, I think, of importance that every case in which dates can be established with any degree of accuracy, should be preserved and for that reason I mention it here.

Scientific proof will not be obtained, until criminals are inoculated with leprosy material in a country free from endemic leprosy

6.—THE ALLEGED INCREASE OF LEPROSY.

Closely connected with the question of communicability of leprosy is that of the increase of the disease. If leprosy is communicable in any high degree, we should expect a rapid increase all over the world, for segregation is not absolute anywhere.

Judging from published Reports we must believe that the disease is increasing in Hawaii in spite of the strenuous efforts which have been made to isolate all the lepers.

In Memel also there seems to have been a slight increase. Dr. L. Rosenthal writes:—
 “Es ist mir nicht bekannt, dass vor dem Jahre 1882 Leprafälle in diesem Kreise vorgekommen sind. Der erste Fall wurde von Dr. Fuerst und mir im Jahre 1882 constatirt. Es handelte sich um einen litthauischen Bauern aus einem Vororte Memels. Der Mann war nie über die russische Grenze gekommen, hatte auch nachweisbar keinen Verkehr dorthin. Ob kleidungsstücke die Vermittler waren, konnte wenigstens nicht fest gestellt werden. Es sind seitdem sieben neue Fälle beobachtet worden, der letzte im vorigen Jahre.”—(Arning: Die gegenwärtige Verbreitung der Lepra in Europa und ihre sociale Bedeutung).

But in four countries where for many years little or no trouble has been taken to ensure absolute segregation, the published figures show a very different result.

I. TRINIDAD.—Only three official enumerations of lepers have been made in Trinidad since the island was ceded to the English.

In 1813 Sir Ralph Woodford wishing to establish a Leper Asylum caused an official enquiry to be made as to the number of lepers in the island. 73 were then found.

In 1815 the question of the founding of this Asylum came before the Legislative Council, and the same Governor ordered another enquiry. This time the result was 77 lepers. The population of Trinidad at this period was given as 32,000.

The next enquiry was ordered by Sir William Robinson and was completed in 1890. Every effort was made to obtain full returns, the chief sources of information being the District Medical Officers and Wardens. The result showed a total of 414 lepers, of whom 210 were inmates of the Leper Asylum. The census next year showed the population of Trinidad to be 200,028.

Calculated from the above figures we find that the percentage of lepers in 1815 was .242, while that in 1891 was .206. It must in fairness be stated that the latter figures are not quite accurate, for the leper enumeration was completed in 1890, while the general census was taken in the next year. The figures however are sufficiently approximate. It is greatly to be regretted that no leper census was taken here in 1891, as was done in India.

An obvious fallacy in any enumeration of lepers is the fact that cases may be overlooked or not reported, or that the same case may be reported under two names by different observers. A patient in this Colony frequently has two or three names. On the other hand it must be remembered that there are often several patients of the same name, especially amongst Coolies, and above all that mistakes in diagnosis are constantly made, and persons are reported as lepers who are suffering from other diseases. Almost every year patients are sent to the Leper Asylum who are found on examination not to be lepers. We may then regard these different factors as to a great extent counteracting one another, and look upon the figures obtained as approximate.

The question may be stated in another way: If there were 77 lepers in a population of 32,000 in 1815, how many ought there to be in 1891 with a population of 200,028? The answer when worked out is 481.

There is still another aspect of the question. The percentage of deaths at the Asylum is given in Table II. for the past 16 years. The average percentage on that period comes to 11.1. Therefore the number of lepers dying in Trinidad in a year out to be between 40 and 50. Do more than 40 or 50 new cases occur in a year? From what I know of this end of the island, including Port-of-Spain—the most densely populated part of Trinidad, and the most infested with lepers—I should very much doubt it. I see a good many new cases but not nearly enough to suggest a total of 40 or 50 per annum for the whole island. Imported early cases are probably few. I rarely meet with a patient in whom the disease has commenced out of Trinidad. It may be objected that the worst cases are admitted to the Asylum, and therefore the mortality is higher there, but against this must be set the fact that good food, hygienic surroundings and medical and surgical treatment probably prolong life in many patients who would soon die outside the Asylum. This view is borne out by the miserable and half dying condition in which patients are often readmitted after they have been out of the Institution for some time, and by the rapidity with which they improve again after they have been back a few weeks.

On the whole the available figures for Trinidad show that leprosy has not increased relatively to the population, but if anything has slightly decreased.

II. INDIA.—Little need be said about India here, for the recently published Report of the Census Commissioner, Mr. J. A. Baines, shows an absolute decrease in the lepers since the last census. The number of lepers enumerated were—

In 1881	...	...	...	131,660
„ 1891	...	...	...	127,056

There is thus an absolute decrease of 4,600. Mistakes and omissions have no doubt been made by the native enumerators, but these obtain in both censuses, and the probability is that diagnosis has been more exact in the last enumeration.

An important point however is that in the 1881 census, no lepers were returned from Upper Burma, Rajputana, Travancore and the Central Province States, whereas the 1891 census shows 2,960, 1,708, 968, and 1,259 respectively for these districts, or a total of 6,895. It is extremely unlikely to say the least, that in 1881 there were no lepers in the above-mentioned areas, and it is therefore highly probable that the actual total decrease is very much greater than that shown by the figures.

III. NORWAY.—The figures for Norway are so well known that that I will merely mention them here. They are :

1856	...	...	...	2,900 lepers
1885	...	...	...	1,195 ..

During this period of 30 years there has been a steady fall, with the exception of a slight rise in 1859. Until 1885 there was no law compelling the isolation of lepers. Dr. Kaurin has lately sent me a short paper (*Om Loven af 6te Juni 1885 angaaende Spedalskes Afsondring*) in which the following remarks occur:—"La loi de 1885 sur l'isolement des lépreux a donné lieu à de vives critiques, attendu qu'on l'a trouvée trop rigoureuse. La loi permet en effet dans certains cas et même sans l'assentiment des malades, a hospitaliser tel ou tel lépreux qui ne peut pas, ou ne veut pas, vivre dans un isolement suffisamment efficace d'avec sa famille ou son entourage; la loi va jusqu'à permettre la séparation de deux conjoints, après avis préalable du pasteur, et approbation du préfet."

Dr. Kaurin goes on to show that during the eight years which have elapsed since the law was passed, 99 lepers have been admitted to the Reknæs Asylum, of whom 14 came in by reason of the new law. He does not state what is the present leper population of Norway, but I think the above figures and dates are sufficient to show that the decrease of leprosy in Norway has been almost if not entirely independent of compulsory segregation.

IV. NORTH AMERICA.—The parts of North America to which those interested in leprosy first turn their attention are the North Western States, to which Norwegians have been immigrating for the last 50 years. Dr. Charles Hewitt (*Lancet*, March 26, 1892, p. 684) makes the following concise and apposite remarks on an interesting paper by Dr. Gronvald:—"This Report by the Committee on Leprosy of the State Board of Health of Minnesota came too late for presentation to the late Congress. It relates in very conservative language the experience we have had for the last forty years with leprosy in Minnesota. In no other State that I know of are all known lepers registered and kept under observation, and all suspected cases carefully looked into. The history of these cases has been very thoroughly studied. No further isolation than the use of their own beds and utensils is required, and this their own good sense and that of their relatives, as a rule, secures. It must be understood that the State Board of Health and the Local Boards have abundant power to enforce the strictest isolation, if found needful; but up to date there has not been any occasion for the use of such power, as the disease is limited to the immigrants, and has never appeared in the descendants of lepers, nor in anyone born in the State. It is under constant and careful observation, and has been for the last eighteen years under the care of the State Board of Health. The facts here officially stated will interest the students of a disease about which a good deal more has been written than is actually known."

Dr. Gronvald concludes his paper by the following quotation from Dr. Hansen (*Virchow's Archiv. Band CXIV., 1888*) who visited America in 1888 to study leprosy in the immigrated Norwegians and their descendants:—"I cannot here relate all my observations in detail. I will only tell what I have found in regard to the occurrence, or rather the disappearance, of lepers in America (N. W. States). Of about 160 lepers who have immigrated into the three States named (Wisconsin, Iowa, Minnesota), thirteen are alive whom I have seen myself, and perhaps three or four more. All the others are dead. Of all the descendants of lepers, (and that includes the great-grand children of some of them) not a single one has become leprous. This is, in short, the result of my investigations."

From the above considerations it would appear that in Trinidad there has probably not been much change one way or the other, but if anything there has been a slight decrease in the proportion of lepers to the general population; that in India there has been a marked absolute decrease; that in Norway there was a steady decrease long before compulsory segregation was thought of; and that in the North Western States of North America where leprosy was not endemic, the immigration of Norwegian lepers has not been attended with any prejudicial results to the rest of the community, nearly all the imported cases having died out, and no new cases having occurred.

It may be added here, that in Great Britain, with the exception of the well-known Dublin case of Dr. Hawtrey Benson, there has been no instance of a possible spread of the disease from one subject to another.

7.—A SUMMARY OF SIX YEARS' MORBID ANATOMY.*

During six years one hundred and nine autopsies were made by me on lepers in the Leper Asylum, and it may be interesting to notice briefly here the chief appearances met with, and to discuss some of the more interesting questions connected with the morbid anatomy of leprosy.

The three forms of leprosy are almost equally represented in the subjects of the autopsies, the number being—

Tuberculated	...	...	...	...	...	36
Anæsthetic	...	...	...	...	...	42
Mixed	...	...	...	...	...	31
Total						109

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 leprosy growth. The converse condition, the development of cutaneous tubercles in a case of pure anæsthetic leprosy, the writer has very seldom seen. Leloir† mentions three such cases.

Recent dissections by Gerlach‡ show that in anæsthetic leprosy the primary growth takes place in the skin around the peripheral ends of the nerves, extending afterwards up the branches to the main trunks. These observations, if confirmed, will bring the two forms of leprosy much closer together, for the mode of onset will thus become the same in both. A possible explanation of the more frequent transition of a tuberculated than of an anæsthetic into a mixed case is also afforded by Gerlach's researches. In tuberculated leprosy large tracts of skin are infiltrated with new growth containing quantities of bacilli, whereas in anæsthetic leprosy the new growth occurs in limited areas around the peripheral nerve endings, and soon travels up the nerves leaving the skin practically free from bacilli, for it is well known that these are seldom or never found in the skin in cases of anæsthetic leprosy. Now it is obvious that the risk which the nerves passing through the infiltrated areas in tuberculated leprosy run of becoming secondarily involved by extension from these areas is much greater than the risk which is incurred in anæsthetic leprosy, of the skin becoming infiltrated by a growth which, after the first onset, is practically confined to the nerves. The condition of the skin as to bacilli in extremely early cases of anæsthetic leprosy will be a matter for further research. Meanwhile it may be accepted as a fairly accurate statement that cases of tuberculated leprosy are those which have not lived long enough to become mixed.

The next point which demands attention is the average duration of the disease in each of the three forms. The number of years during which the patient had been a leper was only ascertained in ninety-two of the hundred and nine cases. Particulars are given in the following Table :—

Form of Leprosy.	Number of Cases.	Average duration of disease in years.
Tuberculated	30	6·4
Anæsthetic	32	10·8
Mixed	30	9·5
Total	92	9

It thus appears that the duration of life in tuberculated leprosy is about two-thirds that in mixed leprosy, while anæsthetic leprosy has a longer course than either of the other two. The reason of this is not apparent, for, as will be seen in subsequent Tables, visceral lesions are almost if not quite as common in anæsthetic as in tuberculated leprosy.

* Part of a paper published in Guy's Hospital Reports, 1891.

† Traité théorique et pratique de la lèpre, p. 209.

‡ Untersuchungen über die unabhängigkeit der Bildung anæsthetischer Hautflecke von der Erkrankung Zugehöriger Nerven bei der lepra anæsthetica. Dorpat, 1890.

In the next Table the expectation of life in leprosy in Trinidad is compared with that in Demerara and Norway :—

Form of Leprosy.	AVERAGE DURATION OF DISEASE.		
	Trinidad.	Demerara.	Norway.
Tuberculated ...	6·4	8·5	9·5
Anæsthetic ...	10·8	15·	18·5
Mixed ...	9·5	6·	No Return.

This Table shows that the average duration of tuberculated and anæsthetic leprosy in Demerara and Norway, as calculated by Hillis and Danielssen, is greater than that in Trinidad. Mixed leprosy appears to run a shorter course in Demerara, while in Norway no returns are given. The above-mentioned authors, however, exclude such diseases as phthisis and kidney disease, which they consider are intercurrent, and therefore unfairly reduce the average duration of leprosy as a disease considered apart. But, as will be shown further on, it is by no means certain that such diseases as those mentioned above are not dependent directly or indirectly on leprosy lesions, and even if they are intercurrent the expectation of life in leprosy is not affected by including them, as appears from the following Table :—

Form of Leprosy.	AVERAGE DURATION OF DISEASE.		
	All cases of Leprosy.	Leprosy with Kidney Disease.	Leprosy with Tuberculosis.
Tuberculated ...	6·4	7	5
Anæsthetic ...	10·8	17	13
Mixed ...	9·5	5	6
Total ...	9·	10	8

Omitting decimals, the average duration of all cases of leprosy is found to be nine years, while that in leprosy with kidney disease and leprosy with tuberculosis is ten years and eight years respectively. If these two complications are taken together the average duration is found to be nine years, exactly the same as in all cases of leprosy.

The next Table shows the average age at death in the three forms of leprosy. The ages obtained can, however, only be regarded as approximate, for members of dark-skinned races, as a rule, are very uncertain as to their ages, and a more or less rough estimate has often to be made :—

Form of Leprosy.	Age at Death.	Age at Onset.
Tuberculated ...	24	18
Anæsthetic ...	44	33
Mixed ...	40	30
Total ...	36	27

Decimals have again been omitted in this Table. As far as the figures can be trusted, they show that tuberculated leprosy appears much earlier in life than either of the other forms. But as it has already been shown that mixed leprosy is usually a sequel of the pure tuberculated variety, it ought to begin at about the same age. It is therefore probable that the last figures are not accurate.

The birth-places of the hundred and nine patients are as follows :—

Trinidad	...	...	...	...	59
India	...	...	...	...	30
Africa	...	...	...	...	6
China	...	...	...	...	2
Barbados	...	...	...	...	2
Germany	...	...	...	...	2
Demerara	...	...	...	...	1
France	...	...	...	...	1
Grenada	...	...	...	...	1
Madeira	...	...	...	...	1
Martinique	...	...	...	...	1
Nevis	...	...	...	...	1
Tobago	...	...	...	...	1
Born at sea	...	...	...	...	1
Total	...	...	...	...	109

It is worthy of remark that only three Europeans occur in the list, two of these being born in Germany and one in France. It must, however, be remembered that Europeans belonging to the lower classes are not numerous in Trinidad. As would naturally be expected, Trinidad supplies more than half of the total number, while a very considerable proportion is represented by Indian immigrants. The latter, before they are employed on the estates, are subjected to three medical examinations, one in Calcutta and two in Trinidad, and it is rarely that leprosy appears before the expiration of their five years' indenture. From these facts two inferences are possible, either that the usual incubation of leprosy in them is more than five years, or that they acquire the disease in Trinidad. Judging from recorded cases in which leprosy has developed in persons who have moved from an endemic area to a country free from indigenous leprosy, the latter seems the more probable hypothesis.

Lastly, reference must be made to the lesions found after death in the cases of leprosy under consideration. These are given in the following summary :—

CHIEF LESIONS FOUND AFTER DEATH.

Kidney Disease	...	...	...	...	35
Tuberculosis	...	...	...	...	33
Ulceration and Gangrene	...	...	...	...	12
Pyæmia	...	...	...	...	8
Obstruction of Larynx	...	...	...	...	7
Ankylostomiasis	...	...	...	...	7
Abscess and evidence of Hæmorrhage	...	...	...	...	4
Pneumonia	...	...	...	...	4
Cirrhosis of Liver	...	...	...	...	4
Gangrene of Lungs	...	...	...	...	3
Atheroma	...	...	...	...	3
Dysentery	...	...	...	...	3
Lardaceous Degeneration	...	...	...	...	3
Pleurisy	...	...	...	...	3
Syphilis	...	...	...	...	2
Pericarditis	...	...	...	...	2
Cardiac Hypertrophy	...	...	...	...	2
Abscess of Liver	...	...	...	...	2
Emphysema	...	...	...	...	1
Addison's Disease	...	...	...	...	1
Malarial Fever	...	...	...	...	1
Sunstroke	...	...	...	...	1
Facial Carbuncle	...	...	...	...	1
Cystitis	...	...	...	...	1
Cerebral Thrombosis	...	...	...	...	1
Hydronephrosis	...	...	...	...	1
Sacro-Iliac Disease	...	...	...	...	1
Cancer of Uterus	...	...	...	...	1
Strangulated Hernia	...	...	...	...	1
Hip-Joint Disease	...	...	...	...	1
Aortic Aneurism	...	...	...	...	1
Total	...	...	...	...	150

In many cases several different lesions were found in the same body, hence the total number of lesions is considerably in excess of the number of subjects examined. It is at once evident on looking at the Table that a very large proportion of the lesions are the result either of some form of kidney disease or of tuberculosis. As will be pointed out presently, the latter term is only used provisionally, and it may be necessary to change it at no distant date.

For the purposes of this paper the lesions mentioned in the above list may be divided into three groups :—

Kidney Disease	...	...	...	...	35
Tuberculosis	...	...	...	...	33
Other Lesions	...	...	...	...	82
Total	...	...	...	...	150

It is proposed to examine these groups separately, and to conclude with a few remarks on the distribution of leprosy bacilli in the tissues of the body.

Kidney Disease.

Kidney disease has long been known to be common in leprosy. Of the hundred and nine bodies examined, thirty-five or thirty-two per cent. showed some form of nephritis. Other renal changes, such as lardaceous degeneration, pyæmic infarction and syphilitic and tubercular deposit have purposely been omitted from this calculation. Sometimes, however, these changes have occurred in addition to the nephritis.

In order to determine whether kidney lesions are commoner in lepers than in persons free from leprosy, the records of deaths in the Colonial Hospital, Port-of-Spain, were examined, and it was found that seven and-a-half per cent. of the cases showed some form of kidney disease. Thus the percentage of cases of nephritis in the Leper Asylum appears to be more than four times that of similar lesions in the General Hospital. An allowance must be made for the fact that in the latter Institution some of the kidneys probably escaped examination, but even if the figures are doubled or trebled, the percentage of kidney lesions in the Asylum will still be greatly in excess of that in the Hospital.

Various statements have been made as to the nature of the kidney lesions in leprosy. Danielssen and Boeck^o say of tuberculated leprosy:—

“Les reins sont presque constamment plus ou moins attaqués si la maladie a duré longtemps, si même les autres organes internes sont demeurés tout à fait intacts. La capsule des reins est souvent revêtue de petits tubercules, la substance renale est aussi plus ou moins affectée. Nous ne doutons aucunement que chacun ne soit porté à reconnaître dans ces altération celle de la nephrite albumineuse, si parfaitement décrite et représentée par Rayer.”

Of anæsthetic leprosy they remark:—

“Les alterations sont les mêmes que celles constatées par nous sous la forme tuberculeuse, seulement nous avons remarqué ici deux fois une grand quantité de cystides formés surtout dans la substance renale.”

It is quite possible that the tubercles described by the above authors in tuberculated leprosy are identical with those presently to be discussed under the head of tuberculosis. The writer has also observed cysts in the kidney in several cases of leprosy, but these did not appear to differ from those found in non-leprous persons.

Bidenkap[†] regards the kidney changes as specific, and says that albuminuria is not uncommon in tuberculated leprosy.

Hillis[‡] quotes albuminous nephritis as causing twenty-two and-a-half per cent. of the deaths in tuberculated leprosy. In anæsthetic leprosy he mentions dropsy as a cause of death in eleven per cent. of the cases, but says that it is not dependent on nephritis.

Cornil and Babes[§] do not seem to recognize the ordinary forms of chronic nephritis in leprosy, but describe albuminous nephritis as coming on together with lardaceous changes in other viscera as the result of ulcerations of the skin and mucous membranes. They also state that the bacillus lepræ may invade the kidneys, together with all the tissues of the body, without producing any naked eye change.

Leloir^{||} states that Hansen has never found leprous changes in the kidneys.

The following Table shows the number and varieties of kidney lesions occurring in the thirty-five cases of leprosy already mentioned:—

Form of Leprosy.	FORM OF KIDNEY DISEASE.				
	Acute Nephritis.	Large white Kidney.	Mixed Kidney.	Contracted Kidney.	Total.
Tuberculated ...	1	9	3	2	15
Anæsthetic ...	...	3	8	1	12
Mixed ...	..	2	4	2	8
Total ..	1	14	15	5	35

The case of acute nephritis scarcely comes within the scope of the present enquiry, for the left kidney was congenitally atrophied, weighing only half a drachm, and probably the acute attack was in a great measure caused by the almost double work which devolved on

* *Traité de la Spedalskhed*, pp. 226, 289.

† *Lectures on Lepra*, p. 47.

‡ *Leprosy in British Guiana*, pp. 39, 111.

§ *Les Bactéries*, p. 769.

|| *Op. cit.*, p. 256.

the right kidney. If this case is subtracted it will be seen that the total number of cases of kidney disease is almost the same in tuberculated and anæsthetic leprosy, while in mixed leprosy the kidney lesions are less numerous. The different forms of chronic kidney lesion are almost equally distributed in the different varieties of leprosy, with the exception of the large white kidney, which shows a preponderance in cases of tuberculated leprosy, and of the mixed kidney, which shows an almost equal preponderance in cases of anæsthetic leprosy.

The next Table shows the average duration of the different forms of leprosy when associated with the varieties of kidney disease already mentioned :—

Form of Leprosy.	AVERAGE DURATION OF LEPROSY IN DIFFERENT FORMS OF KIDNEY DISEASE.				
	Acute Nephritis.	Large white Kidney.	Mixed Kidney.	Contracted Kidney.	Total.
Tuberculated ...	7	7	7	8	7
Anæsthetic ...	...	19	14	...	17
Mixed ...	...	4	6	...	5
Total ..	7	10	9	8	10

But kidney disease was often associated with lesions of other viscera. Hence it is probable that in some cases nephritis was not alone responsible for shortening life, and the above figures are not strictly accurate. In eight cases kidney disease co-existed with tuberculosis. All these have been eliminated from this and the corresponding Table in the next section, for the results obtained both in kidney disease and tuberculosis would thus have been considerably vitiated. As it is, the figures, though not strictly true, may be regarded as approximate.

The most noticeable point in this last Table is the much longer duration of life in anæsthetic leprosy associated with kidney disease than in either of the other two forms of leprosy when occurring in conjunction with renal changes. Two patients with large white kidney had suffered from anæsthetic leprosy for twenty-three and fifteen years respectively, while four patients with mixed kidney had been anæsthetic lepers for thirty-four, twenty, seventeen and thirteen years respectively. This is possibly to be explained by the different degrees in which the sweat glands are involved in the three varieties of leprosy. The cutaneous changes are more rapid and extensive in tuberculated and mixed than in anæsthetic leprosy. In the first two forms a sudden eruption of tubercles may damage a large number of sudoriparous glands, and so make a sudden demand on the secreting structure of the kidney. In anæsthetic leprosy on the other hand the changes in the sweat glands are more gradual and often of less severity, so that the strain thrown on the kidneys is less.

The kidneys were examined microscopically in seventy-seven of the hundred and nine cases, and in only seven instances were leprosy bacilli found, twice in tuberculated and five times in mixed leprosy. It is an interesting fact that in all these seven cases the kidneys appeared healthy to the naked eye. This agrees with the statement of Cornil and Babes already quoted.

In none of the thirty-five cases of kidney disease were leprosy bacilli found. It may therefore be considered highly probable that the forms of nephritis which occur in leprosy are—at least in the majority of instances—not due to leprosy growth in the kidneys, but are the result of interference with the functions of the skin. This hypothesis is supported by the fact, already referred to, of the longer duration of cases of kidney disease associated with anæsthetic leprosy.

Tuberculosis.

Visceral tuberculosis has been described in leprosy by various writers. Of the hundred and nine subjects examined, tuberculosis of one or more serous membranes or viscera was found in thirty-three or thirty per cent. The records of the Colonial Hospital, already referred to, show a percentage of eighteen and-a-half deaths from tuberculosis. It must be remembered that cases of phthisis are excluded, if possible, from a general hospital, though this objection perhaps has not the same force in the tropics, where patients are often taken in to prevent their dying in the streets. Even if the objection be admitted, it will probably still be safe to infer that deaths from tuberculosis, especially of the lungs, are commoner in lepers than in the ordinary population.

A question naturally arises whether these lesions are due to invasion by the bacillus of leprosy or the bacillus of tubercle. The answer is not as easy as at first sight appears.

Danielssen^o says :—

“Il est difficile d'admettre que deux germes différentes, ayant pénétré à peu près à la même époque dans le sang, aient pu produire, chacun de son côté, des maladies telles que la lèpre et la tuberculose. Il me paraît beaucoup plus probable que la même cause d'irritation (bacilles de la lèpre), qui produit dans la peau des éruptions, dans le tissu conjonctif des viscères des neoformations, puisse donner naissance, dans d'autres tissus de l'organism, à la tuberculose.”

He calls attention to the fact that the disappearance of cutaneous tubercles in a case of leprosy is not infrequently followed soon after by the development of visceral tuberculosis, and he raises the question whether the bacillus of leprosy and that of tuberculosis are not identical. He is led to make this suggestion by the extremely unsatisfactory distinctions between the two bacilli. With regard to the alleged difference in size, he states that bacilli from cases of leprosy in Spain are larger than leprosy bacilli from Norway.

Arning† writes as follows :—

“In all advanced tubercular cases, I was struck with the extreme frequency of grave changes in the larger viscera, more especially the lungs, liver, spleen and bowels. These organs presented an aspect quite new to me, and closer examination of their tissues has enabled me to prove that we have been mistaken in attributing deaths of lepers to intercurrent pneumonia, tubercular phthisis and dysentery, which were simulated by the clinical symptoms. The ulcerations of the bowels and the breaking down of lung tissue are due to leprosy infiltrations, and we shall have to modify our opinions of leprosy being mainly a disease of the cutis and peripheral nerves, and introduce terms such as phthisis leprosa, and enteritis leprosa.”

Hansen,‡ on the other hand, regards the changes found in the lungs, intestines, bronchi, brain and spinal cord of lepers as tubercular, not leprosy.

Damaschino§ states that he has succeeded in producing tuberculosis in guinea pigs by inoculating them with fragments of phthisical lung from lepers. He is thus led to regard the phthisis of leprosy as produced by the bacillus tuberculosis, but he says that he has also recognised the bacillus lepræ in the lungs in those cases. This appears to be a somewhat bold diagnosis.

The above quotations show what very different statements have been made as to the nature of visceral tuberculosis in leprosy. Before proceeding to examine the evidence obtainable from the Trinidad Asylum it will be well to give two short Tables prepared with reference to the cases under consideration.

The first Table shows the various viscera and serous membranes affected, and the distribution of these lesions in the different forms of leprosy :—

Form of Leprosy.	VISCERA AFFECTED.										
	Lungs.	Lungs and Peritoneum.	Pleura.	Lungs and Liver.	Lungs, Liver, Kidney, Spleen, Pleura, Omentum and Peritoneum.	Omentum and Peritoneum.	Lungs, Liver and Spleen.	Lungs and Spleen.	Lungs, Spleen and Kidneys.	Liver, Kidneys, Spleen and Peritoneum.	Total
Tuberculated	5	...	1	1	...	...	2	1	1	1	12
Anæsthetic	8	1	...	...	..	...	1	1	1	...	12
Mixed	4	1	...	1	1	1	...	...	1	..	9
Total	17	2	1	2	1	1	3	2	3	1	33

The tubercles observed in the viscera had the naked eye appearances presented by tubercles in non-leprosy subjects. Destruction of lung tissue was in many cases very rapid, the lungs being speedily converted into bags of pus. It will be noticed that in only three cases did the lungs escape. In one of these the pleura only was affected, in another the omentum and peritoneum, and in another the liver, kidneys, spleen and peritoneum. In those cases in which the lungs alone were affected, the leprosy was tuberculated in five instances, anæsthetic in eight, and mixed in four. Taking, however, the total cases of visceral infection, the three forms of leprosy are almost equally represented, twelve cases being tuberculated, twelve anæsthetic, and nine mixed. It may therefore be concluded that visceral tuberculosis is quite as common in anæsthetic leprosy as in either of the other forms.

* Contribution à l'étude de la lèpre. Archives Romaines. Jan., 1889.

† Report to Hawaiian Board of Health, 1886. Appendix, p. xli.

‡ Leloir. Op. cit., p. 256.

§ Arch. de Méd. et d'Anat. Path., Paris, 1891, p. 213.

The next Table shows the average duration of the different forms of leprosy in the above varieties of visceral tuberculosis :—

Form of Leprosy.	AVERAGE DURATION OF LEPROSY IN DIFFERENT VARIETIES OF VISCERAL TUBERCULOSIS.										
	Lungs.	Lungs and Peritoneum.	Pleura.	Lungs and Liver.	Lungs, Liver, Kidney, Spleen, Pleura, Omentum and Peritoneum.	Omentum and Peritoneum.	Lungs, Liver and Spleen.	Lungs and Spleen.	Lungs, Spleen and Kidneys.	Liver, Kidneys, Spleen and Peritoneum.	Total.
Tuberculated	7	...	...	5	...	...	5	2	...	...	5
Anæsthetic	7	...	...	...	...	...	...	18	...	...	13
Mixed	11	3	...	5	...	...	...	...	...	...	6
Total	8	3	...	5	...	...	5	10	...	...	8

In many of the cases the duration of the leprosy could not be ascertained. The above Table is therefore very fragmentary, but the general results obtainable from it are almost the same as in cases of leprosy with kidney disease, and not very different from the average durations in all cases of leprosy.

Seeing that the distinctions between the bacillus of leprosy and that of tubercle are so very unsatisfactory, it may be well to consider here the other arguments for and against the leprosy nature of visceral tuberculosis.

In the first place all attempts to cultivate bacilli from fragments of phthisical lung or tuberculous viscera failed in the Trinidad Asylum. This, so far as negative evidence is of value, supports the theory of a leprosy origin, for it is by no means certain that the bacillus lepræ has been cultivated. The results of Bordoni-Uffreduzzi,^o Gianturco† and Campana‡ have not yet been confirmed.

Secondly, attempts to infect fowls by feeding with fragments of phthisical lung failed in Trinidad. Other results, however, were obtained in guinea pigs by Damaschino and also by the writer, as will be shown in another part of this Report.

Thirdly, in several cases of tubercular and mixed leprosy in which cutaneous tubercles rapidly diminished towards the end, numerous miliary tubercles were found in the viscera after death, as described by Danielssen. It has, however, been already shown that visceral tuberculosis is quite as common in anæsthetic leprosy as in either of the other two forms. Of the twelve cases of visceral tuberculosis in anæsthetic lepers, four were of the miliary variety indicating recent infection. In these cases there could not have been absorption of cutaneous tubercles.

From the above observations and experiments it seems therefore that the evidence at present is in favour of tuberculosis as the cause of the visceral lesions above referred to.

Other Lesions.

Ulceration and gangrene were present to some extent in very many of the cases examined. Indeed it is seldom that a leper passes through life without suffering in this way at one time or another. Ulceration is very apt to spread rapidly shortly before death and to become complicated with gangrene. These lesions were present to a marked degree in twelve cases only. The amount of gangrene in the Trinidad Asylum is much less than it used to be. This diminution is very probably in great part due to the practice now carried out, of early and free incision down to the bone in cases of sinus or ulcer. Amputation for gangrene has also been followed by good results in several cases.

Pyæmia was found in eight cases. In one case it followed amputation through the thigh for elephantiasis, from which the patient suffered in addition to leprosy. In another case it occurred as a sequel of facial carbuncle, the necropsy revealing thrombosis of the

* Zeitschrift für Hygiene. Band. III., p. 178.

† Gior. della Assoc. Nap. di Med. et Nat., 1890.

‡ Riforma Med., No. 14, 1891.

ophthalmic veins and pus in the cavernous sinus. In two cases absorption took place from gangrene of the legs, while in the four remaining cases pyæmia followed sloughing ulcers of the cæcum, suppurating cervical glands, sacro-iliac disease and ulceration of the larynx respectively. It is remarkable that pyæmia does not oftener occur in leprosy.

In seven cases death occurred from obstruction of the larynx caused by leprosy changes. In one patient who afterwards died of phthisis, life was prolonged for four months by tracheotomy, and in Norway^o several years of life have often been gained by this operation. As a matter of fact it would be safer always to perform tracheotomy as soon as the larynx is distinctly involved, for symptoms of obstruction often come on very rapidly in lepers, and death from asphyxia may occur before surgical assistance can be obtained.

The ankylostoma duodenale was present in greater or less quantity in seven instances. In case 108 death was traceable to the intense anæmia following the intestinal hæmorrhage produced by the parasite. The liver yielded, on analysis by Mr. Carmody, Government Analyst, .26 per cent. of iron, while the spleen gave 3.28 per cent. In the other cases the presence of ankylostomata no doubt contributed to the fatal result. These worms are very common in Trinidad, and are found chiefly among the Indian immigrants. They give rise during life to symptoms indistinguishable from those of pernicious anæmia.

In four cases death was due to abscess or hæmorrhage, or both. In three of these cases hæmorrhage came on after amputation for abscess or gangrene, and the patients already weakened by suppuration succumbed. Generally speaking the blood of lepers clots very rapidly, and healing takes place quite as easily, if not more so, than in non-leprosy subjects. Case 44 is interesting in this respect. A thoracic aneurysm was found, which had undergone spontaneous cure. The blood of lepers has been examined by Danielssen and Boeck,† Hillairet‡ and the writer,§ and their results, though probably not strictly accurate, tend to show that the percentage of fibrin in the blood of lepers is greater than in that of ordinary people.

Pneumonia was found in four cases, and presented no points of special interest. In two cases it was associated with pyæmia, in a third it occurred in a patient broken down by alcoholic excess, while in the fourth case it followed influenza.

Cirrhosis of the liver occurred in four lepers, once in a patient who was also the subject of large white kidney, once with atheroma of the orifices of the heart, once in association with granular kidney and tubercle of the lungs and peritoneum, and once alone.

Gangrene of the lung was found three times. In the first case the patient was a confirmed alcoholic; the second patient suffered from kidney disease; the third case was in an old patient who showed no other visceral lesion beyond fatty degeneration of the liver and kidneys.

Atheroma was markedly present in three cases. In the first case there were sharp calcareous masses at each of the four valvular orifices of the heart, but these were largest above the mitral and aortic valves. In the next case there was atheroma of the Circle of Willis, giving rise to thrombosis. In the third case there were patches of atheroma on the aorta, mitral valve and one of the aortic valves. The mitral orifice was contracted and the heart was considerably hypertrophied, weighing thirteen ounces. Atheroma was of course present in a less degree in other cases, but in these three it was more or less concerned in causing death.

Dysentery materially contributed to the fatal result in three cases. In one it occurred alone in an old patient, and in the other two it was associated with abscess of the liver and kidney disease respectively.

Lardaceous degeneration was found three times, once in association with phthisis, once with kidney disease, and once with superficial ulceration of the trunk and extremities.

Though more or less pleuritic adhesion was found in nearly every case, pleurisy to a marked degree was only seen in three cases. In these it occurred in conjunction with abscess of the liver, tuberculosis of the lungs, and kidney disease and acute pericarditis respectively.

Evidences of syphilis existed in several cases, but in cases 4 and 32 they were most marked, being represented in the first case by fibrous testes, gummata of the liver, spleen and kidneys, and a gummatous mass round the seventh pair of nerves at their exit from the skull, and in the second case by fibrous testes and destruction of the epiglottis and bones of the nose.

Pericarditis occurred in two patients, once in association with kidney disease and once with tuberculosis. In the first case there were several ounces of fluid in the pericardium and some flakes of lymph on the walls of the heart. In the other case the disease was

^o Abraham. *Epidem. Soc. Trans.*, vol. VIII., p. 135.

† *Traité de la Spedalskhed*, pp. 238, 296.

‡ *Ann. de Dermat et Syphilog.*, Tome v., No. 3.

§ *Lancet*, Jan. 9, 1892.

evidently more chronic, for the pericardium was filled with layers of partly organized lymph altogether about three quarters of an inch thick.

Cardiac hypertrophy was found in two cases. In one there was atheroma of the valves, but in the other no sufficient cause was found, the chief conditions recognized being ulceration of the extremities, and of the epiglottis and vocal cords.

Abscess of the liver also occurred twice. In both patients there were multiple abscesses. In the first case there were a few small abscesses near the portal fissure, the largest only three quarters of an inch in diameter, while in the second case there were five large abscesses containing from two to three pints of pus. The first patient was the subject of ulceration and gangrene, the second suffered also from dysentery.

Disease of the adrenals was found in one case, associated with asthenia and numerous pigmentary changes. The writer has not found any record of the occurrence of this disease in dark-skinned races. There were evidences of syphilis in the case referred to, but beyond the adrenal disease no lesions were found which would have been sufficient to cause death.

Sunstroke was accountable for death in one case. This is a very rare affection in Trinidad in spite of its tropical climate. The patient, who suddenly fell down unconscious while sitting out of doors, died exactly twenty-four hours after the onset of the symptoms, and a necropsy two hours after death showed no lesion beyond congestion of some of the viscera. The temperature in the centre of the liver was found to be 106° , while in the spleen it was 103.2° , and in the right and left pleural cavities 102.2° and 101.4° respectively.

Apparently uncomplicated malarial fever caused death in one case. This is a rare occurrence at the Asylum, for though malarial fever is very common among the inmates, death seldom results from this disease alone.

Facial carbuncle occurred in a leper who was subject to maniacal attacks, and who used to put his head in the oven to get rid of supposed evil spirits. Insanity is not uncommon amongst lepers, but no leprosy changes have ever been found within the cranium by the writer. Chassiotis,^o however, says that he has detected leprosy bacilli in the spinal cord.

Cystitis was found in one case as the result of the introduction of a straw four and-a-half inches long into the urethra by the patient himself. This straw had evidently been some time at the neck of the bladder and was thickly coated with phosphates.

Death was caused in one case by thrombosis resulting from atheroma of the Circle of Willis in an old patient.

Of the remaining lesions in the list, namely, emphysema, hydronephrosis, sacro-iliac disease, cancer of the uterus, strangulated hernia and traumatic hip-joint disease, single examples occurred. They are sufficiently described in the Table at the end of this paper, and do not call for special comment.

On looking through the list of lesions which has now been considered, it is worthy of note that, with the exception of ulceration, gangrene, abscess, obstruction of the larynx from leprosy deposit, and some cases of pyæmia, namely those in which absorption from gangrenous ulcers of the skin or larynx appears to have taken place, none of the morbid changes can with certainty be directly traced to leprosy. In other words, reckoning half the cases of pyæmia as due to leprosy absorption, only twenty-seven lesions out of one hundred and fifty can be regarded as undoubtedly traceable to leprosy changes. Many of the lesions at the end of the list are obviously quite independent, while the ætiology of others, as was shown earlier in this paper, is still uncertain.

The Distribution of the Leprosy Bacillus.

Lastly, a few words may be said as to the distribution of the leprosy bacillus in the tissues. The result of microscopic examination in one hundred out of the hundred and nine cases is given in the subjoined Table :—

Table of distribution of Leprosy Bacilli in one hundred cases of Leprosy examined after death.

MATERIAL EXAMINED.	BACILLI.																	
	NUMEROUS.				GENERALLY DIFFUSED.				FEW.				NOSE.				Total number of cases examined.	Percentage of cases in which Bacilli were found.
	Tuberculated.	Anæsthetic.	Mixed.	Total.	Tuberculated.	Anæsthetic.	Mixed.	Total.	Tuberculated.	Anæsthetic.	Mixed.	Total.	Tuberculated.	Anæsthetic.	Mixed.	Total.		
Femoral Glands	10	..	6	16	3	2	3	8	4	2	6	12	13	23	14	50	86	42
Liver	..	..	3	5	2	1	2	5	5	1	6	12	17	32	13	62	84	26
Larynx	3	..	8	11	2	1	2	5	..	..	2	2	18	..	2	5	23	78
Median Nerve	2	3	1	6	..	2	1	3	2	3	3	8	17	23	22	62	79	21
Spleen	2	..	5	7	2	1	..	3	3	..	3	6	16	30	13	58	74	21
Tubercle of Skin	2	..	2	4	2	..	..	2	1	..	2	3	9	..	1	3	12	75
Testis	2	..	2	4	..	..	1	1	1	..	1	2	7	12	11	30	37	19
Kidney	1	..	1	2	..	..	1	1	1	..	3	4	7	31	15	70	77	9
Lung	1	..	1	2	1	..	1	1	..	1	3	4	7	24	6	31	38	18
Epiglottis	..	..	..	..	..	..	2	..	..	..	..	..	2	..	..	..	2	..
Mesenteric Gland	..	..	..	..	..	..	..	..	1	..	1	2	2	1	..	1	3	..
Intestine	..	..	..	..	1	..	..	1	..	..	..	..	1	2	..	3	4	..
Sciatic Nerve	..	..	..	..	..	..	..	..	..	..	1	1	1	2	1	4	5	..
Ulnar Nerve	..	..	..	..	..	..	..	..	1	..	..	1	1	..	..	1	2	..
Superior Cervical Ganglion.	..	1	..	1	..	..	..	..	..	..	..	..	1	..	..	..	1	..
Tongue	..	..	..	..	..	..	..	..	..	..	1	1	1	..	..	..	1	..
Solitary Follicle	..	..	..	..	..	..	..	..	1	..	..	1	1	..	..	..	1	..
Lumbar Gland	..	..	..	..	..	..	..	..	1	..	..	1	1	..	..	..	1	..
Total	25	4	29	58	15	7	10	32	21	7	32	60	150	170	98	381	531	..

Besides the material examined in the above Table, several other viscera and tissues were examined with negative result. These included brain, pons, spinal cord, anterior cervical and dorsal roots, ganglion of vagus, ganglion of aortic plexus, atheromatous cerebral artery, mediastinal, bronchial and renal glands, tubercles of mesentery, pleura, omentum, intestine and diaphragm, ante-mortem clot, infarcts, medulla of bone, adrenal bodies, ovarian cyst, cancer of uterus, heart muscle, anæsthetic skin and discharge from ulcers and abscesses. The number of these additional examinations amounted to fifty. Adding this to the three hundred and eighty-one negative examinations recorded in the Table, a total of four hundred and thirty-one instances in which bacilli were not found is obtained. If to this again we added the hundred and fifty observations which showed leprosy bacilli, it will be seen that there were found in one hundred and fifty out of five hundred and eighty-one observations, or rather more than twenty-five per cent.

It must be clearly understood that these results are only of the roughest description. To form any accurate idea of the exemption or not from leprosy bacilli of a tissue or viscus, many examinations of different parts of the structure would have to be made, for it is well known that the distribution of bacilli in a tissue or viscus may be very local. The figures given above only represent the results of routine examinations of fresh tissues made immediately after the necropsies, and would be more correctly described as referring to the tissues and viscera in which bacilli are most easily found.

It may perhaps seem remarkable that so few examinations of cutaneous tubercle appear in the list, but this material is obtained so much better during life, that most of the specimens examined were taken from living patients. The results of such examinations have therefore no place in this Table, which concerns only dead subjects.

It will not be fair to calculate percentages for more than the first nine tissues and viscera in which bacilli were found, for so few specimens of those in the second half of the list were examined, that the percentages obtained would be valueless. It will be seen that the highest percentage of successful examinations was in the larynx and was seventy-eight. Omitting decimals, the other percentages were cutaneous tubercles seventy-five, femoral glands forty-two, liver twenty-six, spleen twenty-one, median nerves twenty-one, testes nineteen, lungs eighteen, and kidneys nine. It is a striking fact that bacilli are very much less common in the kidneys than in any other of the viscera which have been frequently examined. In the liver, spleen, testes and kidneys leprosy bacilli were found when no naked eye changes could be detected. This accords with Cornil and Babes' observations already quoted. Indeed the writer has never seen any visceral microscopic changes which could with certainty be ascribed to leprosy.

Meanwhile the general axiom holds good, that in every case of leprosy, during a part or the whole of its course, leprosy bacilli are to be found if a long enough search is made for them. Whether any or what viscera are invaded in a given case seems however to be subject to no fixed law.

8.—A RETROSPECT OF SIX YEARS' SURGERY.*

A priori it might be supposed that in a wasting, exhausting disease like leprosy, wounds would heal slowly and imperfectly, and that troublesome chronic suppuration might be set up, with consequent lardaceous and other changes. This we know is the case in tuberculosis, a disease which every year is shown to be more and more closely allied to leprosy. Experience, however, tells us that in leprosy the course of events is very different. Incisions in lepers usually heal with astonishing rapidity, producing firm cicatrices as quickly, if not more so, than in non-leprous patients.

An explanation of this rapid healing was, I think, perhaps be found in the very rapid clotting which takes place in the blood of lepers. This is usually so marked that the labour of tying or twisting bleeding points is very materially lessened in operations on lepers. Occasionally the blood coagulates so rapidly that if a minor operation such as incision of a sinus is being done over a basin of water, the blood settles at the bottom of the vessel in round compact clots.

The fibrin in the blood of lepers has been estimated by Danielssen† and Boeck, who found in fourteen analyses that the percentage ranged from 0.22 per cent. to 0.6 per cent. Hillairet‡ also in three analyses found the percentage to be from 0.31 to 0.61. In fifty analyses which I made at the Trinidad Asylum, I found the range to be from 0.12 to 1.87, the average being 0.76. It is quite possible that my percentages may be rather high, owing to a somewhat rough method of analysis, but even allowing a margin for errors of experiment, the results will, I think, be considerably above 0.2 per cent., the percentage of fibrin in normal blood. I hope soon to obtain some more exact analyses.

Another fact which pointed to the facility with which the blood of lepers coagulates was the discovery in the body of an anæsthetic female leper, who died in the Asylum, of a large thoracic aneurysm filled with firm laminated clot. The centre of the clot had begun to break down into grumous debris.

* Published in St. Louis Medical and Surgical Journal, 1893.

† *Traité de la Spedalskhed*, pp. 238, 296.

‡ *Ann. de Dermat et Syphilog.* Tome v., No. 3.

Whatever the explanation the fact remains, that the tissues of lepers heal well when operated on, and we now come to practical details. I propose first to give a short Table showing the chief operations done at the Trinidad Leper Asylum during a period of six years, and then to make a few remarks on the various operations.

Operations performed at the Trinidad Leper Asylum during a period of six years.

OPERATION.	FORM OF LEPROSY.								GRAND TOTAL
	TUBERCULATED.		ANÆSTHETIC.		MIXED.		TOTAL.		
	M.	F.	M.	F.	M.	F.	M.	F.	
Amputation :									
Through Thigh...	1	...	1	...	...	...	2	...	2
" Knee ...	...	...	1	...	...	...	1	...	1
" Leg ...	...	...	2	1	2	1	4	2	6
" Ankle...	...	...	1	...	...	...	1	...	1
Of Great Toe ...	1	...	21	1	3	...	25	1	26
" Toe ...	...	...	34	1	1	...	35	1	36
Through Arm ...	...	...	2	...	...	...	2	...	2
Of Thumb ...	...	...	1	...	...	1	1	1	2
" Finger ...	...	...	31	2	8	...	39	2	41
Stretching of :									
Sciatic ...	...	1	20	2	6	...	26	3	29
External Popliteal ...	...	...	8	1	3	...	11	1	12
Median ...	3	3	23	3	8	2	34	8	42
Ulnar at Elbow ...	3	1	7	1	7	...	17	2	19
" Wrist ...	1	...	3	...	1	...	5	...	5
Supraorbital ...	...	...	3	...	...	...	3	...	3
Facial ...	...	...	...	...	1	...	1	...	1
Removal of :									
Necrosed bone or Cartilage ...	4	2	509	23	92	...	605	25	630
Tubercles front face or arm ...	13	10	...	...	8	3	21	13	34
" " Conjunctiva ...	1	...	...	...	1	...	2	...	2
Exuberant Granulations ...	2	...	8	...	5	...	15	...	15
Recurrent Keloid ...	...	...	3	...	...	...	3	...	3
Papilloma ...	...	...	1	...	...	...	1	...	1
Fibroma ...	...	...	3	...	...	...	3	...	3
Yaw Tubercles ...	...	...	1	...	1	...	2	...	2
Eye-ball ...	...	...	1	...	...	...	1	...	1
Belly of Gastrocnemius ...	...	...	...	1	...	...	...	1	1
Hæmorrhoids ...	...	...	1	...	...	...	1	...	1
Enlarged Gland ...	...	...	1	...	...	...	1	...	1
Cyst... ..	...	...	...	...	1	...	1	...	1
Ligature of :									
Vessels supplying Tubercle of Con- } junctiva	3	...	...	...	2	...	5	...	5
Hæmorrhoids ... ..	...	...	1	...	...	...	1	...	1
Incision :									
Of Abscess, Sinus, Ulcer or to relieve } Tension	33	7	786	46	141	3	960	56	1,016
Patellar Bursa ... ..	...	...	1	...	...	...	1	...	1
Cyst of Ear ... ..	...	...	1	...	...	...	1	...	1
For Elephantiasis	1	...	...	...	...	...	1	...	1
Tracheotomy ... ..	...	...	...	...	1	...	1	...	1
Circumcision	10	...	3	...	3	...	16	...	16
Intestinal Operations :									
Herniotomy ... ..	...	...	1	...	...	...	1	...	1
Linear Cauterization of prolapsed } Rectum ... ..	...	...	1	...	...	...	1	...	1
Ophthalmic Operations :									
Cataract Extraction ... ..	...	...	3	1	1	...	4	1	5
Iridectomy ... ..	...	...	3	...	3	...	6	...	6
For Pterygium	5	...	1	...	...	...	6	...	6
Tattooing Eye ... ..	...	...	...	...	1	...	1	...	1
Miscellaneous :									
Skin Grafting ... ..	...	...	...	5	...	...	...	5	5
Paracentesis Abdominis	2	2	...	...	...	...	2	2	4
TOTAL	83	26	1,489	88	300	10	1,872	124	1,996

* Lancet, January 9, 1892, p. 83.

† Path. Soc. Trans., Vol. XXXVIII. p., 120.

From the Table it will be seen that during the period mentioned, some 1,996 operations were done in the Trinidad Asylum. It will of course be understood that the number of operations given in the Table does not represent an equal number of patients. Many separate operations are often done on the same patient. These operations may be of the same kind or of different kinds.

It is at once apparent that by far the most operations were performed on anæsthetic lepers. Thus 1,489 were done on anæsthetic males and 88 on anæsthetic females. Amongst tuberculated lepers there were only 83 operations on males and 26 on females, while mixed leprosy occupies an intermediate position, the operations on males numbering 300, and those on females 10.

The number of women in the Asylum is 50 out of 216, or rather less than a quarter of the whole inmates. The total operations on women are only 124 out of 1,996. To preserve the ratio, they ought to be nearly 300. This lower proportion of operation cases amongst the female lepers is doubtless explained by the fact that they do less hard out-door work than the men. The latter are allowed to cultivate gardens and to keep half the proceeds of the sale of the vegetables they raise. The love of gain often prompts them to work beyond their strength, and the results are ulcers and abscesses of the fingers and hands, caused by friction of the gardening tools against the anæsthetic skin. Necrosis of the bones often follows.

A few remarks may now be made on the different operations.

Amputations.

Two amputations through the thigh were performed. One in a tuberculated leper was done at the patient's request, to get rid of a leg which was affected with Elephantiasis Arabum as high as the knee.* Free incisions through the thickened subcutaneous tissue had been tried but only slight and temporary diminution in the size of the leg had been obtained. The flaps united rapidly—indeed too rapidly—for in fourteen days the boy died of pyæmia, the necropsy showing infarcts in the lung. I regretted afterwards that I had not left the flaps open in order to ensure absolutely free drainage, but the infiltration had not extended above the knee and a drainage tube was fixed in the stump.

The existence of leprosy and Elephantiasis Arabum in the same patient is very rare. Vincent Richards† examined 636 patients suffering from Elephantiasis at Balasore and found only two lepers amongst them. I have not seen another case in which the two diseases were present together.

The second case of amputation through the thigh‡ was done for gangrene of the foot and leg, when the patient was almost moribund. The stump healed in three months, some delay having been caused by sloughing of the flaps. The patient died of granular kidney and dysentery five years and nine months after the operation, and there is every reason to believe that the amputation prolonged life for that period.

The amputation through the knee§ was done for a similar reason—leprosy gangrene. In this case there was considerable sloughing of the flaps, and the patella and much dead tissue were subsequently removed. The stump never entirely healed, but a granulating surface some three inches in diameter was left. The patient died of pleuro-pneumonia one year and ten months after the operation. It is probable that in this case the freely discharging granulating stump acted as an efficient drain. The patient was a Portuguese, and it is noteworthy that lepers of this nationality have the disease very badly.

In these two cases I was not surprised to find sloughing of the flaps, for I amputated before the line of demarcation had formed—a proceeding usually condemned in operations for gangrene. I believe that had I waited for the line to form, both lives would have been sacrificed.

The six amputations through the leg were also done for ulceration and gangrene. In one the operation was done at the request of a patient *in extremis* to relieve pain and remove the stench of the gangrene and promote euthanasia. These results were attained, the patient living about four days after the operation in comparative comfort. In another case the patient sank soon after the amputation, exhausted by long continued suppuration and unable to stand the additional drain caused by the hæmorrhage attending the operation. Two other patients died from other diseases at varying times after their legs had been removed, while the other two are still living and in fair health.

One amputation was done through the ankle, also for ulceration and gangrene.

Amputation of the great toe was found necessary in 26 cases. Necrosis of the bones of the great toe is very common, the disease sometimes beginning in the toe and sometimes spreading from a perforating ulcer further back. When all the bone has come away piecemeal, a useless flail-like member is left, which impedes walking, and which the patient usually begs to have removed.

The same remarks apply to amputations of other toes, which operation was performed 36 times. If once the bone begins to come away in any quantity and with rapidity, the toe rarely closes satisfactorily and operative interference is usually necessary. Where the

* Lancet, Jan. 25, 1890, p. 194.

† Fox and Farquhar Skin Diseases of India, Appendix VIII, p. 135.

‡ Brit. Med. Journ., Mar. 7, 1885, p. 484, and Mar. 1, 1890, p. 477.

§ Ibid.

process of elimination is more gradual, the tissues adapt themselves better, and greatly shortened toes may often be seen in which the nail is transposed from the last to the first phalanx, the intermediate phalanges having been thrown off or absorbed, as the case may be.

The two cases of amputation of the arm have already been published.^o They were both done for diffuse acute suppuration which had travelled from the hand up the forearm, burrowing amongst the muscles. In one case there was a firm cicatrix in 27 days, and the patient gained flesh. He died however 8 months later of phthisis. In the second case the patient, a Hindu, died of hæmorrhage after the amputation, the fatal result being no doubt assisted by the long continued suppuration which had rendered the operation necessary.

To the amputations of thumbs and fingers the same remarks apply as in the case of toes. A rapid and firm cicatrix is usually obtained after these amputations.

In nine patients I have found constrictions of fingers and toes closely resembling the condition known as *ainhum*. In many cases the extremity hung by a narrow pedicle and a snip with a pair of scissors was all that was required to separate it. All the bone had usually disappeared from the end thus constricted. I have not yet succeeded in arriving at a satisfactory explanation of the cause of this condition.

Nerve Stretching.

The next group of operations to be considered is the stretching of various nerves. This operation has been done 113 times in the Trinidad Leper Asylum. As an account of the cases has already been published,[†] it will be sufficient here to give a short summary of the results.

Victor Horsley has shown that when the lumbar cord is exposed in the dead body and the great sciatic nerve is stretched, the stretching is observed to extend to the sacral plexus, and the nerve roots are dragged down, shaking the cord. This experiment was repeated at the Trinidad Asylum, with similar results.

Starting with the theory that the results observed after nerve stretching are due to changes in the spinal ganglia produced by this shaking, it would be expected that the best results would be obtained in practice after stretching of the great sciatic, which is nearer the ganglia than any of the other nerves usually operated on. This is found to be actually the case.

I will now briefly review the reasons for which nerve stretching has been done at the Trinidad Asylum. One hundred cases have been selected in order that percentages may be seen at a glance.

ULCERATION.—Various nerves were stretched for ulceration in 38 of the 100 cases. More or less relief was obtained, especially in perforating ulcers of the sole. These often healed in a few days. A fallacy which must be borne in mind here is that the stretching of the sciatic necessitates remaining in bed for some days, and it is therefore difficult to say to what extent the good result is done to this rest. It has always seemed to me that the rapid growth of granulations, increased discharge and thin white cicatrix spreading from the edge of the ulcer within a few days point to a direct trophic influence more rapid in its effect than mere rest. Unfortunately perforating ulcers healed in this way have a tendency to break down again, and, as I shall show presently, I have now found a more effectual way of dealing with them.

PAIN.—Marked results were obtained in those cases in which nerve stretching was done to relieve pain, especially when this was associated with perforating ulcers. There were 9 such cases in the 100. In two of these the pain was so severe that the patients begged for amputation, but after the nerves were stretched the pain vanished almost at once.

In another case the right sciatic was stretched for a painful gangrenous ulcer of the foot. The ulcer became cleaner, the pain went away and the patient asked that the operation might be repeated on the left side for a similar condition of the foot. The result of the second operation, however, was not so marked, for though the ulcer became a little cleaner for a few weeks, gangrene eventually supervened in both feet and the patient died five months later.

In two cases in which pain recurred four months and one year respectively after the sciatic had been stretched, the external popliteal of the same side was stretched with good result.

Considerable relief was obtained from stretching the supraorbital in a case in which mercury and potassium iodide had failed to effect much change in the thickening and neuralgia. The thickening remained after the operation while the pain disappeared.

ANÆSTHESIA.—In 33 of the 100 cases the operation was performed for anæsthesia, but in very many instances no difference whatever was noticed after the operation. In some of the earlier cases there appeared to be some improvement in sensation for as long as a year after the operation, and in other cases slight temporary improvement was noted. On the whole the results of nerve stretching for anæsthesia cannot be considered satisfactory.

^o Brit. Med. Journ., Sept. 19, 1885, p. 545.

[†] Brit. Med. Journ., Dec. 22, 1888, p. 1378.

TUBERCULATION.—In 18 cases nerves were stretched in order to determine if any effect could be thus produced on the growth of tubercles or leprosy infiltration of the skin. Measurements of the fingers were taken, but the result proved absolutely negative.

NECROSIS.—In two cases nerve stretching seemed to facilitate the separation of dead bone. There was increased discharge from the sinuses, and fragments of bone were removed ten days and eleven days respectively after the operation.

The results in the 100 cases may be summarized as follows :—

1. More or less relief was obtained in 47 of the 100 cases or nearly half.
2. The nerve when exposed was found to be enlarged in 48 cases or nearly half.
3. The chief indications for the operation are perforating ulcer, some cases of necrosis, and pain associated with perforating ulcer or peripheral neuritis.
4. The great sciatic is the most satisfactory nerve to stretch as it is nearest the spinal ganglia.

Removals.

Necrosis of bone as was pointed out above is extremely common, especially in anæsthetic leprosy, and removal of sequestra is frequently required.

Of 630 removals of dead bone or cartilage, 532 were in anæsthetic lepers, and 92 in mixed lepers, while only 6 were in tuberculated lepers. Ulcers and sinuses usually granulate and heal readily after removal of dead bone or cartilage, though in some cases, as was already shown, amputation is afterwards necessary.

Excision of tubercles from the face, trunk or extremities is often followed by encouraging results for a time. In an article published some years ago,* I gave some photographs showing the amount of relief which might be expected from the operation. After free excision I usually apply strong carbolic or nitric acid, and then dust over with tannin to form crusts. When the knife has gone well beneath the tubercles I find that recurrence does not take place in the cicatrix. Unfortunately in a year or two fresh tubercles appear in the surrounding skin and in other parts of the body, and the only hope of further relief lies in repeating the operation.

The removal of tubercles from the conjunctiva is unsatisfactory, for the cornea is usually involved, early and complete extirpation of the mass is then impossible.

Troublesome exuberant granulations sometimes make their appearance in lepers at the orifices of sinuses or in ulcers of the fingers. Such granulations were removed fifteen times.

Keloid was excised three times in the same patient. The growth recurred in the original site at short intervals. It was probably independent of the leprosy, and it may here be remarked that keloid is very common in negroes—more so, probably, than in white subjects.

Fibroma was removed three times, twice in one patient and once in another. It also appeared to have no connection with the leprosy.

Troublesome papillomata sometimes form on the feet of lepers, apparently as a result of disordered nutrition. Removal was necessary in one case.

Yaws not infrequently occurs in lepers, though the two diseases are entirely distinct. Obstinate yaws tubercles can sometimes be excised with advantage, mercury and potassium iodide being given internally at the same time. This procedure was adopted in two cases.

Of excision of the eyeball, of hæmorrhoids, or of an enlarged gland, it is unnecessary to speak in detail. The latter was situated above the elbow and had become enlarged in consequence of absorption from ulcers of anæsthetic fingers.

The belly of the gastrocnemius was removed in the case of an old standing ulcer situated over the calf. The mass of muscle was standing out from the edges of the ulcer and was covered with exuberant granulations. After excision grafting with skin from the same patient gave good results, though the patient left the Asylum too soon for a complete cure to be effected.

A solitary cyst was removed from a patient with mixed leprosy. It was situated close to the lower ribs, beneath the fibres of the latissimus dorsi. Numerous daughter cysts were found but no hooklets.

Ligatures.

The vessels supplying tubercles of the conjunctiva were ligatured in five instances. This operation sometimes checks the growth of the tubercle temporarily, but at the best it is only palliative. Collateral circulation soon becomes established and the tubercle goes on increasing.

Ligature of hæmorrhoids was performed as in non-leprosy patients and with similar results.

* Brit. Med. Journ., June 9, 1888, p. 1214.

Incisions.

Under this head come what I think are the most important operations in leprosy. I refer to incisions of ulcers or sinuses or incisions of leprous tissue made in order to relieve tension. The total of these operations is 1,016. During the six years under consideration, it has been my practice to incise freely down to the bone on the first indication of swelling, ulceration, or sinus of leprous extremities. This treatment I am convinced has been largely instrumental in averting gangrene or diffuse suppuration. When I first came to the Asylum these complications were not infrequent. Now they are almost unknown.

A modification of this treatment has lately been applied to perforating ulcers with good results.^o A bistoury is passed through from the sole to the dorsum of the foot, and all tissues are divided forwards, the bistoury being brought out between the toes. If the ulcer happens to be near one side of the foot, the bistoury is brought out laterally. The gaping wound thus made is stuffed with lint and allowed to granulate up from the bottom. Hæmorrhage is usually slight and is easily controlled by the wedge of lint in the wound and by bandaging. This treatment of perforating ulcer has been adopted in 24 cases with more or less success.

In the diffuse brawny swelling which often occurs without suppuration, in the legs and arms of lepers, I find long incisions from the knee to the ankle or from the ankle to the toes of great value in relieving pain and tension. The patients often ask for these incisions.

An inflamed patellar bursa and a cyst in front of the ear were also incised with great relief to the patient and ultimate cure.

Incisions for Elephantiasis Arabum have been already referred to, as preceding amputation. A diminution of three inches in the circumference of the leg was obtained, but the incisions soon closed, and the leg became as large as before the operation.

Tracheotomy was performed in a patient who had leprosy of the larynx, the patient eventually dying of phthisis. This operation has been very successful in Norway. Lepers there have worn tracheotomy tubes for several years.

Circumcision has been done sixteen times; ten times in tuberculated, three times in anæsthetic and three times in mixed lepers. As will be inferred from these figures, the operation was usually done for phimosis due to tuberculation of the prepuce. The incisions, though close to, or through tuberculated tissue, healed rapidly.

Intestinal Operations.

Operations on the intestines were only two in number; herniotomy and linear cauterization of a prolapsed rectum. The former operation was done for strangulated inguinal hernia in an anæsthetic leper of thirty-two years standing, the oldest case in the Asylum. A firm cicatrix formed in twenty-two days.

Linear cauterization with a black hot wire, as recommended by Harrison Cripps, was performed in a prolapsed ulcerated rectum, occurring in an old standing case of anæsthetic leprosy. This case has been published.[†] The operation gave relief, but the patient died at last of dysentery and abscess of the liver.

Ophthalmic Operations.

Cataract is common in lepers, and extraction was performed five times. In one case,[‡] a demented and very anæsthetic leper, the result was most surprising. The patient was so devoid of sensation that the operation was done without any anæsthetic. In spite of this the wound healed readily, and he was able to count fingers at a distance of ten feet. A similar operation on the other side was unsuccessful. The patient had an unfortunate habit of tearing off bandages, a result of his disordered state of mind.

Iridectomy has been performed from time to time in cases of tuberculation of the cornea, in order by means of an artificial pupil to avert total blindness. This measure is only very temporary, for the tuberculated mass gradually advances across the cornea, and blindness is only a question of time.

Pterygium is very common in Trinidad as in other hot places, and many cases occur at the Leper Asylum. Operative interference has only been partially successful.

Tattooing of the eye was done once for cosmetic effect, at the patient's request.

Miscellaneous Operations.

These speak for themselves. It is interesting to note that the skin grafting, as already mentioned, was done from a leper, and that nevertheless the grafts took well.

Paracentesis is occasionally necessary for the dropsy which accompanies the renal disease so common in leprosy. I have found that 25 per cent. of the kidneys examined in lepers after death are diseased.

The above short notes and Tables, imperfect though they are, will, I think, show that operative interference in lepers is capable of affording much relief to the sufferings of this unfortunate class of patients, and the argument is still more forcibly borne out by the eagerness with which the inmates of the Asylum in Trinidad beg for surgical aid when the occasion for it arises.

^o Brit. Med. Journ., Nov. 8, 1890, p. 1059.

[†] Lancet, Nov. 12, 1887, p. 958.

[‡] Lancet, Sept. 25, 1886, p. 581.

9.—THE TREATMENT OF LEPROSY BY LARGE DOSES OF CHLORATE OF POTASH.

Dr. Carreau of Guadeloupe has sent me a brochure containing two photographs which show a very remarkable change in a leper after he had taken large doses of chlorate of potash. The treatment was begun on August 11, immediately after the first photograph was taken. On that day 20 grammes were given, on the 12th 10 grammes, and on the 13th 15 grammes—in all 45 grammes or about 675 grains. The result was bilious vomiting, diarrhoea, prostration, and on the 16th a sudden attack of syncope. The blood showed under the spectroscope the band of methæmoglobin.

Meanwhile a great difference was noticed in the condition of the skin, which Dr. Carreau describes as follows:—

"Il est impossible de méconnaître en effet une modification si profonde des tubercules qui ont presque disparu. La figure est devenue à peu près plane; c'est tout au plus si aux sourcils, aux ailes du nez, à la lèvre inférieure et au menton on constate encore quelques inégalités. Les oreilles sont plates sauf au niveau des deux tubercules déjà signalés et encore ceux-ci ont-ils considérablement diminué de volume. Le cou et le devant de la poitrine parcourus il y a cinq jours par des traînées tuberculeuses, sont absolument lisses. Les mains ont repris leur volume normal; le petit doigt de la main gauche est surtout remarquable sous ce rapport, il était auparavant comme ankylosé tandis qu'à présent toutes ses articulations sont devenues mobiles; en outre il a recouvré en partie sa sensibilité; le malade s'en sert pour se nettoyer l'oreille. Les pieds ont subi le même retrait que les mains, de sorte que la peau de toutes ces extrémités est entièrement plissée."

Dr. Carreau believes that the good results are due to methæmoglobinæmia, and suggests that this condition of the blood may be incompatible with the life of the bacilli. As however it is very doubtful if bacilli occur in the blood of lepers, the influence, if any, of the methæmoglobinæmia on these organisms is probably indirect. A second photograph taken on the 19th—eight days after the commencement of the treatment—certainly shows a marked improvement.

I determined to try this treatment in the Trinidad Leper Asylum, and selected two patients for the purpose. The following are short notes of the cases:

CASE I.

William Green, aged 7, negro, was admitted to the Leper Asylum on May 2, 1883, with tuberculated leprosy of one year's duration. There were masses of tubercle on the face, ears, and extremities. These gradually increased in spite of treatment. He was also subject to sudden outbreaks of tubercles accompanied by fever.

On November 14, 1892, it was noted that tubercles were increasing on the eyelids, face and ears. The eyes were painful. The hands were greatly swollen in consequence of diffuse infiltration. He was ordered 120 grains of chlorate of potash in a glass of water every morning.

November 16. He took a dose of the chlorate yesterday morning and one this morning. No vomiting or diarrhoea. No appreciable difference in the tubercles.

November 21. He has continued the dose every morning. No undue purging or bad effect. Face and ears about the same. Skin of fingers perhaps a little better.

December 7. Has had to stop taking the medicine for about 4 days because there was no more chlorate. Complains that the medicine increases his appetite and that he has not enough to eat. Ordered extra food.

December 30. Taking medicine regularly. Ulcers on face are drying. Tubercles are perhaps a little more flaccid. There is puffiness over the eyelids. Complains now of loss of appetite.

January 24, 1893. Is still taking the chlorate, but no beneficial effect is observable. Hands are more swollen than before.

CASE II.

Joachim Contain, aged 22, coloured, was admitted to the Leper Asylum on July 19, 1892, with tuberculated leprosy of three years' duration. There were large masses of tubercle in the ears, and smaller tubercles on the face. There were tubercles of various sizes on the trunk, and there was much thickening and infiltration of the skin of the extremities.

The application of Kowti oil (from *Hydnocarpus Wightiana*) produced no effect on the tubercles.

November 14, 1892. He had an eruption of tubercles the other day, but they are now stationary again. He was ordered 150 grains of chlorate of potash in a glass of water every morning.

November 16. He has taken two doses of the chlorate. He says it gave him fever. No vomiting or purging.

November 21. He has continued the chlorate every morning. He says it makes him giddy when he takes it. There is no appreciable difference in the tubercles of the face and hands.

December 7. Has taken the medicine regularly. There seems to be less general swelling of the face, and the individual small tubercles stand out more clearly.

February 24, 1893. This patient is still taking the chlorate, but there is no appreciable change in the condition of the tubercles. He says he feels better.

In these cases I was not fortunate enough to obtain anything like the results recorded by Dr. Carreau, but possibly a trial in other cases may give better results. It must however not be forgotten, that free purgation in leprosy may bring about a temporary diminution in the cutaneous infiltration.

10.—VISCERAL TUBERCULOSIS IN LEPROSY.

As I have lately published a paper on this subject (*Lancet*, April 1, 1893, p. 719), I will only refer to the matter very briefly here.

Table XII. shows the results obtained in six guinea pigs which were inoculated with fragments of tuberculous lung from the bodies of lepers.

An analysis of this Table gives the following result :—

- 1 case —negative.
- 3 cases—liver and lungs invaded with nodules after inoculation.
- 1 case —spleen and lungs invaded.
- 1 case —liver, spleen, and lungs invaded.

Thus the lungs were infected in all the cases which gave positive results. The liver was also infected in four cases and the spleen in two.

As these results were brought about by inoculation from three different subjects, it seems reasonable to conclude that the nodules in the viscera of the guinea pigs were derived from the fragments of tuberculous lung.

And as I have frequently inoculated guinea pigs with fragments of cutaneous leprosy tubercles, and have never in the cases so inoculated found nodules in the viscera, I conclude that the nodules now found are tuberculous and not leprosy, and that the pulmonary phthisis and tuberculosis of other viscera so common in leprosy depend on invasion by the bacillus tuberculosis and not the bacillus lepræ.

The bacilli found in the nodules following inoculation are indistinguishable from tubercle bacilli, but I have not yet succeeded in cultivating them. Further experiments are now in progress.

CONCLUSION.

My best thanks are due to Dr. Eakin for kindly sending me guinea pigs, and to Professor Carmody and Mr. Tate for their valuable assistance in chemical analysis of viscera.

It is impossible to describe in words the devotion of the Dominican Nuns, to whom falls all the more arduous work in connection with the treatment of the patients.

Next month they celebrate the twenty-fifth anniversary of their arrival in Trinidad. Of the original band of Sisters only one survives—the Dispenser, Sœur Marie Augustine. During a period of twenty-three years she has only spent eight days outside the Asylum walls—a record probably never approached in the history of leprosy. That she may long continue to adorn the post she so worthily occupies must be the wish of all who have the privilege of her acquaintance.

When we remember the chaos which reigned at the Leper Asylum five and twenty years ago, we may well say of her, as of all the Sisters of Cocorite, “*Si monumentum quæris, circumspice.*”

I have the honour to be,

Sir,

Your obedient Servant,

The Honourable
COLONIAL SECRETARY.

BEAVEN RAKE.

LITERATURE RECEIVED.

From Dr. Ohmann Dumesnil, St. Louis, Mo.—*St. Louis Medical and Surgical Journal.* (Monthly) Dermatological Reprints.

From Dr. Wolfred Nelson, New York.—Eleventh Biennial Report of the California State Board of Health. Leprosy, its extent and control, origin and geographical distribution. By H. S. Orme, M.D.

From Dr. Sajous, Philadelphia.—*The Satellite*—(Monthly).

From Dr. Danielssen, Bergen.—Beretning om Lungegaards hospitalets Virksomhed i Treaaret 1889-1891. Tuberculinen anvendt paa spedalske i Lungegaards hospitalet.

From Dr. Unna, Hamburg.—Dermatological Reprints.

From Dr. Arning, Hamburg.—Die gegenwärtige Verbreitung der Lepra in Europa und ihre Sociale Bedeutung. Discussion über die Lepra.

From Dr. Kaurin, Molde.—Om Loven af 6te Juni 1885, angaaende Spedalskes Afsondring.

From Dr. Donovan, Jamaica.—Report on the Lepers' Home, Jamaica, for 1891.

From Dr. Lacaze, Paris.—Lèpre et Pian à Trinidad.

From Dr. Ernest Neve, Srinagar.—Report on the Kashmir State Leper Hospital, 1891-2.

From Dr. Bancroft, Brisbane.—Leprosy in Queensland. Various hygienic aspects of Australian life.

From Dr. Montgomery, San Francisco.—An American leper. The case of Keanu. By Sidney Bourne Smith, M.D.

From Dr. Murrell, London.—On the action of Apomorphine and Apocodeine.

From Dr. Carreau, Guadeloupe.—Contribution au traitement de la lèpre.

From Dr. Barnes, British Guiana.—British Guiana Medical Annual for 1891.

TABLE I.

General Statistics for 1892.

	Male.	Female.	Total.
Remaining in Asylum on December 31, 1891	165	44	209
Admitted during 1892	21	17	38
Discharged	4	6	10
Died	17	8	25
Remaining in Asylum on December 31, 1892	165	47	212

TABLE II.

Comparative Statistics.

Year.	Admissions.	Discharges.	Deaths.	Remaining at end of year.	Percentage of Deaths.
1877	35	18	16	119	10.59
1878	36	21	17	125	10.96
1879	30	13	17	125	10.96
1880	45	20	18	133	10.58
1881	51	30	26	128	14.13
1882	51	26	18	136	10.50
1883	49	21	25	139	13.51
1884	39	14	23	141	12.92
1885	44	13	28	144	15.13
1886	73	18	21	177	9.72
1887	65	36	30	176	13.39
1888	38	19	16	179	7.47
1889	38	21	16	179	7.40
1890	71	16	25	209	10.00
1891	44	18	26	209	10.27
1892	38	10	25	212	10.12

TABLE III.

Return of Admissions for 1892.

No.	Name.	AGE.		Form of Leprosy.	Years afflicted.	Re-admitted.	Country.	Late Residence.	Date of Admission.	
		M.	F.							
1	Gangaram	50	...	A	24	...	India	Arima	January	9
2	Joseph William	60	...	A	5	...	Africa	Cedros	"	25
3	Joseph Lewis	50	...	A	?	...	"	Chaguanas	"	25
4	Augustus John	12	...	T	4	...	Trinidad	Port-of-Spain	"	30
5	Sadanan	50	...	A	4	...	India	San Fernando	March	1
6	Ramdin	60	...	A	?	...	"	"	"	1
7	Beatrice Ford	...	14	M	2	...	Trinidad	Arouca	"	15
8	Estella Nelson	...	18	A	2	...	"	Port-of-Spain	"	15
9	Bandha	52	...	A	11	Yes.	India	Mucurapo	"	26
10	Francis Hernandez	19	...	A	5	...	Trinidad	Port-of-Spain	"	26
11	Ragnath	28	...	M	3	...	India	Couva	April	19
12	Ellen Sterry	...	15	A	½	...	Trinidad	Belmont	May	4
13	Octavia Payne	...	10	T	2	...	"	Port-of-Spain	"	4
14	Eliza Philips	...	11	T	5	...	"	"	"	4
15	Marie Philomene	...	40	A	10	...	"	San Fernando	"	4
16	Ramsammy	52	...	*	...	...	India	"	"	4
17	Abraham Jacob	8	...	T	?	...	Trinidad	Cunupia	June	15
18	James Lambert	16	...	T	2	...	"	Port-of-Spain	"	15
19	Dulgar	45	...	A	7	Yes.	India	"	"	15
20	Jacinto De Souza	50	...	T	1	...	Madeira	"	"	28
21	Charles Christian	11	...	T	4	...	Trinidad	"	"	28
22	Josephine John	...	24	T	9	Yes.	"	Mucurapo	"	28
23	Joachim Contain	20	...	T	3	...	"	Blanchisseuse	July	15
24	Ramkalam	33	...	*	...	...	India	Couva	"	23
25	Polly	...	29	A	17	Yes.	Trinidad	Port-of-Spain	"	23
26	Thornhill Spencer	24	...	M	11	"	"	"	"	23
27	Alice Lynch	40	...	T	8	...	Barbados	"	August	24
28	Ursula Mendoza	...	10	*	...	...	Trinidad	Carapichaima	September	2
29	Amelia Adolphus	...	18	T	5	...	Grenada	Pointe-à-Pierre	"	14
30	Fanny Daniell	...	6	A	?	...	Trinidad	Montserrat	"	14
31	Theresa Lewis	...	3	A	1 month	...	"	Belmont	"	19
32	Subar	50	...	M	1	...	India	San Fernando	October	13
33	Julia Hargreaves	...	18	M	4	Yes.	Trinidad	Port-of-Spain	"	14
34	Rose Edward	...	60	A	10	...	"	"	"	19
35	Parbatea	...	55	A	10	...	India	Chaguanas	"	21
36	Eliza Warner	...	19	M	6	Yes.	Trinidad	Williamsville	"	22
37	Joseph Lloyd	60	...	M	3 months	...	Barbados	San Fernando	December	2
38	Rampersad	48	...	A	5	...	India	Chaguanas	"	9

*Not a leper.

TABLE IV.

Birth-places of Admitted.

	Male.	Female.	Total.
Trinidad	7	14	21
India	10	1	11
Africa	2	...	2
Barbados	1	1	2
Grenada	...	1	1
Madeira	1	...	1
Total	21	17	38

TABLE V.
Return of Discharges for 1892.

No.	Name.	Country.	Age.		Date of Admission.	Date of Discharge.	Total years afflicted.	Form of Leprosy.	Reason for Discharge.	Condition on Discharge.
			M.	F.						
1	Jagru	India	57	...	Sept. 19, 1891	Jan. 16, 1892	3	A	Left of own accord	Disease stationary. General condition improved.
2	Nargali	"	60	...	Nov. 4, 1891	Jan. 16, 1892	?	A	Do.	Do.
3	Theresa Weekes	Barbados	...	25	Sept. 19, 1891	Feb. 27, 1892	3	T	Do.	Tubercles are increasing.
4	Eliza Warner	Trinidad	...	19	Sept. 5, 1890	Feb. 27, 1892	6	M	Do.	Infiltration of skin of face increasing.
5	Julia Hargreaves	"	...	18	July 19, 1889	May 20, 1892	4	M	Do.	About the same as on admission.
6	Ujalla	India	...	54	Oct. 6, 1883	June 12, 1892	14	A	Do.	Necrosis of bones is progressing.
7	Anganu	"	40	...	Jan. 9, 1890	June 12, 1892	5	A	Sentenced at Criminal Sessions to two years' imprisonment for wounding another patient	Disease stationary.
8	Joseph Lewis	Africa	50	...	Jan. 25, 1892	Aug. 22, 1892	?	A	Left of own accord	Dropsy of face and legs.
9	Ursula Mendoza	Trinidad	...	10	Sept. 2, 1892	Nov. 21, 1892	...	...	Not a leper. Has numerous patches of leukoderma	...
10	Polly	"	...	29	July 23, 1892	Dec. 12, 1892	17	A	To live with her mother	Disease stationary.

TABLE VI.
Birth-places of Discharged.

					Male.	Female.	Total.
Trinidad...	...	...	...	...	0	4	4
India ...	...	...	...	...	3	1	4
Africa ...	...	...	...	...	1	0	1
Barbados...	...	...	...	...	0	1	1
Total					4	6	10

TABLE VII.
Birth-places of Deceased.

					Male.	Female.	Total.
India ...	...	...	...	...	10	2	12
Trinidad...	...	...	...	...	2	5	7
Barbados	...	...	...	...	2	1	3
Africa ...	...	...	...	...	2	0	2
Venezuela	...	...	...	...	1	0	1
Total					17	8	25

TABLE VIII.
Deaths in each Month during past eleven Years.

Month.	1882.			1883.			1884.			1885.			1886.			1887.			1888.			1889.			1890.			1891.			1892.			GRAND TOTAL
	M. F.		T.	M. F.		T.	M. F.		T.	M. F.		T.	M. F.		T.	M. F.		T.	M. F.		T.	M. F.		T.	M. F.		T.	M. F.		T.				
January	1	1	2	0	1	1	1	1	0	1	1	0	0	0	1	2	3	0	0	1	0	1	0	0	0	0	4	0	4	1	0	1	18	
February	1	0	1	2	0	0	1	1	3	1	1	2	1	3	1	4	1	0	1	2	0	2	3	1	4	1	0	1	0	2	0	21		
March	3	1	4	1	1	2	5	1	1	2	3	1	1	2	3	1	4	1	0	1	1	2	1	0	1	0	2	2	0	2	0	26		
April	2	0	2	4	0	4	1	1	2	1	0	1	1	0	1	4	0	0	0	3	0	0	0	0	0	1	1	2	2	1	3	22		
May	0	0	0	1	0	1	2	0	2	2	2	2	2	0	1	3	1	0	1	0	0	1	2	3	1	0	1	0	1	3	1	18		
June	0	0	0	2	0	2	1	5	2	2	1	3	2	1	2	0	2	0	2	0	1	1	2	2	4	1	0	1	1	0	1	17		
July	0	0	0	0	1	1	1	2	1	1	3	1	2	4	0	4	2	0	2	0	0	0	0	0	0	3	1	4	2	0	2	25		
August	1	0	1	1	1	2	0	3	1	1	2	1	1	2	1	0	1	0	2	0	1	1	2	1	3	2	1	3	0	3	20			
September	1	1	2	2	1	3	0	0	2	2	1	0	1	0	1	0	1	1	1	1	1	4	1	5	3	0	3	1	1	2	22			
October	1	0	1	2	2	4	3	2	5	1	0	1	2	0	2	1	2	0	2	0	0	1	1	1	1	2	0	2	0	0	0	13		
November	2	0	2	2	1	3	2	4	3	1	4	1	1	1	0	1	2	1	3	2	0	2	1	2	3	1	0	1	0	0	0	23		
December	1	2	3	0	0	0	1	2	3	0	0	0	0	2	0	2	0	0	1	2	3	1	0	1	0	1	2	0	2	3	2	5	28	
Total	13	5	18	17	8	25	15	8	23	20	8	28	13	8	21	24	6	30	12	4	16	10	6	16	15	10	25	21	5	26	17	8	25	253

TABLE IX.
Return of Deaths for 1892.

No.	Name.	Country.	Colour.	Age.		Date of Admission.	Date of Death.	Form of Leprosy.	Total years afflicted.	Cause of Death.	Post Mortem Appearances.
				M.	F.						
1	Egbert Swain	Barbados	C.	27	...	May 16th, '83.	Jan. 2nd, '92.	M.	13		
2	Joseph William	Africa	B.	60	...	Jan. 25th, '92.	Feb. 3rd, '92.	A.	5		
3	Gangaram	India	Br.	50	...	Jan. 9th, '92.	Feb. 6th, '92.	A.	24		
4	Ramdin	India	Br.	60	...	March 1st, '92	Mar. 14th, '92	A.	7		
5	Gangaram	India	Br.	63	...	Aug. 6th, 1891	Mar. 21st, '92.	A.	?		
6	Robin Gobonia	Venezuela	B.	23	...	Sept. 17th, '81	April 9th, '92.	T.	14		
7	Ganesh	India	Br.	46	...	Aug. 27th, '91	April 16th, '92	A.	5		
8	Paulina Victor	Trinidad	C.	25	...	May 27th, '87	April 17th, '92	A.	5		
9	John Claremont	Barbados	C.	37	...	Aug. 25th, '86	May 13th, '92.	A.	9	Large White Kidney ...	Old deformity of fingers and toes. Old adhesions of pleurae. Spleen 18 oz.; simple hypertrophy; adherent to diaphragm. Kidneys 15 oz.; large white, mottled with red. Femoral glands enlarged.
10	Ramsammy	India	Br.	52	...	May 4th, '92.	May 18th, '92.	*	...	Cirrhosis of Liver Tubercle of Lungs.	Much oedema of lower extremities. Subcutaneous tissues sodden. Numerous abscesses in scalp. Tubercles scattered through lungs; cavities in upper lobes, more in right. Spleen 24 oz.; simple hypertrophy. Liver 37 oz.; tough and cirrhotic. Much fluid in abdominal cavity.
11	Sibu	India	Br.	47	...	Mar. 1st, '87...	May 25th, '92.	A.	10	Gangrene of Arm	Old deformity of fingers and toes. Firm cicatrix in right foot where perforating ulcer was incised. Abscesses burrowing in left forearm and arm up to midway between shoulder and elbow. Tissues gangrenous about elbow. Viscera healthy.
12	Sukri	India	Br.	...	62	Nov. 27th, '90	May 26th, '92.	T.	7	Exhaustion from Ulceration	Body wasted. Ulceration of fingers, toes and legs. Commencing gangrene of fingers. Ears, hands and feet tuberculated. Median nerves enlarged. Viscera normal.
13	William Branch	Trinidad	B.	17	...	Oct. 5th, 1882.	June 18th, '92	T.	17	Tuberculosis of Lung Lardaceous Degeneration	Body wasted. Most of tubercles absorbed. Extremities ulcerated. Larynx, epiglottis and vocal cords thickened and ulcerated. Few small yellow tubercles in right lung. Liver 4 lbs. 4 oz.; lardaceous. Spleen 5 oz.; less lardaceous. Femoral glands enlarged. Testes small, undeveloped.
14	Mansu	India	Br.	48	...	Jan. 12th, '84.	July 1st, 1892.	A.	17	Phthisis.	Old contraction of fingers. Constriction round one finger like anulum. Both lungs filled with tubercles; apices excavated. Femoral glands enlarged. No tubercles in other viscera [This patient had been injected with tuberculin by Dr. Koch].

* Not a leper.

TABLE IX.—CONTINUED.
Return of Deaths for 1892.

No.	Name.	Country.	Colour.	AGE.		Date of Admission.	Date of Death.	Form of Leprosy.	Total years afflicted.	Cause of Death.	Post Mortem Appearances.
				M.	F.						
15	Jadu	India	Br.	57	..	June 24th, '90	July 7th, 1892	A.	9	Ankylostomiasis	Body very anemic. Fingers and toes contracted. Absorption taking place in toes; less in fingers. Grey hepatization of right lung. Heart 9 oz.; left ventricle hypertrophied; aortic valves atheromatous. Kidneys 3 oz. each; cystic. Femoral glands enlarged. Much dark blood and mucus in jejunum, and several ankylostomata. Mr. Tate found 2008 per cent. of iron in the dried liver.
*16	Marie Philomene	Trinidad	B.	..	50	May 4th, 1892	Aug. 6th, '92.	A.	10	Tuberculosis of Ileum Perforation; Peritonitis	Many fingers and toes gone. Median nerves much thickened above wrists. Mesenteric glands greatly enlarged; caseating. About 8 inches of the mucous coat of the ileum just above the valve is ulcerated. The wall is studded with caseous nodules about the size of peas. There are four distinct punched out perforations of the intestinal wall, the largest about $\frac{3}{8}$ inch diameter. The intestines are matted together, and there is dirty yellow fluid in the abdominal cavity.
17	Rose Sant	Trinidad	C.	..	45	Dec. 1st, 1875.	Aug. 10th, '92.	M.	19	Phthisis	All cutaneous tubercles absorbed. Median nerves slightly enlarged, also femoral glands. Lungs full of tubercles; yellow, caseating, and about the size of peas at apices; grey and milky lower down. Spleen 7 oz.; hardaceous. Right kidney 5 oz.; left 6 oz.; enlarged and capsules adherent in places.
18	Ophelia Mackenzie	Trinidad	B.	..	22	Nov. 5, 1887..	Aug. 30th, '92.	M.	9	Tuberculosis	Body much wasted. Most of tubercles absorbed. Deformity and loss of substance in fingers and toes. Larynx thickened and ulcerated; vocal cords ragged. Lungs full of tubercles; at left apex a large ragged cavity about the size of a tangerine orange, traversed by thickened vessels, and containing recent blood clot. Smaller cavity at back of right lung. Tubercles on parietal pleurae. Liver 3 lbs. 9 oz.; contains one or two small yellow tubercles. Spleen 13 oz.; hypertrophied; several yellow tubercles just below capsule. Kidneys 4 oz. each; several small tubercles. Tubercles on peritoneum.
19	Sitalu	India	Br.	41	..	July 29th, '87.	Sept. 20th, '92	A.	10	Congestion of Lungs	Body well nourished. Old contraction and loss of fingers and toes. Fibres of left median were enlarged and gelatinous-looking. Lungs intensely congested, almost black; crepitant and do not sink in water; no pus in tubes. Right kidney 3 oz., left 4 oz., cystic.
20	Alice Lynch	Barbados	B.	..	40	Aug. 24th, '92.	Sept. 21st, '92.	T.	8	Tuberculosis	Body wasted. Nearly all tubercles absorbed. Median nerves thickened above wrists. Lungs filled with small grey tubercles. Spleen 8 oz.; filled with small grey tubercles. Pyramidal infarct about 1 inch diameter, abutting on surface. Kidneys 9 oz.; contain a few small tubercles.

* British Medical Journal, December, 3, 1892, p. 1234.

TABLE IX.—CONTINUED.

Return of Deaths for 1892.

No.	Name.	Country.	Colour.	Age.		Date of Admission.	Date of Death.	Form of Leprosy.	Total years afflicted.	Cause of Death.	Post Mortem Appearances.
				M.	F.						
21	John Davis	Africa	B.	76	...	Oct. 15th, '91.	Dec. 1st, 1892.	*	...	Exhaustion from Ulceration	Body wasted. Ulcer with exuberant granulations occupying greater part of right sole. Right femoral glands enormously enlarged and suppurating. The mass is almost the size of a fist. One kidney cystic. Small patches of atheroma above aortic valves.
22	James Fraser	Trinidad	B.	41	...	Mar. 11th, '87.	Dec. 4th, 1892.	A.	9	Lardaceous Degeneration Mixed Kidney Ankylostomiasis	Old deformity of fingers. Ulcers healed. Bronchial glands greatly enlarged, caseating and pressing on bronchi. Liver 6 lbs. 6 oz.; lardaceous. Right kidney 3 oz.; left 4 oz.; mixed. Numerous ankylostomata in small intestine. Femoral glands slightly enlarged.
23	Ramsahai	India	Br.	49	...	Nov. 13th, '83.	Dec. 9th, 1892.	T.	9	Syphilis. Phthisis Granular Kidney.	Body wasted. Skin dry and rough. Superficial ulceration of fingers and toes. Nearly all tubercles absorbed. Median nerves much thickened above wrists. Epiglottis ulcerated, and cicatrically contracted so that upper opening of larynx is reduced to about $\frac{1}{4}$ inch diameter. Vocal cords normal. Pleurae thickened and adherent. Lungs contain numerous small grey tubercles, caseating and breaking down in places. Spleen 15 oz.; simple hypertrophy. Kidneys 3 oz. each; capsules adherent. Testes fibrous. Femoral glands much enlarged.
24	Eugenie Lewis	Trinidad	B.	...	30	May 13th, '90.	Dec. 14th '92.	T.	9	Large White Kidney	Body fairly nourished. Excoriation and florid granulations on the back of the right hand and forearm. Tubercles still on face. Skin of extremities infiltrated with leprous deposit. Median nerves thickened above wrists. Pleurae adherent. Spleen 8 oz.; enlarged. Right kidney 14 oz.; left 15 oz.; enormously enlarged; surfaces mottled with patches of dilated capillaries. Pyramids and capsule of a dirty yellow colour; latter strip easily. Right kidney lies obliquely across right sacro-iliac synchondrosis. Artery and vein pass over it to hilum from above. Mucous membrane of ileum reddened. Reddening visible through coats of intestine.
25	Karriman	India	Br.	...	49	Sept. 22nd, '90	Dec. 22nd, '92.	T.	4	Granular Kidney Phthisis	Skin dry and shrivelled. Most of tubercles absorbed. Median nerves enlarged. Left femoral glands suppurating. Apices of lungs consolidated, with caseating tubercles. Isolated tubercles lower down in right lung. Right kidney 4 oz.; left 3 oz.; capsules adherent; cortices have striae of fatty degeneration, and numerous cysts.

* Not a leper.

TABLE X.

Chief Intercurrent Diseases during 1892.

DISEASE.	FORM OF LEPROSY.								GRAND TOTAL.	
	TUBERCULATED.		ANÆSTHETIC.		MIXED.		TOTAL.			
	M.	F.	M.	F.	M.	F.	M.	F.		
I.—GENERAL DISEASES.										
Tuberculosis	2	2	1	1	...	2	3	5	8	
Lardaceous Degeneration	1	...	1	...	...	...	2	...	2
II.—SPECIFIC FEBRILE DISEASES.										
Malarial Fever	13	7	24	6	4	2	41	15	56	
Syphilis	1	...	1	...	...	...	2	...	2
III.—DISEASES OF THE NERVOUS SYSTEM.										
Epilepsy ... ..	...	...	..	1	...	...	...	1	1
Mania ... ..	...	...	...	...	...	1	...	1	1
Dementia ... ..	...	..	2	1	..	...	2	1	3
Hemicrania ... ..	...	...	1	...	..	...	1	..	1
IV.—DISEASES OF THE EYE.										
Ophthalmia	1	..	4	1	1	...	6	1	7	
Corneal Ulcer ... ..	...	..	1	...	...	..	1	...	1
Cataract ... ..	...	...	1	...	...	...	1	...	1
Iritis ... ..	...	...	...	...	1	...	1	...	1
Pterygium ... ..	...	..	2	...	...	...	2	...	2
Hypopyon	1	..	...	...	...	..	1	..	1
V.—DISEASES OF THE CIRCULATORY SYSTEM.										
Mitral Disease ... ..	...	...	...	...	1	...	1	...	1
VI.—DISEASES OF THE RESPIRATORY SYSTEM.										
Bronchitis ... ..	...	...	2	1	1	...	3	1	4
Congestion of Lungs ... ..	...	...	1	...	...	...	1	...	1
VII.—DISEASES OF THE DIGESTIVE SYSTEM.										
Diarrhœa	3	1	4	1	...	..	7	2	9
Dysentery	1	...	7	..	1	...	9	...	9	
Ankylostomiasis ... ..	...	...	2	...	...	...	2	...	2
Carried forward ..	23	10	54	12	9	5	86	27	113	

TABLE X.—CONTINUED.

Chief Intercurrent Diseases during 1892.

DISEASE.	FORM OF LEPROSY.								GRAND TOTAL.
	TUBERCULATED.		ANÆSTHETIC.		MIXED.		TOTAL.		
	M.	F.	M.	F.	M.	F.	M.	F.	
Brought forward ...	23	10	54	12	9	5	86	27	113
VIII.—DISEASES OF THE URINARY SYSTEM.									
Large White Kidney ...	...	1	1	...	...	...	1	1	2
Granular Kidney ...	1	1	...	...	...	...	1	1	2
Mixed Kidney ...	...	...	1	...	...	...	1	...	1
IX.—DISEASES OF THE GENERATIVE SYSTEM.									
Paraphimosis ...	...	...	1	...	1	...	2	...	2
X.—DISEASES OF THE SKIN.									
Eczema ...	...	...	3	...	1	...	4	...	4
Framboesia ...	2	...	4	...	...	...	6	...	6
Zona ...	...	...	1	...	1	...	2	...	2
Tinea ...	1	...	...	...	...	...	1	...	1
Total ...	27	12	65	12	12	5	104	29	133

During the year there were fourteen cases of leprous fever, i.e. fever accompanied by an outbreak of tubercles. These were mostly in boys. Leprous fever occurs most frequently when the disease is in an active and early stage.

TABLE XI.

Surgical Operations during 1892.

OPERATION.	FORM OF LEPROSY.						Total.		Grand Total.
	Tuberculated		Anæsthetic.		Mixed.		M.	F.	
	M.	F.	M.	F.	M.	F.	M.	F.	
Amputation of									
Great Toe ...	...	...	1	...	...	...	1	...	1
Toe ...	...	...	9	...	1	...	10	...	10
Finger ...	...	...	...	...	...	...	...	...	...
Stretching of									
Supraorbital ...	...	...	2	...	...	...	2	...	2
Removal of									
Necrosed Bone ...	...	...	67	3	2	...	69	3	72
Tubercles ...	1	...	...	...	...	...	1	...	1
Yaws ...	...	...	3	...	...	...	3	...	3
Enlarged Gland ...	...	...	1	...	...	...	1	...	1
Pterygium ...	...	...	1	...	...	...	1	...	1
Incision of									
Abscess, sinus, ulcer, or tense skin ...	2	...	120	5	6	...	128	5	133
Circumcision ...	1	...	...	...	...	...	1	...	1
Total ...	4	...	204	8	9	...	217	8	225

TABLE XII.
Result of Inoculation of six Guinea Pigs with tuberculous lung from Lepers.

No.	Name.	AGE.		Years afflicted.	Form of Leprosy.	Admitted.	Died.	Post Mortem Appearances.	Animal.	Inoculated.	Died.	Post Mortem Appearances.
		M.	F.									
1	Mansu	48	...	17	A	Jan. 12, '84 ...	July 1, '92 ...	Lungs full of tubercles. Apices excavated; right more than left. No tubercles in other viscera	Guinea Pig	July 2, '92 ...	Dec. 28, '92 ...	Linear cicatrix at site of inoculation. No tubercles in lungs or other viscera. Slightly enlarged gland under right hind leg.
2	Rose Sant	...	45	19	M	Dec. 1, '75 ...	Aug. 10, '92...	Lungs full of tubercles. Yellow, caseating and about the size of peas at apices; grey, and miliary lower down. Spleen lardaceous. Kidneys mixed	"	Aug. 11, '92...	Dec. 4, '92 ...	Indolent ulcer with loose scab at site of inoculation. Caseous masses behind ears. Axillary glands enlarged. One in left axilla is breaking down into caseous pus. Lungs full of translucent nodules about $\frac{1}{4}$ in. diameter. Spleen contains several mottled dark-red and yellow nodules about $\frac{1}{4}$ inch diameter. Magenta shows a few bacilli like those of tubercle in the spleen and lung nodules. Other viscera normal.
3	...	...	...	...	...	...	...	...	"	...	Mar. 6, '93 ...	Circular indolent ulcer about $\frac{1}{4}$ in. diameter at site of inoculation. Edge of ulcer undetermined; hard scab over ulcer, and thickening round. Nodule behind right ear about $\frac{1}{4}$ in. diameter, full of thick caseous pus. Left inguinal gland enlarged and breaking down into caseous pus. Lungs almost solid in places and full of translucent nodules varying in shape, and in size ranging from a small shot to No. 4. Similar masses in liver, but of a bright yellow colour. More frequent along their anterior edge. One nodule breaking down into pus. Other viscera normal.

TABLE XII.—Continued.
Result of Inoculation of six Guinea Pigs with tuberculous lung from Lepers.

No.	Name.	Age.		Years afflicted.	Form of Leprosy.	Admitted.	Died.	Post Mortem Appearances.	Animal.	Inoculated.	Died.	Post Mortem Appearances.
		M.	F.									
4	Ophelia Mackenzie ...	...	22	9	M	Nov. 5, 1887 ...	Aug. 30, 1892 ..	Lungs full of tubercles. At left apex a large ragged cavity about the size of a tangerine orange, traversed by thickened vessels and containing recent blood clot. Smaller cavity at back of right lung. Tubercles on parietal pleura and peritoneum. Several small tubercles in kidneys and spleen. One or two in liver	Guinea Pig.	Aug. 31, 1892 ..	Dec. 10, 1892 ..	Indolent ulcer at site of inoculation, 1 in. long, covered with loose scab. Thickening round ulcer. Cervical and axillary glands enlarged and caseous, about $\frac{1}{2}$ inch diameter. Lungs full of small translucent nodules about $\frac{1}{4}$ in. diameter. Small yellow nodules in liver. Other viscera normal. Magenta shows a few bacilli like those of tubercle in lung, and many in the liver.
5	...	...	...	...	...	...	...	...	"	...	Jan. 1, 1893 ...	Indolent ulcer $\frac{3}{4}$ in. long at site of inoculation; scabbed over. Lungs contain numerous translucent irregular masses like those already described. Liver full of irregular bile-stained masses. A few pale irregular masses in spleen. Axillary glands on both sides enlarged, and breaking down into caseous pus. One left inguinal gland enlarged and caseating. Other viscera normal.
6	Alice Lynch ...	...	40	8	T	Aug. 24, 1892 ...	Sept. 21, 1892 ..	Lungs full of small grey tubercles; no cavity. Spleen full of similar tubercles; also contains an infarct about 1 in. diameter. Few small tubercles in kidneys.	"	Sept. 22, 1892 ..	Apr. 22, 1893 ..	Indolent ulcer about $\frac{1}{2}$ in. long at site of inoculation, covered with scab. Thickening round ulcer. Lungs full of translucent masses like those already described. One yellow nodule in liver about size of No. 6 shot. Axillary and left inguinal glands slightly enlarged. Other viscera normal.