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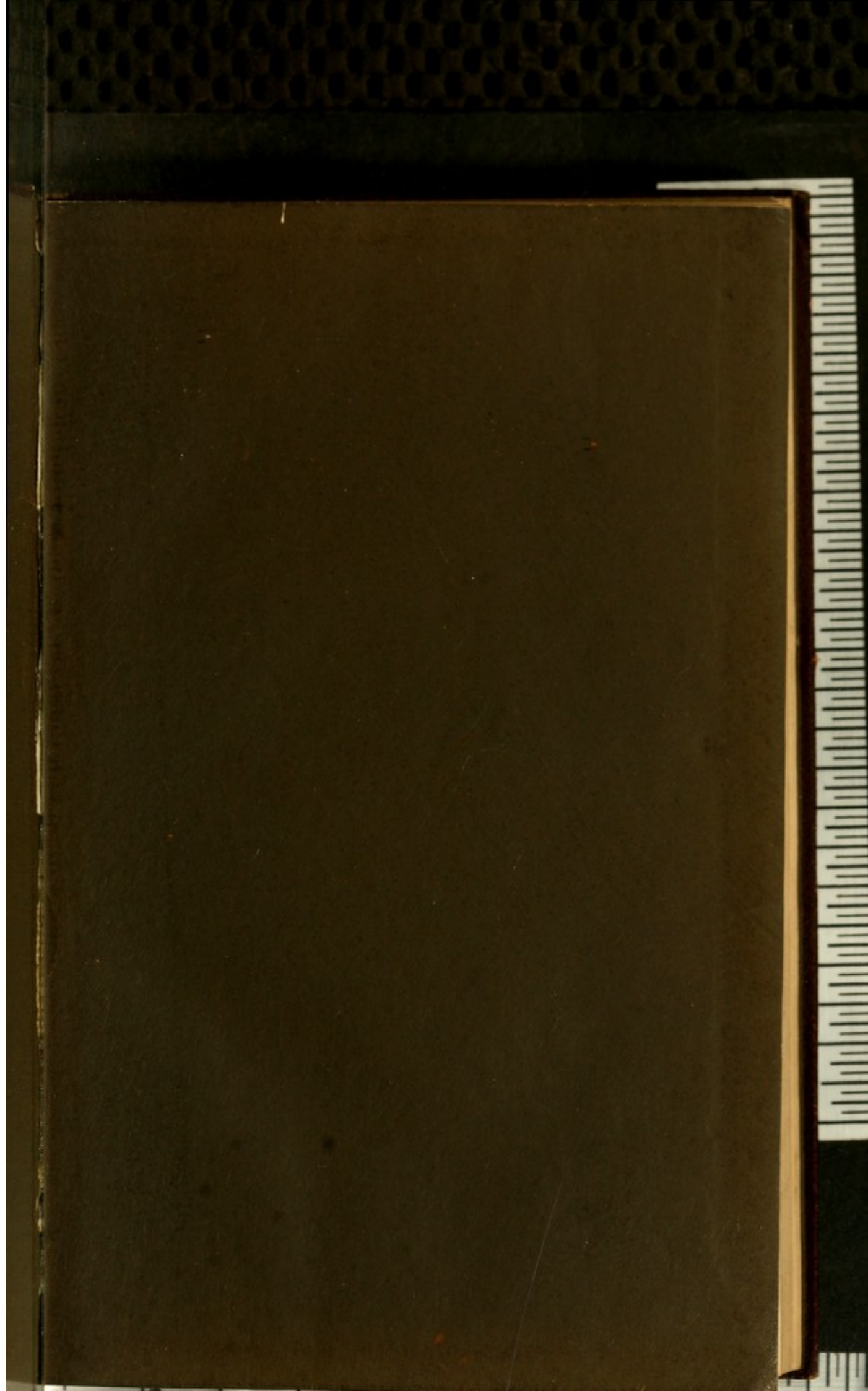
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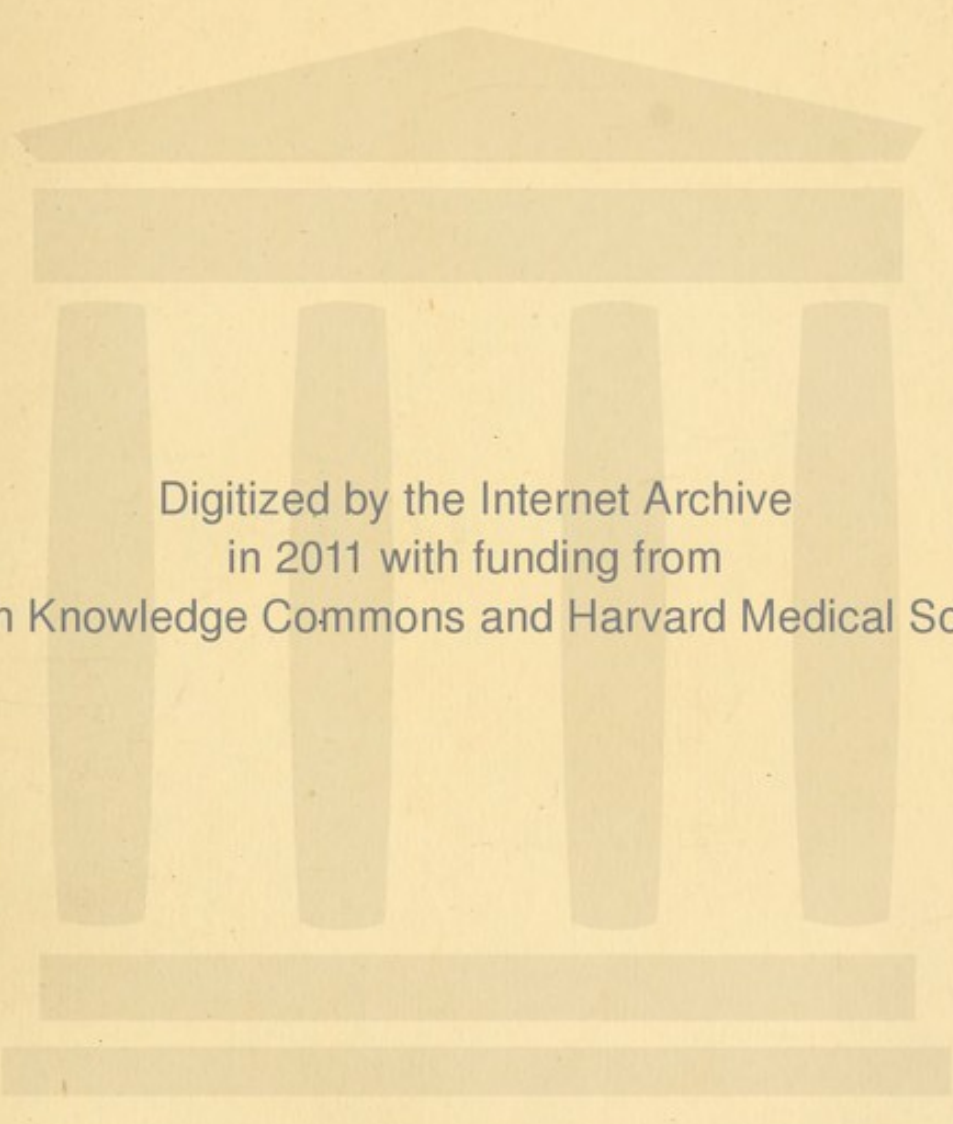
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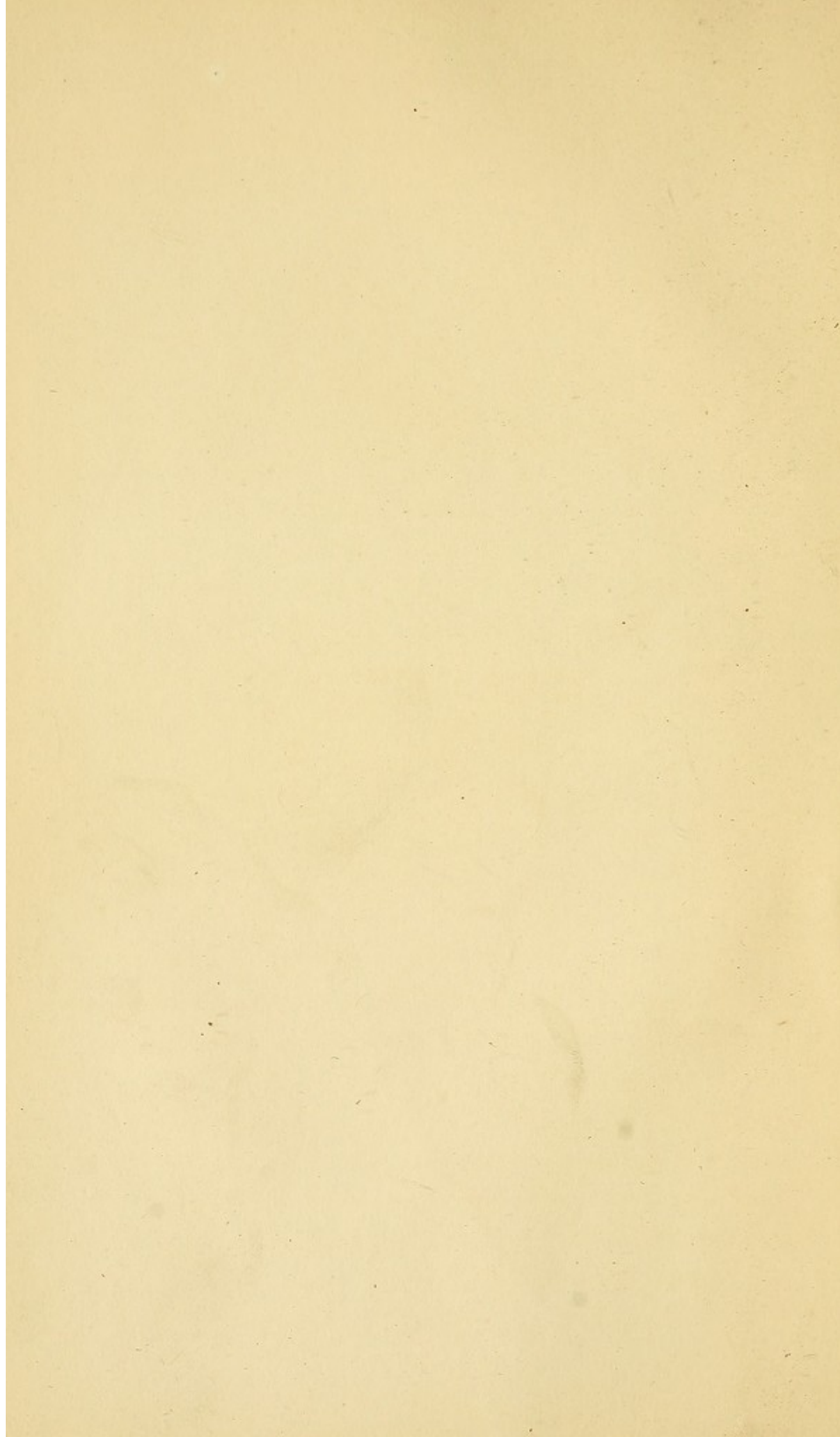




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TRUE LEPROSY.

LONDON : PRINTED BY
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AND PARLIAMENT STREET

ELEPHANTIASIS GRÆCORUM

OR

TRUE LEPROSY.

BY

ROBERT LIVEING, A.M. & M.D. CANTAB.

F.R.C.P. LONDON :

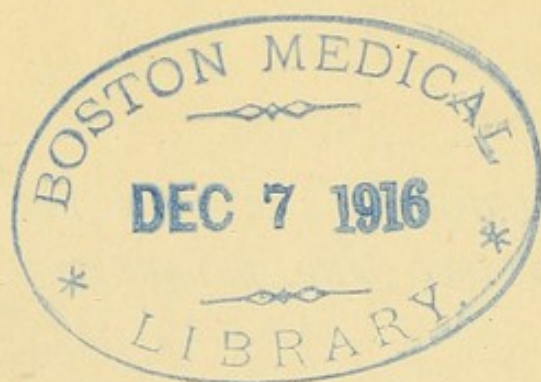
PHYSICIAN TO THE MIDDLESEX HOSPITAL.

*THE GOULSTONIAN LECTURES FOR 1873,
REVISED AND ENLARGED.*

LONDON:
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1873.

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PREFACE.

THE greater part of the following remarks constituted the Goulstonian Lectures for 1873. My object has been to collect from various sources a short account of the past and present history of Leprosy, and to combine with this my conclusions regarding the causes, nature, and clinical features of the disease, drawn from the facts recorded and from my own observation on several cases under my care. During a visit to Norway, in the year 1871, I had ample opportunity of observing the external circumstances under which the disease is developed; and some observations on this part of the subject will be found in the following pages. I take this opportunity of thanking my friends Drs. DUFFIN and CREIGHTON for the assistance they have given me, especially in translating German works on the subject.

11 MANCHESTER SQUARE:

May 1873.

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PREFACE

The following is a list of the contents of the book, arranged in the order in which they appear in the text.

CHAPTER I

The first chapter of the book is devoted to a general introduction to the subject.

CHAPTER II

The second chapter of the book is devoted to a detailed examination of the subject.

CHAPTER III

The third chapter of the book is devoted to a further examination of the subject.

The fourth chapter of the book is devoted to a final examination of the subject.

BOOKS CONSULTED.

THE following is a list of the principal Authors whose works have been consulted:—

HENSLER, 'Leprosy of the Middle Ages.'

AUGUST HIRSCH, 'Handbuch der Historisch-Geographischen Pathologie.' Berlin: 1860.

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'Report on Leprosy.' By the Royal College of Physicians. 1867.

JOHN MASON GOOD, 'Study of Medicine.' 1822.

J. Y. SIMPSON, M.D., 'Antiquarian Notes on Leprosy and Leper Hospitals in Scotland and England.'

SPRENGEL, 'History of Medicine.'

REV. L. J. DEBES, 'Account of the Feroe Islands.' Englished by J. S. in 1676.

GAVIN MILROY, M.D., 'Report on Leprosy and Yaws in the West Indies.' 1873.

H. V. CARTER, M.D., 'On the Symptoms and Morbid Anatomy of Leprosy. With Remarks.' *Transactions of Medical and Physical Society of Bombay.* 1862.

H. V. CARTER, M.D., 'Report on Leprosy in the Bombay Presidency. Based on the Returns of 1867.' 1872.

JOHN STOW'S 'Survey of the Cities of London and Westminster.'

ARTHUR S. THOMSON'S 'Remarks on the Customs and Diseases of the New Zealanders.' *Medico-Chirurgical Review.* April 1854.

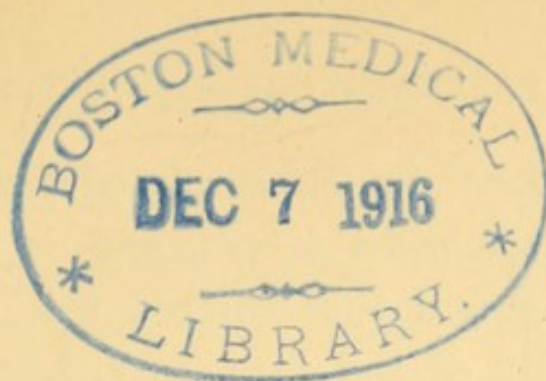
BATES, 'The Naturalist on the Amazon.' 1863.

ARNOT'S 'History of the City of Edinburgh.' 1779.

G. WHITE, 'Natural History of Selborne.'

Various books of travels, especially those of MOORE, PARK, and BRUCE.

The writings of WILSON, HUTCHINSON, VIRCHOW, HEBRA, and many others.



ELEPHANTIASIS GRÆCORUM

CHAPTER I.

HISTORY OF LEPROSY DURING THE MIDDLE AGES.

ELEPHANTIASIS GRÆCORUM, or true Leprosy, is a disease that has existed from pre-historic times down to the present day, and has been aptly described by a traveller of the seventeenth century as 'a distemper so noisome, that it might well pass for the utmost corruption of the human body, on this side the grave.'

Leprosy may be briefly defined as an incurable constitutional disease of adult life, which is especially prevalent in tropical and sub-tropical countries.

It is met with in three principal forms :

First. Macular Leprosy, characterised by an eruption on the skin, accompanied by anæsthesia.

Secondly. Anæsthetic Leprosy, of which the chief features are anæsthesia and discolourations of the skin, and atrophy of the muscles, with ulceration and mutilation of the hands and feet.

The *third* form, or Tuberculated Leprosy, is constitutionally the most severe, and is characterised by a bronzing and tuberculated thickening of the skin, especially of the face, ears, hands, and feet, followed by similar changes in the mucous membranes of the upper part of the alimentary and respiratory tracts, ending fatally in from two to fifteen years, by intercurrent disease in some vital organ.

In dealing with the subject of Leprosy, which is very extensive, I shall not attempt to do more than to give a slight sketch of the History, Geographical distribution, Etiology and Pathology of the disease.

The first chapter will be chiefly devoted to the history of the disease in Europe during the Middle Ages, with a very brief notice of Jewish leprosy. In the second I shall discuss the geographical distribution of the disease at the present day in particular countries, with reference especially to the external circumstances of climate, soil, and the occupations of the inhabitants. The third chapter will be devoted to the etiology of the disease. Lastly, in the fourth I propose to give a sketch of the clinical features and morbid anatomy of the malady.

The nomenclature of leprosy, or elephantiasis, and the confusion of names which arose from combining the Arabian and Greek literature, has often been explained. I shall therefore touch upon it but very slightly.

Hippocrates and the old Greek writers employed the name *lepra* (in the plural) to designate patches on the skin covered with white rough scales, exactly corresponding to our psoriasis. True leprosy was at that time unknown in Greece, and, therefore, it did not attract much attention; it was to the early Greek writers only a matter of hearsay. In the time of Aretæus, however, leprosy had appeared in South-Eastern Europe, and was accurately described by him as a disease with which he was personally acquainted under the name of *leontiasis*. Lucretius and Celsus use the term *elephantiasis* to designate the same disease, and the latter introduces it in the following terms: 'Ignotus autem pene in Italia, frequentissimus in quibusdam regionibus is morbus est, quem ἐλεφαντιασιν Græci vocant.' Thus we have the terms *Lepra Græcorum*, signifying our Psoriasis, and *Elephantiasis* or *Leontiasis Græcorum*, signifying true Leprosy. So far, all was clear. But unfortunately the Latin translators of the Arabian writers chose to render 'Dal-Fil,' or elephant leg, by the word *elephantiasis*, a disease which was evidently our Barbadoes leg, and was probably unknown to the Greeks. Hence we have 'elephantiasis' applied to two distinct diseases, which we are obliged to distinguish from each other by the names *Elephantiasis Græcorum* and *Elephantiasis Arabum*. Again, the same translators employed the term *Lepra*, not in the sense in which it was used by the early

Greeks (*i.e.* psoriasis), but to designate true leprosy ; in which sense it is also used in the Septuagint.

Constantinus Africanus, in the eleventh century, appears to have introduced a modified form of the Arabian teaching into the school at Salerno, and the authors of that school divide true leprosy into four varieties—Elephantiasis, Leonina, Alopecia, and Tyria. With them ‘lepra’ is the general term for a disease of which elephantiasis is only one particular form. We can understand, then, how in the fourteenth century, when the old Greek and Latin authors were re-introduced, great confusion arose, in consequence of the same names being applied to very different diseases, and this confusion has hardly disappeared even in the present day.

To state the matter in a concise form, we have

- 1st. Elephantiasis Græcorum, equivalent to lepra Arabum, or true leprosy ;
- 2nd. Elephantiasis Arabum, or the Barbadoes leg, unknown to the early Greeks ;
- 3rd. Lepra Græcorum, answering to our psoriasis.¹

Whoever reads carefully the account of leprosy (Zaraath) given in Leviticus, must arrive at the conclusion that several distinct diseases are included under one and the same name. One reason for this

¹ A full account of this part of the subject will be found in ‘The Study of Medicine,’ by Mason Good (1822), vol. ii. p. 851, and vol. iv. p. 574, from which Hebra’s account appears to have been in part taken.

belief, which is alone almost conclusive, is that the recovery of some of those afflicted with leprosy is evidently assumed as a possible if not a likely occurrence, and provision is made for their re-admission into the camp. Now if there is one thing certain about leprosy in the present day, it is its incurability; indeed, we should look upon any curable malady as essentially distinct from leprosy. Once a leper—always a leper, is painfully true. It is highly probable, however, that true leprosy, together with many other diseases of the skin, such as eczema, psoriasis, scabies, and possibly syphilis, existed among the Jews in the time of Moses, but they were not distinguished from each other in the early stages of development.

Those who are acquainted with the insidious way in which leprosy sometimes begins, will not be surprised that the Jewish priests should have had some difficulty in making a correct diagnosis. The error of our translators has evidently been that of rendering the *generic* term *Zaraath* by the *specific* name *leprosy*.

Whatever diseases were included under this term (*Zaraath*), it is quite evident that some, at least, were believed to be contagious, and that the exclusion of the leper was not, as has been often stated, simply a religious rite. This is indicated by the directions given to burn the clothes supposed to be infected, and by the repeated washings and shavings

of the head, beard, and even eyebrows of the cured leper. The requirement that he should sleep in the open air instead of in his tent for seven days after he was pronounced clean, points also to the fact that practical rules were mixed up with religious observances, which is in perfect harmony with the double capacity in which the Jewish priests acted.

It is highly probable that the leprosy of Naaman and Gehazi, mentioned in 2 Kings, chap. v., was, as has been often suggested, an hereditary form of Leucoderma, now very common in the East, especially in India, and known as 'white leprosy.' Some account of this disease will be found in Chapter IV., under the head of 'Allied Diseases.'

It is not my purpose to enter into an antiquarian account of leprosy during the Middle Ages. A complete history of the kind, though very interesting, would be far beyond the scope of these lectures. In dealing, therefore, with this part of the subject, I shall confine my observations to those historical facts which appear to have some bearing on the origin, prevalence, and final subsidence of the disease in Europe. I shall refer briefly to the supposed causes of its rapid increase, and to the vigorous and systematic attempts which were made to stamp it out, by the complete exclusion of lepers from legal rights and social intercourse with the rest of mankind. And I shall endeavour to show that erroneous views have been entertained by many historians with re-

ference to the origin of the disease in Europe, and also with regard to the effect of exclusion as a means of exterminating it. The method adopted had, no doubt, an effect ; not, as has been supposed, by preventing contagion, but by destroying the race of lepers. It exposed them to many hardships, it deprived them of their civil rights, and precluded them by oath from propagating their species. Even amongst the wealthy and powerful, who were less under the tyranny of the priests, the horror with which the disease was regarded and its known hereditary tendency had a marked effect in checking marriages.

History records the fact that leper hospitals existed in Palestine at a very early period of the Christian era. In the seventh century the merchants of Amalfi had already established at Jerusalem the Hospital of St. John, where they maintained certain persons, afterwards called Johannites, to attend upon the sick. A little later the remarkable society of the Knights of St. Lazarus was founded, in order that lepers among the higher classes might not be deprived of their knightly honours and fame. These knights were employed in superintending the leper hospitals and providing for the wants of the inmates. They not only admitted leprous persons into their order, but during the early period of their history were bound to elect a leper as Grand Master ; this rule was, however, revoked at a later date by Pope Inno-

cent IV., and the Lazarites gradually ceased to fulfil the functions for which they were originally celebrated. St. Louis brought twelve of these knights into France for the express purpose of instructing others in the management of the leper hospitals of that kingdom.

The introduction of leprosy into Western Europe has often been attributed to the Crusades; the disease, however, was known in Spain, Germany, France, and even England, long before that time. Both Pepin and Charles the Great made laws regarding it, and the former in 757 (at Compiègne) enacted that the appearance of the malady in either husband or wife was a sufficient cause for divorce. In Germany we have good reason to believe that it prevailed as early as the fifth century. A leper house was founded in the eighth century, by Abbot Othmar, at St. Gallen, near the Lake of Constance.

In England several leper houses were founded before the first Crusade, in the reign of William the Conqueror; two of which were in the neighbourhood of Canterbury, and one in Northampton. And a century later leprosy was becoming very prevalent, as may be inferred from some of the regulations which are mentioned by Stow. He says: 'It is to be observed that leprous persons were always, for avoiding the danger of infection, to be separated from the sound, God Himself commanding to put out of the host every leper, &c. Whereupon I read

in a provincial synod holden at Westminster by Hubert, Archbishop of Canterbury, in the year of Christ 1200, the second of King John, it was decreed, according to the Institution of the Lateran Council, that when so many leprous people were assembled that might be able to build a church with a churchyard to themselves, and to have one especial priest of their own, that they should be permitted to have the same, without contradiction, so they be not injurious to the old churches by that which was granted to them for pity's sake ; and, further, it was decreed that they be not compelled to give any tithes of their gardens or increase of their cattle.' The circumstances which have led most of our own historians to erroneous conclusions with regard to the introduction of leprosy into Europe are easy to understand.

In the first place there can be no doubt that the disease increased rapidly about the time of the Crusades, and to those who looked upon it as contagious nothing would appear more natural than that it should have been imported from the East.

Secondly, a great stimulus was given by the Crusaders to the foundation of hospitals. In Palestine they had an opportunity of seeing old-established leper-houses, in good order and constant use ; they therefore favoured the introduction of similar institutions for the isolation of lepers in Europe.

Thirdly, distinguished physicians of the West

began to give their attention to the subject, so that the history and nature of the malady became far more widely known than at any former period.

These three circumstances mainly contributed to foster the belief that the disease which had thus suddenly come into prominence had been newly imported.

‘After the Crusades,’ says Sprengel, ‘leprosy became much more general in the West. But it was not the Crusades that first brought this hideous malady into Europe, for from time immemorial it had existed in France and Italy. Several regulations about lepers are known even of Rotharis, King of the Lombards (in the eleventh century). But, if we may so say, the Crusades were the means of combining the disease of the East with that of the West. The appearances which marked the development of this malady in the West closely resembled the symptoms by which it was announced in the East; but since its first appearance no Oriental writer had so accurately observed leprosy and its various forms as the Europeans, for the genius of observation belongs far more to the West than the East. It is also very remarkable that French and English writers described much better than the Arabs the fever which ordinarily accompanies the onset of the disease, either because it more commonly attends the affection among the western populations, or because the latter have observed it more carefully.’

During the twelfth and thirteenth centuries, leprosy increased to a terrible extent throughout Europe, and especially in England, Italy, and France. Velley, in his history of the latter country, says that Louis VIII. promulgated a code of laws in 1226 for the regulation of leper hospitals in France, and that the number of these hospitals was computed at that time to be not less than 2,000. At a later period the number had increased, so that there was scarcely a town in the country unprovided with a leper house.

The late Sir J. Simpson has collected records from the *Monasticon Anglicanum*, and other sources, of no less than ninety-five of these religious hospitals for lepers, besides innumerable smaller pest-houses, nearly all of which were founded in Great Britain during the thirteenth, fourteenth, and fifteenth centuries. In addition to these, there were at least fourteen houses of the first order in Ireland. The total number of similar institutions in Europe was estimated by Matthew Paris at 19,000. But this probably included houses of a smaller class.

The chief leper asylums in the British Isles were very unequally distributed, the majority being found in the east and south coast counties, and in the towns on some of the larger rivers, such as the Thames, the Severn, and the Ouse. Norfolk was especially a home for lepers, for no fewer than seventeen hospitals of the first order existed within that county; five

of these were at Lynn, and six at Norwich. In Kent there were at least nine, and in Suffolk seven. At first sight it would seem as if the distribution of the leper houses would be a fair indication of the relative prevalence of the disease in different parts of the kingdom; but further investigation makes us pause before accepting this conclusion, for the foundation of so many hospitals might be equally accounted for by the fact that the south and east coasts of England, being the parts of the Island nearest the Continent, were the districts most thickly populated, and contained the chief centres of civilisation. The same remarks apply to the towns situated on large and navigable rivers.

We find that in France in the thirteenth and fourteenth centuries, the greatest care was taken to prevent, on the one hand, lepers from remaining in social intercourse with the unaffected, and, on the other, to guard those in whom there was no evidence of leprosy from being erroneously condemned to exile from society. No doubt lepers were often concealed for a time by their relations and friends, in spite of the almost universal belief in contagion, and the acknowledged danger of such a proceeding.

In a case of suspected leprosy, the medical examination was conducted with the utmost formality and care, and often occupied several days. Special rules were laid down for the systematic investigation of doubtful cases, and even where no doubt could have

existed in the mind of the examiner, the same routine seems to have been generally followed. Kind and considerate treatment of the unfortunate lepers was strongly inculcated, and consolations were frequently given; by some, indeed, they were looked upon almost as martyrs, and were treated with far more kindness and compassion than they now meet with in Eastern or even in some European countries. The exclusion of lepers from society was considered by all a high moral duty, simply because the disease was believed to be dreadfully infectious. The examination of the supposed leper was conducted, as I have said, with much formality. He was first sworn to speak the truth, and to answer fully all questions put to him. The investigation then began with an inquiry into his previous history—respecting any family taint or other predisposing cause, whether he had held communication with lepers, or had been otherwise exposed to contagion. Next, an examination was made of the colour, sensibility, and general aspect of the face; the skin was pricked to ascertain if the sense of feeling was perfect. The physician was especially directed to determine whether the eyebrows were thickened or had lost their hair, whether the nose was enlarged or ulcerated, the voice harsh, the breath foetid, and the features changed or frightful. Then the patient was to be stripped to the skin, and the whole body examined for dark spots, thickening or irregularity about the joints, and wasting or

numbness of the limbs. Water was poured over the body to ascertain if it was unusually greasy, an oily skin being one symptom of the disease. Lastly, the urine and blood were to be tested. The examination of the latter was justly regarded by some of the eminent physicians of that day as of little value. Bernhard Gordon, Professor of Medicine at Montpellier, says (in his '*Lilium Medicinæ*') : 'The blood, when drawn and washed, contains black, earthy, rough, sandy matters, and other marks which authors prominently mention ; but for me, those suffice which are to be found in the face.' The mode of testing the urine is described by Lemnius, and consisted in throwing into the water of the suspected person the ash of burnt lead (litharge ?) ; if this sank to the bottom the individual was in good health, but if it floated on the top he was considered infected with leprosy—a rough way, no doubt, of testing the specific gravity of the fluid. Lastly, the physician was particularly cautioned not to arrive at a hasty conclusion, but to ponder well all the features of the case before giving a verdict which might consign a healthy man to perpetual banishment in a colony of lepers. In doubtful or recent cases the suspected leper was never at once sent to the hospital, but simply confined to his own house and tended by the physician ; but he was not allowed to associate with the healthy. Amongst the wealthy and powerful, here the proceedings often ended. Not so with the

poorer classes. As soon as the signs of the disease had developed, the leper was given over to the ecclesiastical authorities ; but if, on the other hand, the physician pronounced him sound, he was supplied with a medical certificate to that effect and allowed to go free.

When the condemned man was handed over to the priests, certain religious ceremonies were performed to celebrate and legalise his removal from the outer world to the abode of lepers. He was sprinkled with holy water, a mass for the dead was said over him, a handful of earth was thrown upon him in token of burial, and he was then transferred from the church to the hospital. On admission each leper was provided with a special dress, and a rattle or pair of clappers, without which he was on no account allowed to leave the house. By the dress he was at once recognised, while the clappers served to give timely warning of his approach. The dread of contagion was so great, that lepers were strictly forbidden to enter inns, churches, mills, or bake-houses, to touch or eat with healthy persons, to wash in the common springs or streams, or even to walk in narrow foot-paths. They were allowed to enter the towns on certain days only, and to touch with a stick what they wished to buy. If they met anyone on the road, they were obliged to hurry away from him, or so place themselves that the wind should not carry their exhalations towards the healthy. In

short, the dread of infection led people into many absurd practices, some of which were continued down to the seventeenth century. Evelyn, in his diary, mentions that while on a journey to the Hague, in the summer of 1641, he 'observed divers leprous poor creatures, dwelling in solitary huts on the brink of the water, and permitted to ask the charity of the passengers, which is conveyed to them in a floating box that they cast out.'

I have dwelt somewhat at length on the belief that existed in the Middle Ages in the infectious character of leprosy, because it was at the root of all the laws and regulations affecting lepers, and also because it explains why, for many centuries, they were so carefully shunned by all except those who desired to perform some signal act of penance or piety. Matthew Paris (quoted by Sir J. Simpson) gives us an excellent example of the way in which lepers were occasionally utilised for the latter religious purpose. Speaking of Matilda, the queen of Henry I. of England, he says: 'At the same time (in the year 1105) David, King of Scotland, the brother of Matilda, Queen of the English, came to England to visit his sister, and when on a certain evening he came by invitation to her chamber, he found the house filled with lepers, and the Queen standing in the midst; having laid aside her cloak, she with both hands girded herself with a towel, and water being placed in readiness, she began to wash their feet,

and wipe them with the towel, and embracing them with both hands, kissed them with the utmost devotion. Upon which her brother addressed her thus: "What is this which you are doing, my Lady? In truth, if the King knew this, he would never deign to kiss with his lips your mouth, contaminated by the pollution of the lepers' feet!" And she, smiling, replied, 'Who knows not that the *feet* of an Eternal King are to be preferred to the *lips* of an Earthly King? Behold, it was for this that I invited you, dearest brother, that you might learn, by my example, to perform similar actions. Do, I beseech you, that which you see me doing.' And when her brother had made answer that he would by no means do such things, as she persevered in her employment, David, with a smile, withdrew.'

Volz considers that leprosy in the Middle Ages was by no means so contagious as might be inferred from the severity of the seclusion practised; but that this may be rather attributed to the custom of the age, when those who were of the same class in social status, culture, necessities, and distresses, often united to form themselves into a society or brotherhood, which was kept together by a religious bond. The isolation from the rest of the world which hundreds of thousands practised voluntarily, was required as a duty from the lepers, who retired to the leper house, where they usually led an indolent life, supported by the alms of the charitable, or at the cost of the

foundation. The spirit of the time also often endowed them with a certain odour of sanctity, and set a martyr's crown on their heads. Lepers being excluded from the orders of knighthood and from monasteries, had hospitals appropriated to them, so that, though their disease deprived them of the honours and privileges which the world and the Church valued, they might yet retain the benefits arising from a religious life.

In England and Scotland the laws and customs in force with regard to lepers were very similar to those I have described as obtaining in France; the chief difference, as far as I can learn, being the very partial development of the religious ceremonial in our own country. The matter was left more in the hands of the magistrates and doctors, but the result, as far as it affected the leper, was the same in all; namely, his complete exclusion from society, the special dress, the cop and clapper, with all the other provisions to prevent, if possible, the spread of the disease. In some establishments the rules were very stringent. Dr. Shapter, in his account of the leper hospital at Exeter, says that one rule provided that 'no brother or sister shall go or pass out of the house beyond the bridge, without the gate of the said Hospital, without the licence of the Warden or his deputy, upon pain to be put into the stocks, and to have but bread and water for one day.'

At Edinburgh, the punishment for breaking the rules of the house was far more severe, being nothing short of death. Hugo Arnot, in his history of that city (1779), says :—

‘It is a curious, yet neglected object of disquisition, *how certain diseases spring up* and die away in different ages. The frequency of the leprosy amongst the Jews is known to every one, and its loathsomeness and severity are pathetically described in the Book of Job; but our ancestors also were much afflicted with the leprosy. It was by no means a disease peculiar to the poor, but equally visiting the cottage and the palace. King Robert Bruce, who was said himself to have been afflicted with the leprosy, founded near the town of Air an hospital for persons labouring under that distemper. In the reign of James I. it was so general as to be the object of parliamentary regulations. At the institution of the Hospital of Greenside (founded in A.D. 1591 by John Robertson) seven lepers, all of them inhabitants of Edinburgh, were admitted in one day. The severity of the regulations which the magistrates appointed to be observed by those admitted into the hospital, segregating them off from the rest of mankind, and commanding them to remain within its walls day and night, demonstrates the loathsome and infectious nature of the distemper. It has been already observed that the magistrates of Edinburgh, in consequence of a grant

of King James III. vesting in them an ample jurisdiction, and powers to make statutes and bye-laws for the government of the borough, had assumed to themselves an extravagant and tyrannical power of declaring such offences to be capital as they conceived a particular aversion to. Accordingly the lepers were discharged to go without the hospital, or to have its door open after sunset *under pain of death*. That this might not be deemed an empty threatening, a gallows was erected at the gabel of the hospital for the immediate execution of offenders.'

John Stow, in his 'Survey of the Cities of London and Westminster,' first published in 1598 (appendix to Strype's edition, 1720), says, 'I have, moreover, heard that there is a writ in our law *de leproso amovendo*, i.e., of removing away a leper, and I have heard that King Edward III., in the 20th year of his reign, gave commandment to the maior and sheriffs of London, willing them to make proclamation in every ward in the city and suburbs, that all leprous persons within the said city and suburbs should avoid within 15 days next, and that no man suffer any such leprous person to abide within his house, upon pain to forfeit his said house, and to incurr the King's further displeasure; and that they should cause the said lepers to be removed into some out-places in the Fields, from the haunt and company of all sound people. Whereupon certain Lazar Houses (as may be supposed) were

then builded without the City, some good distance; to wit, the Lock, without Southwark in Kent St.; one other betwixt the Milesend and Stratford, Bow; one other at Kingsland, betwixt Shoreditch and Stoke Newington, and another at Knightsbridge, West of Charing Cross. These four I have noted to be erected for the Receipt of Leprous People sent out of the City at that time. To which may be added the Hospital of St. Giles and St. James before mentioned. Finally, I read that one William Pole, Yeoman of the Crown, being stricken with a Leprosy, was desirous to build an hospital with a Chapel to the honour of St. Anthony for the relief and Harborow of such Leprous Persons as were destitute in the Kingdom, to the end they should not be offensive to others in their passing to and fro. For the which cause, Edward IV. did by his Charter dated in the 12th of his Reign give unto the said William for ever a certain parcel of land lying in his highway of Highgate and Holloway within the County of Middlesex, containing 60 feet in length and 34 in breadth. In former times Lepers were in the City very frequent, and the disease of the Leprosy so infectious that as there were many separate Houses for these diseased people to dwell in by themselves, so they had their Overseers and Keepers, and divers Laws and Orders were made by the City concerning them—as that the Keeper of the Lepers should be eased from Inquest; That

the Overseers of them be disburdened from Assizes ; That the Lepers go not about the streets to tarry there ; That the Keepers of the Gates swear that they will not permit Lepers to enter into the City. And there was sometime a Brief for removing them from the City and suburbs. Another time there was a Brief for levying a hundred shillings out of a tenement of the Lepers, and delivering it to their officers for the sustaining of them.'

At a later period, however, considerable relaxation of the old laws regarding lepers was tolerated, till the time arrived when leper houses were totally abolished. Nevertheless, dread of contagion, and the strict exclusion of lepers from intercourse with the rest of mankind, existed hardly more than a century ago in some parts of Scotland, and the Shetland Isles, where the custom long prevailed of exporting all lepers to the island of Papastour, and in the year 1737 (according to Sir J. Simpson), Mr. Fiskien, a minister in Papa, thus writes to Sir John Pringle :—

'This disease (speaking of leprosy) is found by experiment to be very infectious, and seems also to run in blood, most persons that have taken it without infection from another, having been related to three families in the isle. It affects any age or sex, and it is observed that young persons bear it longer than those of a more advanced age, some having lived ten years under it, others only two, some

four, some six, &c., but none ever recover after the symptoms do appear. The persons that fall into this direful case, are, as soon as it is observed, obliged to retire to a solitary little hut, built on purpose for them, at a distance from all houses, and are not allowed any converse with their husbands, wives, or nearest relatives, but have their necessities of life furnished for them by a contribution from all the inhabitants of the isle, and brought to their hut, which they take in when the person who brought it has retired to the windward of their house, at some distance.'

I shall digress for a moment to point out that the very stringent laws of the Middle Ages closely resemble those now in force in China. A recent report by Dr. Hobson, from that country, states that lepers are so effectually excluded from society that they are as among the dead. This separation is so complete, and its consequences are so much dreaded, that persons becoming leprous are known very frequently to end their lives by opium, or by hanging or drowning themselves. The Chinese never permit marriage with the progeny of leprous parents; its appearance in a family not supposed to have any hereditary predisposition, puts an effectual stop to all matrimonial engagements. Lepers themselves only intermarry with those of the same grade or type of disease. For example, a leper of the fourth generation, with no external appearance, but known

to be of leprous origin, will only marry a woman who is in the same circumstances herself. Their progeny is considered free from taint, and need no longer be excluded from society.

But to return. It must not be supposed that the leper houses of the Middle Ages were hospitals under medical supervision for the treatment or cure of patients. The more celebrated ones were endowed religious asylums, and entirely under civil and ecclesiastical, but not medical, control. The smaller establishments were nothing more than wretched abodes which just sufficed to shelter a few miserable creatures, who had to live from hand to mouth, depending for their subsistence on the charity of their neighbours. In England and Scotland, the flesh of diseased animals, which could not be sold in the public market, was often sent to the leper house outside the town, for the use of the inmates. Under these circumstances we are not surprised to learn that a cure was never effected except by miraculous agency.

Although hospitals were founded with the primary object of suppressing leprosy and preventing contagion, yet it can hardly be doubted that there remained in the minds of many, a remnant of the old Jewish superstition, that the disease was religiously as well as physically unclean; in other words, that it was a special Divine judgment on individuals, and that, therefore, a life of seclusion and penance

was the one most suited to their condition. And this explains the fact, that greater care was bestowed on the spiritual than on the temporal wants of the sufferers, many of whom would gladly have bartered the *future* benefits attached to their religious exercises, for a *present* supply of wholesome food.

It is not easy to determine the exact time when leprosy reached its zenith in Europe. It did not arrive at its maximum of development in all countries at the same time. For instance, it appeared in Scotland long after it was known in England, and was declining in the latter country before any sign of abatement was observable in the north. As far as we can judge, the disease appears to have been most prevalent in France and England at the end of the thirteenth century, and in Germany somewhat later.

The greatest number of leper hospitals was founded in England in the twelfth century, while the thirteenth provided almost as many; but after that period very few were added. The last one of any note (already referred to) was founded at Highgate in 1472 (just four centuries ago), but long before that time many of the old leper houses had fallen into disuse, and their revenues had become diverted to other purposes.

Matthew Paris mentions that in the middle of the fourteenth century (1350) the number of lepers at St. Alban's had greatly diminished; for in the preface

to the statutes of that leper house, published in 1350 (in Matthew Paris' history), it is stated that the number of lepers that presented themselves for admission, had diminished so much by that time, that their expense of maintenance was below the revenue of the institution. 'In general,' it is added, 'there are now not above three, sometimes only two, and occasionally only one.'

The hospital of St. Mary Magdalene, at Ripon, was established in 1139 for the relief of all the lepers in that district. In the time of Henry VIII. it contained only two priests, and five poor people to pray for 'Christen sowlez.'

Speaking of the leper hospitals of London, John Stow remarks: 'A little farther from the city on the other hand, viz., at Great Ilford in Essex, was a more ancient (and that a Royal) Foundation for such diseased People, built and endowed liberally by King Stephen, for a Master, who was to be a Priest, and 13 poor brethren, who were called *Fratres Leprosi*, i.e., Leprous Brothers, and for certain poor women to attend on them; which Hospital is in some part still remaining, with the chapel; but the most part of the Revenue swallowed up, being gotten into the hand of Laymen.' In one of the Reports of the Commissioners for Suppressing Colleges, Hospitals, &c., in the time of Edward VI., it is observed in regard to this Ilford hospital, that though founded 'to find 13 poor men being lepers,

2 priests, and 1 clerk thereof, there is at this day but 1 priest and 2 poor men.' We find from these and other accounts that in the latter part of the fourteenth century leprosy was rapidly disappearing in England. It lingered on, however, in some parts of Scotland¹ and the Shetland Isles until the middle of the eighteenth century, but then, with the exception of a few isolated cases, it finally departed. In 1742, a day of public joy and thanksgiving was appointed in Papa for the total disappearance of this plague.

On the continent, Philip Gabriel Hensler has clearly demonstrated that towards the end of the fifteenth century scarcely a trace of the so-called 'knotty leprosy' could be found; a milder form, however, known to the authors of the time as 'scabby leprosy,' was still common in some countries, especially in Germany and Holland. In the first half of the sixteenth century, Francis I. of France ordered that the privileges of the leper houses should be revised, and the number of true lepers determined. This led to a re-distribution of the funds, which were found to be too large for the requirements of the few remaining lepers. About a century later, leper houses were finally abolished by Louis XIV., and their property given to the Carmelites, one hos-

¹ Martin, in his 'Description of the Western Islands of Scotland' (Lond. 1716), mentions that the leprosy had lately appeared at St. Kilda, and that 'twelve lepers had died the year after his visit.'

pital alone being retained for its original purpose. Thus, we may safely conclude that the disease had quite disappeared from the chief countries of Western Europe by the end of the seventeenth century.

The history of Elephantiasis in the Faroe Islands supplies us with an interesting link between the past and present, between the disease of the Middle Ages and that of our own day; it carries us on from the time that it was dying out in Europe, to the beginning of the present century, and proves, if proof were wanting, the identity of the disease in both ages.

In the latter half of the seventeenth century, when leprosy was extinct in France and England, it was very prevalent in the Faroe Islands, as we learn from the writings of the Rev. L. J. Debes, from an old translation of which, published in 1676, I shall quote the following passage:—

‘As for leprosie itself, I would not omit, for the Reader’s sake, to mention something of its nature. Physicians write that there are three sorts of Leprosies, viz.: First, *Tyria*; in this Leprosie the Patient’s skin is soft, and sometimes falleth off in shells, and they have many spots and white wartes thereon. The second is called *Alopecia*, by reason the hairs fall off, as those of a Fox; he that is affected with this Leprosie, hath a red face, and his beard and eyebrows fall off. The third sort is called *Elephantiasis*, from the Elephant, to whom they become like on their skin.

The body and face of him that is infected with this disease is full of knobs. The Leprosie wherewith they are troubled in this country is usually *Elephantiasis*, for the face and limbs of almost all the infected are full of blew knobs, that break sometimes out, as Boils, whereby they look very deformed in the face, being besides all hoarse and speaking through the noses; the sickness taketh them most in the Spring and in Autumn, and then many of them dye thereof.

‘ I find the cause of this Leprosie to be the air and dyet; for, as we said above, here is usually a pretty cold and moist air, which causeth the scurvy to those that lead a solitary life, and this hath a great affinity with Leprosie. Besides, the meat of all, specially of the poorer sort, is half rotten flesh or fish, all their nourishment in summer being likewise fresh fish and sweet milk, without any salt; wherefore he that is not of a strong and good complexion, may easily have his blood corrupted, the Sickness gnawing itself through the body, before it breaketh out; and when anyone is so infected, he may easily give it to another, that is of the same complexion with the sick. Now that disease acting a great while in a man, before it breaketh out, it happeneth that many think they be clean on both sides, do marry together, and yet afterwards the one is found to be infected. God and nature deal wonderfully with such people in their marriage, for amongst

the children they beget, some are clean and some unclean. I have three examples in my parish of women that have been unclean, and have brought forth many children, whereof most are married, none of them yet being found to be unclean; wherefore the inhabitants take but little care in their wooing, whether the parents have been clean or no. I have also an example, that the father hath been unclean, and yet the children healthful.

‘It has also been taken notice of, that two living together in marriage, though the one be found infected, they live together as before, as long as one doth but murmur of it, till the magistrate doth separate them, and yet the sound remaineth unaffected; whereas another is often taken with the disease by a very little conversation. Here are examples yet before our eyes, that poor cripples, clean but helpless, have been put among the sick in the hospital, eat with them, converse daily with them, and are not infected in the whole time of their lives. What is this, but that God confirms the truth of his word, taking place in them that live in a just wedlock, and wander in lawful ways, putting their hopes in him, that neither fire nor water, contagious disease, nor dangerous Pestilence shall hurt them?’¹

From the time this account was written, about two hundred years ago, up to the beginning of the pre-

¹ From Rev. L. J. Debes’ ‘Account of the Faroe Islands,’ Englished by J. S. in 1676.

sent century, the disease existed in the Faroe Islands. The reason of its final disappearance has been attributed by Dr. Hjort to hygienic causes. He says: 'We learn from the Faroe Islands that the disease has there diminished, and is now almost unknown, since the great sea fishings were relinquished, and more attention has been paid to agricultural pursuits.'

The history of leprosy in the Middle Ages suggests the following points for consideration:—

(1) How did the disease become common in Europe?

(2) Was there any ground for the almost universal opinion that it spread by contagion?

(3) Did the mode of life of that period influence its progress?

(4) Did the isolation of lepers tend to its rapid decrease in the fifteenth and sixteenth centuries, and to its almost complete extinction in the seventeenth century?

With regard to the first question, the broad fact is evident, that the disease, though present in Europe long before it became common, yet received in the twelfth century a sudden accession of strength, and swept like a wave across the continent from south to north; and that in the main it subsided in the same order, first in Italy and the greater part of Spain; then in France, England, and the greater part of Germany; thirdly, in Scotland, Holland, and Denmark; and lastly, in Sweden, and the Shetland and

Faroe Islands. In its retreat it left behind foci of disease, wherever circumstances favoured its permanent development. There was, in short, an *epidemic* accession to a disease which was already more or less *endemic*.

In affirming that leprosy was epidemic in Europe during the Middle Ages, I am well aware that it only amounts to stating the fact, that we do not know the true causes which produced this remarkable feature in the history of the disease. It is better, however, to acknowledge this, than to bolster up erroneous theories as to its mode of propagation.

Secondly. The question of contagion as a propagating cause of leprosy in the Middle Ages is one of difficulty. The universality of the belief in its infectious character is no proof that the belief was well founded, for every epidemic disease was in those days regarded as contagious. Now we know that leprosy is not so in Europe in the present day—at least, not in any appreciable degree. Has it then, we may ask, changed its nature during the last two centuries?

While, therefore, I cannot admit that there is much evidence of the spread of leprosy by contagion, I fully agree with those who hold that many Europeans acquired it in the East during the Crusades, and thus brought into Europe a constant supply of new cases. Admitting the disease to be hereditary, the effect of this in a few generations would be obvious.

Hirsch remarks that: 'At a time when syphilis was not recognised as a specific disease, either in its primary, secondary, or tertiary form, it was often taken for leprosy, and to that mistake is to be ascribed, in some measure, the popular and professional idea of the contagiousness of leprosy. In the seventeenth and eighteenth centuries the belief in this theory began to disappear, and scarcely one modern observer holds it. That leprosy has lost a contagious property which it formerly possessed, seems an arbitrary and absurd supposition, inasmuch as no determined facts in the history of the disease support the view, and there is no analogy to be found in any other disease.'

Thirdly. With reference to the effect of the mode of life and diet in use during the Middle Ages, little reliable information can be obtained from the writers of those times. Even amongst the best educated and most enlightened observers, absurd notions prevailed as to the causes of diseases in general, and of leprosy in particular. Stow, for example, mentions that the smoke of coals was looked upon as a noted source of disease, and their use was at one time actually prohibited in London and Southwark. Some held that leprosy was produced by an excess of animal food, while others believed that a vegetable diet had the chief share in its production. The combination, however, of milk and fish seems to have been considered especially favourable to the disease.

Bernhard Gordon says: 'Comedere lac et pisces in eadem mensa inducit Lepram.' ('Lilium Medicinæ').¹ In short, there was scarcely any kind of food that was not condemned by one writer or another; so that if their united directions had been followed, the progress of leprosy would have been effectually forestalled by death from starvation.

Lastly. With regard to the isolation of lepers, I have already hinted that it tended to prevent marriages with those infected, and thus to a certain extent checked the spread of the disease. Or rather, I should say, that when the epidemic character of leprosy was subsiding, this, among many other secondary causes, assisted in its final extermination.

¹ It is not a little remarkable that the same opinion obtains in the present day in India. We find the following statement in the leprosy report of the College of Physicians (1867), p. 116: 'There seems to be an impression in the minds of Dr. Carter and Messrs. Steinhæuser and Shepherd that there is some foundation for the popular idea that a diet chiefly composed of milk and fish tends to produce the disease.'

CHAPTER II.

GEOGRAPHICAL DISTRIBUTION OF LEPROSY IN THE
PRESENT DAY.

THERE is no disease that has a wider Geographical distribution than leprosy. It is found both in the Northern and Southern Hemispheres, and in almost every latitude from the Poles to the Equator. Of the five great continents, Europe and North America are the *least*, and Africa, in proportion to its population, the *most* affected by it.

To begin with Europe. Leprosy is found in Iceland, Western Norway, Lapland, on the Russian shores of the Baltic, in certain parts of Portugal, in the northern and southern provinces of Spain, and along the coasts of Provence and Nice; but in all these places it is confined to a comparatively small portion of the population, while in Sweden it is fast dying out. In Turkey and Greece, in Candia, and most of the islands of the Archipelago, as well as in the provinces of Russia between the Black Sea and the Caspian, it is also endemic.

Asia contains a larger number of lepers than any other quarter of the globe. The disease exists in

Syria, Palestine, and Arabia; but it is by no means so common in these countries as is generally believed. In the island of Cyprus it is very prevalent amongst the Christian population, but not amongst the Mussulmans. It is met with in Persia, especially in the Northern Highlands, throughout Turkestan, and on the shores of the Sea of Aral. In Cabool, Cashmere, and over the whole Indian peninsula, it is terribly common, and is almost equally so in Burmah, Siam, and the neighbouring countries. In South China a large proportion of the people suffer from it; but north of the Great River (Yang-tse-kiang) it is but seldom seen. There is some doubt whether leprosy exists at all in Japan; in any case, it is rarely met with in that empire. It is not uncommon in Kamtschatka. The disease is found in nearly all the islands of the Indian Ocean and Malay Archipelago, especially Ceylon, Sumatra, Java, Borneo, and the Moluccas. Australia has at present escaped, with the exception of a few cases imported from China. New Zealand has not been so fortunate; but there it is confined to the native population, and both the disease and its victims will shortly become extinct.

In Africa, leprosy has existed from time immemorial in Egypt and Nubia. It is also found on most of the African sea coasts, and in many inland districts, especially in the vicinity of the great rivers Niger and Congo. It was probably imported into Cape Colony about two hundred years ago. It is

common in Madeira, the Canaries, Madagascar, Mauritius, and many other islands.

It is certain that leprosy has been largely exported from the Eastern to the Western Hemisphere during the last 300 years, and it is in the highest degree probable that this is the only channel through which the disease has now become endemic over a large part of South America and the West Indies. Spain, Portugal, Africa, and, of late years, China and India have all contributed to produce this disastrous result. Leprosy has extended over the whole of the northern part of South America, and is extremely common in Surinam, Venezuela, Guiana, and Brazil. It is said to be unknown in La Plata, Chili, and Peru. It is prevalent in Panama and the highlands of Costa Rica and Mexico, but not in the intervening provinces of Nicaragua and Honduras; and it exists also in most of the West Indian Islands. In the Sandwich Islands it has lately increased to an alarming extent. In North America, the malady is found in New Orleans and some other parts of the southern States; also in the Canadian province of New Brunswick and in Greenland. The extent to which leprosy prevails in the different countries I have enumerated is by no means uniform. In some it is widely scattered, in others collected into foci.

A glance at a map will give a better idea of the geographical distribution of the disease than can be obtained from any mere enumeration of names. It

will be seen that while the disease is common in the Tropics and in high northern latitudes, it is comparatively rare in the Temperate Zones.

In order to form a just estimate of the external causes which may influence the development, growth, and decay of leprosy, it will be necessary to investigate the circumstances under which it exists at the present day, especially with reference to the habits and customs of those nations or races who suffer from its ravages; and to notice also any peculiarities of soil, climate, and food, which may be likely to affect the progress of the disease.

With this object in view, I propose to describe briefly the modern history of leprosy as it is met with in some of those localities where it is either still prevalent, or gradually disappearing.

Beginning with Europe, we naturally turn first to Norway, where a certain district of about eight hundred miles in length, extending from Stavanger to Hammerfest, has acquired the unenviable character of being the last European stronghold of this dreadful disease. Along the western coast of Norway, leprosy has prevailed from time immemorial, extending sometimes inland along the shores of the fiords, but only quite lately showing itself in districts far remote from the sea. Its chief centre, however, is Bergen and its neighbourhood. From most European countries this disease has either disappeared, or is fast disappearing at the present time. In Norway, on the

contrary, we are met by the startling fact, that so far from receding, it is actually gaining ground, and spreading over districts where it was before unknown.

The total population of Norway is about 1,500,000. Six-and-thirty years ago it was first noticed that leprosy was on the increase, and at that time the total number of lepers was believed to be about six hundred and fifty; it was probably slightly in excess of that number. In 1845 there was a general census of the kingdom, and the number of lepers was then ascertained to be 1,122, and eight years later they had increased to 1,783. Again, in 1857 they had multiplied, according to Stein, to 2,700, and in 1865 the number reached 3,000. Therefore, in thirty years, the number of lepers had more than quadrupled; in other words, the increase was about 340 per cent.; and even allowing that the later censuses have been made with greater care, it is yet impossible to doubt that the disease has steadily progressed.

Having established the fact of the rapid increase of leprosy in a certain part of Norway, let me notice briefly some of the geographical and other features of the district. In reference to the climate, it is well known that the west coast of Norway is remarkable for the mildness of its winter, due, no doubt, to the warm sea currents which wash its shores. During the winter months, while the ports

of the Baltic are shut in with ice, the harbour of Bergen is constantly accessible to ships. In addition to a mild winter, there is a heavy rainfall. But neither of these physical characters is likely to influence the health of the population unfavourably. From my own observation of this part of Norway, I have been led to the conclusion that the district is physically not a very unhealthy one. It is perfectly true that the valleys are shut in, damp, and badly drained, and that pure water is often difficult to obtain; but I have also noticed that one of the very few points in personal hygiene about which the Norsemen show any signs of care, is their water supply; and I have often known them walk thirsty for many a mile, rather than drink from what they believed to be an unwholesome stream.

With regard to the food in ordinary use in Norway, it is of the most miserable description,—both animal and vegetable; the former consisting of half rotten and imperfectly salted fish, bad eggs, sour milk, rancid butter, and cheese in a state of such disgusting decomposition as to defy description. Who that has visited Norway can ever forget the abominable smell of the ‘gammel ost’? There is little variety of food, and therefore the Norwegians prefer that little full-flavoured. They eat scarcely any vegetables, and their bread is thoroughly unwholesome. In agricultural matters, the natives of the western districts are at least two centuries behind

the rest of the world. Corn, chiefly oats and barley, is grown on badly drained land, in mixed crops, and with a superabundance of weeds. It never ripens, but is cut green, and then very imperfectly dried. We cannot wonder, then, that their grain is poor and often musty. Not only is the quality of the food extremely bad, but the quantity is often insufficient; and during a hard winter, many deaths occur from starvation. Lastly, I would remark that the Norwegians on this coast are largely engaged in the fishing trade. I shall again refer to the subject of Norwegian diet, when speaking of the causes of leprosy.

Norway and Sweden are inhabited by kindred races, and are geographically closely related; we are, therefore, not surprised to find that until lately leprosy was very common in the latter country. During the last fifty years it has steadily decreased, and has now almost disappeared. At the beginning of the present century it was, however, widely spread, chiefly in Angermanland, Helsingland, Medelpad, Upland, and Bohuslän.

In Angermanland, the disease prevailed in the valley of the river Angerman, especially at the confluence of its two arms, and in the villages and farms of that district.

From 1820-40 there still lived in the leper hospital at Hernösand twenty-nine lepers. Within the last two decades no new case has appeared.

Leprosy prevails most at present in Helsingland,

especially on the banks of the Ljusna, which are liable to frequent inundations; but here also it has much diminished, and occurs only in isolated cases.

In Upland, it was formerly very common on the banks of the river Dal, especially at its mouth. It is now very *rare*.

Dr. Hjort points out that in the last century 'there were large herring fisheries on the coast of Bohuslän, and at that time 'spedalskhed' was exceedingly common in that district; but after the herring shoals in 1807 left that locality and showed themselves on the Bergen side of the country, the leprosy almost entirely ceased on the coast of Sweden. The disease, however, seems to have accompanied the herrings to the Bergen shore, for it is precisely from that time that spedalskhed has increased so remarkably in the western districts.' But while bearing in mind the change of occupation of the Swedes, consequent on the loss of the fishing trade, we must not forget that during the last half century they have made considerable progress in agricultural pursuits, and this has led to a general improvement in the condition of the poorer classes.

Changes exactly similar to those I have described in Sweden have, as I have already stated, occurred during the present century in the Faroe Islands, where the fishing trade has diminished, and leprosy has disappeared, while agriculture, and consequently food, has improved.

The history of Iceland tells the same tale. In 1768, the number of lepers was 280; in 1838, it had decreased to 128; and ten years later there were but 66. It is no doubt true that an epidemic of measles (in 1847) carried off many, and thus reduced the number somewhat rapidly; but it is equally true that their place has not been supplied by others. Dr. Hjaltelin notices the disappearance of the disease chiefly on the south coast of the island; and this he attributes to a general improvement in hygiene as regards food and water. Schleisner, in his medical report on Iceland (1849), says: 'I wish to call attention to the remarkable circumstance, that upon the whole north and east coast—tracts of country where no fishing is carried on—very few lepers indeed are to be found; while one-third of the whole number in the island are to be met with in Guldbringe Syssel, and there principally in one parish, where the chief fishing stations are situated.'

In central European Russia leprosy is unknown; but it is met with at two opposite extremities of the Empire, namely, on the shores of the Baltic and the Caspian. In the former district the disease is confined to the coasts of Finland, Esthonia, and Courland, where the inhabitants are very poor, badly fed, and exposed to many hardships. In the south-eastern provinces, extending from the Crimea to Astrachan, the disease abounds. It is met with also amongst the Cossacks of the Don, the Volga, and

the Ural, and in some parts of the mountain ranges of the Caucasus. Much attention has been directed to the origin of the disease in these regions. Some writers have referred it to importations from Persia. It is, however, highly probable that Krebel is right in saying that it was endemic in the fifteenth century, and has remained so ever since. Amongst the inhabitants of the northern shores of the Caspian, it is said to be chiefly confined to the Russians, who alone are engaged in the fisheries, while Kalmucks and Armenians generally escape. The inhabitants of these regions live under the most unfavourable hygienic conditions. The soil is unproductive and charged with salt; the climate during the summer months is tropical; and the food is of the most unwholesome kind, consisting of imported bread, stinking fish, and the impure water of the Volga.

Leaving Russia, I pass to the eastern islands of the Mediterranean, in most or all of which Elephantiasis Græcorum is occasionally met with. In some it is common, in others comparatively rare. But of all European countries, Crete alone is the rival of Norway as a stronghold of leprosy; and in Crete, as in Norway, it is increasing. The total population of this island is about 300,000. Not many years ago the number of lepers was estimated at 400, and at the present time, according to the lowest computation (that of Dr. Brunelli), it is 500; while according to Dr. Hjorth, it is not less than 1,000. There is

obviously, therefore, some doubt as to the exact number, but all writers agree in asserting that the disease is not declining, but rather the reverse. It is worthy of remark, that in many respects the Cretans and Norwegians are exposed to similar external agencies. For example, the island is mountainous, with a long coast line. It is imperfectly drained, the water supply is bad, and the food disgusting. In two respects, however, there is a difference: the climate of the coast of Crete is semi-tropical, and it is inhabited by mixed races, consisting of Greeks, Turks, Jews, and Europeans. Dr. Hjorth, who considers that bad diet is one of the principal, if not the main element in the development and aggravation of leprosy, remarks: 'In consequence of the numerous fasts of the Oriental Church, coupled with the neglect of agricultural pursuits, the Cretan peasants seldom or ever make use of fresh meat, butter, or vegetables. Their food consists of bad salt fish, barley bread, and of an enormous quantity of olive oil, often rancid, which they drink freely. In many places there is a want of good water; it is often brackish, and in the mountain districts, from which a large number of the lepers come, it is derived from the melting of the snow.'

Dr. Mongeri confirms these statements, and appears to agree in the opinion of Dr. Hjorth, that the large consumption of semi-putrid salt fish and

pork, coupled with the total neglect of personal cleanliness, has much to do with the development of leprosy.

There is throughout Crete a general dread of infection, and an almost superstitious horror of this disease; consequently the lepers are driven to inhabit certain villages, especially set apart for this purpose, and to which all are obliged to repair, a custom which forcibly reminds us of the ancient Jewish laws on this subject. 'Whoever,' says Hjorth, 'walks out of the gate of one of the large towns, especially on a Saturday, is distressed by the hideous sight of many of these unhappy beings, sitting by the road side imploring charity. It is sad to behold the condition of these unfortunate people, and to think that as soon as they are branded with the name of leper, they are driven from parents, children, relatives, and friends; shunned like criminals, deprived of the power of earning their livelihood, and condemned to the degraded state of beggars.' I may remark in passing, that the plan of excluding lepers from society and reducing them to the state of beggars, has no effect in checking the development of the malady, as long as they are allowed to intermarry with the healthy.

Spain and Portugal have at all times been noted for the existence of leprosy in certain districts. In 1821, Gomezin estimates the number of lepers

in the latter country as 800, found chiefly in the provinces of Lower Beira, Estremadura, and Algarve. Here, as in all other European countries, the disease is confined to the poorer classes, who are badly fed and housed. In 1820 the leper hospital at Lisbon contained forty patients, but in 1861 the number had increased to sixty-nine.

Leprosy still lingers about the coast of France and Italy, between Genoa and the mouth of the Rhone. In many of the villages along this coast the disease has died out, but in others it appears to have increased within the last thirty years. This is especially true of the district about Mentone, Monaco, and Nice. An official return in 1843 gives the number of lepers as 100. But as they were evidently increasing, the Government determined in 1858 to establish a hospital at San Remo, into which forty lepers were admitted from the neighbourhood of Nice. Foderé suggests that the lepers in this region are descendants of the Moors, who, after their banishment from the south of France, took refuge in the mountains, but were shut out from intercourse with the native inhabitants, so that by intermarriages within their own community, the disease has been perpetuated and extended.

In 1755 we find that it was pretty widely spread in Provence; but in 1782 there was a remarkable decrease in the number of those affected, and at the

present time it is limited to the coast, especially about the marshy delta of the Rhone.

I have chosen for this somewhat detailed description the four or five principal districts in Europe where leprosy is still endemic ; districts far scattered, and presenting characters of climate and race widely different ; the damp winds of Norway, the dry and dusty atmosphere of the Caspian, and the mild and charming breezes of Nice, alike have little influence in checking this remarkable disease.

Africa lays claim to being the cradle of leprosy ; but great diseases, like great men, have many birth-places. At the present time, there is scarcely a mile of coast on this vast continent entirely free from the disease. Perhaps the region least affected is that washed by the waters of the Mediterranean ; nevertheless, in Morocco and Algeria it has long been known.

It is, however, to the western coast and its islands that I wish especially to direct attention. Whether or not Africa was the original birth-place of leprosy, must for ever be a matter of doubt, but that it has been the unwitting means, not only of propagating it, but also of spreading it over a large portion of the western hemisphere, is only too painfully evident. It is one of the many curses attendant on the slave trade, that it has thoroughly established this loathsome malady in tropical America—a just retribution, some would say, for the crimes of bygone days.

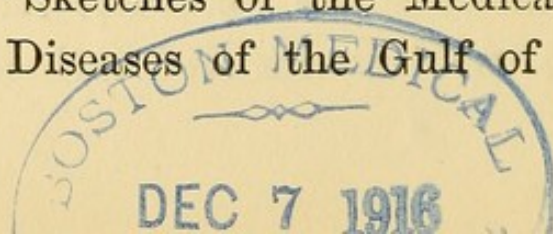
We know comparatively little of the natives in the interior of Africa, or to what extent leprosy prevails amongst them; but that it does commonly exist in many inland districts we have ample proofs. Both Sir J. Simpson and Dr. G. Milroy state that Moore, in his "Travels in the Inland Parts of Africa" (1738), makes mention of true leprosy in that country; I have been unable, however, to find any allusion to the disease by that traveller. Sir J. Simpson refers in particular to the following passage (p. 130), which evidently applies to Elephantiasis Arabum, and not to true leprosy:—'These people are naturally pretty healthy and multiply apace, nevertheless they have various distempers among them—the fever, small-pox, king's evil, worms, pains in the head, and swelling in one of their legs, insomuch that you will very often see people with one leg as big as their middle, which I am informed proceeds from herbs put into their victuals by one another on purpose to create affection. And what makes it the more likely to be so is, that none but grown persons are afflicted with this distemper.'

Mungo Park, in 1797, met with true leprosy among the Mandingoes of the Niger. After distinguishing between yaws, Elephantiasis Arabum, and leprosy, he remarks:—'This last-mentioned complaint appears at the beginning in scurfy spots upon different parts of the body, which finally settle upon the hands or feet, where the skin becomes withered and cracked

in many places. At length the ends of the fingers ulcerate, the discharge is acrid and foetid, the nails drop off, and the bones of the fingers become carious, and separate at the joints. In this manner the disease continues to spread, frequently till the patient loses all his fingers and toes. Even the hands and feet are sometimes destroyed by this inveterate malady, to which the negroes give the name of "balla jou," which means "incurable."

Park notices also the extensive use of fish as an article of food in inland Africa. This fact is especially interesting to those who believe in a fish diet as one of the causes of the disease, inasmuch as the traveller has no theory on the subject, but merely records it in connection with the general habits of the natives. Moore also refers to 'stinking fish' as a delicacy. He says: 'The river being fallen, the women flock out in abundance, and are exceeding busy in catching small fish, like sprats, which they dry and keep by them as a dainty dish, called "stinking fish." . . . They make them up in balls of about three pounds each, and so keep them all the year round; a small quantity of it goes a great way.' I should think so.

Negroes brought from the interior, especially from the neighbourhood of the great rivers Niger and Congo, are often afflicted with leprosy. Dr. Daniel, in his 'Sketches of the Medical Topography and Native Diseases of the Gulf of Guinea,' remarks,



that 'leprous slaves are frequently brought from the inland district of Soudan to the West Coast.' This evidence places the prevalence of the disease in the interior of Africa beyond doubt.

Elephantiasis Græcorum is believed to be very prevalent in Abyssinia at the present day. It is not improbable that it may be met with in some parts, but in the time of Bruce, about a century ago, it was unknown in the districts through which he travelled. He gives a very careful and accurate description of the principal endemic diseases of the country, and remarks: 'The last I shall mention of these endemial diseases, and the most terrible of all others that can fall to the lot of man, is the elephantiasis, which some have chosen to call the leprosy, or *Lepra Arabum*, though in its appearance and in all its circumstances and stages it no more resembles the leprosy of Palestine than it does the gout or the dropsy. . . . The chief seat of this disease is from the bending of the knee downwards to the ankle; the leg is swelled to a great degree, becoming one size from the bottom to the top, and gathered into circular wrinkles like small hoops or plaits, between every one of which there is an opening that separates it all round from the one above, and which is all raw flesh or perfectly excoriated. From these circular divisions a great quantity of lymph constantly oozes. The swelling of the leg reaches over the foot, so as to leave about an inch or

a little more of it seen.' He goes on to remark that the 'distempered legs of the unfortunate individual of the human species resemble those of the noble quadruped, the elephant, when in full vigour.' Bruce's description clearly refers to the Barbadoes leg. He was perfectly familiar with true leprosy as it was met with in Egypt, Palestine, Syria, and Arabia, and would certainly have mentioned it in his account of the diseases of Abyssinia, if it had prevailed to any considerable extent in that country.

Many of the islands off the west coast of Africa have a more healthy climate than the continent. They are for the most part mountainous. Among the more important groups are the Canaries and Madeira, in both of which leprosy has long existed. The Canaries were discovered in 1344, and about two centuries later, in 1542, a leper house was built. Madeira was discovered in 1420, and we find that a hospital for lepers was erected in 1656. Since that time leprosy has remained endemic in both localities, but of late years it has diminished, especially in the Canaries, coincidently with increased prosperity.

In Madeira the disease is distributed very unequally. In the northern districts, possessing a population of 20,000, there are only fifteen lepers; while in the southern part of the island, with a population of 25,000, there are no less than seventy-three lepers. The habits of life are said to be the

same over the whole island, but on the northern side the villages are about 1,000 feet above the sea, and are cool and humid; while on the southern side they are situated in bays at a lower level. This difference of climate and position, however, seems hardly sufficient to account for the great difference in the number of those affected. The variety of the disease met with is almost entirely the tuberculated, and is confined to the poorest classes.

Menol states that it is chiefly found in those villages where the coloured races have remained isolated, and mixed but little with the white. The people, he says, live in the most abject misery, in narrow, damp huts, with a very scanty supply of food, consisting of maize, potatoes, fish, and yams. He is of opinion that leprosy is associated with a sea climate, and that it never spreads far from the coast. In this respect, however, he is in error; for the disease is found many hundred miles inland in India, Africa, and South America.

The Cape of Good Hope supplies us with a very striking example of imported leprosy. It was, indeed, quite unknown to the Kaffir tribes, the aborigines of the country; and even at the present time it is chiefly met with amongst the imported African races, such as the Hottentots and Negroes, the former of whom suffer most. The Cape was first colonised in 1600, and, as Dr. Abercrombie remarks, 'the disease has probably been known from an early period

of the colony as a Dutch settlement.' Both Doctors Ebdon and Abercrombie agree in the opinion that the copper-coloured Hottentots are more liable to it than any other races; next to them the Negroes; and least of all the Whites and Africanders. 'Amongst the aboriginal races, such as Bheels, Coels, it is very uncommon.'

The most interesting points in connection with the malady at the Cape are, first, that we have elephantiasis endemic in a country with one of the most perfect climates in the world; secondly, that it is confined almost entirely to certain imported races; thirdly, that the disease is unknown in the neighbouring colony of Natal.

Leaving Africa, let me direct attention to tropical South America. In Brazil, leprosy presents a very interesting variety. Departing from its usual custom of infesting the sea line, it is here quite rare along the coast in proportion to the population. In the interior of the country, on the other hand, it is terribly common, and within the last two centuries there are no signs of its having receded from the interior towards the coast. The disease is met with in every part of Brazil, except the province of Rio Grande in the south, and Maranhão in the north. In the district of San Paulo almost every family is more or less affected by it. The President of this province, in 1840, reports: 'C'est un spectacle digne de compassion, sur la route de Rio Janeiro à San

Paolo, de rencontrer tant de malheureux infectés de la lèpre. À chaque ville on trouve une cabane aux environs qui sert de refuge à ces proscrits de société.'

In spite of this fearful prevalence of the disease, there are only three genuine hospitals for lepers in Brazil; one in the neighbourhood of Rio Janeiro, and the other two at San Salvador and Pernambuco respectively.

Mr. Henry Bates, the naturalist, gives us the following description of leprosy, as he met with it at the small town of Santarem, on the Amazon, about 400 miles from the Atlantic: 'There is one great drawback,' he says, 'to the merits of Santarem. This is the prevalence here of the terrible leprosy. It seems, however, confined to certain families. I once visited many of the lepers in company with an American physician. They do not live apart; family ties are so strong, that all attempts to induce people to separate from their leprous relatives have failed; but many believe that the malady is not contagious. The disease commences with glandular swellings in different parts of the body, which are succeeded by livid patches on the skin, and at the tips of the fingers and toes. These spread, and the parts embraced by them lose their sensibility, and decay. In course of time, as the frightful atrophy extends to the internal organs, some vital part is affected, and the sufferer dies. Some of the best families in the

place are tainted with leprosy; but it falls on all races alike—White, Indian, and Negro. I saw some patients who had been ill of it for ten or a dozen years; they were hideously disfigured, but bore up cheerfully. In fact, a hopeful spirit and free, generous living, had been the means of retarding in them the progress of the disorder—none were ever known to be cured of it. One man tried a voyage to Europe, and was healed while there; but the malady broke out again on his return. I do not know whether the dry and hot soil of Santarem has anything to do with the prevalence of this disease; it is not confined to this place, many cases having occurred at Parà, and in other provinces, but it is nowhere so rife as here. The evil fame of the settlement, indeed, has spread to Portugal, where Santarem is known as the “Cidade dos Lazaros,” City of Lepers.’

From Mr. Bates’s account, I am quite unable to discover at Santarem any of the external predisposing causes to the disease which are so often mentioned by writers, and which are, no doubt, usually present. The country around is not clothed with dense forests, like the rest of the great humid river plains of the Amazons, but consists of an undulating tract of land, wooded only in patches, or with single scattered trees.

‘The climate,’ says Mr. Bates, ‘is glorious; during six months of the year very little rain falls, and the sky is cloudless for weeks together; the fresh breezes

of the sea, nearly 400 miles distant, moderating the great heat of the sun. The streets are always clean and dry, even at the height of the wet season.' In short, it is a very healthy place. 'Excellent beef can be had daily at twopence per lb., and very good bread is hawked round the town every morning, with milk and a great variety of fruits and vegetables.'

This, I think, is the very last place where we should expect to find leprosy; yet there it exists, and there it seems likely to remain. The disease in Norway, we are told, and with apparent truth, is promoted by hard living, bad food, and a cold and damp climate. By what, we may ask, is it promoted in Santarem? Hereditary taint, or contagion, seems all that is left to account for it.

With regard to the origin of leprosy in Brazil, it is in the highest degree probable that it did not exist among the aborigines, but that it has been introduced since 1500 from Portugal and Africa. Even at the present time, it is far more common amongst half-castes and mixed breeds than among the pure Indian races.

In Central America, Elephantiasis Græcorum occurs in Costa Rica, amongst the high valleys of Cartago and San José, situated several thousand feet above the sea. The population consists chiefly of the descendants of the Spanish emigrants of the sixteenth century, and a few Indians, Negroes, and Mulattoes. The majority follow agricultural pur-

suits, and subsist on maize, beans, bananas, and beef. *Fish is very seldom eaten.* In Mexico, the localities where the disease is rife are similarly situated; that is, they are the high inland plateaux, and *not* the plains and coast district.

The most remarkable feature of the disease in the West Indian Islands is its very unequal distribution, without any apparent cause. For example, it is extremely common in Jamaica, Cuba, Barbadoes, and Trinidad; less common in St. Kitt's, Antigua, and St. Vincent; while in Puerto Rico, the Virgin Islands, Granada, Tobago, and Sta. Lucia, it is comparatively rare. There is nothing in the climate of the different islands, or the habits of the people, to explain this peculiarity.

Dr. Gavin Milroy, in his report on the West Indies (1873), says: 'The extent to which leprosy exists among the rural population throughout the colony was made apparent to me by the perusal of a very instructive paper, furnished me by Governor Scott, which had been drawn up by Dr. Shier, the medical inspector of estates' hospitals, and entitled, "Enquiry into the Prevalence of Leprosy, 1869 and 1870. County of Berbice."

'The enquiry embraced the examination of the indentured coolie immigrants on twenty-four estates in Berbice, together with the inhabitants in the adjacent small villages in which most of the Creole and Negro labourers live. The first examination was

made in 1862, the next in 1869, and was repeated in 1870. Although the data recorded are brief and imperfect, and many of the needful details are incomplete, the general information given is in many respects interesting and highly suggestive, as it serves to make us acquainted, among other things, with the widespread existence of the disease among the labouring population on the whole, and more particularly among that portion of it derived from the coolie immigration. Two or three points in the natural history of the disease also receive marked illustration from the record. For example, in an immense majority of the cases the suspicion of its communication by sexual intercourse seems not to have been even so much as thought of, one of the parties almost invariably remaining unaffected. In only two instances of married couples, both husband and wife were found to be leprosy; but nothing is said of the one having contracted the malady from the other, no particular details being given. As a general rule, leprosy unions seem to be far from being productive; in a large proportion of the cases there being no progeny at all. That in the great majority of cases among the coolie immigrants the development of the malady occurred subsequently to their arrival in the colony, does not admit of reasonable doubt. Occasionally they may have been landed with some of the less decided symptoms upon them, but this was doubtless of rare occurrence. One such instance

will be presently recorded. Another point deserving notice is, that very often—perhaps it may be said very generally—the patients continued to be able to do some useful work upon the estates to which they are attached.’

Leprosy has been known for many years in New Brunswick, but not until lately has it attracted much attention. The complete isolation of this small leprous community in North America is remarkable. The disease is prevalent in the French settlement of Tracadie, and its immediate neighbourhood. It is confined to the French population, and the current belief is that it was introduced by emigrants from St. Malo, in Normandy. Doctors Nicholson, Bayard, and others, agree in stating that it is entirely confined to the poor, who live in rude log huts, hardly sufficient to protect them from the inclemency of the weather. Usually there is but one room, which is occupied by pigs, poultry, &c., as well as by the family. They are poorly clad, and all around them betokens the most abject poverty. Their habits are indolent, improvident, and extremely unclean. In the winter their diet consists solely of salt herrings, and salt and dried cod-fish, frequently offensive from decomposition, potatoes, and at times salt pork; in summer they live on fresh fish; they have very little bread. They are chiefly employed in fishing, and agriculture is shamefully neglected.

The following account of leprosy, as it existed in the Sandwich Islands in the summer of 1872, is given by Dr. Samuel Kneeland, of Boston, U.S. He says: 'On paying a visit to Honolulu, I took some pains to inform myself by actual observation, and also from official sources, on the subject of leprosy in the islands. At the time of my visit there were about twenty patients in the asylum at Kalihi, the sexes being equally divided, and of all ages, from fifty to five or six years. Though some of the cases were horrible to look at, I was told that many worse ones had recently been sent to the National Asylum on the island of Molokai. The two usually described varieties of the disease appear to coexist in the same person, and, as it seems to me, are simply stages of one malady; either the skin or the nervous system being chiefly affected, according to the constitution or habits of the patient. How it is produced is a matter of question. It was not known in these islands till 1848, at which time it was said to have been introduced by Chinese, and it was not noticeable as a disease of the country till ten years afterwards. There can be but little doubt that it spreads by cohabitation and inoculation of its diseased fluids in the same way as syphilis. There is a want of common prudence displayed by the natives that almost sets at naught the best directed efforts of medical men, and a recklessness displayed in the indulgence of animal appetites, that goes far towards

eliminating that pity that we are all ready to feel towards these unfortunates. There is no evidence that leprosy has ever been produced spontaneously in the Sandwich Islands. The usually assigned causes of the disease do not exist here. The people are cleanly and well fed; their fine climate prevents physical misery, and malaria is unknown. Leprosy is most abundant in the neighbourhood of Honolulu, where the natives are best fed; it is rare in the white races, who are exposed to the same external circumstances as the natives; hence we may infer that the natural or acquired characteristics of race may have some influence in the propagation of the disease.

‘In the two years ending March 31st, 1872, there were at the Kalihi Asylum 202 lepers, 124 males and 78 females, including 26 children under 14 years of age; and since its establishment nearly 600 cases have been treated there; most of these as they grew worse were sent to the National Asylum at Molokai, but 29 of the number died at Kalihi. Up to the same date nearly 600 had been received at Molokai, of whom 200 had died. In this leprous colony, the houses of the lepers are scattered through the valley; they are generally well kept and clean. The females are industrious in making mats and other material for the internal comfort of their cottages; the males who are able and willing, work their potato fields, raise sugar canes, bananas, &c. Fresh provisions

only are issued to the lepers; the weekly supply for each leper being five pounds of meat and twenty-one pounds of paiai (the root of *Arum esculentum*), which when baked resembles an insipid sweet potato, and is very nutritious. Some marriages have taken place among the lepers, but sterility is the almost universal result. Within the five years' existence of the institution, and in a population of several hundred people, only two births have been reported; in the first case the child was born dead, the other is living now, borne by a woman who shows no signs of leprosy, but her husband is a perfect leper; some doubts have been expressed about the paternity of this child. Leprosy is more common among the males than the females; two-thirds of the lepers in the valley are males.'

No one who has read Dr. Arthur Thomson's account of a disease which he met with in New Zealand, and which he calls *Lepra gangrænosa*, can possibly doubt its identity with *Elephantiasis Græcorum*; all the more striking features of the former are accurately described by Dr. Thomson, who himself believes it to be identical with true leprosy. He gives the following account of the circumstances under which it occurs: 'My own opinion,' he says, 'is, that the *Lepra gangrænosa* is produced by the use of poor food (food, perhaps, containing some decayed matter, but deficient in azotised nutriment), want of personal cleanliness, and indolence of body and mind. It is

a disease indicative of a low state of civilisation. I have not heard of a European, a half-caste, or a native woman living with a European, having had the disease. The malady is now most frequent in the interior, because there civilisation is lowest, and because there European food (I do not include potatoes) and European clothing, are little used. The former tends to nourish the body, the latter to produce personal cleanliness. Women appear to be less subject to the disease than men, probably because they are obliged to do more work. No animal on the face of the earth is dirtier than the human animal in its natural state. In a tropical climate men go into the water not to clean their bodies, but to cool them. Many New Zealanders during the six cold months sleep, eat, and walk about in dirty, stinking, coarse mats, having the pores of their skins glued up with dirt. The consequence is, that cutaneous diseases are very common.

‘ Captain Cook has recorded that the New Zealanders eat food which natives of Van Diemen’s Land reject; indeed, they will eat almost anything. There is a custom among the New Zealanders of putting maize and potatoes into water, where they are allowed to remain until they are putrid. The smell which issues from the places where this process is carried on, is worse than from any dunghill. In this state the potatoes or maize are boiled and eaten, and they are highly relished. The smell of

the food when cooked is like human excrement, but its taste is not bad, being somewhat like cheese. This mode of preparing food, although not described by Captain Cook, is not new, for a similar plan is adopted in preparing other kinds of food in New Zealand and among the Polynesian Islands in the Southern Ocean. A chief explained to me that the disease had become very rare to what it was formerly, because most of the people had become Christians, and since that event the gods had lost the power of inflicting that disease. Formerly, and even now, sufferers are 'tapued,' a house is built for them, and they are fed apart from healthy people; and it is still believed that the disease may be communicated by the touch. Sufferers are held in disgust. . . . The disease I have now endeavoured to describe is becoming rare; probably in twenty years more civilisation, and her handmaidens industry and cleanliness, will have extended themselves to the tribes in the interior, and *Lepa gangrænosa* may become extinct. New Zealanders may then tell their children of the dreadful disease which their old gods inflicted on their fathers, and how Christianity deprived them of this power.'

In all the islands of the Malay Archipelago leprosy is present. In some it is very common, especially amongst the Chinese races, but it is rarely seen in Europeans. The districts where it is prevalent are the lower parts of the northern and western pro-

vinces of Java, Sumatra, and Borneo, and in the interior of Timor and Flores; and amongst the inhabitants of these islands, fish, often rotten, is a staple article of food. In the leper hospital in Java, in 1856, there were 156 cases and 24 deaths; and in 1857, 153 cases, of whom 27 died in the course of the year.

The Arabs, who live free from all communication with other races, but who are exposed to the same external influences of climate, soil, &c., escape the disease; a circumstance which speaks in favour of its hereditary origin, and, perhaps, also of the greater susceptibility of certain races.

In India we have an example of a vast country in which great varieties of climate, soil, and race are found, and where the habits and occupations of the people of necessity adapt themselves to the locality in which they are placed. Now, although leprosy is common throughout India, it is not equally so in all parts, nor is it uniformly distributed amongst every race or caste. It would, indeed, be strange were it otherwise.

Regarding India as a whole, one or two facts connected with it are worthy of notice.

1st. Lepers are to be found in greater numbers in the rural districts and small villages than in the towns and cities. 2ndly. Though the disease is common enough in the interior, it is yet more common on the coast. 3rdly. As a rule, it is compara-

tively rare in dry and well-drained lands, or where agriculture is carried to a high state of perfection. 4thly. The elevation above the sea level, *per se*, has but little influence; in other words, it is equally common in the highlands and in the plains. 5thly. Of the different races, the low caste Hindoos suffer most; then the Mussulman, next the Parsees and high caste Hindoos, while the Europeans are rarely affected. In short, no one can doubt that poverty, with all its attendant circumstances, exercises in the long run some influence on the progress of the disease.

The staple articles of food in Bengal and Madras are rice, fish, fruits, vegetables, and spices. In the Punjaub, Central India, and the North-West Provinces, unleavened bread made with mixed meal, of wheat or Indian corn and barley, pulses, vegetables, milk, and sometimes meat. In Mysore, rice, corn, and pulses; fish, either salt or fresh, is rarely eaten. In Madras, rice, fish, vegetables, and spices. In British Burmah, rice, fish, vegetables, spices, oil, milk, and butter.

Speaking of the Bombay Presidency, Dr. Vandyke Carter remarks, that the average of lepers is nearly one in a thousand of the whole population, and as the total of the inhabitants amounts to seventeen million, the whole number of lepers would be at least fifteen thousand. The foods used in the Bombay Presidency are rice, wheat, the millets, and other

grains, pulses, plantain, the sugar-cane, cocoa-nut, melons, and gourds, and many other kinds of fruits and vegetables; fish, both from sea and river, is largely consumed; flesh of other kinds not to any considerable extent; a very large proportion of the population are vegetarians, or partake of animal food only occasionally. There is no clear evidence that any special article of diet either excites or predisposes to leprosy.

Marriage customs in India are of some importance as affecting the hereditary transmission of leprosy. The rule is, that marriages are limited to caste, and among the Brahmins consanguinity is an impediment to marriage; first cousins may marry only when the children of a brother and sister and not of two brothers. Amongst the lower castes these restrictions are not enforced, and marriage with a niece sometimes takes place. Intermarriages between two families for several generations are very common, and quite in accordance with the established customs of the country, and it is quite evident that the effect of this in leprous families would be to intensify the hereditary tendency of the disease, just as intermarriages among phthisical families in our own country produce such disastrous results on their descendants.

Dr. Vandyke Carter gives the following summary of the circumstances under which true leprosy is met with in the Bombay Presidency: 'Judging,' he says,

‘ from a close scrutiny of the data contained in the official returns, it appears that the worst form of true leprosy largely prevails in Western India ; that the various sub-climates of the Concan and the Deccan have no essential influence on its prevalence ; that malaria and scurvy, or other definite diseases, have no connection with leprosy, nor is this affection attributable to any known peculiarities of diet, to special occupations, or even to defects of sanitation. That as it is of an hereditary character, the peculiar institution of caste has a decided influence in maintaining and diffusing or concentrating, as the case may be, the pre-existing leprous taint ; that all castes are pervaded by such taint, and in particular those of primary aboriginal descent, and the hill tribes. That the disease is much more common in the adult male than the female sex, and that it does not quickly exhaust the vital powers. It is also found that though the disease is hereditary, yet it arises most frequently spontaneously.’

It will be seen that I have not attempted in this sketch to give a detailed description of all the countries in which leprosy is found. I have not even tried, in all cases, to describe those peculiarities of climate, soil, and race which might have some bearing on the subject under discussion. Such an attempt would have been foreign to my purpose. My object has been rather to select for especial notice countries which would supply me with examples of every

variety of climate and people, and where the circumstances under which leprosy is endemic are as varied and dissimilar as possible. Can we, for instance, imagine external circumstances more unlike than those which surround respectively the luxurious East Indian and the hardy Icelanders? Can countries be found which differ more than rainless Egypt on the one hand, and humid Norway on the other? Yet the disease is equally present in both. In short, every quarter of the globe has its leprous districts, and every race its victims.

CHAPTER III.

ETIOLOGY OF LEPROSY.

IN discussing the Etiology of diseases, we usually divide the causes which produce them into two classes, primary and secondary. Thus, for example, in scurvy (a disease somewhat allied to leprosy), we know the *primary* cause to be a deficient supply of fresh food and vegetables; and the *secondary*, exposure to wet, cold, and other hardships. In the case of leprosy, however, we are quite ignorant of its primary source, and therefore, in dealing with the subject, I can only discuss its secondary and predisposing causes, of which the seven following are the chief:—(1) Climate, (2) Soil, (3) Race, (4) Defective Hygiene, (5) Diet, (6) Hereditary tendency, (7) Contagion.

These seven factors differ much in their relative importance. Some exercise but little influence in the propagation and perpetuation of the disease, while others are of great moment.

First, as to Climate. It will be gathered from what I have said in the geographical sketch of leprosy, that I do not attach much value to climate

as a cause of the malady. I have already proved that the disease exists in all latitudes, from the Poles to the Equator. Nevertheless, I believe that the importance of climate has been rather under than over estimated, especially by the modern German writers, who attempt to determine its effect by comparing one country or district with another, and they argue, that as the disease is equally common, say in Norway, South Africa, and the West Indies, therefore atmospheric influences are inoperative. I need hardly point out that there is a possible fallacy in this argument, inasmuch as by thus comparing one country with another, they really include several factors, namely, soil, race and food, any of which may exert an influence over the disease. To separate these and assign to each its proper value, is the difficulty. In order to judge of the effects of climate, much larger tracts of country—such as include many different soils and races—must be compared, though even then, the sources of error are only partially eliminated. A glance at the map shows us that leprosy is vastly more common between the tropics than in the temperate zones—here is a broad fact that cannot be denied—and the most probable explanation of it is, that tropical climates exercise an unfavourable influence by promoting the development of the disease.

Secondly. The conditions of Soil have always been regarded as exercising an important bearing on leprosy.

By the earliest observers, the moist banks of the Nile were considered to stand in a causal relation to it. Both mediæval and modern observers have recognised that, although leprosy is diffused over a large part of the earth's surface, it prevails most along the marshy banks of rivers, and on flat sea-boards. This fact is in the main borne out in the geographical sketch I have given of its distribution. In Europe, for example, it is met with almost exclusively in islands, along the coast, or in the neighbourhood of large rivers or inland seas. In Africa, it is notoriously prevalent in similar districts. In China, which may be considered as a hot-bed of leprosy, it is along the coast line and low marshy plains of the south that the disease is especially rife. India forms an apparent exception to the general rule, as leprosy is distributed throughout the length and breadth of the land; but even here, it is more common near the sea coast. It cannot, however, be denied, that many regions in the Western Hemisphere, which do not possess a moist or marshy soil, are visited by it; nor is it confined to a low-lying coast district; the highlands of Mexico and Costa Rica, and the mountainous regions of Brazil afford us striking examples in point. Nevertheless, highland districts are not necessarily healthy and well drained, nor are mountains always free from malarial exhalations. Writing of leprosy in Madagascar, Dr. Davison says it exists equally 'in town

and country, at a height of 7,000 feet above the sea level, along the coast line, and through all intermediate elevations.' It is not in fact the elevation above the sea, nor distance from its shores, which is in any way antagonistic to the disease, but the development of agriculture, and the artificial drainage of the soil which is generally to be found in inland districts. In support of this view, I may cite the following examples: Sweden, Iceland, the Faroe Islands, the Canaries, the Mauritius, and many parts of India, in all of which leprosy has diminished or disappeared coincidently with improved drainage and cultivation. It may be objected that when the disease was prevalent in Europe, it was independent of any conditions of soil. This may or may not be true; it is, however, certain that when the disease was at its height during the Middle Ages, its virulence was so great, that telluric influences were entirely subordinated; but on the subsidence of the plague from unexplained causes, its continuance in certain localities was ensured by such minor agencies as peculiarities of soil, diet, &c. Secondary or subordinate causes may convert an *epidemic* into an *endemic* disease, and are always most apparent when the chief or specific cause has become inoperative.

Thirdly. By many it is denied that Race *per se* has any influence whatever on leprosy. And at first sight there appears good foundation for this con-

clusion, inasmuch as all races are amenable to its attacks. But the question is, Are they all equally so? Many examples may be cited, which lead us to pause before arriving at a positive conclusion. In India, for instance, all agree that Europeans are less frequently attacked than the natives; but obviously this may be due to other causes than that of race. At the Cape, the Hottentots suffer more than the Negroes, and the latter far more than the native tribes; here the comparison is less open to objection, the external circumstances of the Hottentots and Negroes being identical. The Arab races have a special immunity from the disease in Algeria, Egypt, and the Malay Archipelago. This is the most remarkable fact of the kind with which I am acquainted. It would, however, be unwise to draw any conclusion from it; for special occupations, mode of life, and diet are so intimately connected with particular races that it is impossible to separate the one factor from the other, or to determine whether race alone has any effect whatever on the propagation of the disease.

Dr. Gavin Milroy, in his report on leprosy in the West Indies (1873), says: 'The immunity of the aboriginal Indian tribes still living in the district of Essequibo, and also of the descendants of the former Dutch settlers by Indian women, known by the term of "Bovianders," was frequently mentioned to me; and the reason generally assigned was that these primi-

tive people lived chiefly on fresh fish from the river, and game caught in the woods, along with cassava meal, and other roots, &c., and only occasionally ate the salt fish which is the staple food of the Negroes. Mr. Allison, of Mahaica, has remarked that during eight years' experience in the colony he had never seen or heard of an aboriginal Indian having been afflicted with leprosy. This may be attributed to the free ventilation of their dwellings and to their cleanly habits. The huts, or rather tents, of the Indians are more or less open, and they sleep in hammocks suspended from cross-poles.'

Fourthly. Hygiene. It would be unreasonable to suppose that offences against public and private hygiene are entirely without influence on such a disease as leprosy. Want of personal cleanliness, a filthy and defective condition of clothing, and wretched damp dwellings, are under no circumstances conducive to health; but whether they exert any special action on this disease, more than on many others, may be fairly doubted. In the Middle Ages we know that princes, prelates and crowned heads were subject to it, and in modern times, though it is undoubtedly more common amongst the poor and dirty in all countries where it is endemic, yet it is by no means confined to these classes. Sometimes it capriciously spares certain portions of a country where the condition of the population is identical with that of those attacked.

In Spain, it is common in Galicia, which is the least prosperous part of the country, but it prevails also in Catalonia, the richest province.

In the reports returned by medical observers in different parts of the world, we find an almost unanimous opinion expressed, that exposure to hardships, residence in foul dwellings, and neglect of personal cleanliness, serve to aggravate the disease and accelerate its progress, and that the opposite conditions have the reverse effect. No one, however, supposes that these circumstances alone would ever originate the malady.

Fifthly. Diet. It is remarkable that at a very early period in the history of Elephantiasis, the effect of food in promoting the disease was noticed. Galen says that it was common in Alexandria among those who fed on pulse, lentils, shell-fish, and many kinds of salted food, and Arab testimony is not wanting to the same effect.

That excellent observer, White of Selborne, writing just a century ago, attributes the disappearance of the disease from England mainly to improved agriculture, and an abundant supply of fresh food and vegetables. He says: 'Some centuries ago this horrible distemper prevailed all over Europe, and our forefathers were by no means exempt, as appears by the large provision made for objects labouring under this calamity. It must be, therefore, in these days, to a humane and thinking person, a matter of equal

wonder and satisfaction when he contemplates how nearly this pest is eradicated, and observes that a leper is now a rare sight. He will, moreover, when engaged in such a train of thought, naturally enquire for the reason. This happy change perhaps may have originated and been continued from the much smaller quantity of salted meat and fish now eaten in these kingdoms, from the use of linen next the skin, from plenty of better bread, and from the profusion of fruits, roots, legumes and greens, so common in every family. Three or four centuries ago, before there were any enclosures, sown grasses, field turnips, field carrots or hay, all the cattle that had grown fat in the summer, and were not killed for winter use, were turned out soon after Michaelmas, to shift as they could through the dead months, so that no fresh meat could be had in the winter or spring. Hence the marvellous account of the vast stores of salted flesh (namely, 600 bacons, 80 carcasses of beef, and 600 muttons) found in the larder of the eldest Spencer, in the days of Edward II., even so late in the spring as the 3rd of May. . . . The plenty of good wheaten bread that now is found among all ranks of people in the south, instead of that miserable sort which used in old days to be made of barley or beans, may contribute not a little to the sweetening their blood and correcting their juices.' The latter part of this quotation is given in a note of the Leprosy Committee's report, and

curiously enough has been re-quoted in a document printed for circulation throughout India, as the opinion, not of White of Selborne, but of the committee of the College of Physicians themselves. I am far from wishing to attach any blame to the able writers of the document in question; but the clerical error has, I think, contributed to exaggerate in the opinion of the profession in India, the importance which the committee of the College attach to diet as a cause of leprosy.

Hugo Arnot (1779) takes a similiar view. He says:—
‘The frequency of this distemper is evinced from a regulation making the being born in Edinburgh, or at least a residence there for seven years, an indispensable requisite to admission into the leper hospital. Yet it is now so totally worn out, that physicians of the first practice do not understand the nature of the disease, perhaps never meet with an instance of it. . . .

‘To what then is the expiry of these diseases to be attributed? To a change in the manner of living, to the improvement of agriculture yielding a larger quantity of grain, and the cultivation of pasture affording fresh meat in all seasons of the year; to the vast increase in the cultivation and consumption of vegetables, to a more frequent change of linen,¹ and to an increased attention to cleanliness both in person and lodging.’

¹ The late Archbishop of Glasgow put on a clean shirt once a week.

In the present day, Danielssen and Boeck, together with several other Norwegian observers, have strongly insisted on the importance of diet as an agent in the production of leprosy. Speaking of the maritime population in the western district, Dr. Danielssen remarks on the prevalence of fish, especially herrings in a partially decomposed state, as an article of food. He says: 'Herrings are generally used in a salted state; rarely if ever are they eaten fresh. The peasant of the western coast is so little delicate about this article of food, which forms so large a proportion of his daily sustenance, that he often devours it in a putrid state. When the herring fishery happens to be in places where assistance is not at hand, as is often the case in North Bergen, a large number of herrings are thrown on shore and left for many days, waiting for purchasers. Should these not appear, the peasant appropriates the fish to his own use, and adding a small quantity of salt to the half-rotten herrings, he conveys them home. After the lapse of some weeks, these herrings are in a manner pickled, that is to say, they are in a state of decomposition, and then they become the daily food of the whole family. Each week, until they are consumed, they become more and more decayed, but nevertheless, the nauseous food is eaten, till not a herring is left. Nay, so constant is this hateful custom among the peasantry, that they will not touch fresh fish, but prefer to leave it for some days,

till incipient decay gives a zest to their coarse palates.' The truth of the latter part of this statement I can fully bear out from my own observations. If disgusting and half-rotten animal food has any influence whatever on the development of leprosy, the west coast of Norway is of all countries the most favourably circumstanced for its production.

On the coast of Catalonia, where leprosy is not uncommon, the chief food of the inhabitants is salted fish. Again, with regard to the Lafôes in Portugal, Baptiste remarks that the inhabitants live on dried fish, sardines, bad bread and fat pork; and that the fish, especially the sardines, are eaten in a half rotten condition; and he attributes the presence of the disease to this peculiarity in the diet of the inhabitants. In my account of the geographical distribution of leprosy, it will be remembered that I frequently referred to the above-mentioned kind of diet as very generally prevailing in leprous countries, not only in Europe, but in all quarters of the globe; but I have also drawn attention to the fact that there are many districts where a fish diet is quite unknown, such, for example, as some inland parts of northern India and Persia, as well as the highlands of Costa Rica, where the disease exists, though fish is seldom or never eaten.

On the subject of diet, Mr. Jonathan Hutchinson remarks 'that all localities which either are now, or ever were noted as the homes of leprosy, have this

in common, that they are either on the sea-shore, or on the banks of marine estuaries. The most probable conjecture is that it is caused by some peculiar diet common to marine localities; that it is due to fish eaten in some peculiar state may be plausibly suspected. The fact that it is met with in such widely distant parts renders it improbable that it is due to any particular variety of fish. The sum of our conjectures then appears to amount to this, that leprosy is far too specific and peculiar in its symptoms to allow of our supposing it due to the influence of general poverty; that the cases in which Europeans are attacked all indicate the power of endemic influences; that of endemic influences, food is the one which has the most of probability as to its being the true cause; and lastly, as the disease is met with only near the sea, we may plausibly guess that it is in some way connected with the fish diet.'

Vinkhuijzen, who has written a work of great interest and importance on this subject, especially with reference to the etiology and treatment of the disease, expresses a very decided opinion that it does not depend upon any specific poison; but that it develops under the combined influence of a series of external causes, amongst which bad food, want of fresh food, the imperfect care of the skin, and filth in general, occupy the chief place.

In the accounts received from upwards of two hundred medical men, scattered over forty-five dif-

ferent countries where leprosy is more or less common, we find that in thirty-five out of the forty-five countries, the disease is reported on medical evidence to be much influenced and promoted by the semi-putrid or otherwise unwholesome food on which the poor class of the inhabitants subsist. In seven countries no mention is made of the effects of diet, and with regard to three countries only is an opinion expressed that food has no influence, either for good or evil, on the progress of the disease. Again, in twenty-six out of the forty-five countries to which I have referred, fish, either salt or fresh, and generally in a state of partial decomposition, is mentioned as the chief or only animal food of the classes amongst which leprosy is common. In some instances salt pork is also mentioned. Besides stinking fish and pork, musty or otherwise bad grain and pulses are often used as the staple farinaceous food. The question however, is not whether the eating fish, especially bad fish, has any significance as an etiological factor, but whether there is any special element in this diet that produces a *specific* effect; standing, in short, in the same relation to leprosy that *Lathyrus sativus* does to a certain form of paraplegia, or spurred rye to ergotism. It must be admitted that the fish theory is much weakened by the fact already mentioned, that the disease exists where this diet is unknown. Fish is the staple animal food of the whole tropical world; what wonder

then that we should find it largely used in leprous countries? I believe that it would be quite possible to show that people who suffer, say from tropical remittent fever, are great consumers of fish. While, therefore, I do not believe that fish, *as such*, has any especial influence in promoting this disease, I fully admit that decomposing and unwholesome food of all kinds has a marked effect on the progress of the malady; and further, that as fish is a kind of food very largely used, and at the same time very ready to undergo decomposition, it has acquired an exaggerated reputation as a cause of leprosy.

Sixthly. Hereditariness. The existence of hereditary tendency to leprosy has been admitted in all ages and all countries, from the time of Avicenna to the present day, and is now one of the factors very generally recognized. Virchow mentions an early instance of hereditary transmission, in the case of a citizen of Frankfort-on-Maine and his two daughters, who were received into an Order of Lepers in 1283. Sir James Simpson quotes a case that occurred in Glasgow in 1581, where 'one Patrick Bogle' was ordered to be inspected for leprosy, and eight years afterwards 'Robert Bogill, sone of Patrick Bogle,' is reported as an inmate of the Leper House belonging to the city.

In our own time, Danielssen and Boeck have stoutly maintained that hereditary predisposition is one chief cause of the perpetuation of the disease in

Western Norway, and in support of this view they allege that out of 213 cases of leprosy, 187 occurred in leprous families. In this calculation, however, they include collateral as well as direct relationship. In Crete, out of 122 lepers, according to Brunelli, the disease appeared to be hereditary in 76 cases, and spontaneous in 46. The accuracy of Danielssen's conclusions on this point have been contested by Dr. Hjort, who says, 'from time to time the relationship of many hundred lepers to each other has been carefully investigated, and the result has shown that many of them are more or less akin; and hence the conclusion has been drawn that the disease was hereditary in all those lepers who were related. It will be plain to all, that this conclusion does not rest on a sound basis, and that a malady can only be inherited when the seeds thereof pass in a direct line from parents to children, while those persons who are only collaterally related do not inherit the disease one from another. When both parents and children become leprous at the same time, we may reasonably conclude that the children have not received the disease from their parents, but that the malady has arisen in both parties from external causes, common to both.'

In relation to the spread of the disease by hereditary transmission, it is worthy of note, that in those regions where it prevails endemically within a limited space, it is confined almost exclusively to

certain families, among which it is perpetuated through intermarriages. This is the case in Provence, Asturia, Galicia, and also among some Dutch families at the Cape, and was formerly noticed in the Shetland and Faroe Islands. My friend Dr. Creighton has suggested to me that this principle may be to a certain degree generalised and extended from families to villages, and even to districts. In other words, leprosy exists on the earth's surface in exact inverse proportion to the amount of commercial exchange, intermixture of races, and other elements of civilization; and it persists among communities shut in by the sea, or by the social barriers of prejudice and caste, which have not been able to eliminate the specific element of the disease by natural selection.

A few cases are on record of children who have sprung from infected parents, having been attacked by the disease at a very early age, and in some instances after quitting the leprous country in which they were born; but cases of this kind are very rare. Therefore, when we speak of the hereditariness of leprosy, it must be understood in a different sense from that of syphilis; that is, it is not true of the disease itself, and, as Virchow remarks, it can only refer to a predisposition to leprous disease in the same way as cancer and phthisis are spoken of as hereditary; the development of which calls for certain external relations, or, under favourable

circumstances, may fail altogether. If it were truly hereditary, it would probably show itself much more frequently in early life, as congenital syphilis invariably does; it is not, however, till the period of puberty is reached that the disease declares itself. While fully assenting to Virchow's distinctions between *true hereditariness* and *hereditary predisposition*, I would remark that the latter quality is far more developed in leprosy than it is in cancer, or even in phthisis; but the difference is, no doubt, one of degree, rather than of kind. On the other hand, that the seeds of a disease should remain dormant in the system from birth, until that time of life is reached which is favourable to their development, does not seem to me more remarkable than that symptoms of tertiary syphilis should suddenly reappear, after an interval of many years of perfect health.

Seventhly. Contagion, as a means of propagating leprosy, was fully believed in in the Middle Ages, and even now in many countries the same opinion obtains, and the exclusion of lepers as a hygienic precaution is still practised in China, Palestine, and many other places. Even where strict seclusion is not insisted on, lepers are very generally shunned through fear of infection. On this point, my friend Dr. Macnamara remarks of the natives of India, that 'although lepers move about amongst their countrymen, they are to a great extent isolated from them. Who ever saw a healthy native touch, much

less eat with one affected with leprosy? In many parts of India, the fact of admitting a leper to a general hospital is sufficient to drive away every other person out of it.'

Again, 'the belief in contagion in Dutch Guiana,' says Dr. Van Holst, 'is so strong, that the people are afraid of shaking hands with any persons who are suspected of the disease, and even of sitting on the same chair that they have occupied, or of using the same privies.' This kind of evidence of contagion, is however, of little or no value. Only those who are trained to observe and analyse, and who are perfectly free from any fear of infection, are entitled to give an opinion worthy of our consideration.

The conclusions arrived at by the Leprosy Committee of the College of Physicians are clear and to the point. Their report states: 'The all but unanimous conviction of the most experienced observers in different parts of the world is quite opposed to the belief that leprosy is contagious, or communicable by proximity or contact with the diseased. The evidence derived from the experience of the attendants in leper asylums is especially conclusive upon this point. The few instances that have been reported in a contrary sense either rest on imperfect observation, or they are recorded with so little attention to the necessary details as not to affect the above conclusion. That leprosy is rarely, if ever, transmissible by sexual intercourse, when one of the parties has no

tendency whatever to the disease, is the opinion of the great majority of the respondents, who have had the largest opportunities of observation.'

The existence of contagion is altogether denied by Hjort, Danielssen, and Boeck; but Dr. Hoegh, in his report on leprosy for 1855, suggests that the disease is communicable through the Itch *Acarus*, which in Norway commonly infests the skin of lepers. He mentions a remarkable case in point, which had come under his own observation, of a family living at a farm in the Bergen district, 2,000 feet above the sea level. The eldest daughter, aged 25, associated with a leprous girl of the neighbourhood, and became afflicted with the disease; a sister who slept with her, and a brother, aged 15, both subsequently became lepers; and lastly, the mother fell a victim to it. In this case there was no history of hereditary taint, and none of the family had suffered from cold or privations of any kind, but all were severely affected with itch. This is the strongest case in favour of contagion that I have met with in Norway, but after all it only amounts to this, that four members of one family living together in a country where leprosy is endemic, became lepers.

In the reports returned from India and our Colonies by about 200 medical men, I find only about ten that express a decided opinion in favour of contagion. I will quote the first as an example. Dr. Aquart writing from Grenada, West Indies,

says : 'I have seen a few persons amongst those affected where contagion appeared evident. A young girl about 12 or 14 years of age slept in the same bed with a young woman who had symptoms of leprosy. Within twelve months the girl presented the red patches, and seven or eight years afterwards she was a confirmed leper. The mother of this girl contracted the disease, but the father escaped. I do not think the disease in its incipient stage transmissible by sexual intercourse. I consider that contagion will take place when ulcerations exist with copious discharge, and this can only occur in tuberculous leprosy.'

Dr. Vandyke Carter remarks that leprosy has been, and is still generally regarded by the inhabitants, not only of India, but of all countries (tropical?) where the disease abounds, as liable to be propagated through contact; and though this view may not at present be upheld by the majority of medical men in India, whose opinions are necessarily based on ordinary observation, yet all would probably admit that special and precise information is needed to settle the question. Facts, too, are slowly accumulating which tend to prove that the casual inoculation of leprous matter is one actual means of spreading this fell complaint; and were it not that the crucial test employed in medicine, that of direct experiment, is obviously inapplicable in the present instance, more

decided views respecting the inoculability of leprosy would be adopted.

I shall next pass to the consideration of evidence of a higher order than the mere opinion of the public or even the profession; evidence well worthy of the consideration of all who are interested in the subject. In South America and some other countries, we have the strongest reason to believe that leprosy did not exist formerly among the native tribes, but that it was imported from other countries, and has now spread amongst the aborigines, even where no inter-marriages have taken place. The factor of hereditary transmission is here excluded.

The history of leprosy in the Sandwich Islands, already referred to, is a very remarkable one. According to Dr. Hillebrand's account (which is published in Dr. Macnamara's Pamphlet on Leprosy) the disease was introduced into Honolulu by Chinese emigrants in 1848, and Dr. Hillebrand saw the first leper in 1853. Ten years later, the disease had appeared in six other persons dwelling in his immediate neighbourhood; and according to a recent census, the lepers now number at least 250. Professor Erasmus Wilson, in his lectures lately delivered before the College of Surgeons, remarked on the significance of these facts, and expressed it as his decided opinion, that though leprosy was, under favourable circumstances, non-contagious in Europe,

it was probably contagious in tropical and semi-tropical countries. It would be very interesting to learn more of the disease in the Sandwich Islands, and especially as to the number of imported cases, as compared with those that have originated in the islands.

Again, leprosy has existed for some time past amongst the Chinese emigrants in Australia; and lately it has been reported that the disease has spread beyond the Chinese population. I have ascertained, however, that the Colonial Office has received no information as to the authenticity of the report, and in the absence of further evidence, we cannot come to any conclusions on the subject.

Landré has lately attempted to prove that the disease is contagious in Cayenne, and he has brought forward many striking cases in proof of his views; but some of his examples, if they prove anything, prove too much, namely, that the disease is highly infectious, and this no one is inclined to admit. We cannot shut our eyes, however, to the fact that leprosy very frequently occurs in members of the same family, even when hereditary transmission is out of the question, and that Europeans not unfrequently become leprous, by residence in countries where the disease is endemic. I have lately had under my care a very severe case of leprosy in an English gentleman, who was born and lived in England during the early part of his life, but afterwards

resided for many years in a country where the disease is common, and where he fell a victim to it. Many other similar cases are on record. Hebra and Kassosi have met with four such.

CASE 1. Male, aged 45. Born in Turin ; at 30 years of age he went to Cairo. The disease began after ten years' residence there, and after five years it had produced an abundant formation of nodules in the face and hands.

2. His wife, ten years younger ; she was also born in Turin, and went with her husband to Cairo. She fell ill two years later with tubercular leprosy, but had, after three years' illness, anæsthesia of the hands.

3. A female, 48 years of age, born in Alsace ; when aged 17 she went to New Orleans, and was taken ill when 44 with the tuberculated form.

4. A male ; he was born in Hamburg. At 28 years of age he went to Rio, was taken ill seven years later, and when seen in Hebra's clinic had well-marked tuberculous leprosy.

The problem to be solved is this : Do the physical and natural relations of the country alone explain these facts ? If not, we are driven to the conclusion that the disease is in some way communicable from the unhealthy to the healthy. For my own part, I am inclined to believe, that though leprosy is not contagious in the ordinary sense of the word, it is nevertheless propagated by the imbibition of the excretions of those affected, much in the same way (not in the

same degree) as typhoid fever or cholera are propagated; but as leprosy is developed but slowly, there is far greater difficulty in tracing it home to its true source. This hypothesis gives the best interpretation of many facts in the past and present history of the disease, which would otherwise remain unexplained.¹

Sexes. There is a prevailing opinion in the present day that leprosy more commonly attacks males than females. On this point we obtain little or no exact information from a study of its history.

The leper-houses throughout Europe were sometimes provided for both sexes conjointly; as for example, that of St. Nicholas in York, which contained both male and female lepers. In other places they received one sex only, as at Nürnberg, where, of the four leper hospitals, three were allotted to women, and only one to men. But the records of the time

¹ Since writing the above I have come upon the following remark in Dr. G. Milroy's report on 'Leprosy in the West Indies,' 1873, which to a limited extent bears out my own view, though he evidently thinks the disease less liable to *spread* than I do. 'In conclusion, I would say in respect of this very important question—the communicability of the disease by contact with the afflicted—that having carefully considered the whole evidence that has come before me, and wishing to avoid even the appearance of dogmatism upon a matter which does not admit of absolute certainty, leprosy appears to me to be neither more nor less contagious than scrofula (Phthisis?) What Dr. Williams, whose authority no one will question, has stated in regard of pulmonary consumption, one form of tuberculous disease, is, in my opinion, equally applicable to the other cachexy: "Although I concur in the opinion that we have no evidence that pulmonary consumption is infectious like smallpox, scarlatina, &c., yet I think, &c.,"' p. 41.

do not generally show the relative number of the males and females admitted; nor would such information, if it existed, be a very certain guide to determine the point in question.

The official returns at Bombay show that out of 8,220 lepers, 6,692 were males and 1,528 females; the ratio being 4.38 to 1. Assuming that the ordinary male population exceeds the female by about 10 per cent., we still have the disease much more common among men than women. Dr. Carter remarks that the proportion of lepers in the two sexes varies at different ages; 'between 31 and 60 the male lepers greatly preponderate, and this fact constitutes one of the chief peculiarities of leprosy. In earlier life the disease appears to be equally common amongst boys and girls.'

Some caution, however, is necessary in adopting these statistics as a fair estimate of the relative frequency of the disease in the two sexes. The natural instinct of women in all countries is to conceal their defects as long as possible, and one cannot help suspecting that many cases may have been omitted in the returns. Again, Dr. Carter notices that leprosy develops at an earlier age in females than in males, and that the former succumb more readily to its attack. This fact would, no doubt, tend to diminish the total number of female lepers alive at any given time. It is also believed by some that many of the female children of lepers are destroyed.

An investigation of the number of cases admitted into the hospitals of tropical countries in the present day, would lead us to the conclusion that the disease is far more common in males than females; but I may state at once that deductions from this source are often fallacious. It is well known and admitted on all sides, that in most countries, but especially in the East, the women are far more unwilling than the men to enter the Leper Hospital; hence it is that we find a great disproportion between the males and females admitted. And this fact has led observers to erroneous conclusions on the subject. The only records I can find which are not open to this objection are those of Norway and Jamaica; the latter are obtained from a census of the whole island, where no doubt many lepers of either sex were overlooked, but probably in about equal proportions. We find in Norway, out of 906 cases, 461 were males and 445 females; and in Jamaica, out of 778 cases in 1861, 391 were males and 387 females; and in 1871, out of 749 cases, 400 were males and 349 females. Thus, if we are to judge by the statistics of these two countries, we must admit that the disease is nearly equally common in both sexes. We require, however, some further information on this subject.

The ages of 8,220 lepers of both sexes in the Presidency of Bombay are entered in the returns, and are shown in the following table, arranged by Dr. Vandyke Carter:—

Age	Sex		Total	Percentage		Total
Years	Male	Female		Male	Female	
10	45	29	74	0·67	1·89	0·9
20	527	203	730	7·87	13·28	8·88
30	1,496	446	1,942	22·35	29·18	23·32
40	2,046	392	2,438	30·57	25·65	29·65
50	1,793	299	2,092	26·79	19·56	25·44
60	659	129	788	9·84	8·43	9·58
70	100	25	125	1·48	1·70	1·58
80	23	5	28	0·03	0·03	0·52
90	2	0	2	0·	0·	0·03
100	1	0	1	0·	0·	0·
Total }	6,692	1,528	8,220			

Dr. Carter remarks, it will be seen from this table, that the largest number of lepers is found between the ages of 31 to 40 years; the next highest from 41 to 50, then 21 to 30 years; these and all the remaining numbers at various decimal periods being determined by the figures in the 'male' column, owing to the great preponderance of that sex in leprosy. Not 1 per cent. of all lepers are found at childhood, and not 2 per cent. after 60 years of age; at 11 to 20, and 51 to 60 years, the percentage is about 9 only, so that the great majority of lepers are between 21 and 50 years of age; and this statement applies to both sexes. The following differences in the sexes appear from the percentage table:—Female leper children are *proportionately* three times as numerous as male children; at 11 to 20 they are not very far short of

double as many, and at 21 to 30 the percentage of women is at its maximum, that of men being found in the next decimal period (31 to 40 years); after 30 years, amongst women, the percentage diminishes, and then falls rapidly, till at 61 to 70 it is nearly the same as amongst men. In both sexes a sudden diminution in numbers occurs after 50 years; it is especially marked in men, and well in women at 51 to 60. It is apparent that the age of female lepers tends, among early adults, to anticipate that of males, and that a greater rise in numbers takes place amongst them at the age of puberty; it may hence be inferred that the disease tends to appear sooner in women than in men.

‘The practical inference,’ says Dr. V. Carter, ‘to be made from the above table is this, viz., that the germs of leprosy may be dormant till near the middle of life; and it is also apparent that an individual bearing within him the leprous taint may grow up and beget children, and die before the evidence of this taint becomes manifest in his person; and it can hardly be denied that this experience might be repeated in the instance of his children; this being, it might be surmised, the explanation of many obscure facts in the history of leprosy, as well as of some other constitutional diseases known to be propagated from father to child.’

These remarks of Dr. V. Carter are no doubt in the main true, but we must also bear in mind that

an hereditary tendency to any particular disease is transmitted with greater certainty when the disease is actually developed in the parent, than when there is only an undeveloped predisposition at the time of procreation. For example, a child begotten by a person who is of phthisical family, and also suffering at the time from phthisis, is more likely to be consumptive than one who was begotten say some years previously of the same parent, when he was strong and well. A broken-down constitution has a marked effect on progeny, not necessarily but frequently.

The following table is given by Dr. Regnaud, and compiled from 109 cases treated by him in the Mauritius:—

		Males	Females
1	At birth	1	—
4	Under 2 years	1	3
3	From 2 to 5 years	3	—
4	„ 5 to 8 „	3	1
6	„ 8 to 14 „	4	2
13	„ 14 to 21 „	6	7
15	„ 21 to 30 „	10	5
28	„ 30 to 40 „	23	5
32	„ 40 to 50 „	30	2
1	Of 65 years	1	—
1	„ 68 „	1	—
1	„ 69 „	—	1
109		83	26

These statistics, in the main, bear out those of Dr. Carter; and it is quite evident that in the Mauri-

tius, as well as in Bombay, the great majority of lepers (i.e. more than half) are between the ages of 31 and 50 years. The number given in the latter table is not, however, large enough to supply us with statistics certainly free from error. They are, however, taken in conjunction with others, sufficiently large and accurate to prove the broad fact that leprosy is a disease of young adult and middle life, though by no means confined to that period, and that its appearance in either infancy or old age is very rare.

I will briefly sum up the conclusions to be drawn from the foregoing account of the etiology of leprosy. Firstly, that its primary cause is yet unknown. Secondly, that of subordinate causes, diet and hereditary tendency are by far the most important, and that climate, soil, and race are not without a certain influence on the development and progress of the disease. Thirdly, that it is uncommon before puberty, and is in some countries more prevalent in the male than in the female population. Lastly, that leprosy, if not contagious, is capable of propagation by the imbibition of the excreta of lepers.

CHAPTER IV.

CLINICAL HISTORY, MORBID ANATOMY, AND TREATMENT
OF LEPROSY.

THE French physicians of the fourteenth century divided the signs of leprosy into two classes—the equivocal or inconstant, and the unequivocal (univocal) or certain.

Amongst the former are mentioned—the falling off of the hair, the formation of tubercles on the skin and under the tongue, an unctuous condition of the skin, numbness of the limbs, with many others, all more or less symptomatic of the disease in our own time.

The unmistakable signs of the malady were—‘ (1) a dark appearance and rotundity of the eyes, with a thickening of the ears; (2) a tuberosity of the eyebrows, and falling off of their hair; (3) a dilatation and thickening of the nostrils externally; (4) a harsh and nasal voice; (5) foetid breath; (6) and a horrible satyr-like aspect.’¹

The accuracy of this description of tuberculated

¹ From the writings of Guy de Chauliac, of Avignon, Physician to Pope Clement VI.

leprosy can leave no doubt of the identity of the disease of the Middle Ages with that of modern times.

The identification of leprosy, however, in the present century as a distinct disease has been beset with difficulties. Up to a late period it was confounded with several other disorders, such as the Barbadoes leg, syphilis, and scurvy. By some it was supposed that certain local maladies, such as the 'radesyge' of Norway and the 'pellagra' of Lombardy, were only different varieties of leprous affections; and it was even believed for many years, that the leprosy of Iceland and Madeira respectively, and the 'spedalsked' of Norseland, constituted distinct species from Elephantiasis Græcorum. All this of necessity led to much confusion; and not until Drs. Danielssen and Boeck had visited the eastern shores of the Mediterranean was the question finally set at rest, and the identity of leprosy in all parts of the world fully established.

At the present day, leprosy is universally recognised as a constitutional disease, *sui generis*, and manifesting certain well marked and characteristic features. It is especially a malady of young adult and middle life; yet no period from infancy to old age is entirely exempt from it. Amongst the more remarkable features of the disease may be mentioned its predilection for attacking the distal segments of the limbs, the ears and face. The sym-

metry with which these parts are invaded is in accordance with its constitutional nature. Unilateral leprosy is very rare. Dr. Vandyke Carter was one of the first of our countrymen to describe accurately the three principal forms assumed by Elephantiasis Græcorum, namely, (1) the Macular, (2) the Anæsthetic, and (3) the Tuberculated. These three forms are often only different phases of the same disease, and are sometimes seen co-existing in one and the same individual. Nevertheless, in typical cases, their clinical features are sufficiently distinct to justify the nomenclature now usually adopted.

The Premonitory Stage.—The early stage of leprosy is characterised by lassitude, and a sense of bodily and mental weariness and depression, without any assignable cause. These symptoms last for an uncertain time, which may be measured by weeks or months, and are usually accompanied or followed by slight rigors, loss of appetite, and nausea, with occasional nocturnal febrile attacks, and other unequivocal signs of general constitutional disturbance. After a time, this is followed by what Danielssen and Boeck call the ‘periodically eruptive stage,’ in which an acute eruption breaks out on different parts of the body, the skin of which becomes red, swollen, and tender in patches. After a few days or weeks, these blotches subside, but often leave behind a patch of brown pigment in the seat of the eruption, which may be for a time more or less anæsthetic; some-

times, however, they pass away, and leave no apparent trace of their former existence. Several months may elapse between successive crops of these red blotches, but with each return there is an increased liability to permanent tissue-changes in the true skin.

Among the prodromata occasional outbreaks of bullæ are met with, like those of pemphigus, which may last for many months before the regular leprosy sets in. This eruption is distinguished from idiopathic pemphigus by the fact that bullæ usually appear singly and suddenly, one healing before another shows itself. They vary in size from a nut to a hen's egg, and generally break a few hours after they appear. During the febrile attacks, there is often an insatiable thirst.

The following case, at present under my care in the Middlesex Hospital, illustrates very well the early stages of the disease:—

A Case of Elephantiasis Græcorum of two and a half years' standing.

E. B., aged 23, admitted into Middlesex Hospital, April 17, 1872.

Family history.—The patient states that his father and mother are both alive and well. His father is a native of England, and his mother of the Mauritius, and of French extraction; he has eight brothers and sisters now living in the Mauritius. He is acquainted

with his family history as far back as his great-grandparents, and not one of his relations has ever suffered from leprosy.

Previous history.—The patient was born in the Mauritius, and lived there till he was twenty years of age; he always enjoyed good health, and he never had syphilis or any other serious malady. His diet in the Mauritius was of the best quality, and consisted of fresh fish, meat, fruits, vegetables, and bread made from imported wheat. He states that he has seen a good deal of the disease, but not amongst people of his class, it being chiefly met with amongst the coolies.

Present attack.—In the month of May 1870, the patient first noticed a brown irregular spot about the size of a threepenny-piece on the outer side of the right thigh; at the same time two similar spots appeared, one near the bridge of the nose, and another on the left temple, both of small size. The appearance of these spots was unattended by any constitutional disturbance, so far as he can recollect. They were first noticed shortly before he left the Mauritius, and were believed by the medical men who saw him to be of syphilitic origin. After leaving the Mauritius he went to Algoa Bay for two months, and then proceeded to England. During this time the spots became darker, and soon after he arrived in England, he was treated with mercury, on the supposition that he was suffering from syphilis.

On or about April 10, 1872, he noticed that the lobes of his ears were getting red and painful, and that the bridge of his nose was similarly affected; at the same time he felt ill and feverish, and suffered from attacks of sickness. A week or ten days later he was admitted into the hospital.

State on admission.—The patient is a well nourished man, of dark complexion. On his face there is a well-defined irregular patch of a pale coffee colour. It occupies the skin of the nose and a portion of both cheeks, extending downwards on the right side of the chin; the skin round the left eye and on the forehead is marked in a similar manner. A portion of this patch, near the centre of the forehead and on the bridge of the nose, is raised, red and inflamed; the ears, especially the lobes, are swollen, red, and tender on pressure; the inflammation presenting somewhat the appearance of gout. On the outer side of the right forearm is a round patch of a reddish-brown colour, raised and painful. Similar but smaller patches exist on the backs of both hands; on the trunk the skin is healthy; on the outer side of the upper part of the right thigh there is a brown discoloration of the skin, and over this patch sensation is slightly impaired. The urine is of a pale colour, its specific gravity 1020, and contains no albumen, but a small quantity of mucopurulent matter, which is probably secreted from the urethra. The patient complains of being feverish at

night, and of suffering considerable pain in the red patches on his arms, ears and face, so much so that his sleep is disturbed. His pulse is 112, temperature 103. He complains of great thirst. After a fortnight's residence in the hospital, the raised patches on the face, arms and ears had almost disappeared, leaving behind a dark discolouration of the skin in the seat of the inflammatory process. His temperature fell to a little below normal, being usually about 97, and his pulse 66. A fortnight later, the margin of the brown patch on the face, and those on the arms and hands had become paler, while the ears were rapidly resuming their normal colour and appearance. About three weeks afterwards, early in June, he was discharged, having for the time entirely recovered from the febrile eruptive attack, the only *apparent* changes in the skin being those of pigmentation, with a slight thickening about the alæ of the nose and the cheeks under the eyes. He remained free from any return of the eruption till January 15, 1873, when, without any assignable cause, both his legs below the knees and his feet became red, swollen, and tender. Patches of eruption appeared also on both arms, and the backs of the hands were uniformly puffy and tender on pressure. His face and ears were entirely free from any fresh eruption; the dark pigmented patch extending over the greater part of the face, remaining much in the same state as it was when he was discharged

from the hospital in June. The eruption on the feet and legs was followed by well-marked temporary anæsthesia. In the course of a month he had pretty well recovered from the attack.

On a close inspection of the nose and cheeks, it is evident that the skin is slightly puckered in places, as if produced by some cicatricial contraction of the subcutaneous tissue. The skin of the nose remains somewhat thicker than is usual, and he has lost some of the hair from the outer part of both eyebrows. In the beginning of March, 1873, he had another slight eruptive attack, this time confined to the dorsum of one foot and the backs of the hands. It was attended with the usual constitutional disturbance indicated by a rise of the temperature and pulse, sickness, and general languor; in the course of a week or ten days the attack passed off, apparently cut short by large doses of quinine. The urine is of normal colour and specific gravity, but always contains a small quantity of muco-purulent matter.

Remarks on the Case of E. B.

In the above case we have an excellent example of true leprosy in its early or '*periodically eruptive stage*.' The disease appears to have commenced in a very insidious manner, the first indication of it having been the appearance of two or three brown spots, unattended with any apparent constitutional disturbance, so far as the patient is himself aware. Pro-

bably, however, he is in error on this point; most likely there was some trifling febrile attack at the time of the appearance of the spots, but it either was not noticed, or was subsequently forgotten. It was never for a moment suspected by his medical attendant in the Mauritius, that these spots indicated the presence of true leprosy. The three eruptive attacks, which we have had an opportunity of observing during his residence in the hospital, have all followed precisely similar courses, and differed from each other only in severity and in the extent of tissues involved. In the first attack, which was the most severe, the skin of the face, ears, and the backs of the hands were the parts principally affected; in the second, the feet and hands suffered most; while in the third, from which he has just recovered, the tissues were involved to a very trifling extent. In all three attacks the constitutional disturbance was the same, and the temporary anæsthesia was more or less present on each occasion, and they were all separated by a well-marked interval, during which the general health of the patient was perfectly restored, and no apparent changes occurred except the gradual disappearance of the excess of pigment from some of the patches. One or two questions naturally suggest themselves for our consideration. How was the disease acquired in this case? There is no history of hereditary taint. The patient was in comfortable circumstances in the Mauritius, and wanted for

nothing; he lived on ordinary mixed diet of the best quality. We may therefore exclude the two important factors of diet and hereditary tendency; and we are almost driven to the conclusion that he acquired the disease either by contagion, or by the imbibition of the excreted poison from other lepers, admitted into the system through the vehicle of food or water. The only other alternative is, that the disease sprang from some cause which is at present quite unknown, and even unsuspected.

I. *Macular Leprosy*.—1. After a longer or shorter premonitory stage (or sometimes without any at all), permanent maculæ appear in the skin; the spots assume various forms, of which the following are the most common and characteristic. They consist of more or less circular spots, varying in size from half-a-crown to the palm of the hand. The edges are a little raised and of a reddish colour, the redness disappearing under pressure. The centre is slightly depressed, pale, dry, and sometimes white and shining. The tendency of these spots is to spread at the circumference. The hairs on the patch are more or less atrophied, and may become grey or perfectly white, and the skin in the centre loses its sensibility. After a time, the spots shrivel and become atrophied, either uniformly or in patches, so as to present an appearance of many small, shallow, white, scar-like depressions. The areas affected sometimes become blended, and then form large surfaces of altered skin.

2. A more common appearance than the one above described, is that of discoloured patches, which sometimes present a raised margin, and often occupy a large tract of skin, which becomes covered with a dark pigmentation. The centre of these may be of a lighter shade, or even white, and thus irregular rings and markings are produced. These white spots may again become brown, in consequence of fresh pigmentary deposits. In most of them sensation is impaired.

Danielssen, speaking of what he calls the 'permanently eruptive stage,' says, 'the discolorations no longer disappear under pressure; their colour is more intense, the thickening of the corium more notable; and there will be no longer any retrogressions or disappearance of the eruption.'

The various forms and appearances which macular leprosy assumes in the different stages of its progress, and in different individuals, hardly admit of a detailed description. They can only be fully realised by the inspection of a large number of cases.

The following illustrative case (taken from Dr. V. Carter's excellent article published in the 'Bombay Medical and Physical Journal,' 1863) is a good example of macular leprosy passing into the anæsthetic form.

'Tah Mahomed, aged 53, a pensioner, comes from near Nassick (Deccan); 2 years sick. On the body is an eruption of circular patches, the centre of which

is pale and comparatively depressed (sometimes really below the level of the skin); the margin broad, raised, defined, of a purplish hue; the cuticle is entire over both, wrinkled and dry. On close examination the hair follicles are found to be distended, the hairs frequently absent or atrophied, not blanched. The diameter of these patches varies from $\frac{3}{4}$ of an inch to 3 or 4 inches; they are present on the nose, temples, cheek (right side of face), helix of both ears, neck, shoulders, arms, and forearms; on both mammæ; there is one exactly on the middle line behind, others on the nates, right thigh, leg and foot, and also on the opposite a few; they first appeared on the right thigh close to the knee, on the inner side, and the patch there is still the largest; one spot is just below the attachment of the ligamentum patellæ; the most recent (15 days?) is on the opposite thigh; its diameter is about 6 lines, colour reddish purple; it is raised with a mere trace of a central pale part; no tenderness, but loss of sensation. At a short distance these patches have a whitish glistening aspect, which is attributable to very thin, dry flakes of cuticle, or to a similar state of the general surface, without distinct scales being apparent; their number is about twenty, and they are all, without exception, quite benumbed in the centre; being sharply pricked, blood exudes.

‘About the time the patches first appeared (two years since), he accidentally discovered that the

right hand was weak and benumbed; the two inner fingers are slightly atrophied, and remain a little flexed when at rest; their palmar surfaces, especially of the first phalanx, wrinkled, shrivelled, and of a purplish tint; also the whole length of the inner third of the palm of the hand is shrivelled slightly and livid, the difference being perfectly clear to the eye; these parts are benumbed except close to the wrist, and also the dorsum of the two fingers beyond the first phalanx; their temperature is notably diminished. The whole hand is weak, and the interossei are atrophied, particularly of the first space. The ulnar nerve of the same side about an inch above the elbow forms a firm and tender swelling, running upwards for about two inches, which, when pressed, causes pain in the forearm and starting of the two inner fingers; this swelling was first noticed about the time of the numbness; it cannot be confounded with enlarged lymphatic glands. General health fair; never had fever; is married, and has a grown-up family and grandchildren, who are all well; knows of no taint of leprosy in his family; has had syphilis on more than one occasion, many years since.'

II. *Anæsthetic Leprosy* is sometimes a further development of the Macular variety. At other times, the changes in the skin are so slight as to escape notice, until numbness over patches of otherwise healthy-looking cutis first attracts attention. It is in anæsthetic leprosy that the eruption of bullæ, which

I have already described, is most frequently seen. After the blebs have burst, they usually dry up and scale, leaving dark pigmented patches, or more commonly white spots, from the absence of pigment. Occasionally, however, instead of drying up, they form into ulcers, which subsequently slowly cicatrise, and give rise to thick, smooth, irregular scars. At first, the spots which remain after the disappearance or cicatrisation of the bullæ, may retain their normal sensibility, but sooner or later they all become anæsthetic. Dr. V. Carter's experience is not quite in accordance with this view; he says, 'Difficult as it may be to explain the occurrence of these bullæ on benumbed surfaces, it cannot be denied that many times they appear to arise spontaneously, and hence they have been ranked as the peculiar feature of Anæsthetic Leprosy; but they are often absent, and in my experience they have never appeared on a surface not *previously* anæsthetic, so that their diagnostic value can be but slight.' At the same time that these changes are going on, hyperæsthesia may exist in healthy-looking parts of the skin; and patients often complain of pricking and shooting pains in the fingers and toes, with jerkings and shakings of different parts of the body, so much so in some cases that they require to be fed. This hyperæsthesia, which may be either local or general, often lasts for months, or even years, and causes great distress to the sufferer, who lies torpid in bed,

because walking or even moving is attended with great pain. The handling things, moreover, causes all kinds of subjective sensations, such as burning, stabbing, and irregular reflex muscular action. Later on, the hyperæsthesia diminishes or disappears, and is followed by the characteristic feature of the disease, namely anæsthesia, which commonly, though not universally, develops in those parts of the skin which have been previously hyperæsthetic, or the seat of abnormal pigmentation.

Thus we see that the maculæ, the hyperæsthesia and the anæsthesia, are all closely related, and follow each other in a kind of series. For example, a spot of the size of a crown may appear on the face, of a pale red tint, slightly swollen, and painful to the touch; to this succeeds an alteration in the pigmentation of the part, so that the spot becomes white or brown, and at the same time its red edge advances, and forms a small hyperæsthetic zone around an inner anæsthetic area; outside all, is healthy-looking skin. The anæsthesia, which is at first confined to one or two spots, may gradually invade almost the whole surface of the body, and especially it may affect unchanged patches of skin.

The insensible parts do not generally correspond with the distribution of particular cutaneous nerves, but spread into the area of several nerve-trunks, or occupy one only partially; even in the midst of a

large anæsthetic district there may be sensitive islands. In some cases, the loss of sensation is so complete that patients may be severely burned without knowing it. Mr. Arthur Gordon, speaking of a visit that he paid to the Leper Hospital at New Brunswick, says: 'One individual was pointed out to me, whose hand and arm had been allowed to rest accidentally on a nearly red-hot stove, and who had never discovered the fact until attention was arrested by the strong scent of the burning limb, which was terribly injured.'

As the disease advances, atrophic changes occur in the skin and deeper tissues. The cutis becomes dry and wrinkled, and assumes in patches the appearance of extreme old age, whilst the adjacent parts are plump and natural. The face looks prematurely aged, and the expression comfortless; the muscles waste, and, as the atrophy advances, the features become twisted and deformed; the lower lid is everted and recedes from the eyeball, leading to an overflow of tears, and haziness of the cornea. The lower lip falls away from the gum, the saliva dribbles, and the whole expression becomes vacant and painful. The hands and feet are similarly affected with muscular atrophy; the flexors partly overcome the extensors, the backs of the hands sink in, especially at the first interosseous space, the palm is arched, the first phalanges are drawn backwards, while the second and third are flexed, and thus the fingers

are curved, stiff and claw-like, and their tips club-shaped. Dr. V. Carter remarks, 'In the forearm paralysis seldom occurs, and then on the inner side where the two muscles supplied by the ulnar nerve are placed; I have also noticed a wasting here, indicated by a straight or concave outline. These changes may occur in a few months, or they may be delayed for two, three, or more years, depending no doubt on the degree of nerve disease, and also on the general condition of the patient.' The skin over the semi-flexed joints becomes tense, thin, and shining, the epidermis scales off and bursts, and thus indolent ulcers are formed. Gradually the destruction extends deeper, the joint ends of the bones are laid bare and the joints opened; and at last, as a consequence of the gradual shrinking and breaking up, a whole phalanx is separated. When the distal bone is removed, the altered nail and pulp are sometimes transferred, as it were, to the second segment of the digit. Generally, however, two or more phalanges are involved either together or consecutively; the parts fall off without giving pain, and thus a whole hand may be amputated. 'If the sufferer accidentally knocks his finger or toe against any obstacle, the part breaks off.' The mutilation does not often extend to other joints than those of the hands and feet. The pathological process which produces all these changes in the tissues has been aptly called dry mummifying necrosis.

Dr. Mantell remarks that the ulcers which sometimes occur on the soles of the feet are very indolent and highly characteristic; superficially they are circular in form, and internally conical, the apex of the cone reaching to the bone; the discharge is thin, and in India attracts flies, which deposit their eggs, and thus the ulcer soon becomes a nidus of maggots.

Associated with these visible effects of the disease, there is often an abnormally low temperature, which, however, is not confined to cases of the anæsthetic variety. The tables of temperature, very carefully prepared by my friend and clinical assistant, Dr. Balding, from two cases of tuberculated leprosy now under my care at the Middlesex Hospital, serve to illustrate this point. It will be seen that the morning temperature at 9 A.M. is always below normal (about 97°); while in the evening it is sometimes a little above, but more often below, the mark.

III. *Tuberculated Leprosy*.—This variety of leprosy is that most frequently met with in Europe, but is less common in India than the anæsthetic form. It is ushered in by the usual premonitory symptoms, and, like anæsthetic leprosy, is sometimes an advanced stage of the macular variety.

As I have already mentioned, with each eruptive attack, pigmentary changes are apt permanently to alter the appearance of the skin, and in these patches the characteristic tubercles are most liable to develop; the original maculæ acquire greater stability,

the skin thickens, and flat prominences appear on its surface; as their number increases they coalesce, and cause an exaggeration of the original lines and furrows of the skin, which acquires in a European a shining coffee-coloured tint, and the consistency of india-rubber. The tubercles and thickened cutis are tender on pressure; their chief localities are the eyebrows, the lobes of the ear, the alæ of the nose, and the extensor surfaces of the upper and lower extremities. The skin of the forehead becomes thickened, its furrows deepened, and its prominences exaggerated; on the eyebrows especially tubercles are apt to be well marked, forming a kind of roof over the eye, furrowed by deep partitions, and producing the morose aspect so characteristic of the disease. The hair of the eyebrows, especially at the outer part, is soon lost; the nose is tumid, and occupied by nodules and tubercles; the cheeks are thick and hanging; the lips hard, swollen, shining, and everted; the chin broad and nodular; and the ears—stiff, shining, and thickened—stand out from the head. The bronzed appearance, and the thick everted lips and ears, give to a European the aspect of a mulatto. The hands and feet are, next to the face, the parts most commonly affected: the backs of the hands become swollen with œdema and thickening of the tissues, and the skin of a brownish red colour; the fingers stand stiffly apart, are thickened and are club-shaped at the tips; the nails dull, dry, and

fissured. Various retrogressive changes may occur in the tubercles and altered skin: among these, atrophy is the most common. The nodules shrink, and are more or less absorbed; the epidermis scales off, and a round, flat, pigmented spot remains; over the spot the skin is thin and atrophied. More rarely the nodules suppurate, and the entire mass breaks up into cheesy pus. Not unfrequently superficial ulcers or simple excoriations form over the surface, and give rise to a thin secretion, which dries and forms into crusts. Occasionally, though rarely, the ulcers spread deeply into the subcutaneous tissues, and may lead to a separation or destruction of the bones of the phalanges, producing an effect similar to that described in anæsthetic leprosy; but in this respect, what is the rule in the latter is the exception in the tuberculated form.

During the early stages of the malady, the lesions are confined to the skin and subcutaneous tissues; and it is only after it has lasted for years that the mucous membranes of the tongue, mouth, fauces, larynx, and conjunctivæ are affected. The changes which occur in these structures are akin to those met with in the skin. The hard and soft palate may be seen to be nodulated and fissured; the dorsum of the tongue acquires a peculiar aspect, from the great prominence of the papillæ and the grey opacity of the epithelium; the tongue itself becomes dense, stiff, and furrowed; the epiglottis is also nodulated,

and almost immovable ; while the implication of the true and false vocal cords produces the obstinate cough, and the peculiar hoarse whisper, which are marked symptoms of an advanced stage of the disease. Inflammatory changes may occur in the conjunctivæ which are independent of any leprous formation, and produced by imperfect closure of the lids ; and sooner or later, from one cause or another, the cornea becomes opaque, and vision impaired or entirely destroyed.

As the changes in the skin and mucous membrane progress, the general organism suffers more and more, and there is increasing feebleness, loss of appetite, and mental depression ; the powers of nutrition fail, and an attack of phthisis or diarrhœa soon closes the scene. The average duration of this form of leprosy in countries where it is endemic is about eight or nine years, or less ; that of anæsthetic leprosy sixteen or seventeen years.

After *tubercular* leprosy has run its typical course for many years, a new symptom may appear—namely, anæsthesia ; and the disease may gradually assume the type of the anæsthetic form. Much more commonly, however, the type remains unchanged—the loss of sensibility in small patches of skin being very common in true tubercular leprosy. This combination of symptoms has given rise to the name of *mixed* leprosy.

With regard to the febrile attacks which recur

during the course of the disease, Hebra and Kaposi remark: 'We are of opinion that the fever has partly the same importance as that which accompanies the outbreak of variola or syphilitic roseola, and in part is the result of a metastatic process, as Hansen holds. When many nodules soften at once, it is obvious that the absorption of broken-down elements may excite fever, and this may be associated with a new external metastasis (softening of one set of nodules, production of another). A metastasis may also occur in internal organs, as the *post-mortem* examinations show, or elimination may take place by the ordinary excretory apparatus. For the initial fever, a toxic influence, as of a disease of the system at large, may readily be assumed.'

I shall illustrate the clinical features of tuberculated leprosy by a short history of two very severe cases, one of which has been under my care at the Middlesex Hospital for upwards of two years:—

M. A. E., aged 45, was admitted into Middlesex Hospital on October 5, 1871, having been under my care as an out-patient for about a year previously. She was born of English parents in the West Indies, where she remained during the first twenty years of her life. She then resided in England for four years. Subsequently she returned to the West Indies for one year; and at the age of 25 she went to live on the West Coast of Africa, and there remained until 1869, when she again came to England, and has since lived

near London. She has one brother and four sisters, all healthy. Her eldest son died in Africa; her other children, four in number, are all strong and well, and she is not aware that any member of her family has been afflicted with a similar disease.

She suffered from what she calls 'climate fever' in the West Indies, but otherwise enjoyed good health, until she went to Africa, where the present disease commenced nearly eight years ago. She firmly believes that it was produced by artificial means, some malicious person having rubbed her skin with a poisonous herb, and thus injured her for life. Nothing that we can say to the contrary dispels this extraordinary delusion. She describes the first symptoms as having consisted of vomiting and pain in the abdomen, with a sensation of numbness and tingling in the limbs, especially affecting the hands and feet; these were shortly followed by slight swelling of the upper and lower extremities, with some discoloration of the skin, and six months afterwards the face became similarly affected.

Her state of health has changed but little during the last two and a half years that I have had her under my observation, and may be briefly described as follows:—

She is a tall, well-formed woman, but emaciated; the hands, feet, face, and mucous membrane of the mouth and throat are the parts of the body most seriously affected. The skin of the hands is of a

darkish-brown colour, and enormously thickened by tubercular swellings, which are scattered irregularly, chiefly on the dorsal aspect of the hand and wrist. The fingers are more uniformly enlarged, and measure in circumference round the middle as follows:—

	Right Hand		Left Hand	
Index finger . .	4½	inches	4	inches
Middle finger . .	4	„	3¾	„
Ring finger . .	4	„	3½	„
Little finger . .	4	„	3	„

The measurements were made about the middle of each finger in October 1871, and six months later their size had greatly diminished. The palms of the hands are comparatively free from disease; on one finger there is a large and painful tubercle, which is now increasing in size, and giving evidence that active changes are going on at this spot. She is quite unable to close the hand, or even to bend the distal joints of the fingers. Brown patches of discoloration are scattered over the skin of the forearm, some of them reaching as high as the shoulder; while here and there a small hard lump can be felt in the skin. There is entire loss of sensibility at the back of the right wrist, over a patch of skin rather larger than a crown piece; elsewhere the sense of touch is nearly perfect, although a sensation of numbness exists. The feet, like the hands, are diseased, but in a less degree; they are of a darkish brown colour, patches of the same hue extending up the leg. The face is frightfully disfigured by the

irregular thickening and wrinkling of the cutaneous tissues, which is especially marked about the lips, nose, the cheeks just below the eyes, and the forehead, so as to present the well-known leonine expression. There exist the remains of several scabbed sores and scars on the face and hands; a large one is especially noticeable in the centre of the forehead. The hair of the eyebrows is gone. Rather more than the lower half of each cornea is opaque, but the pupil may be seen by looking obliquely downwards through the upper part, which remains tolerably clear. The patient can perceive light, but is unable to distinguish objects. The tongue is fissured and indented; the mucous membrane of the fauces, soft palate, and epiglottis is much thickened and tuberculated; she speaks in a hoarse whisper, and is troubled with a harsh, persistent, laryngeal cough, showing that the larynx is seriously involved. The skin of the trunk is tolerably healthy; the senses of taste and smell are not much impaired, and the hearing is perfect. The patient complains of general weakness, loss of appetite, and great difficulty in walking. A little solution of atropine was dropped into her eyes. This enabled her to distinguish objects, so that she could count the fingers of a hand held up a yard from her face; showing that the loss of sight is due only to the opacity of the cornea.

With the exception of the above-mentioned parts

of the body—namely, the upper and lower extremities, the face, eyes, and the upper part of the respiratory and alimentary mucous tracts—I am not aware that any other organs are especially affected by the disease.

Remarks.—In the above case we have an excellent example of Tuberculated Leprosy in an advanced stage, the disease involving the mucous membranes of the mouth and throat to a considerable extent, and giving rise to the cough from which she suffers, and which is one of her most distressing symptoms. The perfectly anæsthetic patch of skin over the back of one wrist serves to illustrate the fact that in typical Tuberculated Leprosy we may have anæsthesia.

Case of Elephantiasis Græcorum.

L. G. E., aged 19, admitted into Middlesex Hospital
Feb. 17, 1873.

Family History.—Father and grandfather both born in England, and are alive and well. The grandmother of the patient died of heart disease. His mother was born in India, of French parents, and is alive and well; her father was from Bordeaux, and her mother was born at Madras and died a year ago. None of his family have been afflicted with leprosy. The patient himself was born in Calcutta, in 1854, and was suckled by a native woman, whose family, as far as is known, was healthy. He lived in Calcutta till within a few months of his final depar-

ture for England ; during those few months he paid a visit to some relatives living in the unhealthy district of Rungpore, where leprosy and goître are extremely common. During the time that he lived in India he was never robust, but on the whole his health was pretty good, though he had ague and measles. While at Rungpore some sores formed on his legs, which quickly healed, and left behind some thickening and discoloration of the skin. His diet was that in ordinary use amongst the better classes. He left India for England in the beginning of 1863, and suffered from an attack of ague on the voyage home. In June 1863 he arrived in England, his general health having much improved since he left India. Two and a half years later, that is, towards the end of 1865, some brown patches appeared on his arms, and shortly afterwards his face became similarly affected. This attack was attended with slight constitutional disturbance—not sufficient to lay him up ; the spots gradually disappeared, and he remained in good health for nearly a year. In 1866 his feet and legs as high as the knees became swollen and tender, but there was little, if any, discoloration of the skin, though there was some temporary anæsthesia. The constitutional symptoms in this attack were severe, and lasted for two months. The swelling of the feet then subsided, and about a month later had nearly disappeared ; but his feet have never quite resumed their normal size. As the swelling subsided, the

epidermis scaled off. After this attack his health remained pretty good until 1868, when he first noticed the skin of his face was becoming discoloured and thickened. This change in the cutaneous tissues has continued to increase gradually up to the present time, but has not been attended with any further well-marked febrile symptoms; the change, indeed, has been so gradual that those who are with him constantly hardly noticed it. In August 1871 his feet first broke out into open superficial sores, which healed, but have returned again and again. The patient has never suffered from syphilis.

State on Admission.—The face of the patient is more or less covered with large tubercular knobs, which have coalesced in many parts and produced enormously thickened patches of indurated skin, which are cracked and fissured chiefly in the direction of the normal folds of the skin. A large patch of this kind covers nearly the whole of the forehead, and presents a well-defined abrupt margin; the skin of the cheeks is similarly affected; the lips and chin are also enlarged and thickened, and the latter covered with tubercles; the lobes of both ears are enormous, and the alæ of the nose are much affected, while the bridge presents a flattened appearance. At the outer side of the white of each eye is a thickened yellowish-looking mass, which appears to be hypertrophied conjunctiva. He complains of an offensive discharge from his nose. Both wrists and

arms are more or less covered with scattered tubercular patches, and the cuticle in many places presents a scaly appearance; his legs are in a similar condition; his feet are much swollen, and covered with scattered superficial ulcers, which secrete a watery fluid of offensive odour. There is some slight thickening in patches of the soft palate and uvula; the mucous membrane of the tongue and the rest of the mouth appears healthy. The skin of his hands also presents a healthy aspect. The urine, specific gravity 1016, acid, no albumen; it contains some mucopurulent matter, probably coming from the urethra.

On March 30, at 9 P.M., his pulse rose to 108 and temperature to 102° ; early on the morning of the 31st he had a shivering fit, and on the same evening his pulse rose to 144 and temperature to 104.2° , as may be seen in the following table. This febrile attack, which lasted for some days, was coincident with the formation of new sores on the face and arm, and enlargement and pain in the glands of the right groin. It was, in fact, a good illustration of the effect produced by the absorption of morbid material from the open sores, which in his case existed on the right foot—the ‘softening of one set of nodules, production of another.’

The following table has been very carefully made by my friend and clinical assistant, Dr. Balding. Great care was taken to leave the thermometer in the axilla for at least five minutes.

TABLE OF PULSE AND TEMPERATURE OF L. G. E.*

Date of Illness	Day of Month	Nine A.M.		Nine P.M.	
		Pulse	Temp.	Pulse	Temp.
February	28	84	100°
March	1	72	97·6°	92	100·6
"	2	72	97	88	98·2
"	3	74	97·2	90	100
"	4	84	98·4	80	98·4
"	5	80	97·4	82	98·2
"	6	68	97·4	84	98
"	7	72	97	86	99·2
"	8	76	97	84	99
"	9	84	97·4	90	98
"	10	76	97	78	97·8
"	11	84	97	72	98·2
"	12	72	97	84	98
"	13	78	97·2	86	98
"	14	86	97·3	84	97·8
"	15	72	97	88	97·4
"	16	80	97·4	86	97·6
"	17	76	96·8	84	97·4
"	18	72	96·4	84	97·6
"	19	78	97·2	88	97·4
"	20	84	97·2	84	98
"	21	78	96·6	90	98
"	22	96	97	84	97·2
"	23	90	97	96	98
"	24	98	97·6	90	98
"	25	88	97·4	96	98·4
"	26	80	96·4	80	97·4
"	27	84	98·2	96	98
"	28	86	97·2	94	99
"	29	90	97·4	84	97
"	30	80	97·8	108	102
"	31	108	101·4	144	104·2
April	1	..	99·4	112	102
"	2	..	99·2	148	105·2
"	3	98	100	108	104·2
"	4	108	100	108	101·2
"	5	108	100·2	100	102·4
"	6	..	99·4	100	101

* L. G. E. was placed under my care by my friend Professor Erasmus Wilson.

TABLE OF PULSE AND TEMPERATURE OF L. G. E.—*continued*.

Date of Illness	Day of Month	Nine A.M.		Nine P.M.	
		Pulse	Temp.	Pulse	Temp.
April	7	96	98·8°	84	100·2°
"	8	84	98	108	98·4
"	9	100	98	96	98·4
"	10	96	97·4	72	98
"	11	76	97·2	80	98
"	12	76	97	62	98
"	13	72	96·8	78	97·6
"	14	90	97·4	72	98
"	15	72	97	80	97·4
"	16	76	97·2	80	97·4
"	17	72	97	84	97
"	18	80	97·8	80	97·6
"	19	90	96·8	72	97·4
"	20	92	97·2	80	97·6
"	21	84	96·6	84	97
"	22	100	96·8	80	96·8
"	23	84	97	84	97·4
"	24	84	97·2	88	97·2
"	25	76	97	80	97
"	26	80	97	100	96·8
"	27	76	95·8	84	96·4
"	28	90	97·2	84	97·4
"	29	82	97·8	72	97·6
"	30	84	96·4

Remarks.—In the above case we have a typical example of Elephantiasis Græcorum of the tuberculated variety, and of about eight or perhaps ten years' standing. The exact date of the commencement of the disease appears to me somewhat uncertain. The patient himself and his friends are firmly impressed with the belief that the disease did not show itself till two years after his arrival in England; and that

the sores, followed by dark pigmentation of the skin, which occurred on his legs during the short time that he was at Rungpore were in no way connected with the disease. I am inclined to think, however, that in this they are mistaken, and that the disease really commenced in 1863 at Rungpore, and that the first indication of it was the spots to which I have referred. In either case the history is remarkable. On the supposition that the disease did not appear till after two years and a half residence in England, we have an instance of leprosy appearing for the first time in a member of a healthy family after a long absence from the country in which the disease is endemic. Cases of this kind, though not unknown, are *extremely rare*. On the other hand, if he contracted the disease at Rungpore, it must have remained latent in his system for at least two years and a half without producing any constitutional or other disturbance, and this appears to me to be the more probable supposition of the two.

As in the case of E. B., we naturally inquire, How did the disease originate? There is no history of hereditary transmission from any members of his family, as far as we are able to trace it; his diet has always been good, varied, and abundant; he has never been exposed to hardships; and the only disease from which he has suffered is ague. If the disease is in any sense contagious, or communicable through the excreta of lepers, we have a possible

explanation of the way in which he contracted it. If not, we are entirely at a loss to account for its origin.

One clinical feature of the case which is especially worthy of notice, is the comparatively slow progress of the disease. It has already exceeded its average length of duration in tropical countries, and yet our patient, though frightfully disfigured and suffering much from the superficial sores on his feet, still enjoys tolerable general health, his appetite is pretty good, and he is usually free from pain. The disease, too, has not invaded the mucous membrane of his mouth and throat—at least not to any considerable extent. The slow progress of the disease in this case is no doubt due to his residence in a country where the malady is unknown, and to the fact that he has been well fed and nursed and otherwise judiciously treated; and we have every reason to believe that he may live on for several years to come, though the progress of the disease will never be really arrested. I would further remark that, in both this case and in that of E. B., we notice a more or less abnormally low temperature, which remains pretty constant except during the febrile attacks from which they occasionally suffer, and in both there is a persistent discharge of mucus from the urethra. These symptoms have been noted as common in leprosy, and are well illustrated in these two cases. In the case of M. A. E., the temperature was unfortunately not taken.

Morbid Anatomy: Changes in the Skin.—On examining a section of one of the leprous tubercles, it is found to consist of a yellowish red mass, finely granular and uniformly dense and firm. The tubercle often extends close to the surface under the cuticle; sometimes, however, a layer of apparently healthy skin intervenes. The deep surface is usually not very sharply defined, but shoots off into irregular branches. At other times it is bordered by a firm, dense, fibrous layer. Microscopically, the nodules consist of small, round, closely packed cells and nuclei, mixed with some spindle-shaped filaments, which are seated in a delicate fibrous network of the corium. In young nodules the cell infiltration is not uniform, but is composed of small clusters which are chiefly found near the thickened walls of the vessels, and around the glands and hair follicles, while the intervening connective tissue only shows scattered cell infiltration, and is in places quite healthy. Vessels are very numerous round the infiltrations, but rare in their interior. The older nodules consist exclusively of cells and soft areolar network; in them the gland elements have vanished. The hair-follicles are barren, or provided only with a thin crooked hair. The papillæ are distended with cells. The epidermic layer is thinned, while the proper connective tissue of the corium is atrophied; the muscoli arrectores pilorum, on the contrary, are hypertrophied. Out-

side the infiltration, the tissues are normal, or only slightly thickened. Thus we see that the neoplasm of leprosy is not unlike that of lupus, s̄yphilis, and some other diseases. *Its mode of invading the tissues, and the stability of its elements, constitute, however, important differences.*

The changes which occur in the nerves have been described by Drs. Carter, Danielssen and Boeck, Virchow, Hebra, and others. If one of the long nerves of the arm, for example, be examined, swellings will be found developed at intervals along its course. They are mostly situated at points where the nerve is exposed to mechanical injuries by its superficial position, or its relation to the bones; thus the median is most severely affected where it runs over the wrist, whilst the ulna is especially liable to suffer at the elbow-joint. At the enlarged spot, the normal colour of the nerve becomes changed to a dirty grey or brownish semitransparent hue; at the same time the nerve itself becomes tough and hard, and on section looks abnormally homogeneous.

Under the microscope, the neurilemma of the nerve is seen to be changed, sometimes only slightly, while at others it is metamorphosed into a hard resistant mass. The most important changes lie deeper in the inner septa of the nerve-fibrillæ and in the interstitial nerve-substance. These changes begin frequently close under the neurilemma, where we

find a strongly refracting mass deposited; they continue thence to the greater septa, which split up the nerve bundles into a series of smaller ones. The dark mass which fills these parts is composed of a dense accumulation of cells, which are found everywhere between the individual primitive fibres surrounding and enclosing them.

Virchow says that after the disease has persisted a long time, fatty degeneration may occur, or there may be complete atrophy of the primitive nerve fasciculi. The disease, he says, of the nerves, thus seems to be a chronic inflammation, and the frequent interchange between hyperæsthesia and anæsthesia is explained by the more or less complete absorption of the inflammatory products. Similarly the remarkable fact, that the anæsthetic areas do not always tally with those of the distribution of the larger nerves, is explained by the discovery that in the first period of nerve-disease, all the fibres of a great trunk are not simultaneously implicated. When once the growth is uniform, and there is persistent thickening of neurilemma, the anæsthesia becomes permanent, especially when atrophy or fatty changes in the nerve itself ensue. In 1862 Dr. V. Carter remarked that 'the cause of the wide-spread anæsthesia' in apparently unchanged skin 'has not been adequately investigated; it is probable, however, that the cutaneous nerves are also sometimes implicated:' what Dr. Carter anticipated ten years

ago, has since been proved by Danielssen and Boeck, who found atrophic changes in the small nerve-branches of the skin and subcutaneous areolar tissue. This fact may also serve as an additional explanation of the irregular way in which tracts of skin become anæsthetic, which do not correspond, as has been already stated, to the distribution of the large nerves.

I agree with Hebra's remark, that a question arises whether, independently of other proper clinical symptoms of leprosy, the anatomical changes just described in the nerves can be regarded as strictly leprosy. Bergmann says that the leprosy new formations between the nerve-fasciculi differ from inflammatory ones by the mode of their accumulation in small circumscribed groups, giving a decided resemblance to cutaneous tubercular formations. But Virchow and others hold that the atrophy of the nerve-fibres is produced, not by the leprosy disease itself, but by a chronic inflammation often connected with it. Hebra and Kassosi are of the same opinion. They admit that the cellular infiltrations along the connective sheaths of the nerve-fasciculi and primitive fibres, the thickening of the walls of the vessels and the fatty changes and atrophy of the nerves themselves, are among the symptoms of leprosy, but not characteristic of it, and that they can only be so regarded when found in connection with other signs of the disease.

Identical changes of the nerves and similar functional disturbances occur, though rarely, when nerve trunks lie near the seat of chronic inflammations, and are occasionally met with in the Barbadoes leg, in lupus, and in chronic forms of scrofulous caries and necrosis.

The lymphatics, especially the inguinal ones, are attacked in all forms of leprosy, particularly in the tuberculated variety. They become enlarged, firm, thickened, and varicose. The testicle is also sometimes attacked, and deposits of round cells are occasionally found in its substance; and, if leprosy begin before puberty, the testis is apt to remain but poorly developed.

Of internal organs, the lungs, liver, spleen, and kidneys are often found diseased; but the researches of Danielssen and Boeck tend rather to show that the changes in these organs do not specially belong to leprosy, but are rather incidental complications. The appearances these observers have found in the lung, pleura, mesentery, peritoneum, &c., admit of the inference of a tubercular origin rather than of a specific leprous affection, and it is well known that Bright's disease is a frequent concomitant of advanced leprosy.

Complications.—The only complication of leprosy to which I shall direct attention, is scabies, so commonly met with in Norway, and which is interesting, because some observers have believed that it served

as a means of propagating the disease by contagion. Norwegian scabies is a very severe form of the ordinary disease, and becomes so, simply because it is allowed to go on for years unchecked; and for the same reason, it was formerly extremely common among lepers, many of whom were more or less covered with dry horny crusts, of a dirty brown colour, and upwards of an inch in thickness. These crusts were found to be composed of the dead bodies, eggs, and other remains of acari agglutinated together; the products, in short, of twenty or thirty years of scabies piled over each other. On forcibly removing the crusts, living acari were sometimes found on the excoriated surface beneath. This disease has really nothing in common with leprosy, and occurs only in the way I have explained, through neglect.

Allied Diseases.—Some account of those diseases which are most nearly related to leprosy would be a very interesting part of the subject; but it is one which space will not allow me to dwell upon. Leprosy is undoubtedly allied, on one hand, in its pathological processes, to such diseases as scrofula, lupus, and syphilis; while, on the other hand, it is closely connected, both clinically and etiologically, with maladies of the scorbutic class; amongst these I may mention, scurvy, pellagra, ergotism, chronic poisoning by *Lathyrus sativus*, and, perhaps, the button-scurvy of Ireland. Now, all these are admitted

dietetic diseases, and are known to depend on the persistent use of defective, or actively injurious, food; while their clinical features forcibly remind us of true leprosy. For example, the dry mummifying necrosis of the distal segments of the upper and lower limbs met with in chronic ergotism, closely resembles that of anæsthetic leprosy. Again, in pellagra, we have a constitutional disease, more or less chronic, and characterised by recurrent febrile symptoms, with an eruption of red patches, and sometimes bullæ, especially attacking the skin of the face, hands, and feet, and followed by desquamation of the cuticle, leaving the skin thickened, rough, and fissured; the bullæ appear in succession, and leave behind pigmented spots. As the disease advances, there is diminished general vitality, defective nutrition, pain in the limbs, cramps, convulsive movements and atrophy of the muscles, and not unfrequently permanent discolorations of the skin. Subsequently, nervous symptoms may supervene in the form of mania or melancholy, or, as more frequently happens, death occurs from nephritis, phthisis, or some other disease. It is impossible to find another malady so closely allied to leprosy as this, both in its history and clinical features; and if we assume that it is specifically produced by the habitual use of diseased maize, we have a suggestive fact as to the influence of bad food on leprosy itself.

Morphœa.—Professor Erasmus Wilson gives the following description of morphœa in his ‘Lectures on Dermatology:’—‘In morphœa, after a temporary hyperæmia, the connective tissue of the derma begins insensibly to proliferate and increase in quantity at the expense of the more highly organised tissues—the vessels and the nerves. It is probable that the connective tissue of the coats of the vessels, as also of the sheaths of the nerves, takes on a similar proliferating action, until, in the end, the part attacked has the appearance of a smooth white cicatrix. With the loss of capillary vessels the part becomes pale; with the loss of nerves it is insensible. It is dense and hard from the increase of white fibrous tissue, and the hardness sometimes extends in cords through the neighbouring structures. Its smoothness and whiteness have suggested to different observers a comparison with dead skin, with ivory or alabaster, or with a skin infiltrated with wax. The disease occurs in patches of various size and extent, sometimes stretching along a part of a limb; and after a time, the skin either returns by degrees to its normal condition, or falls into a state of permanent atrophy, the part looking withered and dead.’

Professor Erasmus Wilson has collected twenty-five cases of morphœa; in eleven of these the disease was unilateral, and in eleven the trunk of the body was affected. Some eminent German dermatologists regard these cases of morphœa as forms of true

macular or anæsthetic leprosy; this view, however, is erroneous, and is not entertained by the Norwegian observers, who regard morphœa as a rare disease, quite distinct from leprosy.*

The following are some of the points of distinction between the two diseases :—

(1) Morphœa is essentially a local disease, true leprosy is a general disease, presenting certain local manifestations.

(2) Morphœa is often unilateral, leprosy very rarely so.

(3) Morphœa is more common in women than in men, and it is met with more usually on the trunk than on the hands or feet. The converse is true of leprosy.

(4) Morphœa sometimes disappears slowly, leprosy never.

To state the case in a concise form—Morphœa is a local disease, presenting pathological changes not unlike certain forms of leprosy; Elephantiasis Græcorum is a general malady, attended with severe constitutional disturbance, and giving rise to progressive local changes which are symptomatic of the disease, but do not constitute the disease itself.

White Leprosy.—There is some difference of opinion amongst the Indian medical writers of the day, as to

* Drs. Anstie and Buzzard have both recorded cases of true leprosy which occurred in individuals who had never been out of England; these cases were, however, quite distinct from morphœa.

the relationship which exists between 'White' and 'True' leprosy; but a large majority is of opinion that the two are quite distinct. The contrary supposition may in some instances be explained by the fact that the two diseases sometimes occur in the same individual; and such cases would give colour to the opinion that the one disease passes or develops into the other. Again, by some observers, true macular leprosy may have been mistaken for 'white leprosy,' and thus have led to the belief that the two were related.

'White Leprosy' is evidently a severe form of leucoderma, which is hereditary, and more common in adults than in children. It is very prevalent in leprous districts, and may possibly be affected by the same endemic influences as the more serious malady; but whatever may have been the original source of the leucodermic affection, it is essentially distinct from true leprosy in its present form.

'White leprosy,' says Dr. V. Carter, 'is popularly known in the native community as "kod," and is as universally prevalent as true leprosy, and would seem also to occur in inverse ratio to it; thus in the Southern Concan and Mid-Deccan, kod is probably less common than "rukta-piti;" while in Gujerat it is rather more common, and in Sind very much more so. That this local blanching of the skin should ever have been classed by Europeans with *true* leprosy, appears to be due to a very old impression

among learned men, that the disease described in the Old Testament ("berat") was identical with the latter; although its very different characters might, one would think, have been apparent in the light of the sad experience which England had long endured before Biblical translations were undertaken: kod and rukta-piti (or true leprosy) have no apparent connection with each other, though there is some evidence in favour of their similar origin; and as matter of observation, the two most rarely co-exist in the same individual. By natives they are regarded as wholly diverse. White leprosy is probably in no sense contagious; and repulsive as is the complaint to the sight, it carries no social disqualifications with it, except such as appertain to disfigurement: it is decidedly of an hereditary nature.'

Since not many facts regarding kod appear to be on record, a short summary embodying the information contained in some of the leper-returns is given by Dr. Carter in his Report on Leprosy (1872):—

'White leprosy is everywhere found. Perhaps 1 person in 1,500 in the whole Bombay Presidency is affected by it; and this proportion is tolerably uniform for Gujerat, the Deccan, and Canara, whence it appears that *climate* has no marked influence on the prevalency of kod. Both sexes are nearly equally disposed to the complaint; a preponderance of males being, however, observed in Broach and Canara, while the reverse is the case in Sholapore; but in no

instance* does this preponderance equal the mean liability of males observed in true leprosy. Of 730 individuals the ages in decennial periods were as follows :—

Age	Males	Females	Total
Years			
1-10	11	8	19
11-20	32	37	69
21-30	65	63	128
31-40	79	72	151
41-50	113	75	188
51-60	84	33	117
61-70	25	10	35
71-80	15	5	20
81-90	2	1	3
	426	304	730

Whence it appears that previous to 50 years women are, *in proportion to their number*, slightly more often affected than men; subsequently the converse obtains.' The largest number of sufferers is found between the ages of 41 and 51.

Medical writers in the Madras Presidency describe the disease as commencing insidiously with spots on the extremities, trunk, or face, which enlarge without structural change, and without much functional derangement of the skin, occasionally increasing to such an extent as to assimilate the dark skin of a native to that of a fair European. We often find

this state associated with burning of the eyes, hands, and feet. It is occasionally combined with leprosy, but when uncomplicated, it leads to no impairment of the health, neither does it induce the ulcerations and mutilations which accompany leprosy.

Dr. Bell, writing from the Bombay Presidency, says:—‘I had always been of opinion that there were two forms of the disease, namely, white and black leprosy; but from careful investigation I now find that there is no affinity between them. That which I regarded as white leprosy is a distinct disease, never passing into leprosy proper.’

Dr. Macnamara expresses an opinion that in the white or leucopathic leprosy, the change in the colour of the infected parts appears to be simply due to an absence of pigment in the skin, which, together with the hair upon it, becomes perfectly white, but continues to perform its functions as in health. Yet he holds that the disease is in some way related to true leprosy; and one of his chief reasons for this belief is that the children of lepers are often affected with the leucopathic malady.

White, or Jewish Leprosy, as it is called, prevails extensively in Ceylon, particularly in the North Western Province. A medical writer in that island describes it as characterised by a peculiar marbled appearance of the skin. It generally begins on the hands and lower extremities, and occasionally on

other parts of the body, in the form of small white dots, which gradually enlarge and extend over the whole surface. It not unfrequently shows itself on the lower lip, whence it spreads to the face, and the hair on the affected parts becomes quite white; the spots are sometimes of a grey or dusky hue, and often remain stationary for a long time, but when they once begin to assume an active state of development, they rapidly extend so as to cover the whole body with large irregular white patches, which disfigure the individual very much. Although the disease produces a striking appearance in its advanced stage, yet it causes no inconvenience to the patient, and is unattended with ulceration or other physical suffering.

Treatment.—Hitherto the direct treatment of leprosy in all countries and in all ages has entirely failed. No one has yet discovered a drug which specifically influences the progress of the disease, and the local treatment of leprous formations has been attended with but very partial success. A method which has attracted considerable attention of late years, and is known as Beauperthuy's, consists in the local application of the oil of the Cashew-nut, which acts as a powerful stimulant, combined with a well-regulated diet, and small doses of mercury. Through the kindness of my friend Professor Erasmus Wilson, I have had an opportunity of seeing a case under this plan of treatment; some local improvement seemed to follow

the use of the oil, but, if I recollect right, there was no permanent arrest to the progress of the disease. So far as my own limited experience allows me to express an opinion, I am inclined to think that five to ten grain doses of quinine have some effect in checking the febrile attacks, especially in the early stages of the disease. Small doses of perchloride of mercury have been recommended by Dr. Beauperthuy and others; I have never, however, found any benefit result from the use of this drug; on the other hand, much harm has been done in many cases by its too free administration. This opinion is confirmed by Dr. Gavin Milroy's report (1873) on the cases he examined at Kaow Island that had been treated by Dr. Beauperthuy's method. He says:—'It struck me forcibly, on observing the persistency of the anæmic condition of so many of the sick, and still more of Dr. Beauperthuy's three private patients at Bartica, that this symptom was in part due to the prolonged use of a medicine which is found to be notably injurious in like conditions of the system in European practice, and is discommended by the highest authorities.' I do not doubt that the chief good derived from Dr. Beauperthuy's method has been produced by change of diet.

The troublesome open sores and ulcers, which are so apt to form on the feet and hands of leprous patients, should be kept scrupulously clean. I have found resin ointment a useful local application.

There is one point that is well worth the attention of Anglo-Indians, and other Europeans living in tropical countries: it is this, that leprosy progresses much less rapidly in healthy temperate climates where the disease is not endemic, than within the tropics; the obvious conclusion being, that leprous patients should be removed as soon as possible to a healthy part of Europe.

The compulsory segregation of lepers with the view of exterminating the disease, is really an important matter, and it has been strongly advocated in Norway and India. The three following propositions were seriously discussed in Norway some twenty years ago. The first proposal was to isolate all the lepers by confining them in asylums, as was done in the Middle Ages. The second, to prohibit the marriage of all lepers, and of their immediate descendants. The third, to deprive all the male infants of leprous parents of the power of continuing their species by ligature of the vasa deferentia. The second of these proposals was laid before the Norwegian Parliament in 1854, but was rejected by a small majority.

Dr. V. Carter recommends the following measures for checking the progress of the disease in India:—

‘1st. Strict segregation of all indigent lepers, as a preliminary step, in fit dwellings, or villages within the district to which they belong. 2nd. Deportation of the affected to a central cool and healthy locality

situated in the division to which the infected districts pertain. 3rd. The establishment of hospitals for the accommodation of lepers alone, should any plan of treatment be found to be strictly curative.'

'Legal enactments enforcing residence in either hospital or asylum would undoubtedly be necessary.'

It is in the last sentence, I presume, that the chief difficulty lies. 'Legal enactments' of the kind are never likely to be made or enforced, unless the profession are quite agreed that a satisfactory result may be confidently expected. The segregation of lepers without other measures would, I believe, result in failure. In order to ensure a probability of success, it would be necessary to prevent in some way the marriage of the children of lepers, begotten perhaps before the disease appeared in the parents. I doubt the possibility of carrying out regulations sufficiently stringent to produce the result desired. The foundation, however, of suitable asylums in India, adapted exclusively for lepers, would be of great advantage and convenience to the community generally, even if the effect of such a measure should turn out to be somewhat less than the sanguine supporters of the plan of segregation seem to anticipate.

JULY 1884.

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