

Modern Indian leprosy : being the report of a tour in Kattiawar, 1876 : with addenda on Norwegian, Cretan and Syrian leprosy.

Contributors

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Royal College of Surgeons of England

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FIRST MAP OF
PART OF KATTIAWAR BO PRES^t

ILLUSTRATING OF H. V. CARTER'S TOUR

LEPER-LOCALITIES—thus * *

NON-LEPER-VILLAGES—thus x

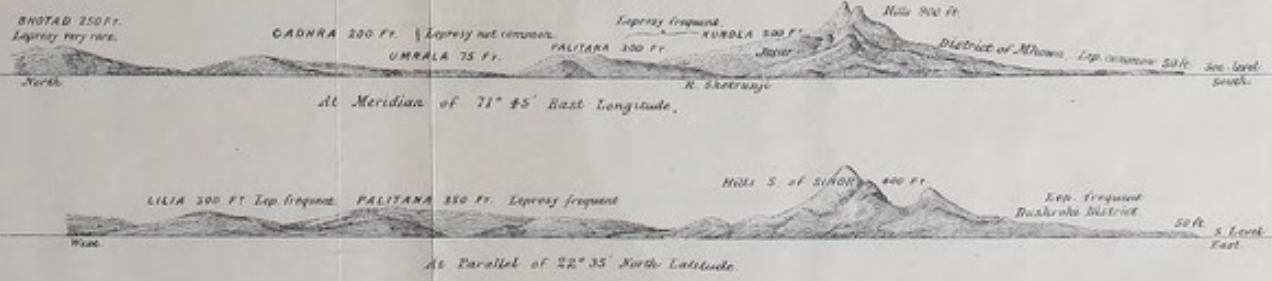
Elevation above sea level in figures.

Native States &c. other than Bhavnagar are shaded.

Author's Main Routes the black line.

H. V. C. del.

ELEVATIONS.



H. V. Carter, del.

10

MODERN INDIAN LEPROSY

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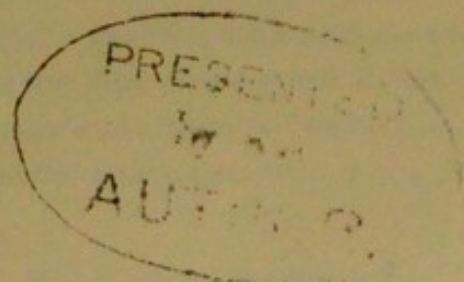
REPORT OF A TOUR IN KATTIAWAR

1876

WITH ADDENDA ON NORWEGIAN, CRETAN AND SYRIAN LEPROSY

By *H V Carter M.D.*

Printed at the expense of the Chiefs of Kattiawar



BOMBAY:

1876.

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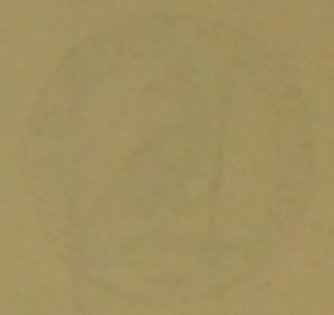
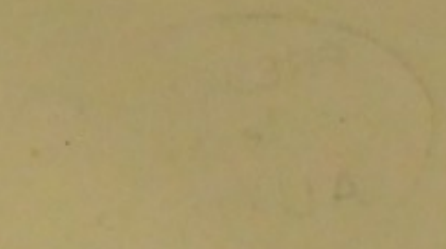
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1876

WITH APPENDIX ON EUROPEAN, CHINESE AND JAPANESE LEPROSY

BOMBAY: PRINTED AT THE TIMES OF INDIA STEAM PRESS.

Printed at the request of the Chief of Stationers



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PREFACE.

To complete the account of Modern Indian Leprosy, there was wanting a description of the 'haunts and homes' of this fell disease. Our existing knowledge of the malady as a whole having been summarised, some statistical information being already gained and valued European experience made accessible,* it remained to initiate local enquiry in India; and, as a first contribution thereto, the essay detailed below was attempted.

Thus, in continuance of similar work carried out in Norway, Crete and Palestine, I sought and obtained, towards the close of last year, the liberal permission of Government to devote a few months to special research in KATTIAWAR—this province of Western India being selected, because it was known that the leprous disease is common there, and because the Native Chiefs of Kattiarwar have already manifested a practical interest in the alleviation of suffering by their support, since 1850, of an Asylum for Lepers at Rajkot. Thanks to the representations of Mr. J. B. Peile, C.S., Political Agent of Kattiarwar, the same gentlemen voted a deputation allowance in aid of my tour: their names are as follows:—

THE NAWAB SAHEB OF JUNAGURH.
THE JAM SAHEB OF NAWANAGAR.
THE THAKORE SAHEB OF BHAONAGAR.
THE RAJ SAHEB OF DHRANGDERA.
THE RANE SAHEB OF PORBANDAR.
THE THAKORE SAHEB OF BHAGVATSINGJI.
" " WADWAN.
" " LIMRI.
" " MORVI.
" " PALITANA.
KHACHAR ALLA CHELLA OF JUSDHAN.
BABI KAMALORDIN AND OTHERS, BATWA.

My warmest acknowledgments are due to

* See the author's communications to the Bombay Medical and Physical Society, 1862 and 1871, and other articles in the Transactions of the Pathological and Medico-Chirurgical Societies of London, &c., which are mostly summarised in the large work on leprosy, &c., published under the sanction of H. I. M.'s Secretary of State for India in Council, 1874. Also Official Reports on the Leper-Asylums in Norway (1874), and a second series on leprosy in N. Italy, Scio, Crete and Palestine, issued under the same authority (1876). Besides, there are many other useful and most excellent contributions to our knowledge in the Report of the R. College of Physicians, London (1867), the late Report on skin-diseases of Drs. Fox and Farquhar, in papers by Dr. Vincent Richards and in Reports issued by the Governments of the several Presidencies of India.

Mr. Peile; to Major J. W. Watson, Staff Corps, Mr. E. H. Percival, C.S., and Mr. Gowrishankar Udeyshankar, the late and present Joint Administrators of the Bhaonagar State; also to Captain J. Hunter, Assistant Political Agent in Gohelwar, and to Mr. A. A. Borradaile, C.S., Collector and Magistrate of Ahmedabad. From Thakore Saheb Takhutsingji of Palitana, I received most hospitable entertainment; and for much needful local aid, I am indebted to Native officials at Bhaonagar, Songadh, Kundla, Mhowa, Datta, Talaja and Trapaj.

To Surgeon-General W. Thom, Indian Medical Department, and to Mr. Hewlett, Acting Sanitary Commissioner, I owe many useful suggestions; and to Dr. Blomfield, Civil Surgeon at Rajkot, much obliging information. Nor should I omit to mention the ready co-operation of the Native Surgeons in charge of hospital and dispensaries at Bhaonagar, Songadh, Kundla, Mhowa and Talaja.

It was found convenient to limit the sphere of enquiry to Bhaonagar, and immediately adjoining States; the rest of the province of Kattiarwar, therefore, remains open for future research.

During a period of nearly three months, I travelled over upwards of 600 miles, inspected 127 villages and took notes of 262 cases of leprosy.

The method of enquiry employed, was as follows:—infected and some non-infected hamlets, villages and towns were visited and examined; the chief and older men were consulted, as to the present and past history of leprosy in each locality; and all known lepers were collected, seen and questioned by aid of an interpreter, according to the following scheme, which is that I finally adopted for all these points.

1. Locality.—Position and site; number of houses and general condition; castes, food, water-supply; prevalence of guinea-worm, mycetoma, cholera, fevers, ophthalmia and common diseases; the existence or non-existence of leprosy.

2. Previous history of this disease, so far as now

known—number of former lepers, sex, name, caste, age, birth-place, place where the disease appeared, place where death occurred, date of death, duration of malady, its form (anæsthetic or tubercular); ancestors of former lepers, and their descendants.

3. Examination of the leper.—Sex, name, age, caste, occupation, birth-place, has travelled and where, how long resident, duration of disease, how it began and its after course. Present symptoms—head, trunk, limbs, palate, inguinal glands, &c.; state of cutaneous sensibility. History—parents, brother, sister, relatives in direct and collateral line, any family taint: married or not, wife, husband; number, sex, age and date of birth (*i.e.*, before or after commencement of parents' disease) of the children. Contact with other lepers, supposed cause of malady; diet, occupation and residence at its outbreak; its progress since and now. Whether or not separated from the rest of the family: are there running sores? General condition: syphilitic taint: remarks.

In the limited time at my disposal, I found it impossible to attempt other details; nor from the fact that much of my information is necessarily hearsay or tradition, could I hope to attain clear proof of certain prime agencies, whose action is to be determined only by prolonged and precise

research. Thus, the influence of diet and personal hygiene in originating disease, together with the effects of strictly endemic conditions (as soil and minute living agencies), the proof of contagion and of the actual conveyance of disease by human intercourse, are points obviously not to be settled in a passing visit: yet what has been effected is not without interest, or even significance; and, as another gain, the field of future enquiry has become better defined by the dissipation of some erroneous notions.

I should add that an abstract of my tour in Kattiawar having been before submitted, with other papers, to the Right Honorable the Secretary of State for India in Council and ordered to be printed, some of the following observations may be found to be repetitions; but the present Report has been drawn up altogether afresh, and it embodies much fuller data and conclusions. No apology, too, can be needed for the addition to this Report of some like original facts and memoranda, respecting the cognate malady in Norway, Crete, &c., and Palestine; for a comparative scrutiny of the phenomena of the great leprous malady, offers a channel of information in this quarter, where so much yet remains obscure.

The suggestions I have had to make, are offered with equal deference and confidence.

H. V. C.

INTRODUCTION.

GENERAL DESCRIPTION of the country visited.

Position.—The south-east corner of the peninsula of Kattiawar.

Boundaries.—Between 21° and $22^{\circ} 15'$ N. latitude and from $71^{\circ} 15'$ to $72^{\circ} 15'$ E. longitude, having the sea on the East and South, and in other directions being conterminous with the rest of the province.

Area.—About 5,000 square miles.

Elevation.—Mostly from 50 feet to 300 feet above sea-level; coastward, the land slopes and is comparatively low over a breadth of 10 to 20 miles, when there rises a hilly range which attains a height of 600 to 900 feet, and which running parallel with the sea-board, partly isolates the long maritime tract; from this range offsets proceed inland, and near Palitana its peaked hills reach 1,900 feet. The interior of the country presents a wide, undulating plain, at an elevation varying from 50 feet (towards the East) to 300 feet (towards the West and North), and numerous streams are here found, which converge to three or four rivers emptying themselves in the sea; the coast-plain is also traversed by shorter water-courses. Some of the streams inland are strictly local, and at low levels marshes, both fresh and saline, are found. The ground-water is at 5 to 50 feet from the surface.

Soil.—Is in general fertile, being often derived from underlying rock belonging to the trappean series of W. India. Granite appears in some higher hills, and recent limestone and sandstone are found along the coast. Red clay (moorum) is widest spread; black soil (regar or cotton soil) occurs over large areas; gravel and sand in the lower parts. The fossiliferous strata on the south coast, are of the same character as those of the well-known island of Perim. Entertaining, as I do, the conviction that leprosy holds no especial relation to quality of soil or to wider geological condition, the notes I made were not intended to convey information upon these points. Nor, so far as I am aware, are there yet published any full descriptions of the geology of this part of Kattiawar; yet having regard to the peculiar local distribution of the leprosy disease, it would be interesting to learn all the surface or telluric conditions of infested areas.

Climate.—This is tropical, the seasons being strictly periodic; rainfall occurs in summer, it is not copious (15 to 25 inches) and is chiefly due to the S. W. monsoon. The temperature of the air rises to 110° from March to May, and it sinks to 45° in January; the precise amount of moisture in the air has not been ascertained, but no peculiarities are known. On the whole the climate compares not unfavourably with that of W. India generally.

Products.—All the usual grain and pulse crops are here produced; also cotton, to a large and increasing extent. There are no forests, and large trees are found only near villages, whence the country offers a rather bare aspect: there is much stony and barren land, and much that is suited only for grazing the numerous herds and flocks of sheep and goats, buffaloes and kine, which are a source of sustenance to a large class of people. There are no mines or manufactories, on a large scale; and fisheries are wanting, although the sea and rivers swarm with life. Cotton and grain are therefore the chief products of the country, and ghi or native butter is also exported, as well as some sheep and cattle. The roads are numerous and fair; traffic is decidedly on the increase: Bhaonagar, Mhowa, Surtanpur and Gogha are the chief ports. Famine is happily rare.

Inhabitants.—The total population is about 600,000: mean density 150 to the square mile, or in a few central and northern districts as many as 400 to 500. Towns and villages exist in the proportion of 0.22 to 0.86 per square mile; houses from 50 to 140 per square mile, and the average of persons to each house varies from 2.92 to 3.74. The average population of town or village exceeds, perhaps, 600 persons. The normal proportion of the sexes resembles that of India generally, inasmuch as males are about 53 per cent. and females 47 per cent. of the populations, whether Hindu or Mussulman.

Race and Caste.—The people belong to the Gujerathi section of W. India, which is not strictly a homogeneous race. Hindus and Buddhists form upwards of 91 per cent. of the entire population, and their castes in the main resemble those in the adjoining great peninsula (for their customs, &c., see my previous Report to Government, published in the Trans. of the Medical and Physical Society of Bombay, vol. XI., 1871). Mussulmans form about 8 per cent.; most are of indigenous origin. There are here immigrants from the surrounding provinces, who still retain special designations (as Rajputs, Kolis, Bhils, &c.), and, besides, families from Sind, Arabia and Africa, who are mostly in service. The tribes more peculiar to Kattiawar (Kattis, Ahirs, Waghirs, &c.) may yet be distinguished, although now a settled and industrious element of the community. Late changes in the administration of the country, have resulted in the acquisition of quiet and peaceable habits; yet feudal and independent tenures of land are a characteristic still remaining. I have found that all grades of the people are liable to the special malady under notice, not excepting the head-men—'Garassias'—themselves; and, from observation here, I assume that leprosy has no particular connection with such wide features as either the race or social habits of a mixed people.

Occupation.—Agriculture in all its forms is the predominant calling; next comes tending of cattle and flocks. There are merchants, traders, artisans and the low-caste village servants: the police and private employés. Religious devotees abound, and wandering mendicants. As a class, fishermen do not exist, even on the sea-coast; nor do coast residents differ in their occupation from inland dwellers.

Education, habits, &c.—Hitherto the people have remained ignorant enough—for only 23·4 per cent. at most, of male Hindus can read or write, and hardly $\frac{1}{2}$ per cent. of the females: but under the present more enlightened native rule, schools are becoming more abundant. Owing to the prevalence of peculiar religious tenets, and to the existence in Kattiawar of numerous shrines sacred to the Hindus, much tenacity of creed and practice will be found. Perhaps the most important feature in either, is the value set on all forms of animal life; and this is carried to such an extreme that destructive game, vermin and parasites are never willingly destroyed. Animals are not openly caught or killed for food, and it is noteworthy that the humbler Koli follows the Kunbi and Wani in all such prejudices. I have seen numerous lepers who never tasted animal food of any kind. For the rest, the people are now sober and industrious; tobacco is largely consumed, and opium-drinking is an indulgence especially with the inactive head-man—Garassia or Rajput. Marriage restrictions are in full force, but female infanticide no longer prevails. The people are intelligent and not inhumane, though slow to adopt measures for the better comfort of the domestic animals whose mere life they are taught to respect. Their leprosy sick are treated not so much in a harsh, as in a neglected manner: practical sympathy for suffering caused by disease has hardly yet been aroused amongst them, but I am under a strong impression that were the ruling powers to insist upon separation from the family of every disabled leper, no opposition would be manifested and rather a general concurrence displayed in so reasonable a measure.

Food, clothing, lodging and hygiene.—On all these points the notes of my diary printed below, will furnish sufficient information, and I need not here anticipate their tenor (see especially the first few pages under dates 1st and 9th January), further than to observe that a great uniformity in the mode of life everywhere obtains, both coastward and inland. It has been matter of surprise to me leprosy is not more frequent than appears, and either some preventing influence must be at work checking the dissemination of this evil; or, more likely, it is only under a certain concurrence of conditions that this

obstinate malady can be propagated. Whether or not such conditions attach to defective sanitation, is not clear; and the most obvious inference which one is entitled to draw from the facts hitherto elicited, is the supreme importance of isolating affected individuals, in order to obviate the risk of others being attacked, and as well to afford to the poor sufferer himself such alleviations as are now denied to him.

I have, finally, to add that the wide area under notice embraces not only the ten districts or pergunnahs of Bhaonagar, but also numerous smaller sections, respecting some of which I am unable to offer very full information as to the number and distribution of their leper population. Yet, enough has been elicited to afford an accurate conception of the whole land, and of the districts of Bhaonagar, which are fairly typical as regards position and population, our knowledge seems tolerably complete.

The present Report consists of two Parts. Under Part I. comes the 'diary,' which is a literal transcript from notes made day by day in the course of the tour. My route proceeds from Bhaonagar westward to Kundla, which is situated near the confines of the territory in this direction; afterwards, by a return course it is directed southwards to the coast, and pursuing this line Gogha is again reached, thus completing a circle. For the most part, the route is in Bhaonagar territory, but it traverses other parts; and at Songadh, Palitana, Datta, Kukad and Gogha, my camp was situated on other land. By aid of the larger MAP the whole main line may be traced, and the villages inspected on special excursions, will also be readily seen. In my notes the different forms of leprosy (L.) which were found, are, for brevity's sake, indicated by capital letters having the following signification:—A. L. is anæsthetic leprosy, and N. L. is nerve-lepra, or almost exactly the same thing, for I acquired the habit of writing A. L. only when some kind of eruption on the skin was present, in addition to the mutilation of the hands and feet which is so characteristic of nerve-disease. L. L. is sometimes found; 'Lepra leprosa' or the typical skin eruption of the disease, which may predominate over other signs. T. L. is tubercular leprosy, or the severer form of the complaint. M. L. may be entered as mixed anæsthetic and tubercular disease.

Each of the recognised divisions of the land is headed by a short preface, added in the order that each was reached; and in a supplement to Part I. are placed notices of the districts which were not visited on this occasion, but regarding which I have been furnished with useful leper-lists.

Part II. contains an Analysis of the above data, and my Comments thereon.

MODERN INDIAN LEPROSY.

A TOUR IN KATTIAWAR.

PART I.

Diary and Districts.

1.—*Pergunna or District of Duskrohi* (State of Bhaonagar).

As my tour commences in this district, the following brief description of the latter is here subjoined:—Duskrohi embraces the more eastern seaboard, extending a few miles inland and containing the metropolis of the State. It joins Sihor district westward, has the Bhal (a non-leprous expanse) on the north, and southward it blends with Talaja mahal. It is intersected by the Gogha taluka (British territory). It contains 220 square miles, 51 towns, villages, &c., and (excluding Bhaonagar city) has 130 persons per square mile. This coast-lying district partakes of the characters of sea and inland areas in its proportion of both large and small villages, and here leprosy is frequent: 1 in 450 of total population is a leper, and one-half the villages are affected, *i.e.*, about $\frac{1}{2}$ the smaller, more than $\frac{1}{2}$ the middle-sized, $\frac{1}{2}$ of the large villages and each of the three towns; these proportions are near the averages for the whole country.

The following is the leper list in detail: places visited are in italics:—

COAST.—*Rewapura* (1 leper), *Koliak* (5), *Hathab* (2), *Bharbhar* (1), *Lakhanka* (1), *Kharsalia* (1), *Paniali* (4), *Jaspura* (1), *Sonsya* (2), *Khadapar* (1), *Mitiviri* (2). INLAND.—*Nari* (2), *Wartej* (7), *Shampura* (1), *Sidhsar* (3), *Budhel* (6), *Tersimia* (1), *Ratanpur Nowa* (1), *Bhum-bhli* (2), *Rampur* (1), *Thordi* (1), *Kobri* (1), *Bandaria* (4), *Sartanpur* (2), *Sakhrasar* (1), *Trapaj* (10).

Note that these villages are all connected with each other, or with a common centre; *Wartej*, *Sidhsar*, *Shampura* and *Budhel* all adjoin upon the great trunk road to *Gogha*, and around *Koliak* is a nest of leper villages (*vide* the maps). I have thought that leprosy might have been indigenous or introduced in this district, and hence have spread, for it is common, widely-distributed and of long mean duration, as judging by living instances.

Parts of *Duskrohi* were visited at the beginning and the end of my tour, and the notes corresponding will be found in their places due.

DIARY.—*Bhaonagar*, 1st January 1876.—This morning to *Hadewara*, a village of about 150 houses, 6 miles to the south, and in the open plain: it is located on the banks of the *Malisiri* stream, which rises and is lost in the neighbouring salt-marshes. While guinea-worm (*Filaria Medinensis*) is frequent, leprosy is said not to exist in this village.

Thence to *Budhel*, 2 miles beyond and situated on the main road from *Gogha* to *Rajkot*, &c.; it is at a distance from the river above-named. Here 6 adult lepers were known, and

were all seen. *Budhel* has about 200 houses and 741 inhabitants: it does not differ in main features from *Hadewara*: there are irrigated fields immediately around it: water-supply from two wells placed on the roadside at the entrance of the village. The only visible difference between *Budhel* and *Hadewara* consists in rather the more inland position and the well-water supply of the former; the people are the same, their houses alike, food and occupation, &c., identical, yet in the one case leprosy is absent and in the other frequent. The following notes it will be useful to transcribe as an epitome of subsequent experience in this part of *Kattiarwar*.

Sanitary condition of the villages in question.—This is alike indifferent: ashes and straw-refuse, dust and dilapidations everywhere abound: the alleys are strewn with ordure; there are absolutely no drains of any kind. Dogs, horses, asses, sheep, goats and cattle live under the same roof with human beings. Drinking-water in the one case is derived from the adjoining river which is 20 to 30 feet below the village; in the other, it is taken from wells close to the houses and a main road: contamination by leaking of sewage might certainly occur in the latter case (*Budhel*), and possibly in the former (*Hadewara*): the well-water I found to be within three or four feet of the surface in this season of the year, and it never sinks lower than a few feet more, owing to the low level and swampy nature of the adjacent flats. Foul smells were noticed only in the village lanes, which it is the custom daily to use as public depositories: within the courtyards only a stable odour was present, and in the houses a musty rather than foul smell, owing to over-crowding and the storage within of cotton and grain. It seemed to me that the high temperature of the air and strictly periodic rainfall here, would be powerful agents in preventing such moist and persistent decomposition of organic matter as we are accustomed to in Europe, and from whence chiefly proceed the nuisance of bad smells. In *Kattiarwar* (and indeed through India generally) exposed liquid matter is speedily desiccated, with the result that decomposition is checked: everywhere, the rainfall is periodic and limited in duration to three or four months, and during this time the sun's heat, at intervals, is very great. The outward conditions belonging to sanitation are therefore very different in tropical and temperate climes, and it would seem that the former are naturally the most favoured, since in India the utter absence of public hygiene has not led to the same disastrous results so often experienced in Europe, in the ravages of typhus, enteric fever and fatal diarrhoeas. The middins of Europe are represented by heaps of excreta, vegetable and house refuse, which encroach on the public way and furnish perfect clouds of dust whenever disturbed: this matter is strewed on the fields as manure before the rains set in. As animal food is not used here, there is necessarily an absence of much material liable to hurtful and offensive decomposition; but the amount of parched vegetable organic matter, which the air in villages most commonly contains, is doubtless very considerable. Intermittent fevers and dysentery are the great bane of life, and fatal cholera is occasionally epidemic.

The people are not cleanly in person: they seldom bathe, and they wear for long periods the same cotton vestments, without change. They are provided with sufficient clothing, and commonly wear shoes. Their castes are numerous, as

elsewhere; and different sub-races of men are to be met with in the population.

Buildings—Of sun-dried earth, rarely burnt brick or stone: roofs low and tiled: floors level with ground; mud-wash in place of lime. Rooms small and dark; no upper storey, chimney or window, as a rule: no attempt whatever at drainage. Each house is isolated, singly or with others, it is often surrounded by a wall: the village streets or alleys are narrow and irregular, seldom swept; an entire absence of common sewers.

Diet.—The food-grains are jawari (sorghum vulgare), bajri (penicillaria spicata); little wheat or rice: the common pulse, —urid (phaseolus mungo) or mung (phaseolus radiatus), rarely gram (cicer arietinum); onions and other fresh vegetables are eaten; sweet oil, ghee; chillies, &c.; the milk of cattle, sheep or goats, less the whole fresh milk than the curds and whey left after boiling and the extraction of the butter; these, more or less diluted with ordinary potable water, serve as the common drink taken with the unleavened bread—the mixture is known as 'chass,' and sometimes is sour or stale when sold or drunk. A fair quantity of nutriment is consumed, and the people have well-developed frames. Animal food is very rarely used; only Mussulmans, a few Rajputs and Kolis of lower grade, will touch either meat or fish; they are the great minority of the people, and but seldom indulge. There is a strong prejudice against destroying life in any form whatever: even vermin and noxious animals are left alone: fish abounds in the rivers at certain seasons and always in the sea, usually not far off; but in any form it is used too rarely to be regarded as an article of regular diet. Eggs are not to be had, as except a crowing-cock which serves as a sort of public watchman, the keeping of fowls for food is an unknown practice here.

Lastly, the drinking-water is taken directly from stream or pool, or from holes dug in the bed of a river or tank, where water accumulates by percolation: or it is derived from the wells, of which two kinds are here found, namely, the 'wao' with, and the 'kuwa' without steps. The water is seldom free from impurities visible to the eye: it is never filtered or boiled before use: it is sometimes hardly sweet, but slightly brackish; it is freely used. The wells of either kind are never protected from the ingress of dust, leaves or rubbish: they are not always free from suspicion of sewage contamination and commonly are near human dwellings. Very often pigeons occupy holes in the sides of wells, and the water becomes obviously tainted by them. During the hot and dry seasons, drinking-water not seldom becomes scanty and more impure.

The above remarks apply to a large part of the district which I traversed, and peculiarities subsequently noticed will be mentioned in their places below. I now revert to the instances of leprosy seen at Budhel, quoting my notes made on the spot.

1.—M. (male), æt. (aged) 25, Kunbi (caste); born here; duration of disease 3 years. A hale young man. F. (father) a leper and died 10 years ago: M. (mother) alive and well: has one brother (æt. 15) and a sister (æt. 12) younger than he and both yet well; saw them. F. was not diseased when this boy was born, nor until about 10 years after: he died after an illness of 5 years, at the age of 50: grandfather not affected. F. was born here: no taint is known on mother's side; she was born in a distant village. It is probable that the father was diseased when both the younger children were born. The man has early T. L. (tubercular leprosy), there being tumefaction of skin of face; enlarged nipples; swollen glands in groin, &c., coming on about a year ago. Eats the same food as others: lives in the same room as his parents and the rest. The villagers would not like to eat with him, but they are not careful about contact: no near neighbour has this disease.

2.—F. (female), æt. 30, married and has one son: husband alive and well; a Kunbi (saw him). Ten years affected with T. L. well marked in face; an eruption on the trunk. The son was born after his mother became sick and is yet well: her disease came on in this house. Her mother was a leper; father well; no brother or sister: no taint on the husband's side. She lives in the common house, having a small space to herself: she mixes with other villagers and daily goes to work in the fields, doing all she can from morn to eve: she is not allowed to cook the food, but gets it from her husband. The disease has as yet spared her hands and feet, and her general health. Their home is not near that of No. 1.

3.—M., Kunbi, æt. 45, a leper of about 12 years; has marked M. L. (mixed leprosy, or the combined tubercular and anæsthetic forms), the face being swollen, nose sunken, ears elongated, &c., and the fingers and toes destroyed by absorption. Married: 4 children, the eldest son 22 years old, the youngest child—a girl—about 11 years: a boy of 12 and an older sister who is now married; all yet well, and also their mother. Neither parent of this man was affected, but it is said that his paternal grandfather's brother (F. F. B.) was a leper, and he lived with this family formerly, having, however, died about 20 years ago. Lives in the common enclosure, but in a separate place or open shed; and he never goes inside the family-house. His wife is in good health and all her relatives were sound. Was born at Bhimtala (some way off), but at 4 years of age came to Budhel.

This man, prematurely aged, was found couching against a distant wall of the enclosure, surrounded by dirt and dilapidation, and without company, sympathy or medical aid: his sad appearance reminded me of the poor lepers of Crete and Syria.

4.—F., Kunbi caste, æt. 40; married and has a daughter, who is also married and now lives at a distance. M. L.; the feet being most affected: disease of 2 years' standing. Was born near here and has resided in this village for 25 years. Denies all family taint. Husband well, and his family said to be also free from leprosy taint: not being greatly disfigured she still lives with him: he is an old man (not seen, being at work in the fields) and is said not to be afraid of his wife's disease. Her complaint is referred to eating oily food after a miscarriage: their house is near to that of No. 3.

5.—M., Garassia (Rajput), æt. 30; born and resident here, his house being in another part of the village to those of the above-named lepers. About 8 years' disease. Was betrothed, but did not marry. Has distinct M. L., though not yet in advanced degree: nose much sunken; denies all syphilitic taint. Parents were well, but a paternal uncle (F. B.) was a leper: this man lived next door, but he died about 20 years ago. There is no one now residing with the present subject; he mixes with the other villagers, but does not eat with them, as they consider that infection may take place from eating with a leper, and if the disease be much advanced, the people will be still more cautious: even then, however, the man's friends will not desert him. Incipient disease is little dreaded, and the common poverty prevents all idea of effective seclusion of the leper; all must work to live as long as they can, and separate lodging is commonly unattainable.

6.—F., Mussulmani, æt. 45; 3 years ill: was born a short distance off: resident here for 25 years. Widow: husband died about 11 years ago. She is a decided leper: T. L., face disfigured, fingers clubbed and one of the toes gone: there is said to be (on trial) no want of sensation in the hands. Married life of 25 years, and has had 6 children, viz., 4 daughters and 2 sons, now from 13 to 24 years old and all well. Lives with her children, who prepare her food, at a house not near those of the above lepers: she occupies a verandah separate from the common room, moves freely about and is not much feared. States that her father had the disease: he died about the time she was born: mother was well. I cannot trace the history of the affection further back. Her husband was well, but his brother (H. B.) was a leper: he was a neighbour of theirs (the men being Mussulman sepoys in the police) and is now dead. Cannot account for her disease except through contact with this man.

Remarks.—The early history of leprosy in this village was not fully investigated, but the following is a list of previous cases known to old residents and others:—

1.—F., Kunbi, died about 1856: daughter a leper (No. 2):
2.—M., Kunbi, died about 1856, great-nephew affected (No. 3):

4—M., Kunbi, died about 1856, nephew affected (No. 4); 5—M., Kunbi, æt. 50, had T. L.?, dating from 1860, died in 1866; son a leper (No. 1); 5—M., Mussulman, died, his brother's wife is a leper; he lived near his brother.

Hence some form of heredity is commonly mentioned, but the facts are open to possible interpretation with the aid of contagion. It is true that here, as elsewhere, the long date which must be assigned to the incubation of leprosy on the adoption of the contagion-hypothesis, seems to be hardly credible; but this difficulty having reference to dates, is not a fundamental one, because the peasantry are ignorant and careless, and hence the early or transient signs which most commonly precede unmistakable leprosy disease, may well have been overlooked, misinterpreted or forgotten. It is a safe rule to reckon the duration of leprosy as being longer than is usually stated by patients: and, judging from experience, it may be longer even by a year or more.

With reference to the import of popular 'general impressions,' let me add that in this village of Budhel, the very existence of leprosy was unknown to an educated missionary, well acquainted with the place from numerous visits made previously to my own, when we happened to meet at the village 'chowri' or town office. And Government officials of long experience may be, as I know, equally unaware of the extent to which the leprosy plague infests a district under their immediate charge.

2nd January.—Visited Wartej, about 8 miles to the S. W. of Bhaonagar: located on the banks of a stream now nearly dry. It is also situated in the same main road as Budhel, from which it is distant only a few miles; there being interposed, I may add, two other villages which are known to be the residence of lepers, and the whole forming a distinct group of leper-villages, connected together by the main thoroughfare of the district. About 500 houses, 100 being those of Mussulmans: 2,249 inhabitants; no apparent peculiarities: river-water chiefly used for drinking. Leprosy is said to be very rare; but this statement is hardly true, for a brief enquiry elicited the following cases, and subsequently to my visit two other instances were found, making a total of 7 lepers.

Cases seen.—1. The 'mukki,' or head-man, æt. 60, Mussulman, has had for 6 or 8 months a copious and persistent eruption all over the body, which entirely resembles that of L. L. (true leprosy eruption on the skin), the spots being raised, round, pink-tinted, level, of varying size and tending to blend: not now benumbed. Face affected. Is not acquainted with the nature of his malady, nor hesitates to show the spots. Was born here; diet consists of wheat, rice, vegetables; rarely animal food now, and never eaten during the past year or more. Has had 20 children by two wives: 11 children alive and well; all grown up. Parents were sound. His disease began with symptoms like *Urticaria* (nettle-rash), or itching spots in front of abdomen, red in colour, beginning as pimples, and enlarging and blending; but unlike *urticaria* these spots remained, and he took mercury for relief, but without benefit or rather with the reverse. Never had any syphilitic affection. On further examination, I found benumbed places in the skin just below the right elbow and in front; also behind the left shoulder; here is some paleness and thinness of the skin, as if from subsided red patch or vesicle, but not limited to a regular space (? subjacent cutaneous nerves affected); the numbness is clear and even considerable, it seems to quite confirm the evidence of leprosy; it began, or was detected, about the same time as the eruption was seen. The latter continues to come out and appears to extend by small accretions, but in some places the spots have a pale and flattened aspect, and the man himself fancies the eruption is subsiding on the whole—a result he attributes to some treatment by a Brahman he has adopted, but which may be due to such natural subsidence as is known to take place in this disease, without the intervention of drugs. There are noticed no febrile exacerbations: general health and strength good: a tall and muscular man, possessed of remarkably handsome children.

Remarks.—Here the origin of the disease is obscure: I visited the man's house and family, without detecting any noticeable peculiarity. That the case is one of true leprosy,

my clinical experience elsewhere would indicate as an unquestionable fact, notwithstanding the popular ignoring of such symptoms.

2.—M., Wani, æt. 30, born here: a leper 4 to 5 years: stout and in good bodily condition. A. L. (anaesthetic leprosy). First had syphilis and was salivated: then an eruption appeared, and afterwards the fingers became affected. They are swollen, distorted and stiff: nails horny, tips sometimes shortened and palmar surface marked with signs of 'blebs' of unusual depth and definiteness. There are now clear traces of an eruption in the form of round, pale patches, varying in size and situated on the back, which seem to be characteristic. Bursæ at malleoli enlarged, but toes hardly changed. The peculiar hard, dark, scooped-out 'plaques' on the fingers began with blebs or vesicles, occurring spontaneously and oftenest during the night, are not due to injury or burn. Numbness has lately come on in the hands and it is somewhere considerable: there is numbness on dorsum of feet. There are dark stains on the cheeks, brow, &c.

Denies any family taint; his wife and two children are alive and well; the latter were born before this outbreak. His house is dirty as the rest. The history of syphilitic infection seems to me to be of doubtful veracity, as there are no scars or bubo: he probably had herpes or tinea, and still has about the groins. He keeps a shop for drugs, oil, &c.; still lives with his wife who is blind (from corneal disease) and mixes with the people. On trial, the ulnar nerves at the elbows are felt to be decidedly enlarged and tender. Here is undoubtedly leprosy, however arising.

3.—A man, æt. 25, is shown, who is an idiot; one of a family of healthy people: his fingers and toes have displayed signs of leprosy (nerve-form) in the course of the last 2 years. The symptoms are still little prominent; family taint is not admitted.

4.—M., Mochi, æt. 60, living in the town (as shoemakers do here, whilst tanners are out-caste), is brought forward. He has a general eruption on the body; the affected surface is red, rough, raised, wrinkled; the skin thickened and, in the loins, nodulated: the appearances are like those of No. 1, more advanced. Duration 2 years: it began with symptoms of nettle-rash. There is thickness of the ears, and some numbness of the hands. Denies family taint: has 5 children; they and his wife are well.

5.—M., Dher, æt. 42, born here (he lives in the low-caste quarter outside the main village); duration of disease about 9 years. It is well-marked and advanced T. L. Health and general condition indifferent: is not subject to fever: there are enlarged glands in the groin: denies syphilis. No leprosy taint in his family: married: wife well; 3 children, the youngest born after the outbreak of his leprosy—all yet well: occupies the small verandah of his compartment in the long 'chawl,' or row of houses occupied by these Dhers: eats apart: does not now cohabit with his wife. No other leper now in this suburb, but there was previously an affected man here who died before the disease appeared in this subject. Dhers are reported to eat all kinds of flesh, even of dead animals: their houses here are smaller and dirtier than those of the peasantry in general.

Remarks.—This case is characteristic of the worst form of leprosy. On asking the patel if the caste wish to have this man removed to an asylum, they expressed an indifference about the matter; they will not eat with him, but have no objection to his remaining about the village; they will not voluntarily interfere with his movements, and he seemed to know his perfect liberty, standing, as I last saw him, in the middle of a crowd of children—a most repulsive sight.

The detailed official list which I received after my visit to Wartej, contains the following names, &c., in addition to the above:—1—F., æt. 35, Kolin, married, 4 years affected: 2—F., æt. 20, Mussulmani, unmarried, 6 years a leper: 3—M., æt. 35, Dher, 4 years affected. Hence it is evident that some instances were withheld from my notice, or, perhaps, they were absent at the time. I cannot tell the form of disease which they had, but in none was the malady of long duration, and hence the probability that leprosy is still thriving in

the town of Wartej. Here relationships are wanting, but the possibility of communication of disease seems apparent enough; it co-existed with heredity at Budhel. An endemic influence is compatible with such communication.

On leaving Wartej and returning to Bhaonagar, inspected the village of *Chitra*, about mid-distant from the capital. Here are 25 houses, or 30 with those of the Dhers; the intelligent old patel assured the interpreter (Mr. Lullubhoy) and myself that there is no leprosy in this village. Yet outward conditions, except that of size, seem identical with those obtaining at Wartej: therefore, the smaller dimensions of *Chitra* means either a number of people too small to offer a subject susceptible to leprosy, or that hitherto the hamlet has not attracted to itself an importation happening to be diseased. In other words, the people rather than the place will have to be considered in studying the exemption from leprosy of small places like this one.

Guinea-worm is very common indeed at *Chitra*: it is attributed to the water used, but I did not learn that any particular well was to be blamed. This troublesome affection occurs at Wartej, where river-water chiefly is employed, and I did not find that its advent is entirely due to any special form of reservoirs or single source of drinking-water. As my observations, however, were but cursory, they need not be reproduced in this place. A remark heard at Budhel is yet worth quoting:—by no means all who draw or drink water supposed to give guinea-worm are affected, and amidst a crowd of others, a man boasted that neither he nor his wife ever got the complaint, whilst their neighbours all did: query, is there such a thing as a predisposition to this parasitic affection? The people here say it is by drinking the water that the worm is introduced into the veins, &c.; and when asked how the embryo could get into the veins, they reply how does the blood itself get in?—meaning, of course, the materials of the food suitable for replenishing the blood. The retort has sense in it: for *Filaria* may and do exist in the blood itself, and doubtless may enter in through the lymphatics or chyliferous vessels. Men who seldom resort to the wells for drawing water, are yet quite as often affected with guinea-worm as the women—water-drawers universally. Some other occasions for alluding to this subject will be presented, and now I would only remark that the source of infection and its mode of entry into the system are two separate questions.

3rd January.—Went to *Akmara*, 6 miles on the Gogha road: a village of about 100 houses and 546 inhabitants. There is said to be no leprosy here now, but about 30 years ago a *Garassia*, native of the place, died of this disease: his three sons are still alive and two of them I saw here, aged 30 and 25, neither married (for want of money); the other, older brother lives elsewhere and has two children: all these descendants of the leper are well, but it is obvious that time may bring evidence of a latent taint in any of them. No other instance of *L.* is remembered in the place for three generations, and the crowd of people I saw were healthy-looking; but these negative data possess no great weight. The people are chiefly Kolis and Bhurwads: the village is irregularly built, dilapidated and dirty: many children have bad eyes. River-water is used as food; that from wells, being brackish, for irrigation only. Guinea-worm occurs during the rains: cholera was absent last year, when it so much prevailed in the neighbouring capital. Here is another example of unfavorable sanitary conditions, and yet an absence of leprosy: see also below.

Proceeded thence to *Malanka*, about a mile higher up the stream, a village, like the rest about here, located on a

slight elevation, unwallled, having 300 inhabitants chiefly Kolis; also a dirty and poverty-stricken place, situated on the bank of a wide-bedded stream furnishing the sole water-supply. There is no leprosy here: no sign of it amongst the crowd. Other diseases rare, and possibly these Kolis are close fellows who hide such complaints as really exist.

Thence to *Tarsimia*, about 2 miles further on and away from the river-bed: contains a mixed population of 500. On enquiry, there is said to be no leprosy here, but amidst the crowd a man was noticed who proved to have the disease in its early stage.

Case.—M., Mochi, æt. 40, born and resident here: duration of disease 2 years: it began with small patches in the skin: there are now large, pale, numbed spots on the back (left side), left upper limb and leg: also less marked, on the right arm and forearm. Ulcers have broken out at the left great toe and in the sole in front (right side). The man asserts that only the left side of his body is affected, but this unilateral disposition is not strictly maintained.

The white patches now present are popularly termed 'Kodia' or 'Dádur'; the former term being elsewhere correctly applied to the so-called white leprosy (*Leucoderma*), which is not believed to be truly leprosy in character; and the latter term being the usual one for a frequent innocuous skin-disease; there is, however, such a possibility of mistaking old pale leprosy spots for the leucodermic affection as will account for this occasional popular misapprehension. On testing, the spots proved to be benumbed: this fact shows them to be truly leprosy. The ulnar nerves are enlarged and tender, especially that on the left side, and the left hand and forearm are weak and slightly wasted in the usual manner: there is no deformity of the fingers as yet. The left great toe has lost its tip by ulceration. No fever or outbreak of vesicles. Hereditary taint is denied: his caste-men are all free here: he lives in the same room as his wife and eats with her and the rest of his people. Cannot say how he acquired the disease and knows of no source of infection. Has a son of 7, who is well.

This instance is sufficiently characteristic: its unilateral character is noteworthy; the man's eyes are not perfectly symmetrical in aspect, but I did not notice clear marks of brain-disease.

The case shows that one form of the leprosy disease may be overlooked or misunderstood by the people. The village is not in the official leper-list. It has a small tank near to it, which furnishes water for a time; afterwards the river is resorted to. No wells. Guinea-worm occurs. The place is rather cleaner and better built than usual.

Proceeded to *Rewa*, a small village within a mile of the low sea-coast and close to salt-marshes: 4 miles from Bhaonagar. Contains about 35 houses: 168 people, mostly Kolis. The existence of leprosy is denied, and no signs of it are apparent in the numerous population. The principal complaint here is guinea-worm: every house in the place has it, often several members of the same family, and individuals may be affected in successive years. The water-supply is peculiar; it comes from a low dell of spongy ground on the borders of the salt-marsh, which is inundated during the rains, and at other times is so saturated that ground water rises to within a few feet of the surface. A 'wao' or stone well with steps and troughs for cattle was built here many years ago, and is constantly full; it is about 25 feet deep and consequently the circulation of water in the well is not sufficient to prevent stagnation and foulness. Hence the people have ceased to take water from this well and they now use small pits about 6 feet deep, in which water freely rises: a fresh pit is dug when so much mud has fallen in the older one as to render its contents dirty, and even then such water is free from the foul smell which the well-water has. In neither case is the water at all brackish; both kinds are muddy, but the one stinks and the other does not. Cattle are

watered at the troughs, and do not refuse the fouler liquid. The people say guinea-worm comes from contamination of their drinking-water, owing to the margins of the pits not being protected from tramping-down and detachment of the muddy surface-soil. This defect could be easily remedied by a temporary wooden cover, but they will not do this for themselves, preferring an appeal to the 'Durbar.'

This place would be a suitable one for the study of the Filaria-disease, but observations should be carried on for at least one year, or entire cycle of development of the parasite concerned.

4th January.—On the road to *Rewapura*, a shrine some 3 miles to the east of Bhaonagar, is a small hut on the roadside which is occupied by a leper-man, a Sadu or religious mendicant. He is a native of Hindustan and seems to have contracted leprosy during a visit some 5 years ago to the famous shrines in Kattiawar. A very marked instance of A. L., being attended with extreme distortion and wasting of the hands and feet: the face, too, is characteristically affected. Declares that none of his family ever had the disease. His house was built by some Mahajans of the town, and he is alone, subsisting by begging of the pilgrims who go to the adjoining shrine. This instance is an illustration of the fate of friendless lepers, of a method (*i.e.*, in concourse) whereby this disease possibly may be communicated to others, and of the sad state to which a human being may be reduced by an unsparing malady and popular indifference.

At the hospital in BHAONAGAR, two lepers presented themselves who had been under the care of Mr. Burjorjee Byramjee, the very efficient Medical Officer in charge. Their chief peculiarity is their close similarity.

1.—M., Mussulman, *æt.* 50, a sepoy: 3 years ill: born and resident in Bhaonagar: has spots on the trunk and limbs remarkably characteristic, being round or oval, with raised reddish edges and a pale yellowish, level and depressed centre: they are situated on the back and loins, and on the extensor surface of the arms. There is numbness below the left axilla where the remains of a patch are to be seen; there is loss of feeling in the feet below the ankles and in the hands, but in the latter place improvement has taken place since he began to use the Chaulmogra oil: there is morbid soreness of the soles. A large, fine-set man. Denies all taint; has no living children: cannot account for the disease, yet there is a possibility of contagion from a Hindu leper with whom he used to sit. The disease began with spots on the hands and feet, and with tingling sensations along the corresponding nerves: the ulnar nerves at the elbow are now not much enlarged; is not subject to fever. Has taken the Chaulmogra oil for three months, with benefit.

2.—M., Mussulman, *æt.* 50, a late warder in the jail. Born and resident at Bhaonagar: he presents similar symptoms; thus, there are spots all over the body, which were at first red, but are now pale: there is numbness of the hands, and numbness and morbid soreness of the soles. Duration of disease 3 years, and he has been subject since then to irregular attacks of fever; the nature of this fever is doubtful: glands in groin enlarged on left side, where is a sore on the great toe. No hereditary taint: the disease is attributed to the use of fish; he remembers eating some dried fish one night, and the next morning spots were seen; there was no fever and the spots persisted and increased. Ulnar nerves not much enlarged or tender: the man has been taking Chaulmogra oil for three months, with much benefit.

It appears from the records of this hospital that leprosy is seldom seen amongst the patients, and I have long been aware that entries at dispensaries and hospitals open to all comers, are no trustworthy guide to the real number of affected people in a district. In fact, lepers are not disposed to attend as ordinary patients, and, besides, their visits are not often encouraged, out of regard to other sick: from the

chronic nature of their disease they cannot well be efficiently treated in the wards of a general hospital, but if a separate place or section were allotted to them, doubtless much relief of these miserable subjects might be accomplished.

Of the actual number of lepers in the city of Bhaonagar (35,871 inhabitants) nothing valid is known. Like other central towns, the capital doubtless serves both as a receptacle and an emanating centre of the leprosy disease; and considering the number of afflicted subjects in its neighbourhood, the utility, nay the need, of an Asylum for lepers hardly requires to be urged in these pages.

2.—The Thana or sub-district of Songadh

(Gohelwar).

A small tract in a central position, and resembling, in all essential particulars, the country around. For other details, see end of Diary.

6th January.—Arrived at *Songadh*, 18 miles to the west of Bhaonagar, quite inland and the head-quarters of the Assistant Political Agent in charge of Gohelwar: a station recently laid out, situated on the banks of a stream, partially surrounded by hills and having a population somewhat under 1,000. The usual castes prevail, and the usual diet and habits. Only two lepers are known; one is a Garassia girl, now absent; the other a Koli boy, who comes forward.

Age 13: presents decided marks of T.L.: lobules of ears particularly thickened and brows overhung: nose already a little sunken, skin of face bronzed in tint. There are light-coloured stains on the skin in the mammary region and in the loins, probably too on the extremities, but accumulation of dust and dirt prevents closer scrutiny. No distortion of fingers or toes. The disease began four years ago with an eruption on the body of round, reddish spots at outer side of arms, which have now left distinct indurations or even nodules in the skin, perceptible to the touch; subsequently the face became affected; the disease is advancing. Nipples unchanged, there is fulness in the groins: ulnar nerves probably enlarged. Does not suffer from fever. There is diminished sensibility of skin at back of hands and feet; there are flat tubercles on the hard palate of considerable size.

F. alive and well: M. was a leper and died *æt.* 35, about 5 years ago, that is just before this boy showed the disease: in his family are 4 brothers and a sister, the former comprise a youth of 18 and a lad of 8; the sister is the eldest of the children, all of whom are well excepting this lad. House at the outskirts of the town: the mother latterly occupied a separate place in the verandah: this boy goes freely about, but eats alone. He has never left the place since birth: is said to be the first leper known here and still the native-born people are free (according to the patel), for the Koli family are late immigrants, the father having come for work when the station was being built. These Kolis live chiefly on jowra or bajra: they eat fish from the river only very occasionally, but no salted fish is to be had: the lad declares he never eats fish, having a disinclination to it: stale fish is never eaten. In this instance there seemed to be no ground to suspect a syphilitic taint; the case is noteworthy as an example of introduced disease and it remains to be seen if this lad can go about all his life without injuring others.

Respecting the Garassia girl, the only other leper here, I have learnt, since leaving Songadh, the following particulars: she was absent during my visit, and has died at Rajkot of diarrhoea. Age 17: born at Songadh and showed the disease 7 or 8 years ago: had probably A.L.; was married at Rajkot, no children: family taint denied. She lived at home and there was no cause to keep her separate, because the disease consisted 'only of spots of red colour at the ankles, knees,

thighs and round the elbows, and a few on the back : there was no numbness but sometimes burning sensations were felt : no running sores, &c.' (statement of a relative kindly forwarded to me by Mr. Appaji Govind, the efficient Hospital Assistant at Songadh). Supposed cause of the disease indigestion accompanied by 'gacharaka' (foul eructation). From this report it would seem that the Garassia girl was affected before the Koli boy and in a different manner : the two did not live near each other.

In the evening, went to the village of *Jhitri*, 2 miles north-west ; it contains 100 houses and the usual variety of castes. The people were assembled ; the existence of leprosy is denied, and its presence is not recollected within living memory. However a Garassia man is brought forward, who presents suspicious symptoms.

Æt. 50, stout and hale ; 3 years ago he had a spot on the inner side of the right knee which has now subsided, but it was followed by others more persistent on the hands and feet, encroaching upwards. These are round or oval patches of 1 to 2 inches in diameter, of pale colour (so far as can be seen on the unwashed parts), thickened, hardly scaly, irritable, cracked and said to be benumbed : they are well defined and not unlike chronic psoriasis. The use of acid fruits increases the sense of itching. But there is a tubercular thickening at the root of the nose and the lobule of the right ear seems to be thickened : both little fingers, too, are permanently bent, though hardly atrophied ; the ulnar nerves are doubtfully changed ; this singular deformity of the hands is said to have come on about 25 years ago after an attack of cholera. Glands in groin enlarged, but the man acknowledges to have had venereal disease. Diagnosis therefore somewhat doubtful, though the conjunction of a psoriasis-like eruption with nerve-disease and other marks of true leprosy is not so very uncommon as will be seen hereafter.

The people here (away from the riverside) seldom eat fish, and then only the Kolis, as a rule. The Patel attributes leprosy to the use of fish, and accounts for the absence of the disease in this place to the fact of fish being rarely or never eaten : he mentions as an illustration of his meaning, the leper-colonies at Rajpura and Gudhula on the sea-coast, where almost everybody has leprosy and that from eating much fish. This statement I record as embodying a wide-spread popular opinion, which my subsequent experience shows to be in great part true only of past times.

The village of *Jhitri* is a dirty one and the people are dirty in person and habits ; yet leprosy is absent : may we not therefore infer that this disease requires for its development a specific germ which as yet has not been conveyed hither ?

7th January.—Early morning to *Katoria*, 2 miles northward ; a village of 60 houses : population of mixed castes : situation on the banks of a stream now dry. Water from this river during the rains, afterwards from a deep well whence it is drawn by a 'mote' or a leather-bag. No leprosy here : it is said that a Kunbi boy has the disease in a village about 2 miles off. Diet, habits and general condition of the place much as usual. Some of the Garassias eat fish, boiled and always fresh, but the quantity indulged in seems to be very small.

Went a mile to the village of *Nana Suraka*, also in the open plain : about 100 houses : castes various, several Brahmans. Water from a deep well, and from pools in the bed of a small stream. Guinea-worm occurs occasionally. At present leprosy is said to be unknown here, but the following case is shown, the man belonging to this place, but for the last four years living in another village.

A Kumbhar, æt. 40 ; in good general health. A well-marked instance of A. L. ; the left hand has a bent little finger, the right hand shows absorption of the fingers. On the trunk are whitish patches of various size, quite characteristic ; benumbed spots in loins and on arms behind elbow ; back of hands and feet, and adjoining parts, also benumbed ; glands in groins

enlarged on both sides. The disease is of 7 to 8 years' duration, it began with a vesicle and numbness on the right hand. Was born here ; parents died of old age ; no family taint ; married and has a daughter of 12 who is well ; his brother and sister are well, and their children. This man is not very particular as to diet, but fish is rarely eaten ; he has wandered about the country and this disease came on at *Bhaonagar* ; he may have got it there. Has had syphilis.

8th January.—Went to *Mota Suraka*, about 2 miles eastward : a village of about 100 houses ; population mixed, but without Kolis : situation on the banks of a stream : the usual characters prevail. Drinking-water from the river only (running water) : no guinea-worm. No leprosy. Cotton is grown about here, and the ground around the villages is generally strewn with large thorns of the Babul tree, yet mycetoma (here called 'Ráphi' from the fancied resemblance of the affected foot to an ant-hill riddled with holes) is not very common. I have heard of only one case, in addition to that lately operated on at *Bhaonagar*, which came from the district north of *Songadh*.

Thence to *Walawad*, a mile further on : about 30 houses, and a mixed population chiefly of Brahmans. Water from an old well, built up and furnished with steps, with overhanging trees the leaves of which fall within : no guinea-worm here, though one might have expected it. No leprosy.

9th January.—In the morning to *Panch-choura*, about 2 miles to the south and situated on an incline between two hills : the village contains 80 houses and a mixed population. Water is derived from an adjoining streamlet. No guinea-worm here. No leprosy. The people live chiefly on bajra : the village is in the hands of an old Garassia family.

From the above observations it appears that leprosy is not very common around *Songadh*. I made many enquiries into the habits of the Gujerati people here, but did not elicit any facts of unusual importance. The following are memoranda which will serve for comparison with the state of things in other countries, where the leprosy disease still prevails. Castes are numerous, and the caste-distinctions fully observed ; but the general mode of life is the same for all. Master and man are clothed alike and work alike, and the former, though occupying a better-looking house, is yet surrounded with as many insanitary conditions as his servant ; he is also disposed to opium-eating and excesses. The clothing is universally of cotton material ; it is usually very dirty and is said to be very seldom changed. Ablution of the person is not so general here as in the Deccan, &c. Domestic hygiene is unknown : foul air, foul soil, water more or less impure are the usual concomitants, so that it may be said that the conditions of epidemic disease commonly prevail. It is a wonder that the milk of cattle, &c., does not become contaminated ; the people indeed seldom drink fresh or uncooked milk, but their 'chass' or diluted curds and whey, is made with water which can seldom be pure. Cholera does occur as an epidemic and intermittent fevers are rife. Dengue spread widely in 1873, being introduced at the port of *Verawal*. As to diet, it is the fashion here to abstain from animal food : almost every large village has its 'Shravuks' or pure vegetarians, who, being usually influential men, strongly indoctrinate the rest of the community. Rajputs and Kolis will, however, eat meat when it suits them : and so the Mussulmans, and lower castes. The idea of leprosy being due to eating fish is a tradition possibly based upon an early importation of the disease at some port on the sea-coast, whence, first affecting the fish-eating Kolis, the malady has spread inwards, carrying with it a dietetic notion acquired at the spot where it first appeared. Round about *Gopnath* is the locality generally indicated ; yet my

inquiries have showed that leprosy is almost as common inland as on the coast, and that the locality just named is not at present especially affected. It would not however be unreasonable to infer that the leprous complaint may be now subsiding on the coast, whilst it is spreading inland : that the local history of the malady is comparatively modern, seems also a not unwarranted supposition, for I have failed to hear of dates of disease earlier than the last 50 years.

Before I left Songadh, the following instance of leprosy presented itself :—M., Mussulman, æt. 30, policeman, a native of Waora in the Gogha district, but for 12 years resident at Kumbhai, 6 miles from here; 1 year affected : spots first came on left hand and forearm, then on the face. At present there are numerous pale patches of characteristic aspect on the trunk and limbs; they are whitish, round with a reddish border hardly elevated, and they are benumbed : there is also nerve-disease of the extremities, the little finger of the left hand being bent, and the forefinger wholly anæsthetic with further change. Denies all taint : has a daughter of 1½ year, well. In the village of Kumbhai there was a Brahman leper with whom he was acquainted : some of the people there eat fish, but it is very scarce; it is used both fresh and salted (imported). Had not fever when the spots came out, has had it since; denies syphilia : glands in groins not perceptibly enlarged : cannot account for this disease except by contact : he is off duty on account of sickness.

3.—*The State of Palitana.*

A prosperous, minor State occupying an inland, central plain in which culminate the highest hills about here, and traversed by a large river : there are 99 square miles of territory, 87 villages and 500 persons to the square mile (a number much in excess of the mean). In the Census of 1872, as many as 132 lepers are entered, whilst in a return recently furnished to me, the names of 34 only are given, this discrepancy being explained by the fact that at the former date certain pilgrimages or assemblies happened at Palitana, which led to a large gathering of begging lepers now dispersed to Junagarh, &c. If correct, this statement points to the existence of a floating population of infested persons whose movements certainly claim attention; yet, as there are undoubted omissions in the later return, I conclude that the latter list is not complete. As far as known, however, there is a general concordance in the amount and distribution of leprosy here and around, which illustrates the tendency of this disease, when not very common, to accumulate in and about the larger towns : thus affected localities are mostly arranged around Gariadhar, the former, and Palitana, the present, capital of the State. Notwithstanding a high density of population, the leprous disease is not frequent, and as its mean duration is now not more than 6·4 years, one might infer that only of late has the malady appeared, or at least that a comparatively recent exacerbation of it has occurred, and at present it may be said to thrive.

Known affected localities are the following—*Palitana* (6), *Pertabgurh* (3), *Loharvar* (4), *Badurko* (2), *Ralgond* (1), *Thadach* (3), *Harmatia* (1), *Waria* (1), *Mota Rathli* (1), *Jamanvao* (1), *Mokada* (1), *Pithalpur* (1), *Chonda* (1), *Gariadhar* (8), *Parodi* (2), *Mota Waori* (2), *Adapur* (1), *Panchtobra* (2), *Virdi* (1), *Velawadar* (2).

Note.—*Ralgond* and *Thadach* are outlying villages

which form part of a chain of leper-villages in the north of Mhowa and Talaja districts; and the presence of leprosy in Adapur, &c., seems to be connected with certain distant (and otherwise seemingly unconnected) leper-groups in the Lilia and Kundla districts : the large map should here be referred to in consideration of these illustrative instances.

10th January.—Reached *Palitana* last evening; this morning to the hospital and looked over the register of patients : 'Sun bahiri' (numbness) is a recent entry, but lepers applying for relief are directed to the asylum at Rajkot. Outside the western gate of the city is the shrine (*Datar*) of a Pir, where a few lepers congregate to intercede for cure; and amongst the beggars on the road to the sacred hill of *Shatrunjee*, I noticed a leper girl of 14, *Koli*, born a distance but subsisting here, both parents being dead : a deserted leper orphan, who recollects hardly anything of her antecedents. The disease has lasted since early childhood; whether inherited or not is uncertain. A miserable object, and most decided T. L. aggravated by privation : the child lives in a place in the city where she is allowed to shelter by a charitable person, but her proper home would be a leper-asylum. It occurred to me that many of the cases in old England, under the harsh system of public treatment once in vogue, were probably like this one; but in Europe lepers if expelled from society, still had some refuge offered them. In India the barbarism alone prevails, and the humane side of popular practice is too conspicuous by its absence.

12th January.—Went to the village of *Gheti*, about 4 miles to the west of *Palitana* : a straggling place of 200 to 300 houses and surrounded by a low mud wall : people chiefly *Kunbis*. Water from a well, 'kuwa,' and drawn up by rope : yet guinea-worm is very common. A poor and dirty village. No leprosy and the people correctly distinguished between *Patia* (true leprosy) and *Kodia* (*leucoderma*). Visited the brother of the *patel*—an adult affected since childhood with curvature of the spine, bending and wasting of the limbs; no hydrocephalus; a chief noticeable feature is the scalliness and deformity of the hands and feet, the former being extended or retroflexed and laterally twisted, nails turned into claws : ulcers on the fingers. It seems as if psoriasis (?) had been engrafted on rickets; no numbness, but rather a general hyperæsthesia of the skin : the man lies constantly in one position, coiled up; the spinal cord is probably implicated : duration of disease 25 years : parents and brothers quite well : no other disease. This instance is mentioned because all nervous affections are noteworthy, in connection with the main object of my tour.

13th January.—To the hamlet of *Malapura*, about 2 coss to the N.E., situated in a wide plain, isolated, compact and gathered around a fort or round tower (*kote*), which doubtless served as a citadel to the warlike *Kolis* whose descendants are still here. About 30 houses : people dark, stalwart and independent : drinking-water from a deep well (*kuwa*), guinea-worm very rare : leprosy unknown. A cleaner place than usual and interesting from its feudal aspect.

Within a mile is the larger village of *Makurka*, about 150 houses, and a population chiefly of *Kunbis*; water from both river and a deep well; the latter has a wooden framework at its mouth. Guinea-worm very rare. Saw a case of *Kodia*—the thing is rare here—a young man has large patches on the hands, feet and legs, and on the lips, of some years' duration; he is a *Sonar*, and none else of his family (a brother and six sisters) is marked in this manner. The lad was living

in Bombay when the white spots came out, and was the only child with his parents there; could it have been contracted in Bombay? Married, no children; no other instance of leucoderma in this village.

Found a case of incipient leprosy—T. L.—M., Kunbi, *æt.* 22, a stupid-looking man: born here; has visited the sea-coast. A year ago, he overate himself and on vomiting drank a quantity of sour whey; very soon after the face and ears began to swell: previously, he used to perspire copiously in the sun and his hands used to crack across the joints. At present there is general turgidity of the face (said to be diminished of late), loss of hairs in the eyebrows and decided thickening of the rims of the ears, including the lobules; no loss of sensation in the limbs, &c., therefore the diagnosis rests upon the above appearances, and the people agree that here is true 'Patia.' Syphilis is denied, but of this doubt is justifiable from inspection. No family taint; married, no children.

Here is another obscure case; but can it be that the milk of unclean-feeding animals ever conveys the germs of leprosy? May the excreta of lepers be a medium in which such germs flourish, and in a way only too obvious in this country, by being taken into the stomach of the buffalo or cow, come to furnish to their milk these hurtful matters? Fish is not to be had in this village, but the man has been to the sea-coast and elsewhere where leprosy exists. The village is open, fairly built, well situated and perhaps cleaner than ordinary. The people maintain that they are very healthy.

14th January.—To *Jhambwalia*, 1½ coss to the S.E., near low hills; about 50 houses, almost all occupied by Kolis: a dirty village. Water from a stream close by: jowar and mung are commonly eaten; never fish, for they are 'Talubda' Kolis here, and not 'Sowalia' who will eat animal food. Some guinea-worm during the rains. Fever is the common cause of death: no leprosy here, yet there are many unfavorable sanitary conditions; nor can the very existence of this disease be recollected for three generations past. The patel is a stupid man, and Kolis are always very reticent.

To *Lowara*, a mile further to the N.E.: here are 55 houses, population mixed, Kolis and Kumbhars being the most numerous. Water from a well; the river being distant. Food: jowra, bajra, wheat; mung, urid: fish not eaten: the people seem timid. Leprosy prevails and the following instances are searched out.

1.—M., Bhungy (Sirdara), *æt.* 50, born at a village some way off and lives here because his brother is resident. Disease of 7 years' standing; it began with blebs on the feet, legs and knees, and has extended so much that the man is a perfect representative of the worst form of the disease. T. L. on the face; A. L. on the limbs, greatly advanced. The people have no objection to admit lepers amongst them: this man lives in a miserable straw hut in his brothers' compound. Parents dead; neither they nor any known ancestor had the disease: his aged brother here is well and his two children: the man's own wife and child (the latter grown up) are well. His native village is Bhadraval, which I visited subsequently, and there is leprosy: the road to it leads across a hilly range, so that natural impediments to travel do not necessarily arrest the spread of leprosy. The man is willing to go to Rajkot if he had the means of getting there: the people hesitate to touch him, but he goes freely about, as well as he can crawl.

2.—M., Koli, an adult, in good bodily condition, is brought forward. He has on his chest a large pale patch, 8 inches across, and now spreading in a centrifugal manner after the fashion of parasitic disease: its edge is narrow, perhaps raised, of reddish tint, but not vesiculated or moist, or the seat of itching sensation (otherwise it would be like *tinea circinata*): there is not, however, any diminution of feeling which can be roughly detected; the whole is of only 12 months' duration. This spot is termed 'Karolia'—a designation which is made to suit more skin affections than one: no other

clear sign of leprosy is noticed, family taint is denied and the man's son is strong and well: he was born here. This case is perhaps doubtful, yet on the cheeks, &c., I detected palish patches, which also look more than suspicious. The man is timid and had hid himself; nor would he have been found if I had not heard about him as a leper in the last village, and had him now called by name.

3.—F., a Kolin, *æt.* 30, was led in. She is a native of another village whose name she will not tell: has been here about 20 years: duration of disease about 1½ years. T. L.: it began rather suddenly after drinking a quantity of 'chass'—sour skimmed milk or whey, often kept until it smells very strong—and to partaking this stuff, the swelling of the face and hands is attributed. At present the signs are those of advancing T. L.: face turgid, hairs gone from eyebrows, ears enlarged: hands bronzed and benumbed, with only slight distortion of some nails: the feet are in the same state, with a rough and cracked cuticle; no ulcers or morbid soreness of the soles. Married: has 3 children, all well. Does not know of a family taint, and cannot recollect anything of her parents: no history of contagion. She still lives with her husband and children in the same house. This place I saw and it is a wretched dwelling of a single chamber, lighted only by the low door; site depressed: within on one side bullocks are lodged, on the other are large earthen bins of grain, a heap of cotton fresh from the pod, a fire-place and bare room for a cot or two; floor uneven, damp and dirty, and to the left stained with dung. The place reminded me of one seen near Jerusalem, only there was here no upper storey.

Memo.—On arriving at this abode, I found patient No. 2 lying on a cot in the verandah, and it turns out that he is the husband of this woman, No. 3: this circumstance was kept secret by the bystanders, thus showing how difficult it may be to get at all the facts of a case. Now, the idea at once occurs that the wife had herself infected the husband, and this notion it would be hard to get rid of.

4.—Was conducted to the house of a woman unable to move from her cot, where she lives alone with her husband (Koli): adult; has 5 sons and 3 daughters, grown up. Her disease dates from about 4 years back, and she was able to go about until within the last two months, when fever and pains set in. As she lies under a bare counterpane, I could only see the hands, face and feet: inspection of the hands alone, however, was enough to reveal the clearest evidence of advanced A. L.: the fingers of the left hand were all gone by absorption and those of the right hand partly so: the feet were also affected, but to a less extent: the lobes of the ears seemed large and lax, but the place was too dark for me to see more. She was born at a distance but had lived here 40 years. All the children are well, and so is her husband: they never eat fish. Taint unknown.

The villagers contemplate with perfect apathy this sight of a once familiar member of their community, now sinking without any aid whatever; they believe she will miserably die in a few days, and they had no wish before to protect themselves from a possible similar evil.

Remarks.—Here is a small village which presents a succession of cases, with the probability that in one, at least, contagion had occurred. Here, too, as so often, is evidenced the need of a 'paternal' government.

15th January.—Went to *Harmatia*, 3 miles to the N.W., a small village of 25 houses, situated in the plain, surrounded by a mud wall. Water from a well and drawn up by rope: there is water in the marsh near (whence a stream seems to arise, near the foot of a hill), but it is brackish, or rather saline; the soil around is frosted with efflorescent salts. Food-grains as usual: population chiefly Kunbis and Rajputs not eating any fish: cattle numerous. Guinea-worm is rare. Leprosy is said not to exist here, but I saw a woman (adult) with the following symptoms:—for four months worms (larvæ) have issued from the nose, this occurs at intermitting periods, and most at the middle of the Holi month; the nose is depressed as in syphilis and leprosy, but no clear signs of the latter are visible; she is a Rajput, married, no children:

history imperfect. Her husband deserted her on account of this disease, and she came back to her father's brother. It is at least curious that both the little fingers are permanently flexed, especially on the left side, and the ulnar nerves at the elbow certainly feel to be large, though not tender; no numbness in hands or feet, which are hardly changed; no eruption was seen on a cursory inspection of the trunk. The uncle himself has light patches on the cheeks—'Karolea'—and he has 'sibbla' or rounded 'scurfy' patches on the arms, &c. Here 'Karolea' seems to be an eruption approaching to leucoderma.

This dilapidated village is not particularly dirty: the well-water is fouled from vegetable *debris*.

Then to *Waria*, half a mile on across the marsh, it has 70 houses; people mostly Kunbis, then Kolis, and the usual complement. Water comes from wells: food of the usual grains; fish is never eaten. Guinea-worm occurs, but is not common. A case of leprosy is brought forward:—

M., Koli, *æt* 50, born and resident here; has travelled but little and then on short pilgrimages; a labourer and now much diseased, yet he is allowed to mingle and converse with others. A. L. of nearly 10 years' duration; it began on the hands with ulcers (?); at present these parts and the feet show all the signs of nerve-disease, being bronzed and greatly mutilated in fingers and toes; nothing on face and no perceptible eruption on trunk. Denies all family taint for at least two generations back; has a son and two daughters, all well—the former is 12 years old. There were lately two other lepers in this village; they were Kunbis and did not eat with him; the last of them died soon after this man's disease began; their houses were far apart, their descendants are yet well. His wife is well and lives with him: he cannot account for his disease: never had any medical relief: never suffered from syphilis.

Inspected some of the 'chass' all drink here; it is naturally curdled milk (*minus* the oil or butter) mixed with water in the proportion of 1 to 4 of water: the sample was fresh, and seemed wholesome.

No fresh case of leprosy since this man became affected; no change has supervened in this village within living memory: the place is unusually open and clean: the leper's house is a poor and rather dirty abode. The common well is in this enclosure and it is rather shallow: a wooden stage overhangs it and there is but little wet mud about. As to guinea-worm, the rather intelligent by-standers would refer it to food rather than to the water, and they quite understand the difficulty of accounting for only one in a family being usually affected.

16th January.—Visited the village of *Pratabgurh*, it is a suburb of the capital and situated just outside the western gateway: 100 houses, and a mixed population: construction of buildings somewhat better than usual; water from a well in the centre, shallow and in a most untidy state for want of a little masonry: the river is only 300 yards off, and this well never quite dries up, the mud at the bottom being scraped away water will always appear. Guinea-worm is extremely common amongst those who resort to this well; a potter living close by shows recent marks of 10 worms in his legs and fore-arm. Leprosy occurs here: thus, at a Mussulman shrine just opposite the city-gate, I found the following instances:—

1.—M., Mali, adult, born here: M. L., duration 2½ years, it began with an eruption in the hands followed by numbness. Now, all over the body are the characteristic pale spots: numbness with no distortion of the hands, numbness and some distortion of the toes, with ulceration of the left great toe. Parents free: 2 brothers and 2 sisters well. Never ate fish; his caste forbidding it: cannot say how he got the disease. Unmarried: a brother supports him: he lives here, without any practical isolation.

2.—M., Wagri, adult, came from Bhaonagar here about 3 years ago; his disease has lasted for 20 years. A well-marked case of T. L.: denies all family taint: unmarried: does not know how he acquired the disease, except that he first ate largely of rice and pickle: also eats fish; lives by begging: has probably had syphilis, after the L. began. Moves freely about and has a hut to live in.

Both these men profess themselves much relieved through faith in the deity represented in this shrine (*Datar*): only faith and patience, they say are needed for cure, and thus the natural subsidence of L. in the intervals of exacerbation is turned to the support of superstition. Other maladies are also cured here; the assumed benefit is indeed more felt than obvious, but large profession and excessive exaggeration are not peculiar to the promoters and visitants of shrines in general.

3.—In a field half a mile from this village, I saw a leper engaged in scaring birds away from the threshing-floor: he lives in the village: visited his house there afterwards:—

M., Kunbi, *æt* 33, born at a short distance, has lived here 25 years: duration of disease 6 years: the first symptoms appeared in this place, as a bleb at the inner side of the right little finger, attended with numbness, then the other fingers were affected, and a year afterwards, the feet. Now there is well-marked A. L. of the simplest kind (N. L. nerve-lepra): hands and feet greatly mutilated, by absorption commencing at the tips of the digits: sores and scars, too, abound: nothing on face and ears: on back of trunk some dubious patches which are not benumbed: anesthesia exists below the elbows and knees: deep bronzing of the extremities is very evident in his pale skin. He is very intelligent: never had syphilis: parents lived at Mota Suraka (*vide* page 6): no leprosy in his family for seven generations at least: his brother and 5 sisters are all well: his 3 sons (the eldest 14 years) are also well. Never ate fish in his life; his diet has always been the usual one, and he was working in the fields when the disease came on. His own and his brother's family then all lived together in one enclosure and after the same fashion, and now there is practically little separation between them: his wife, a sturdy woman, washes his clothes, and has but little fear of contagion: he has not, however, had any children since the disease began. This is gradually extending upwards, but muscular power of the limbs remains.

His house is like the rest; he occupies a verandah within two feet of other houses. The brother would willingly send him to an asylum, if any one would bear the cost and support him; otherwise the leper is still useful in watching the crops, and his friends would not voluntarily pay for a substitute: if *ordered*, however, they would send him away, and to such compulsion the arrest of leprosy everywhere must apparently become due: the authorities must interfere, and the people will render an *intelligent* obedience, for they know their own good.

4.—In a hut under a tree, close to the same field, lives another leper. M., Koli, *æt* 30, born near here, and now a wanderer getting a living by scaring birds from the ripening crops: he is alone; leprosy for 4 years; it began with blebs on the little and ring fingers of the left hand, and a tingling sensation all over; no fever. Was then at home, and 2 years afterwards his wife and children left him; a child was born after the beginning of the disease: all are yet well: parents dead: a sister and her children are well: denies all family taint.

There are on the chest large, very pale discolorations with circular borders; nothing on the face: left hand greatly mutilated and the right hand is also partially destroyed: feet less affected, but they present the signs of N. L. No syphilitic taint: a wood-cutter by occupation; attributes the disease to eating mangoes; will eat both fish and mutton when available.

This case is remarkably like No. 3 in all essential respects; the two give rise to an impression that here a *blight* has attacked the hands and feet, whilst the rest of the body is free and well nourished.

5.—F., *æt.* 13, born at Harmatia (*vide* page 8) but resident here since the age of 1½ years; her parents dying at that time, the mother of fever, the father a leper. His disease seems to have been T. L. of 5 years' standing. When first brought here, she was apparently in good health and there was no other leper in the place so far as is known: duration of her disease 3 years. The father was undoubtedly a leper when she was born: she is the only child. At present the nose is depressed, worms have come from it: there are a few white spots in the loins, benumbed (?), fingers very characteristically affected: feet less changed: the girl has incipient T. L. Her great-grandfather (F. F. F.) was a leper, and her great-uncle (F. F. B.), but not the grandfather himself (F. F.), so that the descent of the malady (if such descent be a reality) is interrupted: females in the family were never before affected. The great-uncle was the youngest of four brothers; her father was the youngest of three: saw one of these uncles of hers (a carpenter here), she lives with him, and he furnishes this above information: his own children are well. The girl is lodged in a shed next their house, in it her disease appeared: there is nothing remarkable in the place. The uncle himself suggests that his brother may have had syphilis, but of this idea there is no support, 'garmi' being a term used sometimes for leprosy and other complaints, besides syphilis.

On different occasions the following cases were seen at the hospital at Palitana: they certainly do not represent more than a fraction of the disease actually prevalent in and around this large town.

6.—A respectable Brahman woman, *æt.* 38, comes with symptoms of A. L. of 4 years' standing: born elsewhere: and has lived at Palitana since her marriage: denies all hereditary taint: her son, *æt.* 14, a healthy lad, is with her.

7.—M., Kunbi, *æt.* 38, from Waori a village to the north, has travelled to the coast: leprosy for 2 years, it began with burning and tingling sensations in the feet, followed by numbness; hands then affected, and afterwards the face. At present the latter is bronzed and tumefied, hairs gone from brows, eyes staring and ears thickened; tactile sensation, also, is diminished; the *n. auricularis magnus* is enlarged. Trunk is covered with pale patches, which he states have long existed: hands deeply bronzed, fingers tumid, tip of right forefinger gone: all benumbed on the back: numbness at the back of the feet, which are wasted and bronzed. M. L. Denies all taint: wife and children well: was working in the fields at the end of the hot season and beginning of rains, when the symptoms came on: he is rather better in the cold weather. Neighbours living under precisely similar circumstances have not been affected: cannot account for his exception. In the same village a Koli has the disease and his father had it: there is, too, a Kunbi leper, long affected and without taint: he lives at a distance from the present subject, who cannot admit contagion unless it be from the Koli and his goats which constantly pass before his house.

8.—M., Mussulman, *æt.* 50, from Viridi, 10 coss to the north. The man has a peculiar look in the face, but insists this began many years ago from drinking bad water in the jungles. At present the signs of T. L. are perhaps sufficient on the face and ears: an abundant beard: nothing in palate, on trunk, hand or feet. Denies all taint and is in good health: has excoriation of sides of tongue for 3 months: is still employed as a sepoy: a stupid man with the round, staring eyes of a leper.

9.—A young man begs advice for burning and tingling of soles of feet, a sense of heaviness, &c., in the eyebrows and cheeks, sweating of palms of hands, &c.—all of 6 months' duration. He fears it may turn out to be leprosy, and, for want of information, I cannot myself assure him he is wrong, or that here is nothing but a common complaint often met with, but as yet not understood. 'Burning of the feet' has been compared with the Italian pellagrous disease which is attributed to faulty food; and if we suppose leprosy to have a similar origin, the same symptom might ensue.

17th January.—To *Rajthali* (briefly called *Rathli*), a coss to the north of Palitana: 30 houses or more: population chiefly Kunbis; food as usual, never fish: water from a well. Guinea-worm not common. A village in the plain, of usual aspect (about here the villages are fairly constructed and kept), the ordinary diseases prevail; scrofulous affections of the joints

may be seen, at the knee (white-swelling), the thing was called 'nal,' *i.e.*, a stream or running, from the constant flowing out of discharge at the sinuses so frequent in this affection: catarrhal ophthalmia abounds: itch is common. L. occurs.

F., Kolin, *æt.* 28, born at a distance, here for 10 years: married. For four or five months she has had spots of L. L. (*lepra leprosa*), there are two on the right arm blended and measuring 1 to 2 inches across, serpiginous in character and defective in sensibility at the centre: the nose is covered by a more purplish, raised patch; on left arm above the elbow is an incipient spot consisting of a group of small, flattened pimples: on calf of right leg a pale spot like that on the right arm, and on the left thigh, just above the knee, is a circular patch exactly like that depicted in Plate 1 of my large work on leprosy: on the left ear is a large red patch, and in short here is a typical illustration of early leprosy—the uniform livid patch—the serpiginous spot—the pale stain. The beginning was on the right arm, but she would not be able to see the spot in the calf: in the newer patches numbness is but slight. Husband well: two daughters of 7 and 2 are well: at first the woman denied all taint, but afterwards admitted that her father's sister (F. S. or paternal aunt) was a leper, and had lived close to their house for a year, dying there about 3 years ago—she had A. L. from all accounts. As the present woman's disease is probably of longer standing than she thinks, here is sufficient ground for suspecting contagion. The deceased leper lived a little apart in a shed now devoted to the storing of grain; and this woman used to take her daily food: her clothes, &c., were burnt after death, but cooking vessels, &c., were retained.

A noteworthy instance favoring both heredity and contagion.

The village well is a small up-draw one ('kuwa'), lately constructed, because the grand old 'wao,' a well with steps, at length furnished brackish water, and guinea-worm became very common. Since the new well was built, this parasite is far less frequent.

Then to *Jamannadi*, about 2 miles further on, in the same wide inland plain; it has 80 houses: people mostly Kunbis, then Kolis, Brahmans, &c., none ever eat fish: water from a well outside the mud walls, which has just had a plastered standing-place made to it. Much guinea-worm during the rains, but last year, since the well was plastered, it was less; though the people do not attribute the worm to the use of impure water. Leprosy occurs.

M., Dher, *æt.* 60, well-marked M. L. since 4 years: was born near here and has lived in the place 35 years: denies all taint and all his descendants are well: two sons here are strong young men and have children of their own. No one in this village had the disease before him: he has travelled and many years ago went to a fair at Gopnath (where leprosy prevails). Here is a striking example of mixed T. L. and A. L.: the disease began in the feet, afterwards appearing in the face. He and his caste eat everything, even dead cattle; yet in the four houses here of Dher, is no other case of leprosy; the man occupies a hut a little apart from his old house. Syphilis denied.

Memo.—Notice the irritability of the old man: if children approach him, he warns them off as tartly as they quickly shrink from his touch.

18th January.—To *Khijaria*—about 2 coss northwards and situate in the plains; some dozen houses only of Kunbis and Kolis: food as usual, no fish eaten: water from a draw-well. Guinea-worm is absent: it is popularly called 'tántáns,' a thread or skein; the same expression as the scientific name of 'filaria' conveys: fever prevails: cholera seldom: no leprosy.

To *Sejalía*, 1 coss further on: about 100 houses: population mixed: food as usual, no fish; water from a well. Guinea-worm rare: no leprosy or special disease in this rather thriving place.

To *Lochra* (name often known as *Lensudda*), a mile beyond, upwards of 50 houses: population mixed, Kolis rather

predominating. Water from a well, food as usual. No guinea-worm here: no leprosy. There is nothing apparent to distinguish this place from others near: a large, clean village: the well is pukka-built and the water-supply less fouled than formerly, yet the people say that when the old 'kutchā' well was in use, the guinea-worm was rare.

Here is a line of contiguous localities at present free from leprosy.

21st January.—To *Randola*, 2½ coss to the N.E., a large village in the plain situated beyond a low range of hills—soil rather stony and sterile: nearly 100 houses: population mixed, Kolis being most numerous; food as usual, fish said to have been formerly eaten by the Kolis, who now adopt the notions of strictly vegetarian Kunbis. Drinking-water from the river; water for other purposes from wells (kuwas). No guinea-worm here: no leprosy. A place constructed as the rest and not particularly clean; a few large houses belonging to the Garassias (fine men amongst these); several dilapidations. Fever is the common cause of death, and such a state of debility or old age "that a tap with a stick on the leg will send a man down"—as the old Garassia said to me. Village at present quite healthy, a state attributed to the influence of the mother-goddess—"Bhutar."

Then to *Sagapura*, a mile off, 30 houses and a population chiefly of Kunbis who are now engaged in preparing 'goor'—raw sugar from the cane: a poorish place: drinking-water from the river; guinea-worm rare: no leprosy.

To *Virpur*, a hamlet nearer to Palitana and situated in the stony plain below low hills: about 20 houses belonging to Kolis and a few Bharwars and Wagrīs. A very poor place, indeed; wretched buildings and very evident poverty: soil sterile. The Wagrīs live in two wattle-huts, almost savage fashion, yet their people are content and speak good Gujerati. No leprosy. Here are many of the conditions supposed to be favourable to disease: yet some individuals at least attain to old age in such places as these. Saw a lad with bad chancre lately contracted in Bhaonagar, whence doubtless much like evil is diffused through the province.

With reference to the supposed connection of leprosy with sterile soil or uncultivated land, to-day's evidence is against the validity of such a view. The plain I passed over was mostly uncultivated: soil very shallow, and the rocky substratum (trap) of great thickness—at least 40 feet, as seen in a new well. Here was poverty also, and a pure Koli or aboriginal race in the hamlet last seen: yet no leprous disease.

22nd January.—To *Jalia*, 2 coss to the N.W., situated in the plain, about 25 houses: population chiefly Kunbis: food as usual—bajra, jowra, urid: sweet-oil: water from wells: no fish or flesh eaten here. No guinea-worm or leprosy. The people look healthy: the village is a tumble-down and dirty one; large heaps of rubbish are in close proximity to the wide, open-mouthed well, which has no wall or pavement around: the water is now about 8 feet from the surface, it rises and falls but to a slight extent: its quality looks tolerable: cattle are watered at an adjoining stream. Clothes are washed at the well and there is consequently much wet mud around: a 'pipal' tree grows just over its mouth. A primitive set of people, uneducated, superstitious and yet healthy. Examined the stores of the Wani or village shop-keeper; he has to sell oil, goor, pressed dates, cocoanuts and other dainties in demand during the Holi festivals, &c.: all these things seemed in fair condition.

To *Pithalpur*, a mile onwards, about 60 houses: people

mostly Kunbis, then Kolis, artificers, graziers and low-castes: food chiefly bajri and urid, no fish; well water only, which looks clear. No guinea-worm here: few severe diseases, the people die of fever, cough, &c. Leprosy very rare: saw this case—

M., Kunbi, æt. 40, born 10 coss off (at *Randola*, vide page 11), here for 20 years, as a tenant of land. A strong, hale man, but a decided leper: the disease began with numbness of the hands, accidentally found out by his singeing the knuckles of right hand. On the back are large and pale discolorations with rounded edges: nothing definite on the face; marked numbness of arms below the elbows, and of legs below the knees: second finger of left hand and second toe of left foot atrophied at tip: other digits less altered except by sores and deep cracks: hands and feet bronzed, excoriations at elbows, wrists, sole of feet, &c. He is an agriculturist and still works in his own fields, lives well and is not separated. Parents resident here and well: no taint in his family for seven generations, at least: married and has 5 sons, the last 3 years old and born after the beginning of his disease; family all well. Syphilis denied and the man seems truthful: he is affected with A. L. of about 4 years' standing.

On enquiring about unsound grain used as food, I learn that such grain is seldom eaten, never by men themselves farmers like this man—the people laugh at the idea—for preservation grain is intimately mixed with ashes and thus jowra may be kept for 2 years and bajra for 3; afterwards it is liable to worms: the grain is stored in mud-vessels, raised from the ground. In other places, the dhalls are preserved by having fine sand intermixed. Only the very poorest people will eat grain affected with worms, &c.; the people are very particular in sifting the seeds before grinding them into flour.

In this village there is no other leper at present, but two years ago a Wania died here of leprosy: he had been a shop-keeper for 5 years and came from Palitana, where his relatives are; he had quarrelled with them: was already slightly diseased when he came here: he sold oil, spices, cocoanuts, dates, goor, pān-sopari, &c., and everybody dealt with him: was unmarried and alone: he long took medicine from the Sibor dispensary, the nearest source of aid, without benefit, and 4 months before his disease, had closed his shop here: the disease was probably advanced M. L. I cannot learn that the Kunbi leper had any special relations with this man; he owed him money, but could not eat with him, caste interfering. The people agree it would have been better if the Wania had not come to their village, yet they had no prejudice against buying his goods and coming into closer contact: in fact, of isolation there was probably none.

This village is no better than others as regards sanitary defects: the chief well is situated in its centre and is not kept clean: scores of pigeons nest in the irregular clayey sides of the pit and assist in fouling its contents, as was very perceptible from above.

Experience hitherto tends to shew that (1) villages with lepers are not necessarily in main features any way different from those not so infected; (2) no special caste is peculiarly liable to leprosy, nor an affected individual necessarily the poorest or physically the weakest, &c.; (3) insanitary conditions are so universal that one's attention is apt to be perplexed, yet no one defect has as yet seemed to call for special notice; (4) the difficulty remains why only one or two persons are affected amidst a large number to all appearance placed in identical circumstances; (5) heredity is by no means a universal feature of leprosy; (6) sources of contagion can probably never be absent; yet it is practically impossible to trace ordinary cases to this origin, and difficulty No. 4 still remains. The clue, therefore, as to the cause and spread of leprosy is yet wanting; in other words, more information is needed which can be gathered after a prolonged and thorough enquiry.

4.—*Bhaonagar State, District of KUNDLA.*

I now entered this, one of the larger and most prosperous pergunnahs, mostly inland and north of a long watershed; but having a prolongation south or coastward which adjoins the Mhowa district. Area 550 square miles: population 140 to the square mile; 1 person in 568 is a leper. Like other inland sections, Kundla has a greater proportion of large villages than coast districts; yet one-half, or 54 in a total of 103 inhabited places, contains lepers. The name, &c., of about 150 of these afflicted individuals is on record: the present mean duration of their disease is only 6·5 years, but as there are several foci of old-standing complaint in the inland area of the district, it would seem that a re-kindling of leprosy has lately occurred and that strictly speaking this malady has been long in existence. In Kundla are found abundant instances proving the independence of leprosy of all conditions pertaining to coast residents only.

The following is a list of leper-localities, which may be regarded as accurate:—*Kundla* (14 lepers) and *Sawar* (15), conjointly forming the chief town; northward are *Mesanka* (2), *Thansa* (3), *Gujarda* (2), *Krankach* (1), *Kedaria* (2), *Juna Sawar* (2), *Shedhawadar* (2), *Dhar* (2), *Jira* (1), *Bhamodra Nana* (1), *Karjala* (1), *Khadkala* (1), *Bhuwa* (2), *Phiphad* (1): westward are *Jesur* (3), *Hipawadli* (4), *Bhamodra* (3), *Shelna* (1), *Mekda* (1), *Sejul* (3), *Jhinharda Mota* (5), *Pithaodi* (3), *Wansiali* (5), *Piawa* (1), *Wanda* (3), *Bhekra* (1), *Rubarika* (1), *Shimran* (2), *Borala* (2); *Nesdi* (2); eastward. Southward are *Dhajdi* (1), *Badhda* (4), *Jhabal* (4), *Lawara* (1), *Jambada* (1), *Dadhia* (2), *Wanot* (1), *Wawera* (2), *Ghanla* (2), *Meriana* (2), *Khadsali* (1), *Madhda* (1), *Thordi* (3), *Abrampura* (2), *Ambaldi* (2), *Dolti* (3), *Adsang* (2), *Bagoya* (1), *Agria Mota* (1), *Agria Dhulia* (2), *Raidi* (1).

Note.—Lepervillages are often arranged in continuous lines, e.g., from *Jesur* to *Kundla* (with a remarkable interval), from *Nesdi* northwards, from *Jhabal* southwards, &c.: there are also groups, e.g., *Mesanka*, *Thansa* and *Gujarda* which seem to be connected with a *Palitana* series. Such lines and groups are not, however, necessarily, or even commonly, of contemporary duration: around a village with old lepers will be found others with fresh cases. The series south of the watershed below *Kundla* is remarkable in containing only recent instances of disease, until we reach the bottom (*Agria*), whence a possible connection with an adjoining *Mhowa* village. I am clearly of opinion that, however explained, the lines and groups now referred to are essentially connected, and not the result of fortuitous concurrence.

25th January.—At *Jesur*, 7 coss S.W. of *Palitana*; a village in the plains with low hills to the south and a large stream at hand; about 400 houses and a population of 1,962 chiefly of *Kunbis*: drinking-water from a well, there are other wells of brackish water and the river, which are used for remaining purposes. A large, compact village, differing hardly from others in crowding of men and cattle, narrow lanes hampered with dust-heaps, &c., a few houses of the better class: trees around. Food: *bajra*, *jowra*; *urid*, *mung*: old or unsound grain probably not common, and then used only by the very needy: no fish here. Fever common: nearest medical aid is to be had at *Palitana*: guinea-worm absent: leprosy occurs, three cases being known.

1.—M., Rajput (*Ahir*), *æt.* 45, born and resident here all his life: has visited *Mhowa* as a dealer in cotton, firewood, &c.: a stout man; 6 years a leper. First felt a sense of heat in the body, which was followed by swelling in the face, &c.: cannot now say at what season of the year this came on, was working in the fields; cannot account for the symptoms, but was eating much sugar and rice at the time. The man presents a complete picture of early T. L. and that in a rather rare form: lobules of ears very large and much wrinkled, face puffed and bronzed; obscure rough, reddish patches on the back; on the shoulders, outer side of arms and back of fore-arms, numerous disseminated nodules varying in size from a split pea to a horse-bean, mostly solitary, sometimes in groups; hands much puffed, a few nodules on them and back of fingers; some of the nails are deformed; there is also bronzing: the feet are swollen and bronzed, nails mostly changed into scaly knobs; also a few nodules on dorsum of feet. Some numbness of back of forearms and hands, also on soles and back of feet: no morbid soreness of soles; some of the tumid fingers are benumbed on both sides, not the palm. Nipples converted into knobs; large clusters of nodules on the hard palate. Soft swellings in both groins: syphilis is denied. Father alive; mother dead; both free, and also his family for three generations back, and the collateral line: married and has 5 children (from 18 to 8 years of age), all well: no child since outbreak of disease: denies knowledge of contagion.

This instance is noticeable from the isolated character of the nodules on the arms, &c.

2.—M., Mussulman, *æt.* 30, born at *Chok* (a few miles off) and resident here 12 years. Disease for two years; it began in a gradual manner, and is well-marked early T. L. of face and limbs, the latter may be also hyperæsthetic. Is a sepoy. Parents here and well, he lives with them: is one of four brothers being the eldest, the second is also a leper (No. 3 below), the youngest aged 15 and 8 years are still well: all live together. Married: no children, his wife having gone back to her parents when this disease appeared. He is subject to epilepsy and supposes his disease began with fits: it probably commenced in the cold weather. No swelling in groins and denies syphilis.

3.—M., Mussulman, *æt.* 20, brother of the above No. 2, leprosy for 4 years; the face first swelled: no fever. A most pronounced example of T. L.: ears enormously swollen at their rims, and the brows, lips and chin; hairs wanting on face, and skin everywhere smooth and glossy. Skin of back (loins) completely infiltrated with level nodules, arranged in lines diverging downwards and outwards from the spine and very close set (N.B.—In this direction the nerves proceed from the spinal cord); upwards towards the neck these appearances subside: in front, over the abdomen the skin is also infiltrated, but not over the chest. Nipples enlarged, and as if affected with elephantiasis. Skin of arms dark, rough and thickened in a diffused manner: hands hardly altered; no numbness there. Feet also hardly changed but bronzed and roughened: a nodule on the back of the left great toe. Fullness in groins: denies syphilis: serotum tumid. He has been here 8 years, and was born at *Chok* (where L. exists); has travelled but little: is a labourer. He has visited another village whence lepers are known to have come, but this was after he became affected: is still occupied as a keeper of cattle: unmarried.

The parents of these men are seen; both are well, but sorely perplexed by this affliction of their two sons. Isolation in an asylum is not desired either by the latter or by their parents, who propose that the young men shall go to a shrine at *Junagurb*, named '*Datar*,' where many lepers resort: if no relief then follow, the idea of resorting to hospital may perhaps be entertained. These Mussulmans are hardly less superstitious than the Hindus.

On enquiry I learn that there were lately two other lepers in this village, viz., a *Koli* man and woman who resided here: the former died four years ago, the latter one and a-half years since. Actual contact with these people is denied by all three men now seen; but this perpetuation of the disease is at least a significant fact.

The residences of the above men are apart: the Mussulman's house is a poor place consisting of a single low build-

ing with a narrow verandah and a single room within: just at one end is a small open shed, where a horse and calf are littered, and here is barely room for the cots of the two lepers who are lodged with these animals. Touching the other end of the main building, is a house belonging to a Koli family, and the whole is enclosed by a common wall; so that anything approaching to effective isolation of these lepers cannot be said to exist; in fact contact with them of the healthy seems to be always possible, and it will be interesting for our successors to note whether or not this want of caution and care, have been productive of final injury to the immediate neighbours of these lepers. As at present informed, I could not undertake to decide upon a case of this kind, which clearly involves some of the conditions appertaining to the question of contagion. For the benefit of future enquiries I may mention that the name of the Ahir Rajput is Sadu Kana: the older Mussulman is called Kumal Jiwa, the younger man his brother, Juma Jiwa.

26th January.—To *Hipawadli*, 6 miles off to the N.W.: situated in the plain, skirted by a small stream (now dry) and surrounded by trees. About 180 houses and 841 inhabitants: people chiefly Kunbis, there are Kolis, Rabaris, Kumbhars, Dhers, &c. Food—jowar and bajra; urid and mung: drinking-water from wells, one of which dries up in the hot season: none have steps. No guinea-worm here. There were four lepers, but one has just died; he seems to have had the feet most affected (? A. L.); the following cases are seen:—

1.—M., Brahman, æt. 56, born at a distance, has lived here 27 years: a leper for 11 years. Is a mendicant, and for hire sifts grain which others eat; not a priest. The disease began with a burning sensation in the parts now benumbed: no fever. The old man is purblind from corneitis: thin and weak, but very intelligent. The limbs present the ordinary appearances of advanced A. L.: fingers mostly absorbed at their tips, yet there is little atrophy of the remaining parts of the hand, and no seeming loss of muscular power; the feet are more deformed, some of the toes being quite gone and other are mere stumps displaced laterally or upwards, on the back of the foot: great toes inflamed; ulcers here: decided numbness from wrists and ankles downwards, and partial loss of feeling above these joints, gradually fading away: there is more deformity of the nails than is usual in A. L. Cannot account for the disease unless it arose from partaking freely of oil-seeds (thal) and goor. No leper in the village prior to him, so far as I can learn from the very reticent bystanders: he sometimes goes round to neighbouring villages to beg, but is not aware of having come into contact with other lepers. Denies syphilis and all leprous taint in his family for seven generations (N.B.—Seven is a number specially regarded in reckoning genealogies): his brother and children are unaffected; and his own family (including a daughter of 7) are quite well. Is chilled by the morning cold, and likes the sun: no eruption on the trunks so far as seen.

An obscure case of specific neuritis.

2.—F., Kunbi, æt. 22, a poor miserable creature, blind, and nursing a wretched infant. Born at Kundla (where leprosy much exists) and has lived here since marriage 10 years ago: husband away, lives with his father. Duration of disease about 8 years: the affection came on four months after the birth of a child. She presents some signs of A. L. in the right foot, where the toes are stunted and swollen and the second toe is entirely absorbed: some numbness of hands and legs, of the latter from the knees downwards. The people regard the disease as 'Patia,' and I think rightly, though I did not search very closely. She has had 5 children: 2 are dead, the others I saw all healthy as yet. Has no idea how the disease arose but attributes it to eating some wild vegetable: lives at a distance from the house of No. 1. A similar, obscure case.

3.—M., Kunbi, æt. 60, born near here and resident for 16 years: disease for 7 years; it began at the right little finger with numbness, and he has accidentally burnt this hand without feeling the heat: it is the one chiefly affected—a marked example of nerve-disease, the two terminal segments of all the fingers are gone, the thumb remains entire: the left hand is seemingly unaffected, or it is bronzed (?), numb-

ness being limited to the other side. Numbness is also present in the feet, which are hardly changed in aspect: nothing on the face except dubious pale patches on the cheeks. The trunk is covered with a very characteristic eruption of large, pale patches, having sometimes a slightly raised, darkish edge and depressed wrinkled centre: they seem to be now in a state of retrogression, yet numbness is not evident on rough testing: there are similar spots on the shoulders, back of arms and both forearms: all came on about the same time. Denies all taint: parents dead: married: and has had 7 children, all well, the youngest is 20, the eldest 35 and has his own offspring, also well. An agriculturist: was doing field-work when the disease came on: lived fairly well and as others: is not subject to fever: does not live near other lepers, and cannot account for his disease: denies syphilis.

Here then are three or four lepers all affected in the same way and that quite different to the three in Jesur: there was T. L. and relationships; here A. L. and no relationship. The explanation of these differences remains altogether obscure; and it is also difficult to understand why the villages between Jesur and Hipawadli (*i.e.*, *Pa* and *Jharakla*) seem to have escaped, neither of them being named as containing lepers, and for economy of time, neither visited by me: both are small places, yet no similar break occurs on the rest of the road to Kundla. (P.S.—They are outside the district.)

27th January.—To *Ranigauw*, 2 coss to the N.W. of Jesur, a large village situated in the open plain and on the banks of a stream; irregularly built, poorish but not more dirty than usual. This is a cotton-growing district and the harvest is now on hand: piles of white cotton attract the eye at the public threshing-floors, side by side of heaps of grain undergoing due measurement for revenue purposes. About 200 houses: Kunbis and Kolis form the bulk of the population: there are Garassias (the owners) and Lohanas—a *tacka jat* like Bhattias; merchants and general dealers, ranking here as Wanis. Food: bajra and urid are commonly eaten, also jowra and mung: sweet-oil: fish very scarce and only eaten by Kolis: water from a well, or during the rains from the stream. Guinea-worm then occurs: cholera was here lately, in the cold season, the first case being a Mussulman lad who had come from Mhowa where the disease prevails, yet the next case was a Kunbi boy living in another part of the village and evidence of contact is not forthcoming. I mention this fact as illustrating the difficulty of tracing disease even when it is tolerably certain that propagation by individuals may occur: leprosy is a chronic complaint whose transmission is as yet by no means so approximately ascertained as is that of cholera, and for elucidating its spread prolonged observation is urgently needed. There is no leprosy here: yet the next village to the north (*Gujara*) separated it is true by a large river, has two lepers in it: the disease is even not recollected here, but in this Garassia village I fancy the people were not very willing to communicate.

To *Ranpurda*, 2 miles eastward and also a Garassia village or private property; much uncultivated (arable) land around: hills near, and a large river: an irregular, poorish, wild-looking place, of about 100 houses, it is said, but many in ruins: population chiefly Ahirs (or Rajputs, pardoned outlaws or refugees from Gûkal Mâtûra and originally from Dwârka: the village was founded 80 years ago and belongs to four Garassia brothers): Kumbhars numerous; Kolis, Dhers, Mussulmans. Bajri and urid only eaten, or chenna; no fish. Water from the Shatrunjay river, three-fourths of a mile off (good water), and from a large well (kuwa) at the outskirts of the village, which furnishes brackish water, but is largely resorted to for convenience' sake: such brackish water corrodes the mortar of masonry, as is noticeable here. No guinea-worm here: no leprosy, but two cases are mentioned as being of suspicious character.

1.—M., Kumbhar, *æt.* 35, born near Datha, here for about 10 years, which is also the length of time his symptoms have existed, hence it is doubtful if these latter came on here. It is a characteristic example of advanced A. L.; the middle finger of the right hand was first affected, and an eruption appeared on the same forearm at about this time. The man is now crippled; and I notice the curious limitation of numbness in the hand (both surfaces) to a line traversing the wrist-joint: possibly there is some diminished sensation in the forearm and there are pale spots on the limbs said not to be numb. As the case is of import in diagnosis, I append some details: there is a peculiar expression of the face due to partial paralysis of the right side: nothing visible on the trunk: pale spots at right elbow and on forearm, possibly at back of wrist; the same on the legs; the right hand is alone affected and that extremely so, the terminal phalanges and fingers gone and the nails exist as small pointed knobs tipping the stunted middle phalanges: thumb comparatively less changed, it is stiff; there are atrophy and retraction of the fingers and palm (claw-hand), and bronzing, and universal numbness, even in the palm, extending to just above the wrist, with hardly any change in the usual appearance of the skin at this part. Spots on forearm though rather characteristic in aspect, yet not rounded and with a look foreign to the true leper spot of this variety—are said not to be numbed: on the left forearm and hand are two large pale discolorations, occupying the inner side and back (they are six inches long, and looking like mere pigmentary changes; they are, however, decidedly benumbed): this hand is otherwise quite unaltered. Muscular power is hardly anywhere diminished. Whilst the right foot is not much changed, the left foot is greatly maimed, being shrunken and black, toes wasted and twisted, the whole giving the impression of being mummified or affected with dry gangrene: hence the man's lameness and peculiar gait. Parents not affected: does not know of others like himself (a stupidish man): brothers and sisters not so, they are older than he; cannot explain his being the only sufferer: was working with the hoe in the field when the symptoms came on: fancies some one must have cast a 'spell' over him. Is married: 3 small children, all well; has travelled but chiefly after the beginning of the disease, cannot say anything of his ancestors or of possible contact with other lepers elsewhere: denies syphilis. Lives with his family and eats with his caste-men as if nothing had happened, yet there are running sores. Is said to be the first leper known here.

An obscure case simulating mere neuritis (right hand), but indicating true leprosy (left hand), whence a case of some value in diagnosis: condition of ulnar nerves not ascertained.

2.—The other supposed leper was a woman working in the fields, who was fetched for me to see—the wife of a Kumbhar living close to the above man (whose house is a very poor and dirty place): she is adult and a hard-worker, so that her hands, &c., have the appearance of being much worn: there is, too, some ulceration about the nose, but nowhere that I could see on cursory inspection, any undoubted signs of true leprosy about her: no children: no acknowledged taint.

A case imperfectly investigated, but probably misapprehended as a leper: the influence of hard manual labour, and of long trudging on heated ground, &c., in inducing local neuritis of hands and feet, is a point calling for study: there is, too, the possibility of some infection or inoculation occurring, particularly in the extremities and leading to their first or especial implication.

29th January.—At Wanda, 7 coss to the W. in the plain and on the banks of a stream: about 300 houses: population mixed (1,608), being mostly Kunbis, then Kolis, Kumbhars, 'Sagars' (a kind of Kunbi), Garassia, Bhurwad, artificers, 'Wánka' (wanja), weavers of cloth (cotton), who eat with Sutar, &c.: Khojas; Shrivuk-wanis and Brahmans. Common foods—bajra, jowra; urid, mung; oil from seeds: no fish (which is very scarce here) is consumed, except, perhaps, by the lowest castes. Water from draw-wells only: river-water not used for drinking: no guinea-worm here: fever is the commonest fatal complaint, and chest complaints seem rare. Leprosy occurs. A large, clean village with a new school-house, and

attempts at outward order: heaps of refuse still abound, but in this hot dry air there are no collections of stagnant and foul water, and consequently bad smells are fewer than they might be in an English village: filth here is desiccated, there saturated. Eye-complaints amongst children and adults are not so frequent as would be expected, from the clouds of dust which darken the air at morn and eve, when cattle pass out and in along the narrow lanes, and ploughs are dragged about, not carried; not to mention many other disturbing causes. With so much accretion of decomposing organic matter and germ-bearing dust, one wonders that so many people remain well. The sewage question is disposed of as elsewhere, and a stroll into the lanes surrounding the village, which might be a recreation, becomes unbearable and impossible: children all day long use the common streets, and others during the night in dark lanes; the ground being so dusty and parched, it may be said that the dry earth system is unwittingly here carried out. Wells abound for irrigation purposes, sometimes the water is of good quality as here, and sufficient in amount: surface-water at a depth of about 20 feet at this season, and somewhat lower in the hot weather. The village is said to be thriving: it contains the remains of a round tower or fort, 200 years old; there are a few trees around and some irrigated land.

Lepers seen. 1.—F., Kunbin, *æt.* 32, born at a distance, here for 20 years; disease since 8 years, it began at the great toe of the left foot and then attacked the right foot. A. L.: the woman is intelligent: nose sunken (there has been necrosis of the nasal bones): no eruption detected in the trunk: upper limbs only slightly affected, some fingers are swollen and crooked, on back of right hand is a visicle from a burn, numbness here and on adjoining parts of forearms: feet more changed, left great toe reduced to a mere knob and the other toes atrophied and twisted: right great toe quite gone and the adjoining ones are considerably affected (? internal plantar nerve region): numbness is limited to the parts below the ankle-joint, just as it is most marked below the wrists. Married: 2 daughters of 12 and 8, well: no child born after the beginning of the disease. It is said that her paternal grandfather was a leper: father was free. Her disease came on here, and about that time there were four other lepers in the village, all of whom are now dead (statement from patel), and their children have gone away to Junagurh. The last of these lepers died some seven or eight years ago: three of them were Kolis: they lived in different parts of the village: two were mother and daughter, and one (a Wani) was the father of No. 3 below: the remaining case was a Koli man and seemingly unconnected with the rest: these instances were probably both A. L. and T. L. Syphilis is denied on behalf of both this woman and her husband.

2.—M., Khatri (keeps a shop for condiments, &c.), *æt.* 30, born and resident here: leprosy for 5 years, it began, he thinks, with an eruption on the body, following by implication of the feet and lastly of the hands. At present, there are on the face the signs of early T. L.; ears thickened and pendant; brows overhauling and destitute of hairs: cheeks puffed, opacity of left cornea since infancy. On trunk nothing visible: hands somewhat deformed, the two inner fingers of right hand are tumid, bent, stiff and shortened: in the left hand the little finger has become permanently flexed and shortened, pale and smooth, and its terminal phalanx wasted and deflected, hence the hand at the back looks like that of a painted mediæval saint. Numbness is not marked anywhere except at this little finger. Feet more changed: on the right side the nails are deformed as well as the toes; and so on the left side: a blister on dorsum of fourth toe: existence of numbness uncertain, the man being rather stupid. Parents dead: he is the youngest of 2 brothers and 4 sisters, all well but him: F. was a leper and died 11 years ago, so that it was not until 6 years after the death of his father that he showed the same disease: the father lived here and probably had T. L. for 5 or 6 years before he died. He is the only leper in his family: his nephews and nieces are well. Married and has 3 children *æt.* 13, 10 and 8, none born after the disease began: he lives in the same house as his family, but eats apart: wife separated and well. Denies syphilis, but speaks of a sore about

the time his other symptoms came on : there are no signs of constitutional disease.

3.—M., Wani, *æt.* 20, born and resident here, lives at a distance from the other lepers. States he has had an eruption of 'gajacharma' (eczema) for 4 months ; no fever : the spots persist ; they consist of pale-reddish, oval patches, $\frac{1}{4}$ to $\frac{1}{2}$ inches across (from blending) probably a little raised, quite free from scales ; now wrinkled in a slanting direction and altogether like *L. L. acuta* : largest and coarsest in the loins. There is no numbness in these places : there are excoriations and vesicles on right shoulder : nothing definite in skin of extremities : reddish spots on cheeks, and rims of ears look puffed. These signs are slight, but the people here two months ago had their suspicions roused ; and though it is probable the spots are now subsiding, yet this fact shows the cuteness of popular observation. Ulnar nerves possibly enlarged, not tender : doubtful fulness in groins ; never syphilis ; unmarried. An unwilling witness against himself—yet a leper. Father dead, mother alive, a stout woman : has 2 brothers older, and a sister younger, all well : no family taint is allowed, yet contagion is possible : keeps a shop for oil, goor, &c. : does not work in fields : has been to Mhowa to buy goods, but only two months ago.

A case of incipient leprosy unquestionably, and good for investigation of origin, if one had the clue : the man's house is like the rest : two families live together in a small place : shop apart.

The people here do not suppose leprosy arises from eating fish, for that article of diet is unknown amongst them ; they imagine eating much sugar, rice, oil, &c., in a certain state may cause disease, but have no clear facts or ideas on the subject. Unsound grain may be sold to the poorest people, but disease happens in those who never eat such grain. They suppose the disease to be contagious, yet take no means to isolate their lepers, and would not willingly contribute to their support in an asylum. Only compulsion would make them spend money, and they would submit 'of course' they say, to orders of the Durbar. The same barber shaves all—tainted and others ; only they hesitate to eat with lepers, not being scrupulous about touching, dealing in goods with and in many ways coming into contact with the affected. Here are practices and anomalies which surely call for remedy.

Wanda is near the middle of a line of leper-villages extending back to Jesur and forward to Kundla, with a branch northward and offset to the south, the whole forming a group well worthy of attention from its bearing on the topographical distribution of leprosy in these parts (*vide* PART II.).

To *Piawa*, a mile westward of Wanda, about 200 houses ; population (1,253) mostly Kunbis, 'Sagars' (a class of farmers, labourers, drawers of water, they eat with Suis, Sutars, &c.), Kolis, 'Kathis' (here ranked with Garassias), Wanis, Brahmans, Kumbhars, &c. Food—bajra, jowra, seldom wheat—spiked wheat is grown rather largely this year by irrigation, because the other grain-crops were deficient from the late scanty seasonal rainfall : urid and mung. River-water alone is used : wells for irrigation purposes : the soil is often saline near here. No guinea-worm. One case of leprosy at present.

M., Shrivuk-wani (high caste), *æt.* 50, born and resident here, travels but short distances, to Kundla often, never to sea-coast : a large, hale man and intelligent. Leprosy for 10 years, beginning with numbness at right elbow, afterwards in hands and feet : then swelling of the face. Now the aspect is that of T. L. : nose sunken (worms came away once), a large nodule above root of nose, ears enlarged, &c., nipples gun-cap shaped ; hands bronzed and numbness from just above the wrists downwards, the feet from the ankles. Nothing seen on trunk : white spots on left arm and forearm. Denies syphilis and any family taint ; an elder brother and two younger sisters are well, and their children. Is married : his son and daughter—the former a fine, strong young man—are married and have children : all well. Attributes the disease to eating much sugar (hot, inspissated syrup used in making cakes which he

sells on funeral occasions) ; otherwise he has lived as the rest. Yet on enquiry I find there was a leper (a Bhurwad) formerly here, who died about 15 years ago : had M. L., and was very bad ; ill for 10 years ; lived just outside the town : his son (a healthy man) asserts he was quite isolated, and the Wani does not admit any connection whatever with this lower-caste leper. The Wani is allowed to go about as usual : men will not eat with him, but children are allowed to cluster around and practically no fear of contact exists ; yet the man has excoriations on the fingers and toes, &c.

An obscure instance, but is unwitting contagion as likely as some unknown endemic influence ; and are certain people predisposed to leprosy ? Spontaneity of origin of the disease being an unproductive notion and totally foreign to all that is as yet known of leprosy, can it be said that this malady is ever caused by eating certain kinds of food, especially those liable to fermentation and decomposition ?

30th January.—To *Pithaodi*, 3 coss to the S.E. of Wanda ; a large village in the plain, imbedded in trees ; of the usual diffused construction : 300 houses : population mixed (1,302)—Kunbis, Kumbhars, Kathis, Brahmans, Wanis, Kolis, Rabaris, Bhurwads, Dhers ; a few Sagars, &c. Food : bajra, jowra ; urid, mung : water from the river and wells. No guinea-worm here. N.B.—The wells have seldom steps in these parts. Cholera only in the present cold weather : fever and 'dammah' (asthmatic affections) are common as causes of death : three cases of leprosy known and seen.

1.—M., Kunbi, *æt.* 55, born and resident here, has travelled a little ; does not himself work, being the second or assistant Patel : duration of disease 4 years, and latterly the malady has much progressed ; it began with an eruption on the back of the arms, where there are now small nodules in the skin ; the face was implicated 8 months ago and it now shows decided T. L., the brows being studded with very numerous, small, reddish nodules : hairs gone here, not on lips or chin ; eyes staring ; nose and cheeks bronzed and puffed : ears enlarged. Trunk :—front and back, studded with many reddish, flattened nodules which are most abundant over the abdomen and loins : nipples much enlarged. Arms, also thus studded ; hands swollen and dark, ends of fingers clubbed ; some numbness of forearms and hands : feet in a similar state, nails here deformed, great toes a little atrophied, probably some numbness here, but the man is rather stupid in answering my questions. Syphilis is denied. Father alive and well : mother dead, she was also free : brothers and sisters all well : married and has 7 children, *viz.*, 4 sons and 3 daughters, the eldest being 35, the youngest 15 ; all are well. F. B. wife had the disease, also her daughter (who is No. 2 below), strict hereditary taint is therefore denied (but see further down). Cannot account for his disease ; was living here as usual when it came on : general health fair, lodges apart but goes about freely and has only within the last few days eaten alone, so that ample opportunity for contact has hitherto existed, and it remains to be seen if this was done with impunity.

A decided instance of the worst form of leprosy, happening in a well-to-do man, past middle age.

2.—F., Kunbin, *æt.* 40, born and resident here, has journeyed but little : disease for 25 years, it began in the hands with contraction of fingers, &c. At present, this woman presents most marked features of A. L. : nothing on the face, but the hapless expression common to this affection : on the trunk, so far as seen, are some traces of pale eruption (not benumbed ?). Hands strikingly mutilated, one finger entirely gone, the rest mere stumps, tipped with the remnant of a nail : feet still more destroyed, for not only the toes and metatarsus, but the front of the tarsus itself, are gone, and yet the tips of the toes remain—a most striking illustration of interstitial absorption. Her mother had leprosy (T. L.) and it began in this child just before the mother died, upwards of 20 years ago ; has two brothers alive and well : one brother and a sister are dead ; they died of leprosy (T. L.). Married (ceremonially) but never lived with her husband ; consequently no children. The leper sister died about 18 years ago, and 11 years since the brother died. One of the surviving brothers is here, *æt.* 35, looks well (but is pale and perhaps not really sound), he is a farmer, has 2 sons and 3 daughters, who are well, the sons are aged 3 and 1, the daughters 10, 7, and 5 years. The woman lives apart.

An instance bringing to mind the worst seen in Norway and Syria: here, as is usual, both heredity and contagion seem possible: a leprous family, yet with almost inexplicable selection of disease.

3.—M., Kathi, *æt.* 65, bed-ridden, helpless and miserably lodged. Born and resident here: has travelled in the district, but occupation that of agriculturist. Leprosy for 18 years; it began with an eruption in the skin, described as like that of No. 1. A cripple, but intelligent; on the face are some signs of T. L., ears enlarged, &c.: nothing visible on trunk; nipples enlarged: hands bronzed and wrinkled, fingers atrophied, nails altered and numbness. Feet greatly distorted: some of toes gone, ulcers on the rest, so that he has not been able to walk for 8 years. Parents not affected: he denies all taint: his brother is here and well; 2 sisters now dead, were well; he is the only one affected. Married, has 4 sons and 3 daughters: saw 3 of the former, who are grown up and well, and all the others, with their children, are well. Lives alone in a straw hovel, close to a cattle-shed and a few yards away from his old home; all these people are very poor, yet none want food, and the sons are very attentive to their aged leper father, who boasts to me that when he knocks with his stick three men run out to help him, and when he asks for a bit, they give him handfuls to eat. Causation of disease quite unknown.

A pitiable yet affecting sight; a case well-fitted for an asylum, yet it is more than doubtful if they would let him go.

Saw here a case of Mycetoma or fungus-foot disease; the woman promises to go to Kundla, where I am to be shortly.

To *Senjal*, 3 miles *en retour* to Wanda, situated on the banks of a stream and environed with trees; a small irregular, feudal-like village of about 90 houses: population (599) mixed as usual: Kunbis, Garassias, &c.: in this place the 'Sagars' eat with Kumbhars and intermarry with themselves alone, seemingly a subordinate and inferior Kunbi caste: 'Kathis' are the head-men, Rajputs but of irregular origin and inferior rank. Food—bajra, jowra; urid, mung: water from the river only, and from holes dug in its bed during the dry season. No guinea-worm seen. There were two lepers here lately but one has returned to *Dudhola* where he permanently lives; an old man with A. L. (?) who comes here once or twice a year to see his sister, and has done so for 30 years past.

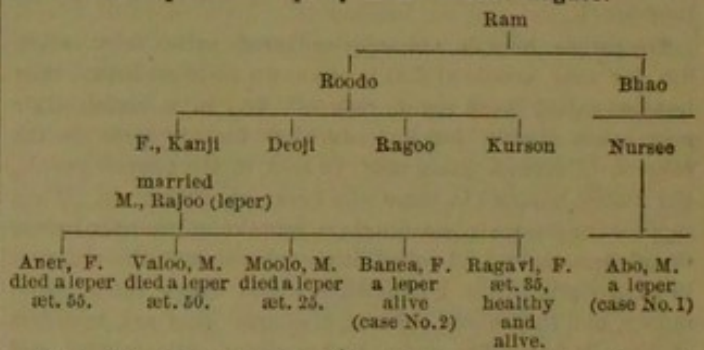
Case seen.—M., Kumbhar, *æt.* 30, born and resident here, has been to Mhowa (sea-coast), &c. Leprosy for 15 years, it began with an eruption of small swellings on the body, and now there are dark livid stains, depressed and wrinkled, on the back and shoulders, which may indicate the site of former acute eruptions. The man is pale and anæmic, but intelligent enough: facial expression rather vacant and some palsy exists, perhaps most on the right side; lower half of each cornea opaque (for 2 years) and incipient ectropium—the consequences of paralysis. Nothing visible on the trunk, which is fairly nourished. Hands a striking illustration of extreme deformity from nerve-lepra (N. L.): all fingers nearly gone and palms atrophied: no bronzing, but almost every degree of deformity: it is stated that during the first few years of the disease, there was decided numbness of the hands and fore-arms below the elbow, but that since the past four years, this has subsided and sensation has quite returned so that he now feels the least contact and even the crawling of insects. Former excoriations have also dried up, and certainly the skin looks fairly healthy in tint and texture on all parts of the remaining stumps: he manipulates the latter without hesitation and with a certain facility, which indicates that muscular power is by no means very defective in these limbs. It is curious to notice the little remnant of original nails, in the mere knobs now representing the fingers and thumbs: thus, absorption has been solely interstitial. The feet are, if possible, still more affected than the hands; they are a perfect picture of the extreme degree: both great toes absolutely gone: all metatarsal bones are defective, and the smaller toes remain only as knobs: there are sores underneath these stumps: there is numbness still in the feet, but it, too, is less than at first.

Parents died of fever; is married and has 3 daughters, aged 11, 5 and *one* year; there is a son of 15; thus, all

these children were born since the onset of the malady of their father: the wife is still young, and like the children, quite healthy. Denies syphilis: never ate fish; cannot account for his disease and, like his neighbours, is quite unconcerned about it. Went to his house, a small, cooped-up, mud hut, one end of which is closed merely by sticks and scanty dabs of plaster: the man himself stays in a straw hovel, a yard off and stuck against an adjoining gable: all is most wretched, but yet more depressing to see the two nude children of 5 and 1 years, who have to own this man as their father; the infant is indeed a chubby one, but the future of this young family should be matter of concern.

Here, then, is an instance which recalls scenes in Candia; and all that can be said in mitigation of the dread such are fit to inspire, is the hope that this thoughtless parent is virtually cured of his leprosy by a spontaneous subsidence, which, it may be said, is the best result that can be looked for, whether the case have been under medical treatment or not. Here we learn, too, that in A. L. the reproductive powers are not necessarily impaired in the male.

Memo.—I append a geneological table of cases Nos. 1 and 2, which were seen at Pithaodi: it shows that there might be a double taint in the woman, with the result of a large development of disease: that one of the children (her sister) is free, may not be true ultimately, for there is ample time for the development of leprosy in the woman Ragavi.



It is also seen that case No. 1 is connected by descent, though distantly, with case No. 2: it is not however known that their common ancestor Ram was a leper, and I could learn nothing more by questions than what is here expressed of a common parentage, rather than of a common taint.

31st January.—To *Wansiali*, 3 miles south of Wanda and not very distant from low hills; a stream runs by: there are trees and uneven ground: upwards of 150 houses: population 930 mixed, Koli, Kunbi, Kathi, Rabari, Ahir (rank as Kathis and below Kunbis, though the pretence is higher), artificers, &c. Food: jowra, bajra; urid, mung or toor: drinking-water from a large well situated in the bed of the stream: no fish used as food. Guinea-worm occurred here last hot weather for the first time within living memory, yet no changes in the water-supply are mentioned which seem capable of accounting for this outbreak; the previous rains were abundant and the well had not been touched; it is true that the last rains of all were very scanty indeed, but since the *filaria* probably requires a year to develop itself in the human frame its host, this dry state of the soil around can hardly be concerned in the present instance. Subsequently to the last rains the well has been cleaned, but for three years it had not been emptied of muddy and fould sediments, yet the water was not 'bad' they say, and in short no cause is known for this sudden development of the parasite. People from a distance having the guinea-worm had not come here to reside: 15 houses had the worm, but the 14 houses of the Dhers who make use of a different well escaped altogether. The parasite appeared in the usual spots of the body of those affected. Fever is frequent in November; coughs in the rains. I cannot learn if leprosy has long prevailed here and if it is increasing or diminishing; but five cases are seen:—

1.—M., Brahman, *æt.* 52, name Valabbjee Govindjee, born at a distance, but resident here 46 years: a trader and has travelled, spending long periods in Bombay,

where he was residing when the disease appeared: its duration is 10 years. It began with numbness of back of hands and feet, below the wrists and ankles. Now, there is well-marked T. L.: face characteristically affected: hands swollen and excoriated over knuckles: fingers partly deformed, numbness is present: feet similarly affected: running sores in the soles. Nipples hardly changed; no perceptible eruption on the trunk. Nose much depressed and hard palate perforated: had syphilis when a youth: no other clear signs now of constitutional taint; palate affected since 4 years only, but the deterioration of structure is probably not leprous.

Parents free, yet he mentions a relative as having been affected, *viz.*, his F. B. son—a cousin—rather older than himself, who lived in this village and died 8 years ago, after 3 years' illness (probably T. L.) which arose here. Married: 4 children—boy of 15, daughters of 14, 8 and 5 years: saw them and the wife (æ. 35), all very healthy-looking. Yet this man has been a leper for 10 years: and even now can hardly be said to live separately: his house consists of a room squeezed in between others; he lives on charity and the work of others. Attributes his disease to eating oranges on boardship when he was sick: is not aware of having been in contact with lepers, but yet inconsistently admits he used to sit with his leper-cousin, whose house was at a distance from his. He is of tall and stalwart frame: and sufficiently intelligent in common matters.

A true leper: disease perhaps acquired in Bombay where lepers are under no restrictions, yet there is evidence of a family taint and of a possibility of contagion from this same relative, so that the *vera causa* of his disease remains undetermined between two possible influences: a sad illustration of popular apathy respecting the likely spread of the disease, through the offspring and companions of a man long and severely affected.

2.—M., Koli, æt. 25, name Kursat Raja, born and resident here, has been to work near the sea-coast: has never eaten fish: a grass-cutter by occupation. Disease for 5 years; it began with vesicles and numbness on the hands and feet: was here at the time and working as a labourer in the cold season: 2 years since, the hairs fell from the brows. At present, he shows the sign of N. L. in the extremities: left hand a 'claw' and right foot deformed: numbness in both arms and legs: no eruption now visible on the trunk, but on the face some thickening of the brows, of pinkish hue, total loss of hair and numbness (T. L.); the whole imparting a characteristic expression, which leads to the inference that the deformity of the hands, &c., is not due to mere neuritis, but to leprous lesion of the nerves. In fair general condition, and intelligent. Denies syphilis, and also a leprous taint in his ancestors: is not married: has 4 brothers and 2 sisters, who are here, and, with their children, all well: he is the youngest of all: and cannot imagine how he got the disease; does not admit contact with other lepers, has lived and worked as the rest; lives alone with his mother. There are a few leucodermic spots on the chest: the crossing of nerve-disease I have noticed before, it is hard to understand: the man has sores on the right foot.

3 and 4.—Two brothers, æt. 40 and 30; tailors by trade; both present.

a.—Kala Jetha (eldest), born at distance, lived here for 30 years and has not travelled any considerable distance; disease for 10 years; it began with an eruption of nodules or patches on the body, attended with burning pains (fever? neuritis?) in limbs, so severe that he had to keep his bed for two years; then numbness came on in the limbs. At present the eyes stare from absence of lashes, hair on brows defective only at outer side; quite recently pink nodules on left brow and temple, cheeks feel (and are) puffed; ears little changed. On the trunk only a few scattered nodules are now visible; skin of arms studded with nodules of varying size—back of arm and outer side of forearm; fingers display nerve-disease, both little fingers being bent and stiff, glossy and excoriated; thumbs least altered, nails much distorted; lower extremities similarly affected, but there is more absorption of the digits, great toes atrophied and some of the smaller toes are gone. Nipples not changed. In fair general condition and intelligent: syphilis is denied: is married and has 2 children, a daughter of 10 and a son of 6 (born therefore after his disease began): separated from his wife only a year. Cannot account for all this; has lived as other people: was working here as a tailor when it came on and

may have repaired the clothes of the Brahman or other leper—cannot now say.

b.—Arjun Jetha (younger man), born in the family home (in the neighbouring Jamnuggur State) and here since 3 years of age: has travelled only to see his relatives: diseased for 4 years; first there was on the back of the middle finger of right hand, a red swelling which even now sometimes recurs (febrile exacerbation?); numbness followed: afterwards the feet became affected. Face—little changed, yet peculiar, there being a flushed, bare look, and quite lately (two weeks) the brows have shown a reddish intumescence, smooth and shining, and the cheeks partake of a similar aspect, a gnawing or throbbing sensation being felt there; lobules of ears also changed; lower lashes of eyelids gone, hence a staring gaze. On the back a reddish blush widely prevails; on the arms the same, with distinct nodules in places: right little finger flexed, and some of the other fingers in this and the opposite hand are also distorted: all are tumid, finely wrinkled and shiny: palms atrophied: only right hand weak. The two outer toes of the right foot are remarkably displaced upwards and backwards, seemingly from interstitial absorption of heads of metatarsal bones, this change occurred a year ago; the other toes resemble the fingers and also those of the left foot: all these parts of the hands and feet are bronzed in tint. Arms benumbed from below the shoulders, and legs from below the knees: nipples unchanged. Denies syphilis: married and has a son of 3 years.

a and b are brothers; parents free from disease and all ancestors they say: a third remaining brother is here, of intermediate age, born and reared as the rest, has also worked with them in the same house: he looks as if free from leprous taint. All these three families reside in close contiguity: saw their houses, practically there is no separation: the two lepers cannot work and the third brother therefore supports them both (according to caste injunction) by his labours as a tailor. No apparent reason for the exemption of this man—he rather supposes his brothers have been great sinners: he is married and has 3 healthy children. There are 2 sisters in the family, intermediate in age, reared in the same house and resident with their husbands at a distance: they and their children are well.

A very striking instance, yet obscure in many points: contagion is surely possible in the village, yet why so limited does not appear.

5.—F., Kolin, æt. 50, name Ajoo, birth-place unknown, here since her marriage near 40 years ago: disease for about 5 years; it began while she was at work in the fields, with fever at night and swelling of the hands and feet in the morning. Now, T. L. on the brows, more especially where the hairs are gone: hands present all the signs of N. L. and in both the little fingers are most affected; that on the left side being almost wholly absorbed; on the right side, it is bent and shortened: nails stunted. Feet very greatly affected, the toes being stumpy, wasted and excoriated. I did not examine the trunk. Denies all leprous taint in her family: 25 years a widow: no children: husband was well, his brother is here and supports her: she does not live near the other Koli leper, and cannot account for the disease: general condition tolerable; lives apart, cooking her own food.

Another obscure case.

The village is unusually clean; visited the tailors' houses; the leper's children are healthy, one has just got the measles (?). The Koli woman's house is clean; saw also the Brahman's house. Examined the well; it was built 25 years ago and is of stone: no steps and a high plinth: mud around. There is an old circular fort here: the place looks now prosperous. An interesting day, but leaving matters much as they were: in fact, here alone is the material for a week's study and far beyond the scope of a few hours. The above details are given because of the rather exceptional frequency of recent, severe and non-hereditary leprosy which they serve to record; and for future comparison, when it shall be seen whether or not other inhabitants have become implicated. Such comparison it is my aim to favour, by herein furnishing the needful minutiae of what I saw and heard; some prolixity is therefore inevitable, in this hand-book of leprosy in parts of Kattiawar.

1st February.—To Solna, 2 coss eastward of Wanda, away from hills, surrounded by trees, a shallow stream at

hand, now dry; an irregular village with the usual heaps of rubbish and ruins: about 250 houses, and a population (1,131) of Kunbis, Kolis, Brahmans, Wanis, Kathis, &c. Food—bajra, jowra; urid and mung: water from draw-wells only. No guinea-worm here: but one leper is known, he is away just now: I saw his brother (an anæmic man, yet free from all apparent disease) who, with others, gives the following information:—

An adult Koli, 2 years a leper (has probably T. L.), a labourer, born elsewhere, here for 5 years and has travelled about; is the youngest of 4 brothers, there are also 3 sisters, 1 younger and 2 older than the leper; all except him free from this malady, nor is there any previous family taint, so far as known. Is married and has a daughter 1 year old. Cause of disease in this man not surmised.

It is asserted by the old patel and his aged friends who were collected together, that previously to this instance leprosy was unknown in the village. Judging from appearances one might have anticipated the reverse, if insanitary conditions are exclusively concerned with the production of the disease.

To *Bhamodra*, 1 coss to the east in the open plain: trees and a prominent square tower, the new house of the reigning Garassia; an irregularly built place of 250 houses and 1,279 inhabitants; the people are Kunbis, Kathis, Kolis, &c. Food—bajra, jowra; urid and mung: well-water. No guinea-worm: three cases of leprosy are known; the disease is termed *Kodia*, but the more accurate name of *Patia* is understood.

1.—M., Ahir (the caste is low but pretentious, will eat with Kathis, but not intermarry; acknowledged to be lower than Kunbi, Sutar or Kumbhar—a different report to common, but conditions are rather peculiar here, as two Garassia [Kathi] families overrule the rest, patel and all), æt. 50, born at a distance, here for 40 years, has not travelled far, holds land on a feudal tenure of servitude: disease for 4 years, it began with numbness of the right great toe, then the hands were affected and vesicles appeared. A case of N. L.; face and ears hardly changed, yet complexion is anæmic and there are dark, shiny stains: on the trunk much hair, no eruption visible: hands somewhat atrophied and wrinkled, inner finger stumpy, nails gone, numbness at outer and back surfaces of arm and pronounced on back of hand and elbows, where are vesicles and excoriations: muscular power hardly impaired in the rather thin arms. Lower extremities in a similar state: great toes eroded at tips and so some others, with vesicles, numbness of feet and again at front of knees (vesicles here). Family taint denied; a brother and sister near his own age died of fever (which is very common here): he cannot account for this disease in himself alone. Is married: has 3 sons and a daughter, the youngest 8 years; all well. Was in this place when the thing came on, cannot recollect any particular circumstance concerned at the time, was then working hard in the fields: never ate fish, never had syphilis: lives barely apart, looks thin but the trunk is not emaciated.

An instance of neuritis, obscure in origin if not due to hard work and exposure.

2.—F., Kathi caste, æt. 50, born at a distance, here for 40 years and has not left the village: disease since 8 years, there were first vesicles and numbness of the hands and feet: it is also a marked case of N. L. Nothing on the face; trunk not inspected, any eruption is denied: the hands are a picture of the consequences of nerve-disease—'claws'—numbness as far as elbows: feet equally deformed, some toes on left foot entirely gone: numbness as high as knees. Husband a farmer: she has a son and daughter of 10 and 20; all are well: family taint is denied; was here when the disease came on and doing only her household work. Does not live near No. 1. Her sister lived here, dying 8 years ago of fever; she cannot account for herself alone being affected: general condition fair: still lives with her family.

A still more obscure case of neuritis.

3.—Described as a Koli man, equally solitary in his sufferings: not seen, as he is away.

The patel and others are too reticent or unobservant to give any history of leprosy in this village: they declare the above are the only instances ever known here, but a leper

woman at Kundla (case No. 11) referred her disease to this locality; and the people assembled were unwilling to speak freely in the presence of the Kathi Garassia (Mr. Bhoj Kamāni), who took a prominent part in my enquiries and afterwards acted as the hospitable host.

Then to *Mehda*, 2 coss to the N.E., further in the plains; walled; upwards of 100 houses and 746 people who are Kolis, Kunbis, Lobanas, &c.: food—bajra, jowra, &c.: well-water. No guinea-worm: one leper.

M., Barber, æt. 50, born at a distance, here for 20 years, has not travelled far; disease for 7 years: he had hiccough (? indigestion) for several days, then came blisters and numbness on the fingers; at this time was plying his vocation here, and cannot account for these symptoms: is in fair bodily condition. Nothing noticed on the face: trunk (back and front) covered with large, pale-reddish patches and the same extend to the arms; are not benumbed on the trunk: bands greatly mutilated, the two last phalangeal rows are gone and on left hand the whole of the little finger, numbness almost limited to back of hand or reaching very little above the wrist. Feet less affected: there is numbness below ankles and including the soles: some distortion of left foot. Muscular power in limbs hardly impaired. Parents and older ancestors never thus affected: is married and has 3 sons of 12, 10 and 8; saw them; they look well; has a sister who is well. No other leper here before this man came (?); he does not shave in other villages; denies syphilis and cannot account for his disease.

On further enquiry I learn there was a Lobano leper living here, who died soon after this man came and might have been shaved by him; he seems to have had T. L. and did not live near the barber. If a possibility of contagion be allowed, it must then be admitted that the period of incubation (or of very mild manifestation) was considerable, extending over some 10 years or more, and this is often an inevitable inference, which as it seems *primâ facie* to point to an improbability, can only be amended by supposing that the disease has lasted longer in the second subject, than is commonly stated—a not unreasonable supposition as matters are as yet understood.

This man goes about as usual: wife dead; lives with his sons who shave the people. One or two of these lads have pale spots on the cheeks, but such an appearance is not infrequent in children here and may possibly be scars from excoriation of the dark-hued cuticle, which require a long time to assume their complete pigmented character. Their father is a true leper.

3rd February.—At *Kundla*, 6 coss to the W. A large town, the head-quarters of administration for a populous district all around: situated in the plain, divided by a strictly local stream into Kundla proper (1,900 houses with 5,274 people) and the suburb of Sawar (1,600 houses with 5,063 inhabitants); soil volcanic; cultivated and arable land, marsh and rock in the neighbourhood; trees few. Houses constructed chiefly of mud and stones: tiled: brick and worked masonry are not unfrequent and a few superior buildings—especially those of the administration—are solidly and well constructed: imperfect fortifications on the elevated area occupied by the town. People of various castes—Wanis of two kinds, Brahmans, Kolis, Kumbhars, weavers, artificers, Dhers, Mussulmans. Food—bajra and jowra, some wheat and rice; urid, mung, &c.: very little animal food is eaten, and then only by the Mussulmans and some Kolis, &c.: fresh fish is very scarce, some salt fish is imported from the nearest port: the great majority of the people follow their leaders the Mahajans in being strict vegetarians, and in opposing all destruction of animal life of any kind and for any purposes. Drinking-water chiefly from the river, whose dry bed is now (February) dotted over with small pits, whence water is taken by women after slow percolation through the superficial gravelly stratum: the wells vary in depth according to their position, and those at a distance from the river generally furnish only brackish water; some

are said to give rise to guinea-worm; according to elevation, the ground-water varies from 8 to 30 feet at this season. Much milk is consumed here, chiefly after removal of the oil and in the form of whey or 'chass'; eggs are not eaten by the majority: fresh vegetables are supplied to the markets from gardens around. Condiments, tobacco, opium and spirits are to be procured. Some beginnings of social sanitation are now being undertaken by the newly-formed Municipality: indeed, the need of domestic hygiene is obvious to any visitor, and an equally crying want is the supply of better drinking-water. As I am not aware that the leprous disease can be attributed to merely insanitary defects, it will not be necessary to dwell on the present state of Kundla (where leprosy is rather common), but reference should be made to a custom of storing grain which is largely in force here. I am assured that spoilt grain is hardly ever consumed by the people; it is very rarely indeed offered for sale. Bajra and jowari are preserved as usual by the free admixture of fire-ashes to the grain, but in addition it is now customary (*i.e.*, within the last 12 years, when the Swami Narayan sect introduced the plan) to add 5 tolas weight or 1 chhatauk= $2\frac{1}{17}$ ozs. avoid., of quicksilver to the ashes used for mixing with 20 mans or 1 khandi of grain, equal to about 600 lbs. weight. This addition of pure mercury is made for the purpose of checking the development of insects, and in sufficient amount doubtless the oxidised mineral will serve that purpose. I need only add that here the proportion is very small—about 1 to 6,400 parts by weight—and whether effectual as a vermifuge or not, as the grain is thoroughly dried and sifted before being ground and cooked, it is not likely that a hurtful, or even perceptible, quantity of mercury would often be introduced into the common food. This practice, therefore, so long as it remains thus, can hardly be regarded as necessarily injurious to health, and much less can it be said to cause or induce the onset of the malady under special notice. I have found no evidence that merely decayed or unsound grain can produce the leprous disease; nor is it at all apparent that this malady is commonly aggravated thereby.

In the official lists the number of lepers is entered as 14 in Kundla and 15 in Sawar; total 29, and 28 is the number I saw. But the sagacious Native doctor of the dispensary here—Mr. Chintamon Mahadeo—inform me that there are at least 12 more lepers in the town, since he has found as many subsequently to the first list being made out. Owing to the unrestricted movements of these poor creatures, one seldom finds them all at home.

Respecting the previous history of leprosy at Kundla, I could not obtain any data, official attention not having been directed to this subject; but I found a general impression to prevail that the leprous malady is decidedly more frequent than formerly. From my list it will be seen that the majority of existing cases are of recent origin. No restrictions whatever are in force against the movements and marriages of lepers, and popular opinion which is only too apt to relapse in favour of inaction, has never been guided and steadied in the better method of dealing with this unfortunate class of sufferers. The investigation of a complaint of a kind which is so unwillingly acknowledged, is especially difficult in large towns; and it is to the active co-operation of Mr. Chintamon Mahadeo that I owe not a little of the material here recorded. First, all the lepers who could be found were called on successive days to the local dispensary; others I saw in their houses, and the residences of the remaining individuals were visited on the following days. Details are in every case mentioned, because future observers may be helped thereby.

Instances seen and examined at Kundla (names are on record):—

1.—M., Mal-wani, æt. 22, born and resident here, has not travelled far (could not); 12 years affected: the disease arose here while he attended school: it began on the hands. He is cachectic but has hardly the leper look: nothing seen on the trunk: nipples small: hands greatly mutilated (N. L.), all the fingers being reduced to the last phalanx, on the left hand no trace remaining of their presence: yet fair muscular power remains and he can freely use the stumps: complete loss of feeling in the latter and on both adjoining surfaces of the forearm for 4 to 6 inches above the wrists at an irregular line: excoriations in the palms, &c. Feet similarly affected, and the left foot the most; is a cripple therefrom: complete numbness to half way up the leg (? as high as the branches of the musculo-cutaneous nerve). A sad case: his brother is No. 2.

2.—Elder brother of No. 1, æt. 25, born here and has travelled a little: leprosy for 5 or 6 years, it came on with great weakness and fever (?), he had Billa-ma (marking nut) applied, and dates the disease from that time: at first the right little finger became numbed and bent and then the other fingers of the same hand. At present, nothing particular on the face; he is thin but healthy-looking: on the trunk, front and back, are large, light-colored patches, having a rounded contour; they look characteristic, are said to have come out just before the numbness, are now stationary and probably somewhat benumbed: nipples unchanged. Hands greatly distorted: the right hand a 'claw'; the left beginning to assume the same deformity, its little finger being already bent and stiff, the others he can still extend by force: vesicles on the fingers here: general numbness of right hand reaching about 3 inches above the wrist; in the left, where disease is less advanced, some tactile sensation remains in the centre of the palm. Feet less changed; right foot probably benumbed in front; of left foot, great toe atrophied and all toe benumbed on the back—not the lower surface.

Father of these lads is dead: mother alive and well. Father had not the disease but his mother (F. M.) had; it arose at Kundla. No other brother: 2 sisters, one died some years ago of the same malady, the other sister (æt. 18) is alive and yet well, and her child also: she left here 4 years ago: previously all the family lived together. Here then is a remarkable instance of neuritis (N. L.) or if the eruption of No. 2 is leprous, of A. L. proper: if the affection of both lads be regarded as mere inflammation of the nerves, then there would be the noteworthy character of heredity (or contagion) attaching to it, and this is striking enough. The order of affection was as follows:—F. M. (paternal grandmother), eldest brother, eldest sister, younger brother; all lepers: the youngest sister is still unaffected, and she is now removed from this sphere of influence.

3.—F., Mod-wani, æt. 70, born and mostly resident here; disease for 8 years, it began with a vesicle in little toe of right foot: was here at the time and living at home, it occurred in the cold season and has not spread. A hale old woman: nothing in face: trunk not inspected: nothing special visible on the hands, the numbness on the back of the left hand seems to be referrible to a Colles' fracture of the radius. Numbness on front of left foot, without decided change of aspect: right foot most affected, the anterior part being dark, shrivelled as if mummified; two outer toes gone, the next two are shortened and the great toe is decidedly wasted at its tip. There is want of sensation above the line of atrophied skin: numbness of sole, doubtful. A widow. Asserts that F. B. (paternal uncle) and her S. (sister) had this or like disease (T. L.?), also her H. B. (husband's elder brother): husband was well: the uncle lived in her house and died there about 40 years ago, and the sister lived with her, dying 2 years ago; she was affected before her sister, but the connection of either with the uncle seems only remote: one cannot push enquiry further.

No children: cannot account for the disease; it is now stationary: no open sores: is not separated from her friends; most probably—certainly—no syphilis.

4.—F., Shrivuk-wani, æt. 50, widow, born at Datha (where leprosy exists), resident here 35 years, has travelled but little: disease 2 years, it began with itching or pricking sensation in the fingers, followed by numbness: toes then similarly affected: was here at the time and at home. Now, nothing apparent on the face: on hands, thumbs and adjoining fingers swollen, tips gone: remaining fingers

not healthy : numbness on both surfaces reaching as high as middle of forearm. Only slight deformity of feet, but numbness everywhere to about 3 inches above the ankle. No family taint : her three daughters and son are well : knows nothing of contact with lepers, cannot account for her disease (which is said to be almost stationary), does not live separate ; no open sores ; syphilis not anticipated : general condition tolerable.

5.—F., Shrivuk-wani, æt. 60, born elsewhere, here 45 years ; has travelled a little : 2 years' disease which began in rainy season with numbness of the fingers. On face nothing abnormal ; hands much deformed, incipient 'claw' on left side and clear nerve-disease on right : little finger of left hand much bent : there are vesicles and excoriations : on right side numbness limited to the affected fingers, on left side to the tips of the fingers. Feet not much changed, but great toe of right foot is atrophied : doubtful numbness here. General condition fair : denies all taint : husband and children well. A stranger leper of the same caste stayed in her house five years ago, and she cannot account for her disease otherwise than by possible contagion from him.

6.—M., Kumbhar, æt. 70, agriculturist, born here, has not travelled far ; disease for 2 years, it came on in cold weather with pricking sensations in left foot, then in hands : was working in the fields about here at that time. On the face nothing seen, and nothing defined on the trunk : hands wrinkled and possibly numbed at their back. On the feet sores—beneath great toe and on sole : not much else to be seen here and hence diagnosis doubtful : yet there are perhaps bronzed and tumid spots in the face, nose, &c., and vesicles appear on the feet. Hale ; denies all taint.

Here are 4 cases presenting common characters : all are elderly people and all show some signs of nerve-lesion in the extremities. They came before me in succession, and possibly have been associated in the popular mind as forming a group of themselves ; they are called lepers, but it is open to question if their disease be not a milder affection than true leprosy. Such a suspicion crossed my thoughts, yet upon reflection I am not able to coincide with this sceptical view ; at least, I know of no other defined malady which accords with these symptoms and history, except that almost protean one which it is my object to elucidate.

7.—F., Kumbhar, æt. 30, labourer ; born at a distance here for 30 years and has not travelled far ; 3 years' disease which began in the cold season with tingling in the hands, followed by numbness. There is flushing of the cheeks, and the eyes look round : trunk not examined ; hands not deformed, but tips of fingers shrunk and little fingers bent ; there is decided numbness out of all proportion to the extent of these visible changes. Feet greatly diseased, some of the toes being quite gone—both great toes—and there are ulcers here : great numbness all up the leg ; the parts of the feet not destroyed, are not wasted, but rather plumper than usual, yet here sensation is defective. Her father was well : mother had the same disease and died 15 years ago : one brother had the same and died 10 years ago : her husband's mother had the same and died 3 years ago ; also the daughter of this woman was a leper : husband is alive and well, a son of 11, is also well : her mother-in-law and husband's sister lived in her house. Cannot account for the disease, which began here while she was working as a labourer : her disease is increasing, there are running sores on the toes : she is in tolerable condition and lives somewhat apart from her family.

Both heredity and contagion seem possible in this case.

8.—M., Brabman, æt. 37, a mendicant : born here and has travelled to shrines ; 4 years affected ; the disease began with tingling of soles and palms, in the cold season ; then spots came out on outer side of both arms, just below elbows, and on front of left knee, below the knee-cap : at these places the skin is now smooth and atrophied, palish, with a darker contour, barely visible but still characteristic as being associated with decided numbness, limited to them. There is a suspicious thickening of rims of ears, and face looks puffed and dark ; the nose is depressed ; eyebrows entire. In very good bodily condition, stout and well-formed : symptoms now quiescent. In the hot season the cuticle of the soles which becomes cracked in the cold weather, heals of itself, and remains whole during the rains. Seems to have had syphilis 12 years ago ; now no signs of the diathesis. Father was a leper (T. L.) and died 10 years ago ; he had been affected for 10 years. Mother was well : his brothers died young ; a sister is well : no previous family taint is known.

Wife living and well, and so a daughter of 8 and a son of 1½ years. A supposed cause of the disease was drinking hot syrup. He is not separated from his family. Father lived and was born here ; his previous ancestors did not reside at Kundla.

Diagnosis hardly doubtful and strengthened by family history.

9.—M., Wais-wani, æt. 40, no occupation ; born at a distance, here for 30 years and has travelled about. The disease began in the hot season 12 years ago, the little finger of right hand becoming numb at the back and bent ; the numbness then spread, and it seems there were patches on the arms and trunk, which were benumbed and have now subsided. At present, nothing unusual is visible on the face ; on the neck is a spot of 'carolea'—a scaly eruption like sibbla (*tinea*) which they know to be not leprosy. The hands are 'claw-hands' ; the feet are greatly distorted : decided numbness on both parts and on the adjoining surfaces of the limbs. Parents well, but a cousin—M. F. B. son—had the disease : wife living and well, and so a son of 11. Contact with lepers not known : supposed cause of the disease eating much sugar. In good bodily condition.

4th February.—Kundla-cum-Sawar continued.

10.—M., Wanja (Hindu), æt. 45, born here and has not travelled : duration of disease 4 years, it began in November with fever and a burning sensation in the lower limbs. The face now shows signs of early T. L., brows thickened, nose and cheeks are bronzed and shiny, rim of ears decidedly swollen, hairs few on brows ; there is wide roughness, redness and thickening of skin of back, skin of arms also tumefied, wrinkled and bronzed. Pricking and burning sensations at back of hands, and lower limbs similarly affected, only the toes are still more tumefied, bronzed and glossy : nails reduced to mere knobs of horn : no actual numbness on feet, but a burning sensation from knees downwards. It is said that F. F. (paternal grandfather) had the disease, but no one else : his four brothers are also well. Married ; wife, 3 sons and 4 daughters are well. A son of 14 is here with some suspicious marks on him ; they are large pale discolorations of the skin, looking like some parasitic disease but are not the seat of itching sensation, and they are attended with some atrophy : situation back of shoulders and front of abdomen : duration 1½ years ; not benumbed : they are peculiar and in a leper would be regarded as leprosy. This is the youngest son ; no other child has the like. The man denies contact with lepers and cannot account for his disease : he was working at his trade here when it came on (a weaver) ; it is spreading. He lives in the common home : has no open sores : general condition fair and never had syphilis.

11.—F., Khatri (silk-weaver), æt. 40, born and resident here ; 5 years a leper, first there was a sense of heat in the body, followed by numbness : was working as usual when it came on. Nothing very marked on the face : trunk not inspected ; hands affected with N. L. ; the two inner fingers of right hand being bent and stiff, and so those of the left to a less extent : there is wide numbness from the elbows downwards. The feet are more changed, especially the left foot ; toes absorbed and bent ; wide numbness here. General condition fair : denies all taint ; is married and has a son and daughter, both well. Has been in contact with lepers, but cannot account for her disease : has lived and worked as the rest of her people ; is now lodged apart. She seems to suffer from general pains, liable to exacerbation : no syphilis.

12.—F., Mussulmani, æt. 40, weaver : born here and resident for 30 years ; has travelled a little. Disease for 4 years, it came on in the hot season with fever and an eruption of nodules ; these subsided in about 2 months, and she remained free until 8 months ago, when a similar attack occurred which has hardly yet subsided. At present the face is studded with 'tubercles' most of which are isolated and of a brownish color ; ears also affected at the rim above : there are livid and raised patches on the back and on outer surfaces of the limbs : fingers tumid and glossy : little fingers bent. No numbness here. Feet in same state. Her father is dead ; mother living and well : brother well : a sister died of cholera. Denies all taint. Husband, son and daughter are well ; knows of no contact with lepers and states the disease followed after eating curry and 'chass'—an eruption on the face (urticaria?) immediately appearing. Lives apart, there are sores : no syphilis.

13.—F., Beldar, æt. 60, beggar, born near and a resident here. Disease 6 years; now she complains of a sense of burning in the feet with numbness in the limbs: nothing is visible except a mummified aspect of the skin on the back of the feet: denies all taint; the thing is leprosy.

14.—M., Vanja, æt. 30, weaver, born and resident here. Disease for 7 years, it began in the hot weather on the face, the hands and feet were next affected; there was fever at the time. Now, there is some puffiness of the face and ears: hairs on brows scanty: hands hardly altered, but there is numbness reaching to the elbows; feet in the same state, with numbness as high as the middle of the leg: no eruption on the trunk; nipples a little enlarged. Father had the disease and died 10 years ago: mother well; a younger brother and a sister are well: wife well, no child. Denies contact with other lepers and cannot account for the disease: lived as the rest: is not separated, is not getting worse. General health fair: was here and doing his usual work when the disease appeared: there is a sore on one of the toes: denies syphilis.

15.—M., Wania, æt. 40, seller of cloth; born and resident here. Disease 1½ years; it began with an eruption on the left arm mistaken for 'carolea' (it looks like pale stains now and is not benumbed), a burning sensation was felt along the inner side of the hand (? affection of ulnar nerve) and on inner side of left foot; at the same time the lobules of the ears became thickened and the face assumed a dark tint: this was in the hot season. He was treated in various ways (by carbolic acid, Chalmogra oil, &c.) and is now much improved: there is very little to be seen. Parents dead: denies all taint: his own family is well: cannot remember any contact with lepers and cannot account for the disease, but attributes it to the sun. General condition good: is not separated: denies syphilis.

Note.—Here is an early case showing a subsidence of disease, which naturally is not uncommon at this stage, and is apt to be put down to the influence of drugs, unusual diet, &c.

16.—M., Kunbi, æt. 25, a farmer, born at a distance and came here at an early age. Disease for 5 years, it began on the face where he has now T. L. well-marked: hands and feet are affected as in N. L. Father and mother are alive and well; but his brother (No. 17) is a leper. Married: 2 children æt. 5 and 3; denies contact with other lepers and attributes the disease to eating some food which produced vomiting, &c.: lives apart; is a miserable object and a stupid man. Denies syphilis.

17.—M., Kunbi, æt. 45, a farmer, born here; 3 years a leper. The disease began in the hot weather: there are now signs of L. L. (lepra leprosa—the specific eruption of leprosy) with perhaps T. L. (nodular disease) on the face. There is a characteristic eruption on the trunk in large, pale patches: the cuticle of the palms is cracked. Lives in the same yard as his brother (No. 16) who is much worse than he. Married: 2 children, well: is not separated from his family: no syphilis.

Note.—Here the older brother was affected last: contact is not only probable but certain, and heredity is denied.

18.—M., Koli, æt. 20, a labourer; born and resident here. Disease for 7 years; it began with vesicles in the hands. N. L.: nothing on the face and trunk; hands extremely deformed, right little finger gone and the thumb: left little finger also wasted: the left foot is mostly deprived of its toes. Father was a leper and died 7 years ago: F. B. (paternal uncle) was also a leper and died about the same time; F. S. (paternal aunt) was a leper and died 14 years ago: his elder brother (No. 27) is a leper and too ill to come to hospital for inspection: he has another brother, æt. 25, and a sister younger than himself, who are both well: he is the middle in age of them all. Not married: cannot account for the disease; has lived as the rest and was working as a labourer in this town when it came on: his leper brother resided in the same house until lately. A weak subject: denies syphilis.

Here is N. L. apparently pure, transmitted by heredity or contagion, and alternating with T. L.; in the brother, at least: form of disease in the others unknown.

19.—M. Mochi, æt. 60, born at a distance, long resident here and has not travelled. Disease for 8 years; it began with light patches on the trunk; hands and feet then became distorted; they are changed in the usual manner, but not very severely; there is 'ectropium' of the right lower eyelid and the man looks weak; he is not very thin. Two

brothers, one died of leprosy 15 years ago, the other (youngest) is alive and well: no sister: the two brothers lived together for a time (parents were well). Is married: 2 sons and 2 daughters, are well. Cannot account for the disease: was living and working here as usual when it came on: it is spreading. He does not live apart: there are running sores on the feet: no syphilis.

20.—M., Mussulman sepoy, æt. 50, born here and has travelled; disease of 4 years' standing; it began in the hot weather with bending of the left little finger; afterwards, he thinks, the spots came on the body. At present, the man has all the signs of A. L.; nothing on the face; the trunk is covered with pale patches of a reddish tint, having a rounded (crenate) border and, as it were, arborescent disposition: they show a very wide, lighter tinted edge and a darker centre, which almost resembles the natural aspect of the skin, only it is not so smooth and supple: this central part is quite benumbed; the light border is not. Hands of irregular 'claw'-shape; everywhere benumbed, and so the skin as far as the elbow; feet also affected, the two great toes being partly destroyed: there is numbness reaching nearly as high as the knees. Denies all taint, and his own family is well. Contact with other lepers is not known: by working in the fields in the sun, the disease may have originated; he lives apart; syphilis denied.

21.—M., Koli, æt. 55, labourer; born here and has not travelled. Disease for 6 years; it began on the hands—a well-marked case of A. L. Nothing on the face: the trunk is covered with large, round, red spots of characteristic aspect: hands greatly mutilated, several of the fingers having lost all their phalanges. The feet are in even worse state. Family taint is denied: his people are well. Cannot account for the disease, which came on here: no syphilis.

22.—M., Koli, æt. 45, labourer; born here and has travelled a little. Disease for 20 years; it began on the hands: a stout man. Nothing visible on the face: the trunk is covered with faint, reddish discolourations, barely perceptible: there are dull, dark spots amongst them which are benumbed: hands the true 'claws' and benumbed: feet greatly mutilated and numb. Denies all taint. Is not married, because of this disease appearing. He had 2 sisters, one of whom died 12 years ago of leprosy: the other is alive and well: he is the youngest of the family. Does not know why the disease came on: he lived in the same house as his leper sister. There are sores on the toes: never syphilis.

23.—M., Khatri, æt. 55, porter, here for 30 to 40 years and 3 to 4 years a leper. The disease began with rheumatic symptoms in the joints, ending with stiffening of the fingers. Now, the right hand has its fingers rather wasted and bent backwards. Previously there were no eruptions, but about 2 years ago, spots have come out which have assumed the form of *erythema circinata* in its most striking form: they are both large and small, and perfectly represent the semi-acute leprosy eruption: in series they are persistent, separately they blend, subside and re-appear, or fresh ones come out. The back is covered by large patches surrounded with smaller ones which are round, raised, of reddish hue; uniform or annular, the rings blending and finally forming large pale areas having a raised, pinkish rim. Here is something like recurrent erythema—it cannot be termed 'urticaria' for there is no great itching in the spots—and the appearances repeat those seen in Norway and Bombay. There are spots on the face: the palish skin of the man shows off the patches. Nothing else is found to indicate the leprosy disease, but it is said that his elder brother and brother's son (nephew) and daughter (niece) were lepers: the latter alone is now alive, but is not here: the brother probably had T. L. Attributes his complaint to eating sour food. Syphilis is denied. A stout, garrulous man, who is in fair general health.

A remarkable example of a typical form of disease, which I regard as leprosy: (see also page 23.)

24.—F., Bhawa caste, æt. 40, born elsewhere, here for 25 years, has not travelled. Leprosy for 12 years, it began after child-birth with spots on the body and face, after which was numbness of feet and hands. Now, on the face are bare remains of an eruption: on the back are very large spots of the pale kind and more chronic form; there is sometimes decided numbness in the darker centre of these spots. Hands greatly mutilated, the fingers being reduced to mere stumps and on both sides the little finger is quite gone; here is numbness all over, and also in adjoining parts of the fore-

arm. The feet are in the same state, that on the right side (as of the right hand) being most affected: numbness seems to extend quite above the knees. She is in fair condition and intelligent. Parents well: her elder brother has had the disease for two years: he is at *Amreli* where her family resides: her two sisters are well. Widow: a son and daughter of 15 and 18, are well. Was at *Kundla* when this came on; cannot account for it; it is spreading. Lives alone: no open sores: syphilis is denied.

25.—M, Dher, æt. 45, here for 20 years and for 2 years a leper. The disease began in the hot season with blisters (?) on the feet, an eruption of spots and a sense of heat in the body, which last yet remains. Has a flushed face: the trunk is covered with round, pale spots of all sizes and having a faint, raised, reddish edge: mostly benumbed. On comparing the *torso* of this man and the back of No. 22, there is noticed a very close resemblance in general disposition and aspect of the spots; only the latter is a more acute form than the former. Hands not deformed, nor are they very numb: the feet are more affected, thus, the right foot has sores on it and there is decided numbness here. Parents well, and brothers, sisters and children: denies all taint and attributes this disease to catching the itch: was eating the usual food and doing common work when it came on: it is spreading: there are open sores on the feet: lives with his family: general condition fair; denies syphilis.

26.—F., Mussulman oil-presser, æt. 30, born and resident here. Leprosy for 1 year; it began with an eruption on the body of reddish spots, now fading and leaving lighter patches of rounded form with a pinkish border: there were vesicles on the fingers and numbness of the hands. At present, nothing on the face: trunk covered with pale spots; hands affected as in N. L.: there are palish spots in the forearm, but she declares that the numbness is quite limited to the hands precisely below the wrist: the little finger of right hand is most of all changed and the thumb of the left hand; elsewhere the disease is incipient. The feet are said to be all right; they look, however, very peculiar—as if mummified: the skin of the right heel is deeply fissured. Parents alive and well; so brothers, and all taint is denied: her 3 sons are well: denies any contact with lepers: was eating the common food and following the usual domestic avocations when this disease came on: thinks it is not now spreading: does not live apart; general condition fair: syphilitic taint is denied.

27.—M, elder brother of No. 18, confined to a straw hut close to the round mud-house occupied by his family. A most miserable and pitiable object, so ill as to be hardly able to speak or raise himself: born and resident here; has travelled: 12 years a leper: has the mixed disease (M. L.), the nerve-form now surviving. The father of these young men died 7 to 8 years ago of leprosy: he had it for 5 years: mother living and well (saw her): there were 3 sons, the eldest a leper, the next still well (is away just now) and the youngest also a leper; the only sister died some time ago, æt. 15, and free from this disease. On the mother's side no taint exists; the old woman herself is hale, well and intelligent. The sick man is not married: cannot account for his disease: lived and worked as the rest: is now apart and has open sores; no syphilis.

28.—F., Dher, æt. 40, born here and has not travelled: 20 years a leper—old A. L.: at first white patches came on the skin, with blebs on the fingers; she could not sit in the sun: the feet then became inflamed and the nose depressed. Now the woman offers an illustration of advanced nerve-lepra: the hands are much mutilated; little fingers of right hand quite gone; complete numbness: the feet are even worse: nose much depressed: no hairs on the pallid face. Father was well: mother living and well: brother and sister well: husband and a daughter of 6 are well. Does not admit either taint or contact; lived with and as the rest; cannot account for her disease; became affected in the same house here (an ordinary place) where she was born, and her mother and child now reside there with her. There are running sores on the feet: general condition tolerable (just as seen in old anæsthetic subjects elsewhere): syphilis is denied.

7th February.—On this date I began an inspection of the residences of the lepers above-named, with the following results:—House of the weaver No. 12: the family live together in one room which also contains

the loom; much crowding: other weavers live close by and none else is said to have the disease. Nos. 1 and 2 who are brothers; find the F. M. B. (paternal grand-uncle) also had the disease; here the malady began in different houses: the married girl is younger than both the boys. Visited another house where leprosy is said to have commenced: 3 brothers came here at the same time, lived in the same way and were engaged in the common occupation of selling cloth, but only one became a leper: he was a strong young man (case No. 9). To the house of the *Kumbhar* (No. 6): a dirtier place than usual, with large accumulations of rubbish, &c. The disease here assumes the form of a wasting the further extremities and tip of nose, as if from atrophy or old age; and if his disease be leprosy, the question is raised whether such forms as this be not a degeneration or the result of mal-nutrition. The old man worked in the fields until last year, when he became incapacitated for manual labour. . . . Visited the house of No. 12—a woman affected with nodular disease: she has lived here for 30 years; there is nothing particular to be seen about the place: the woman is engaged in making cow-dung cakes, she also makes cotton-twist for sale. Is not separated from the family in any way; all living in one room: no other leper near here; she is liable to fever (without eruption?). All the Mussulmans eat a little dried fish, but, at oftenest, once in three or four days: she ate the 'chass' curry referred to in her history in the hot weather and alone; it was in a good condition; urticaria (?) followed: she had often before eaten 'chass' curry at night. This is a marked case of recent leprosy infection: all taint is denied: the woman still does house-work, though already a much deformed object.

8th February.—Went to the house of the cloth-seller with incipient leprosy (No. 15); it is of the better sort and has a low upper-storey; here, as elsewhere, heaps of cow-dung are stored up. The disease began in this place: it followed a visit to the shrines at *Palitana*, where the man is in the habit of going: he then walks with bare feet in the sun up the steep mountain and back, and as is usual on such occasions of religious festivity, he lived chiefly on sugary food containing wheat-flour, ghee, &c.; soon after one of these visits the soles of the feet became dry and cracked, then followed burning of the feet (still present) and numbness: he suffered much from thirst at the time: he placed 'limra' leaves in his shoes in order to cool the feet: the hands were very soon after affected, and white patches appeared on the left arm, which spread downward: it is doubtful if these were benumbed, they are not so now. The burning sensation of the feet was peculiar in being situated on the back of the feet as well as in the soles (thus proving its seat in nerve-filaments commonly diseased), and both hands were also affected at their inner margins (thus clearly indicating ulnar nerve-disease). He now states that five or six generations back there was leprosy disease in his family, on the father's side.

In the same 'ort' is a small colony of these merchants; case No. 4 (woman) lives here and like several others, is a relative of the man No. 15: yet amongst the four whole families here, none else are lepers. The woman is a resident of 7 years and a leper for 3: her hands are affected, but she cooks the food for herself and son—a pallid lad of 15, who does not at present show any signs of disease.

To the house of the dyer-woman No. 11, who has been here 30 years, being a leper for 3 (A. L.): found her spinning cotton. The disease first appeared at *Bhamodra* (where I went, *vide* page 18); there was there another leper woman whom she used to live with. An early sign was a sense of heat in the body, which became exacerbated in the hot season.

Visited the houses of Nos. 16 and 17: close to these is a well largely resorted to. These men, who are brothers, had a sister, æt. 25, a leper; she died 10 years ago, after 3 years' illness. The disease came on at the husband's house at *Junagudh* (a long distance off) and she then came here for a time, eventually returning home, where she died. The younger of the brothers had not the disease when the girl came here: it was in her probably T. L. and she was the first affected. There are eight houses of families all related clustered in this spot, and of the numerous individuals of both sexes and all ages, only the two men at present are lepers. It was first stated that no family taint existed in their case, but on further enquiry, it is now acknowledged that a cousin—F. M. B.'s son—had the disease, he died 4 years ago in this place, and lived at a very short distance from these men: he seems to have had A. L.: age at death 35, and he drowned himself in a well from accumulation of suffering. The elder man attributes his disease to eating hot syrup after an accident he met with. With the younger man live father, mother, and other children: all in the same room—a chamber of the usual limited dimensions and half-filled with grain-jars, &c.

Went to the house of No. 18, and saw his sick brother No. 27. The remaining brother who is quite free from disease (report), when at home lives with his mother and the leper No. 18, and for a time all three brothers shared with their mother the same round hut of 13 feet diameter, even when the elder lad No. 27 became leprous; but lately this youth's state becoming unbearably offensive, he was removed to the straw-hut mentioned above.

The house of the Mussulman (No. 20) is in fair condition: all the children seen were born after the beginning of the disease: he is not separated even now: cattle occupy part of the room: no other leper near here.

The Vanja, No. 14, does not now occupy the same house as that in which his disease first appeared: saw his elder brother who is well: no children: wife ran away from him. Father was a leper, he left his family many years ago and died at a distance 20 years since; all the family lived together when the father was first affected.

9th February, evening.—To the house of the Bhawa woman (No. 24): here she has lived 20 years, being a leper for 12: her son of 12 is with her; a portion of the verandah has lately been partitioned off for her use: the two live by begging. There are several houses of other religious mendicants close by: in none are lepers. A poor place, but clean and airy: no peculiarities noticed.

To the house of the Mussulman oil-maker, No. 23, where she was living when her disease came on: no peculiarities here. A barber's family lives next door: no other leper in the neighbourhood.

Saw the house of the Khatri, No. 23—a mere box 6 or 7 feet square—which he has occupied for 7 years: always lived alone, cooking his own food. He is an eccentric individual and has quarrelled with his family: now states that his elder brother was a leper, dying some 20 years ago. A large and young Mussulman family lives next door to this man, all well: and just opposite is the tumble-down shed occupied by the Mochi, No. 22; his brother's wife and daughter are with him; they are well.

The invariable result of these visits in Kundla was perplexing, or rather of but negative value. So far as mere appearances go, it may, however, be said that the houses and dwellings of lepers are in no wise to be distinguished from those of non-affected people of identical race, caste, occupation, habits, sex, age and social position. Further scrutiny must be more minute, elaborate and prolonged than was possible

with me. Probably such scrutiny will be most effective in the smaller villages, but it is well to know the state of things in such large towns as Kundla and Mhowa, &c., where the evils of non-sanitation and over-crowding are generally apparent enough; but that leprosy is begotten of one or other of these hurtful agencies does not appear.

9th February.—To *Jhinjharda Mhota*, 2½ coss eastward: a large, irregular village in the plains: but not far from a picturesque, isolated hill (*Korlanida*), 350 houses; 1,582 people; they are Kolis, Kunbis, Sagars (a sub-caste of the Kunbi), Kathis, Wantias, Bhawas, Kumbhars, Bhurwads-Rabaris, artificers and Dhers. Food—bajra and jowra; urid and mung: water from both well and river according to convenience. No guinea-worm here: no mycetoma; fever is common. Five lepers here and the old *Garassia* thinks there may have been as many 20 years ago: the following cases are seen:—

1.—M., name *Ako Gigo*, æt. 30, Kumbhar, born at a distance, here for 10 years, has not travelled far; leprosy for 3 or 4 years, it began in the cold season with swelling on the face. At present, there are decided signs of T. L. in the lion-visage (*leontiasis* of old authors): nothing visible on trunk; hands bronzed and wrinkled, fingers swollen, vesicles and absorption of their tips, no numbness but perhaps over-sensitiveness of the skin; feet in the same state with commencing atrophy of some toes. Father was a leper and died 7 years ago: mother alive and well: 3 brothers of whom he is the third: 2 sisters, all well except himself: 3 cousins (F. B. sons) had the disease, they lived at a distant village, where his father was resident, afterwards coming here. Married; has a son of 3 years, who is well; cause of disease unknown; was eating common food and cultivating the ground when the symptoms came on, in this place; disease almost stationary; there are sores on the toes; general condition fair; denies syphilis. Thinks the disease may be due to his drinking hot syrup. A marked case; with possibility of both heredity and contagion.

2.—M., *Ragonath Nuthoo*, æt. 53, *Wania*, born here and has travelled; leprosy for 7 years, perhaps it began in the cold season, on the face. Now, there is confirmed T. L. on the visage: ears much enlarged, bronzing is marked, nose rather depressed: on the trunk nothing peculiar; hands bronzed in a striking manner, no distortion; numbness of the feet, with great bronzing and commencing atrophy of the toes; nipples enlarged. Parents dead, were free: two other brothers and a sister are well: denies all family taint and all contact with other lepers: was eating common food and keeping his shop when the disease came on here; it is not spreading (?): he is alone now; no running sores; general condition tolerable: denies syphilis: his home is not near that of any other leper. Origin of disease obscure, if not from contagion.

3.—M., *Gillo Luximon*, æt. 22, *Sonar*, born here, has not travelled; for 8 years leprosy, it began on the face and ears. A decided subject of T. L.: not much bronzing, skin of face tumid, sebaceous orifices prominent: no distinct eruption on the trunk, but some sibbla-like spots in the loins probably nodules in the skin: hands bronzed and tumefied, numbness on the back and vesicles on the fingers: feet, more benumbed and great toes slightly atrophied: nipples enlarged. Father was a leper and died 8 years ago; he had the disease 5 years. Mother alive and well: an elder brother is here, well and a strong man whose body is covered with 'sibbla': 4 sisters, one of whom is a leper (No. 4 below). F. F. had the disease and F. B. also, as well as his two sons (cousins), a third son being well: these people live at the village of *Jabbal* (*vide* p. 26) No taint on the mother's side. Is not married: does not admit contact: cannot account for his disease; was eating the usual food and working as a goldsmith when it came on: it is increasing: he lives with his mother and leper sister in one room; there are no running sores; general condition fair.

The elder brother is examined; he has a heavy feeling over the brows, but no change is visible.

4.—F., *Vijul Luximon*, sister of No. 3, æt. 16; born here and has not travelled: leprosy for 4 years, it began in the hot season with red spots on the cheeks. At present this young woman exhibits the bronzed, lardaceous state of the

skin of the face which is characteristic of T. L.; the ears are largely affected; hands hardly changed, only the right little finger is swollen and bent: feet in same condition, but here the nails are horny and thick: numbness nowhere marked. Is not married, was betrothed but the man married another woman when this complaint appeared in his fiancée. Does not admit contact with other lepers and cannot account for the disease; was living as usual when it came on, at this place: it is now spreading: no open sores; lives with her brother (No. 3) and mother: general condition fair. This girl has not menstruated and is stunted in growth: her mother thinks her arm less developed than when the disease began: no eruption on the trunk: has a very stolid look. She is younger than her brother and more recently a leper: was the disease acquired from him?

Another man (an adult Wani) is shown whose son had leprosy 3 years ago, from eating mangoes in excess: the people suspect the disease in him, but its signs are not apparent, only the nails are thickened and horny: *æt.* 64. Two other sons of this man are alive and well: they are younger than the leper was.

There was a fifth undoubted leper here who has lately left the village: a man, adult, Sagar caste, had T. L. for 10 years and his father died 15 years ago of the same disease.

Went to the house of the Sonar above: it is clean and well-kept; saw the young children of the unaffected brother (who lives in the same yard), they are well. On enquiring as to their willingness to go to an asylum, the leper man expresses his consent thereto, but the daughter could not leave her mother; indeed, the latter thinks the poor girl needs all consolation from her parent, because of the failure of matrimony which other persons might regard as a blessing rather than a curse, seeing the possible results of her marriage.

Note that in this village the cases are all of one and that the severest form of the complaint (T. L.): hereditary taint and possible contagion are also noticeably frequent.

Afterwards to the neighbouring village of *Nana Jhinjharda*—a mile or two off on a main road and having beyond it other leper-villages near. Here is a locality not to be distinguished, on cursory inspection, from the above; it is indeed smaller in size (568 inhabitants), but otherwise quite alike. There are no lepers in the place. Surely, then, locality can count for little. Beyond, the village of *Pithaodi* contains several lepers: so that an unaffected spot intervenes between two others that are tainted: how did this exemption arise?

10th February.—To the village of *Bahāda*, 6 miles to the south of Kundla, amongst low hills and traversed by the main road to Mhowa (sea coast): black cotton-soil as usual abounds: upwards of 200 houses, 1,010 inhabitants who are Sagars, Kunbis, Lohanas, Wanis, artificers, Dhers, &c. Food—jowra and bajra; arid and; mung: water-supply from both well and river—the latter dries up; saw a well, a mere narrow pit some 40 feet deep and with very little water in it: as drawn up, the water seemed fairly clear, but the supply is very precarious.

There is no *flaria*-disease here: no 'raphi': fever is common. There were 5 cases of leprosy lately, but one—a woman—is gone away to another village. The patel and old inhabitants aver that the disease is much more frequent now than formerly; thus, 20 years ago the father of No. 1 below was the only affected individual, and 10 years ago there were but 2 lepers. If this statement, which was voluntarily put forth, be true, then an important inference obtains, namely, that leprosy may spread in a place, and hence that it may be introduced from without.

The following were seen:—

1.—M., Mochi, *æt.* 25, labourer by occupation, born here and has travelled but little: disease for 8 years, beginning at the right fore-finger with blebs, and swelling of the body. Now, a well-marked case of T. L., there being great tumefaction and bronzing of the face, enormous enlargement of the ears, hoarse voice, depressed nose, &c.; skin of trunk everywhere studded with minute nodules; nipples enlarged: hands dark, swollen, cuticle

desquamating in thin scales, fingers of right hand partly destroyed; numbness from elbows downwards; feet in same state, great toe of left foot most changed; numbness from hips downwards: general condition fair; is intelligent. Father a leper, died here 13 years ago, was diseased like his son and for 20 years. Mother alive and well: one brother alive and well: another died last year, 4 years older than he and a leper for 12 years (T. L.): there was a sister 2 years older than this man, who died in her youth of small-pox. F. S.'s son (cousin) had the disease in this village and died 8 years ago: saw his brother (another cousin) who is well. No taint on the mother's side, is not married. Both leprosy and healthy had lived together in the same room: cannot account for his disease; ate and worked as the rest: lives with his mother now. There are excoriations on the feet: syphilis denied.

I went to his residence; a little place, well-situated and now clean: he was born in this square hovel and his father lived here, becoming affected in the same place. The paternal aunt (F. S.) had first of all the disease and in this village: then the father; then this son. The woman had two sons, one of whom was a leper dying 16 years ago; the other is alive and well. Rubbish, dung and wandering cattle abound as usual, but there is nothing peculiar to be seen. Here the preponderance of evidence seems for heredity: yet contagion was obviously practicable, and what general influences could have been at work?

2.—M., Lohano, *æt.* 25, works in fields; born here and resident; has not travelled: leprosy for 10 years, it began in the hands and feet. A miserable subject of advanced T. L.: face most characteristically affected: there are stains on the trunk: hands bronzed, furfuraceous, fingers tumid, &c., numbness; feet in a similar state, with sores on the leg, probably numbness here, too, but sensation is not eradicated: nipples not enlarged. Father alive and well: I saw him. Mother dead, she was free: brother is a leper (No. 3); direct family taint is denied, but F. B. (paternal uncle) was a leper: 3 sisters are well, and their children; some are older than he, they are not here now: the old father has long lived here and knows of no other tainted relatives. Married and has daughters of 5 and 2 years—born long after his disease became confirmed: the head-man of the village professes himself unable to interfere in this sad case, but like others, wishes the man and wife could be separated. When this man was attacked his leper uncle was living here; but contact with him is denied: ate common food and worked as usual: is not apart; has running sores; general condition bad: is intelligent enough, but has no sense of shame: cannot account for his disease. The old man lives in the same room with this man and his family.

Went to their residence and saw the wife and children: all are healthy in appearance and the house is in decent condition. Another uncle lives close by—no disease there. A place resembling scores of others.

3.—M., brother of No. 2, *æt.* 44, agriculturist, born and resident here, has not travelled: leprosy for 3 years, it began in the hot season with exfoliation of the cuticle in palms and soles: there were eruptions on the trunk, and latterly the face has become swollen. At present, the man offers well-marked signs of early T. L., there is deep bronzing and some tumefaction of brows, cheek and nose, thickening of ears: skin of trunk shows traces of a copious leprosy eruption (acute), and is now red, rough and thickened: hands little changed, but fingers tumid, dry, dark, wrinkled, scaly; nails unaltered; there is possibly hyperæsthesia. Feet in same state: nipples unaltered except by small nodules in the areolæ. Married and has 4 children: the youngest being 8: cannot account for the disease, was living and working as usual when it came on; it is spreading; he is not separated from his family: no running sores: condition fair; still works in the fields. When the disease came on, he used to live in the same room as his brother.

Saw his house and family, they are distinct from the above; the home is a poorish place; cattle are lodged in the same yard. The people are well.

These are notable instances.

4.—M., Rajghar (Kathi priest), *æt.* 40, beggar, born and resident here, has not travelled: leprosy for 8 years, it began in the lower extremities with spots on the legs, then the hands were affected. At present, the man shows signs of T. L., brows, &c., thickened and pale; ears thickened: nothing particular on trunk; hands bronzed, fingers atrophied,

wrinkled and numbed; nails converted into knobs, little finger of right hand bent. Feet in a similar state—bronzed and tumid: sores on the toes; nails deformed: numbness here, too; nipples enlarged. In fair condition; slow of understanding. Father dead: mother alive and well: an elder brother and a younger sister are well: family long resident here and, hitherto, free from leprosy. Married, but does not cohabit with his wife; denies contact: cannot account for the disease: was begging as usual when it came on: lived in the common way: now occupies a room with his mother; the brother's children are well. The disease is advancing.

11th February.—To *Bhuwa*, about 3 coss to the N. of Kundla, in the open plain, dried salt-marshes in neighbourhood: 190 houses, 837 people who in caste are Kunbi, Sagar, Koli, Kathi, with artificers, graziers, &c. Food—bajra, jowra; urid and mung; water from a tank. Filaria-disease very common of late (see below); no 'raphi.' Leprosy is rare, the two cases seen are the first known within living memory, it is said; the earliest was that of the carpenter's wife.

1.—F., Sutar caste, æt. 32, born at a distant village, here for 25 years, has not travelled. Leprosy for 8 years, it began with burning sensation in the hands and feet; then vesicles appeared. At present she shows all the signs of N. L. (anæsthetic leprosy), a pallid visage; trunk not inspected, but eruption denied: there is great deformity of the hands, all the fingers being more or less destroyed, numbness in them and in forearms: feet in a similar state, the great toe on right side is quite gone. Parents dead (free), brothers living and well, and an elder sister. F. F. (paternal grandfather) is said to have had the disease; he lived at the village (*Libdi*) where she came from, and died long before her birth. Married; two sons of 20 and 12, well; a daughter died very young. There was a Wani leper also in her village. She does not admit contact with other lepers, cannot account for the disease, was living in the usual fashion when it came on and was residing in her present home: since it began she lives apart from her husband and children: there are excoriations: general condition weak and thin: she used to do field work until quite disabled.

Here the disease may have been acquired or derived.

2.—M., Sagar, æt. 40, drawer of water, &c., born here, has not travelled far, but has visited Bhaonagar, &c., and still goes about selling cotton. Leprosy for 3 years; it began in the cold season with numbness of the four fingers of the left hand, then the feet were affected, then skin of trunk. Now, the face is tanned, sebaceous ducts blocked: front of chest and abdomen of a deep bronze colour, red, rough, in large irregular patches (a peculiar appearance); nothing unusual visible on the face: nipples enlarged (gun-cap shape); hands bronzed and wrinkled, numbness still limited to both surfaces of the four fingers (whole length) of left hand, excoriations on back of ring-finger; no mutilation. The feet are benumbed in front; right great toe much absorbed and excoriated (? from vesicles) on the back: condition of sole doubtful. Parents dead (free), 2 brothers and 3 sisters living and well: denies all taint. Is married; daughter dead, 3 sons (from 16 to 10 years) well. Contact with lepers is denied (N.B.—Sutars and Sagars eat together.) Was subject to fever (ague) before this disease, not since: lived and worked as others, cannot account for it, it is spreading; has been living apart for a year. Has a peculiar haggard look, but is yet stalwart and works at his trade.

Origin of the disease quite obscure, if not from contiguity.

Memo. on guinea-worm in *Bhuwa*. This pest was unknown until 1871, and it has become frequent (in an increasing ratio) only since the construction of a tank, which is formed by banking up a stream, in a depressed piece of ground. At the beginning of March the tank dries up, and then water is procured by digging shallow pits in its bed. At a lower depth than 5 feet or so, the water which exudes is everywhere brackish, hence wells are useless. The parasite shows all its usual characters: the number of worms counted last rains was above 1,000; it affects horses (in the feet) and dogs (at the back of the ears), but not cattle. The people attribute the complaint to drinking the tank-water, but washing the body is a common practice. On cursory

inspection the water now looks of tolerable quality, but for thorough search it should be examined at every season of the year, *i.e.*, throughout an entire natural cycle of changes. Water from the bed of a stream does not, in this neighbourhood, cause guinea-worm, but water stagnating in certain soils seems to do so. The present instance would be a favourable one for scrutiny: the people are now suffering so much, that they have petitioned the Durbar for relief.

12th February.—To *Nesdi*, three coss to the N. W. in the plains, on banks of a river, of usual construction, about 300 houses and having 1,400 inhabitants, whose caste is Kunbi Wani, Brahman, Koli, Rajput, Lohana, artificers, graziers, low-castes. Food—jowra, bajra; urid, mung. Water from the stream and from pits scooped in its bed. No guinea-worm here. Three lepers (two in Major Watson's list): 25 years ago there was only one (a Kunbi), so that the disease has increased of late: the village has remained much the same, but traffic and intercourse are greater than formerly.

1.—M., Kunbi, æt. 35, drawer of water, born and resident, has not travelled. Has had M. L. (severe disease) for 10 years, it began on the feet with vesicles, then on the hands. Now, it is much advanced: on the face are marks of T. L., ears much enlarged; trunk the site of reddish marks or stains, and lately (within 2 years) the back has become covered with two large, lateral, symmetrical scaly patches, of ichthyoid aspect and not so defined as psoriasis; nipples enlarged; skin of upper extremities similarly affected—scaly patches in front of axilla, outside of arm and elbows, back of forearm, &c.: hands greatly mutilated as in N. L., most of fingers greatly destroyed, others swollen, cuticle thickened, horny and scaly; sores on right thumb; numbness from elbows downwards, no loss of muscular power; feet even more affected, metatarsus on both sides gone and remnants of toes transferred to tarsus; integument of legs covered with scaly patches; numbness as high as knees. Here is marked M. L. complicated with scaly eruptions, which render the subject more than ordinarily repulsive to the eye.

Father alive and well: mother dead, she was not leprosy; he is the fifth of 8 sons who are all here and, with this one exception, all well; 3 sisters, 2 older and 1 younger, well. Family taint of all degree is denied: he is not married, denies contact with lepers, cannot account for his disease, was living and working as usual when it came on, it is spreading; there are running sores; general condition not worse than usual in such subjects: syphilis is denied. He is a large, stalwart man, taller than any of the four brothers whom I saw, whether younger or older than he. A singular spectacle, one afflicted out of many. Since the scaly eruption became extensive, he has left his home with the rest and now lives in a hut in the fields (see PLATE at end); until a year ago, he occupied a single room with his old father and two brothers.

When the disease began in this man, there was living in the village the mother of No 2; her residence is at a distance from his: the earliest leper recollected here died some 30 years ago and had similar symptoms, and the woman, who died 8 years ago, had something of the same.

A case seemingly inexplicable in origin, if not from contagion.

2.—F., Rajput, æt. 50, a field-labourer, born at *Lakimadi* (not far off), here for 30 years and has not travelled. Leprosy for 2½ years, it began in the cold season: she had fever at the time of child-birth, which was followed by the eruption on the face, and to this part the change is still mostly limited. It presents all the characteristic signs of decided T. L.: brows thickened and bare, eyes rounded, skin everywhere tumefied, bronzed and shiny, ears enlarged: the trunk shows traces of an eruption, nodules in loins (front not inspected); hands hardly changed, but fingers tumid and glossy; no numbness but possibly hyperæsthesia, the hands are tremulous: feet also hardly changed in aspect, no numbness here. Father dead, free: mother died 8 years ago, she had been a leper for 8 years; one brother (younger) who is well; no sister. No other family taint is admitted. Is married: husband well; 2 sons of 15 and 4, and a daughter of 10, yet well. Last year, her eldest son and child whose age was 22, died of leprosy, he had been affected for 10 years; he had it on the face like his mother, he lived a little separate, but his mother

used to feed him, and she thinks it possible she got her disease from him: this lad had never left the village, he used to visit his leper grandmother occasionally, but his mother had no communication with this elder leper, because of a quarrel between her husband and her father; it is supposed the lad may have thus got the disease from his grandmother and communicated it to his mother. The older people lived at a distance from this family. She was eating the usual food and working as a labourer when her disease came on, thinks the complaint in stationary; lives apart now, there are no running sores; general condition tolerable. The child she gave birth to at the beginning of the disease is living and well.

A remarkable history, which is verified by eye-witnesses present.

3.—M., Bajput, *æt.* 35, kotwal of the village, born here, lived for 5 years at *Thordi* (where leprosy exists), returning here 4 years ago; has travelled about. Leprosy for 3 years, it began in the hot season with fever and rheumatic pains lasting for fifteen days, and when these symptoms subsided, he noticed the spots on the face. Now, the brows, cheeks, nose and ears are bronzed, nodulated and shiny: there was a recurrence of the fever four months ago, when a fresh eruption of nodules occurred in the loins, &c. T. L. decided in the face, little loss of hair on brows, rims of ears all round and the helix greatly enlarged by leprosy deposit: skin of trunk studded with minute nodules, which are, however, as large as horse-beans in the loins, and the same are evident in skin of extremities. Hands hardly changed, but little finger of left hand seems bent and stiff, skin elsewhere red, rough, thickened; fingers rather atrophied: no numbness. Feet but slightly altered, only great toes look a little atrophied and bronzing is present.

Father dead, free; so mother; 4 brothers, 2 have become 'bhawas' and have left the village as wandering devotees; 2 are dead, and one of these was a leper; there is a sister alive and well. At first all family taint was denied, but on further enquiry I learnt that only the direct line of descent was referred to—a frequent interpretation of the ordinary questions; and it is stated that F. S. (paternal aunt) was the mother of No. 2 above, who is therefore his cousin: cannot push enquiry further. Is married: 2 sons died young, 2 daughters are alive and well, their ages are 4 and 1½ years—a sad fact. Denies all contact with lepers and attributes his disease to drinking 'sirha'—a hot solution of syrup which is mixed with wheat-flour, almonds, &c., into a cake eaten at funerals, &c.; lived as others and was drawing water from wells, when the disease came on; it is rather subsiding (interval of quiescence after the late acute attack): he still lives with his family unreprieved; there are no running sores; general condition fair. Is still holding public office, but next election (the Holi festival) it is purposed to withhold his salary and give it to another man.

Visited the house of No. 1, a dilapidated and dirty place: saw the old father of all these children, a hale man, blind, but free from leprosy; saw also the leper's children and the place where they live: here are the houses of several of the sons very close together, there being a family colony, yet only one leper at present. Saw also the houses of Nos. 2 and 3, the children of the kotwal are well; the houses are poor places and part of a Rajput colony where, as usual, the people live in close communion: *e.g.*, the dwellings of the man and woman are barely ten yards apart. The children of the woman were inspected and are free from signs of disease.

Before leaving Kundla, a case of *melano-derma* or blackening of the skin was brought to me. The patient was a young married woman, in good health, whose skin is stained of a black-lead hue on the face, trunk and limbs; 2 years' duration, and first beginning during a first pregnancy, on the front of the abdomen: the stains are spreading. There is no functional disturbance and the woman is in good health: she works in the fields: no hereditary taint of any kind: husband well. A curious state of things and precisely the reverse of *leuco-derma*. There are now no signs of true leprosy in this patient.

14th February.—Left Kundla for Mahowa *via* Vadal. At 5 o'clock on this main road *Loara* is passed, a village of about 75 houses and 380 people who are Pachouris (Ahirs, or farmers of lower caste than the Kunbi), Kathis, Sagars, artificers, Dhers, &c.; Bhawas are several: there is a ruined fort. Food as usual: river-water is used. No guinea-worm

here. Leprosy is rare: and the present case is the first one recollected beginning in this place.

M., Kumbhar, *æt.* 45, agriculturist, born at a distance, here for 25 years, has not travelled far. Leprosy for 12 years, beginning with numbness of hands and feet. Now there is T. L. on the face, with numbness of cheeks: on trunk a few scattered nodules; nipples enlarged; fingers clubbed, nails gone, they seem to fall from their matrix after changing into mere clumps of horns: little and ring fingers of left hand bent, and tips wasted away; numbness as high as elbow. Feet similarly affected, but not so much; numbness from below the knees. Father said to have been a leper, and died here some 20 years ago of cholera, when his disease was not far advanced: mother alive and well: a brother and sister are dead—not lepers. Married: a son of 12 and daughter of 15, are well; no more family taint known. Cannot say about contact with other lepers, and cannot account for his disease; was living and working as usual when it came on here; it is increasing; he is not strictly segregated, for he lives in the verandah of the family hut: there are running sores: general condition indifferent: said to have had a chancre after this disease began. The condition of his father seems to have been hidden from the knowledge of the general community; the man had come from another village and was resident here only two years.

Query—if leprosy be contagious why did it not spread beyond the family, or are there other cases kept secret from me in this passing visit? The malady, however, is kept up in this man.

Leproid disease? Accidentally, I saw a stout young man, a Bhawa, in the crowd, who has a limited deformity of the left hand, all the four fingers being stiff and bent, and especially those on the outer side which are also wasted and turned aside: knuckles unchanged and absorption limited to the two terminal segments, the broad head of the third phalanx standing out prominent: this is rather peculiar. The two inner fingers and the thumb are less changed in volume: palm wasted and the claw-hand: no impairment of sensation or texture of skin or nails: there is now itch, and there may have been abscess, vesicle or sore about the ends of the middle and fore-fingers. With these alterations there is on this left side only, most decided and extensive enlargement of the ulnar nerve about and above the elbow: possibly the median nerve at the wrist is similarly changed: there is no tenderness of the nerves. No apparent eruption on trunk; family taint and contact with lepers are denied: he was travelling about as a singer when these changes came on two years ago.

A singular but not very uncommon deformity; is it leprosy or is it 'neuritis' only?

Made a diversion to *Jabal*, 2 miles eastward of main road and near a range of hills, much waste and barren land about; an irregular village of about 200 houses and 873 inhabitants who are Kunbis, Ahirs, Kolis, Kathis, Bhurwads, Rabaris, Rajgars, &c. Food as usual: river-water is used (a flowing stream). No guinea-worm; fever common. Forty years ago there was a Kumbhar leper here, who died young: the next leper was the father of Nos. 2 and 3: there was afterwards another leper man; new instances are rather commoner; four are seen.

1.—M., Lohano, *æt.* 40, vendor of onions, &c., born at *Jiri* (where is leprosy), here for 30 years, has travelled a little. Disease for 8 years; it began in the hot season; he had been at a marriage feast and when returning was sick, then swellings appeared on the legs, afterwards on arms. At present, there is on the face and ears well-marked T. L., pallor rather than bronzing; sinking of nose: on trunk a wide dissemination of small nodules, not in patches now; nipples enlarged and excoriated; skin of hands similarly affected, fingers stunted at tips, nails now flattened masses of horn, pulps shrunken and as if nibbled away, otherwise little wasting; little fingers flexed. Feet more changed than hands: on left side, middle toe much reduced in size, great toes wasted; wide-extended numbness: sores in soles and excoriations at elbows, &c. Father dead: mother alive, both free from leprosy: a brother (dead) and three sisters, all equally free: all family taint is denied. Married: wife well: sons aged 18 and 11,

daughters 15 and 12—well. Denies syphilis and contact with lepers; had eaten curds and drunk 'sirraha' (syrup) just before the symptoms appeared: mode of life and occupation then as usual: was resident here. Disease is lessening: he eats alone, but lives with some of his family; there are running sores; general condition indifferent, yet he is strong and hale, and without the moroseness noticed in some lepers. There was a Rajgar leper here before his disease began: this man died 5 or 6 years ago, having been affected upwards of 12 years: he was born in this place: his three sons and daughter are living and well; it is believed his father was not affected.

2 and 3.—Brothers, Sonar caste, close in age and very much alike in aspect.

2.—Elder brother, æt. 20, goldsmith, born here, travelled little, but had been to Kundla before his disease came on: it has lasted 6 years and began with darkening of skin of hands (right hand first), feet and face. Now, integument of visage deeply bronzed, thickened, smooth, glossy; ears enlarged; skin of back red, rough and in some places showing livid marks like subsided acute eruption; nipples enlarged: skin of arms in same state, hands swollen, bronzed, fingers stunted; both little fingers firmly bent and fixed, tips nibbled away, with nails as horny stumps; only little impairment of sensation on back of fingers: right hand more affected than the left. Feet in a similar condition, but not quite so much altered.

3.—Æt. 18, goldsmith, born here, had also been to Kundla: leprosy for 6 years, beginning on the hands with swelling and cracking of cuticle, then the feet and face were attacked. Now even more marked signs of T. L. than in his brother, but less bronzing; tumefaction greater: trunk—back shows indistinct reddish marks, with thickening; nipples enlarged and excoriated; skin of arms in same state, hands greatly changed: the two inner fingers of both hands bent and stiff, the others have stunted, red tips, with horny remnants of nails; left hand especially shows a remarkable limitation of ulnar nerve-disease, attended with decided numbness extending also to the inner side of forearm: feet in a similar state, but not quite so bad, nor is there here marked numbness.

The father of these lads was also a leper, he died 17 years ago and had the disease 10 years. Mother alive and well: there is another brother of 25, not here now but reported as free: two sisters (also older) are alive and well. F. B. (paternal uncle) had the disease, he lived elsewhere but used to come here occasionally; he died 8 years ago; his disease appeared after that in his brother (these boys' father) and it lasted about 8 years: he had a son and daughter (cousins of the above lads) who are now lepers and live at *Mota Jhin jhorda* (vide supra, page 23). These two young men are named Bhuto Bhimo (elder) and Jhote Bhimo: they are the only goldsmiths here, and people do not hesitate to buy their work, notwithstanding the condition of their hands. No taint on the mother's side: neither married. The deceased uncle never came here after their father's death: there is another uncle who is not a leper and his children are well; he is the younger of the three: no aunts. The disease is supposed to be transmitted from their father: they were living and working as usual when it came on: they were mere youths at the time: disease advancing in both: live together, but eat separately: both have open sores: general condition still tolerable: syphilis denied by both.

4.—M, Bhurwad, æt. 30, bullock-driver, born here, has travelled a little: leprosy for 9 years, it began with a sense of heat in the body and an eruption of nodules, at first in front of the chest. There are well-marked signs of T. L. in the face, nose sunken, ears enlarged, voice hoarse: left eye staphyломatous: front of trunk studded with nodules, flattened, pale, in size from $\frac{1}{10}$ to 1 inch, occupying both pectoral regions and epigastrium: nipples stunted: on the back are also nodules in middle line above and below, in both loins, here their color is rather red; no numbness. Hands much bronzed, nails mere horny excrescences, fingers smooth, glossy, no numbness or loss of muscular power whatever: feet affected in same way, no numbness there; still works at his trade.

F. alive and well, M. dead: 2 brothers alive, both younger and so a sister, all well. All family taint is denied: not married: cannot tell about contact, or otherwise account for his disease. Was in jail at Koondla when the disease appeared 1½ year after his going in, he remained another

year there: no other leper prisoner during that time? Disease increasing: he lives apart: has running sores and general condition indifferent: denies syphilis and does not live near the Sonars.

5.—District of MHOWA.

(Bhaonagar).

Is the largest of all sub-divisions, remarkably compact and occupies a wide area sloping from high hills, right down to the sea. A sea-board district, prosperous, populous and fairly fertile. Near the centre is the chief town with a port at hand. Area 620 square miles; 140 persons to the square mile; 1 person in 600 a leper; there are 180 villages of which 121 are small; $\frac{1}{3}$ of all villages contain lepers, of whom 150, at least, are known. Mhowa and Kundla may be here contrasted, and we find coastward a predominance of small towns, but not, therefore, a larger proportion of these infected; inland, leprosy is more frequent and it attacks one-half the inhabited places: one is tempted to infer that were large villages more abundant on or near the coast, the ratio of infected places would rise; all over the country, large villages and towns are the usual or preferential seats of disease. In Kundla near $\frac{1}{4}$ of small places contain lepers, in Mhowa $\frac{1}{4}$. The mean duration of actual disease in Mhowa is only 6 years: localities with very old lepers are comparatively rare, hence any supposed re-kindling of leprosy may be proceeding more actively coastward than inland. Can it be connected with development of traffic?

Leper-localities in this district:—*Mhowa* (25 lepers), *Katpar* (a suburb with 16), *Gujarda* (1), *Neswad* (1), *Tared* (3), *Khera* (1), *Goras* (2), *Wadal* (4), *Bagdana* (3), *Bodla* (1), *Kurmadia* (1), *Chapri* (2), *Belampur* (3), *Gundarna* (3), *Kasan* (1), *Khantaoda n.* (1), *Saloli* (1), *Degaora* (1), *Khari* (2), *Babriadhar* (1), *Balapur* (1), *Kalsar* (2), *Diyal* (1), *Otha* (1), *Taredi* (1), *Bhadrode* (5), *Khatsura* (1), *Anganka* (1), *Kantasar* (2), *Ratol* (1), *Talgajarda* (4), *Wagnagar* (1), *Umniawadar* (1), *Rajawadar* (1), *Nana Jadra* (1), *Bhadra* (2), *Dungar* (6), *Dungarparda* (1), *Dudhula* (1), *Kumbhan* (2), *Dugheri* (4), *Dolia* (1), *Padhiarka* (1), *Rajula* (7), *Masudda* (2), *Khari* (1), *Nani Kherali* (1), *Khantoda* (4), *Lusadi* (1), *Kikaria* (1), *Thorala* (1), *Sedarda* (1), *Bambhania* (2), *Dundas* (2), *Mota Jadra* (1), *Bordi* (1), *Karla* (1), *Gadhda* (1), *Ugalwan* (1).

Note.—The chief groups are about Mhowa and Sedarda (where is rare and old-standing disease), the radiation from the latter is remarkable. Rajula and Dungar, large and thriving towns, have recent disease. There are unaffected areas which are hardly explicable on the score of paucity of population, or even of the absence of large villages: yet in Mhowa district almost every larger place has lepers. All coast villages are not leprosy: Kutpar, a prominent focus, is really but a suburb of the chief town. A remarkable line of villages crosses the hilly range from Jamboda to Rabarika, and near Chok a Mhowa village makes a close approach: from Bagdana (an old focus) starts a renewed line across to Talaja.

15th February.—At *Vadal*, midway between Kundla and Mhowa, on main road, amidst bare hills and by side of a

stream—about 200 houses, population (817) Katti, Kumbhar, Rajgar, Sagar, Wani—no Koli or Kunbi: food jowari, bajri; arid, mung: river-water, no wells here. A struggling, poor and dirty village, dilapidation, remains of fortifications and much *debris* everywhere. No guinea-worm: cholera raged a few days ago, 10 out of 20 attacked dying: no raphi: leprosy said to be rare but the people are very reticent. Instead of 1 case, as in official list, 3 are acknowledged, and 2 others of doubtful nature are mentioned: these were afterwards sought out through the leper Kumbhar. It is positively asserted that this disease has only recently appeared here.

1.—M., Kumbhar, *æt.* 30, labourer, born at a short distance, here since 6 years, has travelled but little, went to Mhowa before disease appeared; it came on 5 years ago, a year after his settling in this place, in cold season; beginning with a chronic eruption on the body, unattended with fever. At present, he shows developed T. L. on face and ears: trunk covered with small nodules seemingly in a quiescent state: hands bronzed, fingers swollen, glossy, ulcerated, nails gone and tips wasted away: numbness as high as shoulders; feet in same state, sores on great toes; there has been necrosis of right tibia; numbness as high as knee. Nipples enlarged. Parents dead, not leprosy; 4 sons of whom he alone is affected: 2 sisters alive and well, 1 dead, not leprosy: other brothers are away in fields, they are well. Previous family taint is denied: cannot account for his disease: married, wife left him on account of this affection and has married again: no children. Denies contact with lepers, but this is uncertain: was living and working as usual when the disease came on, in this village: it is increasing, lives alone: there are running sores on his limbs: general condition indifferent. Syphilis denied, and he asserts that the right tibia was diseased when he was young (it has grown since—shaft affected). There was no other leper here when he came: he came by chance seeking a livelihood by work, from *Babradhar* (where leprosy is known to exist). His niece No. 2 is a leper.

2.—F., Kumbhar caste, about 15 years old, used to work as a labourer, born at *Meriana* (near here and has lepers in it) and came here with a small colony of Kumbhars (including No. 1) 7 years ago: has not travelled: leprosy for 3 years, and commencing with an eruption of white spots—'dadar,' 'carolea,' followed by disease of the hands. Now there is decided T. L. on face; ears enormously enlarged: a stolid look, eyes nearly closed, no hair on tumid glossy face, abundance on head. On back are numerous nodules and traces of the original eruption (L. L.) great distortion of hands, fingers firmly flexed, tumid, eroded at tips, palms atrophied; left hand shows ulnar nerve-disease very well, it is less affected than the other; numbness as high as elbows. Feet rather less changed, but bronzed, rough, red, numbed as high as knees, feels nothing in the soles. Menstruation has not appeared at all in this girl: growth is stunted, and she looks like an old woman. Is the daughter of brother of No. 1—his niece—father alive and well: mother died 10 years ago: she had white spots on the body 2 years before her death at *Babradhar*, there was, too, swelling of the face. Two brothers are well, older; 2 sisters well, younger, she is the only one affected. Uncle No. 1 has the disease. Not married, was betrothed; cannot account for the disease. It causes great grief to her family, because she was an amiable girl and very useful in the house. Partook of usual food, and lived as usual when the disease came on in this village: it is spreading: she lives partly apart: has running sores: general condition indifferent: was living in the common apartment when the disease appeared. All the Kumbhars inhabit one locality here.

3.—There is another leper in the village, the daughter of a Bhawa who is gone to the neighbouring villages to beg; did not see her.

4.—M., Sagar, *æt.* 35, labourer, born at a distance, here for 30 years, has travelled a little; leprosy for 2 years; it began with darkening of skin at back of hands, then of feet. At present face is puffed and red about brows and ears: eyes staring: nothing now on the back, hands bronzed, skin thinned and wrinkled and in parts benumbed: right little finger bent at tip, nails of first and second next fingers changed into horny plates, also of thumb; not of other fingers: numbness in forearm. Feet in same state with numbness. Parents dead, 2 brothers and a sister: all relatives free from

disease, married, has a daughter of 3 to 4, who is well. Denies contact with lepers, and cannot account for the disease: was eating and working as usual when it began in this place: it is stationary now; lives with his daughter; no running sores; general condition fair; denies syphilis. Was the disease acquired here?

5.—F., Rajghur (Koli), *æt.* 32, born at a distance, here for 15 years; has not travelled: affected for 8 years; first a sense of heat in body, followed by stiffness and bending of fingers. Nothing on face: on back mere traces of large white patches, covering whole surface: both hands are typical examples of 'claws': no numbness and probably ulnar nerves not enlarged: feet little changed, but some of the toes are atrophied on left foot; no loss of sensation here. F., M. and brother dead, without leprosy; 3 sisters, 2 alive and well: husband alive and well: a son of 9 and a daughter of 14, well: cannot say about contact or account for her disease: recalls little about the beginning of her complaint; was occupied solely in household affairs. The symptoms are lessening; does not live apart: no sores; general condition tolerable. Here is A. L. but nerve trunks unchanged. Or had there been neuritis?

In this village of *Vadal* only one leper is entered in the usually accurate lists, yet here are 4 or perhaps 5 lepers known, and were the whole population inspected possibly others would be found. The people are very reticent. (I was not able to go about much on account of diarrhoea, resulting probably from a long ride of 24 miles in a hot sun and drinking bad water.—February 16th.)

Cases seen at *MAHUWA* 16 miles to S.E. near to coast; a large walled town in a plain, with low hills around and a river passing by: 4,183 houses, 12,556 people, $\frac{3}{4}$ Hindus, $\frac{1}{4}$ Musulmans and others. A place long built, supplied with water by wells, river and tank: no marked peculiarities: burial ground within walls: a growing place of late, but in detail no cleaner than other towns: no drainage or scavenging; surroundings rather barren, with gardens about, but no care taken to keep the river pure: ground water at present within 10 feet of surface: wells without steps. Guinea-worm occurs, but there is a tank of water often used.

Leprosy is commonly known here as 'Kod'—the lepers as 'Kodia'; 24 are seen, and there are 25 entered.

1.—M., Ram Visram, Koli (Shiyal), 55, born at *Magada* on coast, lived at *Dugaini* near here (not on coast) for 12 years, in Mhowa only a few days, begging, has not travelled much; leprosy for about 8 years, first had guinea-worm in legs followed by swelling of limbs and face. Well-marked T. L. in face which is much bronzed, ears much enlarged, skin of trunk roughened and thickened, hands swollen, nails deformed, fingers clubbed, numbness on back of hands and adjoining parts of forearm; feet similarly affected with numbness, nipples enlarged. Parents dead, not of leprosy: a brother and a sister also free; believes that his wife's brother and his uncle (F. B.), and their children had the same disease. The former (W. bro.) lived close to his room, and his son was affected. Married: wife free and children well: a girl was born after the beginning of the disease in him. There were other lepers in *Dugaini*: cannot account for the disease in himself: was eating and living and working in the fields there, when it came on: it is stationary: is alone here: excoriations about soles: general condition tolerable: eats fish in different states once or twice a week: denies syphilis.

Here contagion is possible, and heredity is also named.

2.—M., Kano Murseri, Koli, 50, beggar, born at *Katpur* (where is much L.), disease for 4 years, has not travelled far, in Mhowa only since it began; it came first in fingers, then on face, with cracking of skin and vesicles. Nothing on face, but there are white patches on forehead reaching to root of hairs and beyond; on trunk are numerous large pale patches: hands deeply bronzed and much mutilated; little fingers quite gone: numbness, but no great loss of muscular power: feet not so much affected, but one toe of right foot quite gone. Parents dead, were free; brothers also well, no family taint. Married, wife alive and well and children too, though

some of them were born after the beginning of his disease. Denies contact, cannot account for his attack. Was working on board-ship, pulling ropes, &c. Malady is stationary; came here to bag: there are excoriations: general condition bad; syphilis denied.

3.—M., Doodo Amis, Sagar, 50, agriculturist, born at *Piawa*, here 40 years: has not travelled much; leprosy for 8 years, it began with fever, then the hands were affected and then the face. There is nothing on the face except the faintest white patches, but these are distinct; hands swollen, fingers clubbed, nails deformed, excoriations; numbness; feet more affected, second and third toes gone, great toes also changed, numbness here too. Parents, brother and sister free from the disease. Married, 4 sons and a daughter grown up, well: denies all contact (but there are lepers at *Piawa*), cannot account for the complaint; was eating the usual food (not of fish) and working in the fields about here, when it came on. It is stationary, he still lives with his family; there are open sores, general condition tolerable; denies syphilis.

4.—M., Hurry Dooda, Kumbhar, 45, wood-cutter, born at *Palitana*, here for 25 years, has travelled, but not to the sea side. Leprosy for 2 years; it began with vesicles and wasting of the fingers of right hand. There was first, however, an eruption on the trunk which is called 'carolea' and yet is present; this eruption is very characteristic, it begins as a flattened reddish elevation, which soon shews a depressed centre (1 inch in diameter); these spots blend and spread, and large pale, dry surfaces are left which are benumbed; it is a true leprosy eruption: it exists on the limbs and back part of arm, but not on the front of chest and abdomen, which is covered with black hair. Nothing on the face; right hand much changed, fore-finger gone and the adjoining little finger is bent; left hand hardly changed, but the inner side of palm and dorsum is quite benumbed. Numbness exists in the other hand. The feet are less changed, but there is numbness of the soles. Parents dead: his two elder brothers and two sisters are alive and well. Denies all taint; married; wife and children well. The latter were born before the beginning of the disease. Denies contact; cannot account for the disease: was eating and working as usual when it came on here; had fever in the Deccan 4 years ago. The malady is increasing; lives with his family: there are open sores: general condition fair; never syphilis.

5.—M., Bhugwan Barvo, Rajput, reader of the *Shastras*, *et.* 16, born near here, in Mhowa 4 years; has not travelled; leprosy for 2 years: it came on in the hot season with vesicles on the feet at the beginning of the monsoon; he had fever and swelling of the face, together with hoarseness of the voice. On the face are decided marks of T. L., ears enlarged, voice hoarse; nothing marked on the trunk; nipples slightly enlarged; hands hardly changed; there is perhaps some wasting and wrinkling, but no numbness or loss of muscular power; feet bronzed, toes swollen, no numbness. Parents and two brothers alive and well; denies all taint; not married; denies contact; cannot account for the disease: was eating and living as usual, when it came on in Mhowa: it is increasing on the face; is living with his family: no running sores, condition good and is very intelligent; never eats fish, denies syphilis, supposes the disease arose from a 'spell' cast upon him by his uncle, with whom his father had quarrelled.

6.—F., Jivo Kunbi, 35, beggar, born near here, in Mhowa 30 years; has not travelled; leprosy 1½ years, it began in the hot season with numbness and vesicles on the feet, and then on the hands. At present nothing much on the face. Trunk not examined. The hands show signs of A. L. in wasting, stiffness and bending of the fingers. The thumbs are most affected: feet more changed; right foot has lost one of the toes and is wasted; the left foot is less altered: numbness exists. F., M., 3 brothers (younger) and a sister, have no leprosy. All taint is denied. Husband a farmer; children young, one an infant of 6 months old; all well. Denies contact, cannot account for the disease: was living and eating as usual when it came on here, it is diminishing; does not live separate: no sores and general condition fair.

7.—F., Nambhai Vooltembee, Rajput, 40, born in *Palitana*, here 40 years, not travelled, leprosy for 2 years. It began in the cold season with an eruption on the arms after bathing here in the river Malun. At present, there is incipient tumefaction and redness of the rims of the ears, upper part; on the cheeks and on the hands are some larger

nodules, all of very recent formation. On the back is a copious eruption of pimples and nodules of quite characteristic aspect; those that measure ¼ inch show a deep depression in the centre. This is an acute eruption, of only a few days' duration. The hands shew some signs of T. L.; both little fingers are bent, reddish and thin; there is no numbness; the eruption exists on the skin of the forearm &c.: the feet are also but little changed, there is no numbness here. Parents dead; no brother or sister: all taint is denied: a widow; husband was well: one son of 8 years; denies contact and cannot account for the disease; was living as usual when it came on, never ate fish, lives with her child; no sores; general condition is good; syphilis denied.

8.—F., Mochee, 18, works at home, born at a distance, eight months in Mhowa: leprosy for 3 years; it began with an eruption of spots on the body and vesicles on the fingers; the eruption is persistent. Face—flushing of the cheeks, &c.; on the trunk are large and small patches, pale with a reddish edge, which is decidedly raised in the smaller patches; and there are fresh spots to be seen on the sides of the body, in which direction the eruption is spreading from the back. The older spots have almost subsided into large pale stains, still retaining however their crenate border. The hands are affected as in A. L.: fingers much swollen and shortened; nails remain: there are cracks and excoriations; the terminal phalanges are those most affected. The palms of the hands are not much wasted, and there is hardly any numbness at present, but at first there is said to have been much numbness. The feet are less changed: the great toe of the left foot is distorted, and on the right side it is swollen: there is little wasting of the feet in general, and little loss of sensation; the nails have fallen off, but new ones are being formed. F. died about 10 years ago of leprosy, which had lasted for 3 or 4 years: M. was well; 2 brothers are also well; no sister; father lived at Vadai, which is 8 coss off, and where there are other lepers (*vide* page 27) Was married; husband dead, no children: cannot say about contact, and cannot account for the disease: was living as usual when it came on; never ate fish; syphilis denied.

Was carried here by her friends to worship at the Datar Pir shrine where a Fakeer resides in charge, who provides food, &c., and she professes to be greatly relieved by faith in this deity. The Fakeer is married, but has adopted this girl as his daughter, she says—a curious state of things: there are now no other lepers at this shrine, but lately a Koli and a Kolin left, who were cured of their leprosy there. She fancies the disease is subsiding, but is a miserable subject, at best.

A striking case of A. L., and an instance of the strength of faith. The Mussulman Fakeer eats fish, but this woman never touches it.

9.—F., Malu Lako, Koturia (Koli), 50, beggar, born at *Oti* (5 coss off), in Mhowa only 5 months; duration of disease 10 years. It began with a sense of heat and pricking sensations in hands and feet, with vesicles. On the face are doubtful traces of T. L.; on back similar marks of eruptions; hands are affected with N. L., middle fingers of left hand quite gone (nail left), other fingers clubbed and nails converted to clumps of horn; otherwise little distortion: little or no loss of sensation; there was vesication of right forearm; no feeling here, and probably diminished sensation elsewhere. The feet are more affected, toes reduced to stumps, particularly on left side, but still some sensation persists. F. died when she was young, cannot say if he was free from disease: M. dead, no leprosy; her elder brother had it, he died at *Khari* 20 years ago; 2 older sisters dead, who were free; no one else in family affected. Her husband deserted her on account of this disease and has married again: they had a son and daughter, free. Denies contact; native place *Khari*, where are other lepers and where she was living as usual when her disease came on; has running sores and general condition indifferent; intelligence and memory slow.

10.—M., Bhungy, 28, basket-maker, born at *Latpur*, here for 7 years, not travelled; leprosy for 6 months, it began with blebs on fingers and eruption on body: at present, there are signs of T. L. on face, though slight; rims of ears enlarged; on trunk is a copious papular eruption and other more obscure marks; nipples much enlarged; skin of arms covered with minute nodules or pimples: hands little changed, they are affected with itch or prurigo; no numbness; feet in a similar

state and covered with the same papular or scaly eruption; nails a little deformed. F. dead, not of leprosy; M. alive and well: a young brother is well: denies all taint. Is not married. Denies contact and cannot account for the disease. Works as usual here, lives with his family, but eats apart: no running sores, condition fair, syphilis denied. States there is no leprosy at Latpur, but answers questions unwillingly.

11.—M., Vishram Waho, Bhattia, 20, labourer, born and resident here, has not travelled; leprosy for 4 years: it began in cold weather, he was sleeping in fields, and his feet became abraded by accident; then blebs came and afterwards on the hands, with a sense of heat in body. Now decided marks of T. L. on face, hairs gone; right eye lost from leprosy nodules on cornea or sclerotic growing all round, and left eye has the cornea dim; nose sunken; voice hoarse; ears enlarged below; cervical glands swollen: nothing on trunk: nipples enlarged: skin of extremities looks rough as if from previous eruptions, excoriations at elbows, &c. Fingers are mostly destroyed, terminal phalanges all gone, also proximal phalanges of thumb and forefinger (left hand) and of middle finger (right hand); the deformity is characteristic; formerly numbness was wide spread, he says, now it is limited to palm of left hand and back of right hand. Feet similarly distorted, that of left side being most affected; some of its toes are gone. Marks of ulcers on right leg, and a peculiar growth of the cuticle at the instep, not unlike prickly warts. F. dead; M. alive and a brother and 2 sisters; all free. Denies all taint; is not married: denies contact: cannot account for the disease: was eating and living as usual when it came on: does not eat fish: malady spreading; he has running sores; general condition fair; is not emaciated; denies syphilis; does not live near other lepers.

T. L. well marked here: heredity and contact are denied, hence the clue is wanting.

12.—F., Giga Nuthoo, has a daughter at *Barpura*, too sick to come to me.

13.—M., Runchore Nilu, Wania, 32, born here, not travelled; leprosy for 7 years, it began in rainy season with blebs on right foot, pains in leg (along course of nerves?), then the same pains in the hands, and afterwards nodules came out. At present, there are marks of T. L. on the face, in some thickening of the brows and loss of eyelashes, and flushing of the cheeks; on ears are large leprosy growths occupying rim and lobules, which are very striking. On trunk nothing but a faint measles-like eruption, at present: hairs abundant in front of trunk. Nipples hardly changed, if a little enlarged; skin of arm little altered, except a few scattered nodules at right elbow along course of ulnar nerve towards wrist; hands swollen and turgid, back of hands marked with large, red or pink, turgid nodules scattered or in clumps; these extend to back of fingers also, giving the aspect of acute lupus or syphilitic tubercles; nails on little and ring fingers are distorted and scaly: numbness from elbow downwards, except on palms (noteworthy); feet in a similar state but tubercles not so marked: morbid soreness of soles: numbness below the knees. This isolated disposition of the nodules is remarkable: they have lasted for 3 years.

14.—M., Juddo Dhano, Kumbhar, 35, pot-maker, born here and has not travelled: leprosy for 12 years, attributes it to a fright leading to a tumour, which was cut by the barber. At present, there are signs of A. L., drooping lids, &c., but hair not scanty. Characteristic white spots on trunk; in loins large transverse white spots, others on sides of trunk, reaching forward; nipples unchanged: the spots are partly benumbed: similar ones exist on arms and forearms; hands strikingly mutilated, the fingers being reduced to mere stumps, the nails remaining as knobs: numbness is limited to both surfaces of hands, and not extending above wrists. Feet little changed in aspect, except some toes of left side: this foot is benumbed below ankle, whilst the opposite one is not benumbed, or but slightly so. Parents dead and a brother (no sister), all free, taint denied: married, wife and children well: 2 daughters of 13 and 12; denies contact: cannot account for the disease, which came on while he was living and eating as usual, in this place: it is stationary. Lives apart: there are sores: general condition indifferent: never syphilis; never ate fish in his life.

15.—M., Usman Jevu, Mussulman, 32, labourer, born near *Talaja*, 12 years at Mhowa, not travelled much: leprosy for 8 years, it began with blebs on knuckles and on feet. Nothing parti-

cular on face, except a dubious puffiness of cheeks, &c., and subsidence of nose: on trunk are spots attributable to other skin-disease: nipples enlarged: nothing on upper extremities, and no numbness now noticeable: lower extremities have numbness below middle of legs, atrophy of toes and sores beneath great toes. Parents free and 3 brothers and 2 sisters. F. bro. (paternal uncle) had leprosy; he died 10 years ago, after being affected 10 years: he lived at a distance and died there, but Usman might have gone (and has) to visit this man. Married: no children: denies contact, except with his uncle, and cannot account for the disease: was eating and working as usual when it came on here: it is spreading: lives with his old mother still: the sores on the soles have existed for 6 months; general condition tolerable: denies syphilis: has eaten fish, but not lately.

A very chronic case, throwing no light on the disease: ? contagion.

16.—M., Bhugwan Jetha, Khatri, 40, wood-turner, born here and resident, has travelled a little: leprosy for 10 years, it began with white spots, (Kod) at front of right knee, which was followed by numbness, and another spot on back of left foot; then numbness at elbows, wrists and shoulders, on arms, brows, &c. At present, there are slight signs of T. L. on the face, puffiness of brows, scanty hairs, cheeks puffed: ears slightly turgid, eyes rather rounded and staring: numbness on brows and rims of ears at upper part (not below): nothing on chest now, formerly there were spots here, but they have subsided (as the result of a charm worn on his right arm); nodules at nucha, and skin of back looks rough, red and coarse: numbness in loins only: nipples gun-capped; skin of arms rough, and hands bronzed, wrinkled, rather puffy; numbness at back, on forearm and at elbows: feet in same state: left great toe partly absorbed: numbness everywhere except in soles, it extends to outer side of thighs, &c.

F. died a leper here some 30 years ago, in the house he now occupies: M. free: a brother died 14 years ago of leprosy: 2 sisters both free; no other relatives affected, so far as known. Not married, does not recollect contact: disease stationary? Lives alone: his surviving sister has children who are well: no running sores: general condition good; denies syphilis; supposes himself much better for the intervention of a Brahman, who has also given him a charm to wear and the thread. Cannot account for his disease. His father being depressed in spirits on account of his disease, pretended to sail for *Rutnagherry*, and drowned himself at sea. His brother leper lived in the same house as he now occupies, and was ill at least a year before he died. The living girl also occupied the common room, leaving it about 15 years ago before the death of the brother, and before the disease broke out in this man: the elder girl died many years before this. No other leper lives near him: never ate fish in his life.

A remarkable case, for evidence of wide nerve-disease, with but slight change in appearance of skin. The contrary is oftener seen.

17.—M., Koli, case of doubtful significance, without taint: nose depressed, two fingers stunted, but he attributes this to accident, and worms came from nose; no syphilis: an opium-eater: no other note taken.

18.—M., Anand Jussa, Lohar (works as Sutar), 35, born here and resident, has travelled to the Deccan: duration of disease 1 year (uncertain), its onset is referred to his taking mercury in honey 6 years ago, for some abdominal complaint; and the drug came out on a burn he had lately on left hand! Nothing striking on the face; ears look a little red, perhaps; on back only a few places of sound skin below neck, rest is covered by a pale eruption, just apparent but with characteristic margins; nothing on front of trunk, where dark hair grows freely: nipples perhaps a little enlarged: numbness towards shoulders, at back, and probably elsewhere. Upper extremities—slight roughness of skin at shoulders, back of arms, elbows, back and inner side of forearms, and dorsum of hand and inner side of palm, but little change in fingers; he seems to burn himself frequently: lower extremities in same state; numbness: such deformity of toes as exists, he attributes to accident. F. dead, M. alive: 2 brothers and a sister all free from disease: no family taint admitted. Married, wife and 2 children well. Does not know of contact: was living and working as usual, when the disease came on here: it is lessening (?); lives with his

family: no running sores: and general condition fair: intelligent enough: denies syphilis.

Here is incipient A. L., date of onset quite unsettled: patient hardly admits he is diseased and still works hard to support five people: his muscular power remaining almost intact.

19.—M., Mullie Nurbai, Muss. 50, garden watcher, born at a distance, here since his youth. Leprosy for 10 years—but he cannot reckon accurately. There are spots on face; trunk covered with pale spots, reddish, of various sizes, some large on back and shoulders, in front others small, level, rounded, defined, but without a raised border (as far as scrutinised): hands affected as in A. L., especially right hand, which is nearly destroyed: little finger of left hand bent, fixed and wasted: there seems to have been necrosis of the distal phalanges. The same eruption exists on arms, &c.: numbness is denied. Feet less changed, great toe of right foot gone: here too numbness is denied. The man in fact does not admit himself to be a leper, and will not answer fairly: denies all family taint: not married: denies contact: lives with others: has running sores: denies syphilis.

An example of suspicion and fear with consequent false testimony.

20.—M., Vira Wanso, Kansaria (works as carpenter), 60, here since his youth, has travelled a little: leprosy for 6 years: it began on forefinger of right hand, with numbness and vesicles, whence numbness spread. Nothing particular on face (white patches?), is night-blind: on trunk large pale patches, and small ones which shew an annular form with depressed and darker centre, evidently chronic in duration. These are more or less benumbed: in loins is a large patch: nipples a little enlarged. On arms and forearms are similar spots, at shoulder, back of arms and elbows: both hands 'claw-like': forefinger of right hand reduced to one phalanx; nail remains, a vesicle at its side: palms shrunken: there is sensation on centre of palms, but not at sides and elsewhere on hand: patches are benumbed in forearm, &c. Feet in similar state: left great toe reduced to a stump, and almost total want of feeling everywhere, extending to leg. Parents free. Brother and sister free: knows of no taint: married, numerous children, all well. Cannot speak about contact: cannot account for the disease: was working and eating food as usual, when disease came on: it is increasing: not separated: excoriations exist: general condition fair for an old man: denies syphilis.

Obscure origin if not from contagion. Why right hand affected first? An artificer.

21.—M., Wani, 55, priest and labourer, born and resident: disease for 16 years, T. L.: nose sunken, extremities deformed and ulcerated, larynx affected; he is now lying in a moribund state in a little separate outhouse, death threatening by asthenia and apnœa—a miserable sight.

F, dead, free; also mother: a younger brother is here, and quite well; 3 sisters all well. No family taint. Not married, being a priest: the disease seems to have begun with a sore on the foot, in this place: syphilis denied by his friends. For 7 years he was separated: the room is dark and low: here in a compound inhabited by 40 people all related, and by numerous cattle, is a wretched kind of place, but there is in the midst a pretentious house, a curious combination. The man used to sit out in the court-yard, the only leper amongst them all: he was strong and hale (like his brother), and lived like the rest; had not travelled: all previous generations of the family were free, as far as known to older men. He washed his own clothes—used to bathe in the river where others resort, and was shaved by the common barber. *N.B.*—It is known to the people that some contagious diseases may be spread by the razor, but none prevent the barber from always exercising his profession, if he choose to do so.

A case full of mystery. Was he inoculated in the feet?

22.—F., Kolin, 25, born and resident here: A. L., probably recent; she seems to have had infantile paralysis. Nothing on face—hands mutilated (median N. affected?); they speak of Kila (nails) coming out, probably meaning necrosed finger-bones: feet (specially right side) much affected. There are patches of eruption on the back, pale and large. F. alive and well: mother dead: a brother and sister are well: also husband, no children: but there are children of a neighbour (Bhurwad) playing in the house. Contact denied: the

disease came on in the miserable hovel she now lives in. No leper lives near. A well-marked case quite obscure in origin.

23.—F., Kumbhar caste, 50, born near *Talaja*: a case of advanced N. L. of 35 years' duration: the woman is severely mutilated, but is active and strong, though perhaps prematurely aged. Family taint denied: 2 living sisters are well: also husband, and 2 stalwart sons. Contact with lepers denied: disease attributed to the curse of an aunt while she was worshipping "Ramdal Deo," the Kumbhar's god, to the effect that "might she lose her hands and feet": 4 sons and 2 daughters born after the disease began are well. The lady came on at *Chapri* (where are lepers); no other leper near this house in the Kumbhars' quarters. Another case of utterly obscure origin.

24.—F., Kumbhar, 55, born at *Tulgajurda* (close by), here since 11 years of age; has not travelled far. Hands affected many years with burning at tips of certain fingers; a year ago, swelling of the face. Now, a flushed and turgid appearance of eye-brows, cheeks and nose (not ears); a burning sensation in brows reaching to top of head, and in fact it looks as if leprosy growth were going on in these parts, the chief redness and swelling being just over areas of the supraorbital N. Nothing on trunk (back): right-hand has middle finger bent, and deprived of its terminal phalanx, the nail remaining; left hand has ring and little fingers similarly mutilated, and tip of thumb is absorbed: in this case the unchanged nail is turned over in front so as to cover the tips of the fingers, the pulp alone being deficient, otherwise not much atrophy of the digits, no general wasting of hand or loss of muscular power or feeling. Feet not changed: chronic ulcers on legs, and on right side a swelling of dorsum of foot. There is behind right elbow a swelling like a softened tubercle and strumous or syphilitic scars, in forearm, of similar tumours. She states there were once such swellings on the body, following the ingestion of some 'larwa'—wheat-flour mixed with sugar, &c., but these seem to have been only temporary, as they subsided in a fortnight's time. Parents free: no brother; a sister (younger) is well: denies all leprosy taint. Is a widow, has a son of 15, well, and a daughter of 20, also well. Contact with other lepers not known, nor possible origin of disease. The sores on the legs have come on within 12 months and fresh spots still appear; these last are tubercles in the skin which inflame and may suppurate.

She is not segregated. There are running sores; general condition tolerable; no discoloration of gums: teeth all right: syphilis denied, but the mouth is puckered; she complains of a sense of heat (neuritis?) in soles and toes and up the legs at the outside: the old scars on the legs look like remains of strumous or scrofulous abscesses, or some syphilitic affection: they are not the usual leprosy marks: no bone disease: ulnar nerve probably not enlarged. A case of doubtful nature, but a leprosy taint is indicated.

21st February.—To *Kutpar*, 3 miles to the south and built on a cliff overlooking the seashore, near to the mouth of the river Malun; isolated and reached by land over a low sand plain: a large irregular and dirty village, contains 250 houses at least, and 1,725 inhabitants; is not increasing; inhabited almost wholly by Kolis (here are no Kunbis, or Brahmans or Garassias, &c.), the rest are Wanis, Bhurwads, Bhawas, Mussulmans and a few Dhers. Common food: bajra, jowra (little wheat or rice; urid and mung: almost every one eats fish, fresh, dried or salted. There is a liquor and toddy shop, and consequently some intoxication amongst the Kolis; common occupation of the latter, labourers, boatmen, ship labourers; fishermen few or none. Well-water is drunk: there are two wells outside the village, saw one of them, a shallow excavation amongst the low hills; water within 10 feet of surface, looks milky, but is said to be sweet and constant; the other is of the same kind. Here is a maritime village corresponding to that of a small port, the residence of sailors or labourers, and in some respects comparable to a frequent condition of things on W. Coast of Norway. The people seem to intermarry or marry without going abroad: syphilis is probably not very rare, but its ravages are not often indicated. Hardly any guinea-

worm here : cholera occurs : there were several cases quite recently (two months ago) : no mycetoma ; 16 cases of leprosy are known, 15 seen : one has gone to a distance, and one has died within the past month. It is estimated that cases are more frequent now than formerly : 10 years ago there might have been 10 ; 20 years ago some 8 or so ; this is common testimony : there have always been lepers here, so far back as old people can recollect : there are no records for guidance.

1.—F., Kolin, 20, born and resident : T. L. for 11 years ; it seems to have begun on the face and spread to the hands. At present, signs well marked on visage : little seen on trunk : hands deformed, especially the left, with numbness : feet also affected, it looks as if there had been disease of tibia. F. dead, M. alive, and a brother and sister, all well ; denies all taint : is married ; no children ; cannot say about contact or account for the disease : was living and eating as usual, when it came on here, was then working in the fields : it is increasing. Lives with her mother, eats apart : there are running sores, general condition indifferent.

2.—F., Kolin, 40, labourer, born and resident here, has not travelled : T. L. for 8 years, it began on hands after an attack of cholera : well marked on face : hands partly destroyed : little finger of left hand nearly gone ; numbness : feet similarly affected, particularly left. Father dead, mother alive : a brother had leprosy and died here 15 years ago, after 10 years of illness : he was the eldest brother : 2 sisters are well : there were 4 brothers, 2 were drowned and 1 is alive : the deceased leper lived in their common room, as did she until her marriage : no previous taint is known. Married ; 3 sons, of 17, 15 and 10, and 2 daughters of 25 and 14, all well. Denies contact with other lepers, and cannot account for her disease. Was living as usual in this village when it came on : it is spreading : there are running sores ; and general condition is indifferent.

3.—F., Kolin, 40, born and resident, never travelled ; leprosy for 15 years : it first appeared on hands, lately on face : now nose sunken : nothing seen on trunk : hand mutilated to an amazing extent : every finger gone and the bare palms left : feet in same state, the tarsus alone remains, which is capped by persistent tips of toes : great toe gone. It is seldom that so extreme interstitial absorption is seen : numbness prevails. F. dead, free : M. died 14 years ago of leprosy, having been affected for 8 years in this village : brother free : no sister : no previous taint. Husband a sailor : 2 sons and a daughter, grown up : all free : contact admitted to be probable : no other cause for the disease : was living as usual when it came on here : it is spreading : lives alone now : there are running sores : general condition poor, but she is intelligent enough, and general bodily development hardly impaired.

4.—F., Kolin, 15, born and resident here, has not travelled ; 7 years' disease, it came out on nails and tips of fingers, then on face. Marked T. L. on face and ears, cheeks and nose tumid and bronzed, &c. Nothing noticed on trunk : hands wasted ; fingers clubbed, stunted, nails gone, little fingers of left hand crooked : there are tubercles (like nodes) in forearm : feet less affected : numbness exists : nodes (?) on tibia. F. alive, well : M. died of leprosy 12 years ago, and had been affected for 6 years : one brother and sister of same father well. Denies all taint, but M. F. (maternal grand father) had the disease and died in this village many years ago. Not married ; menstruation not begun ; general development hardly checked in aspect : cannot account for the disease : was living as usual when it came on, it is increasing : lives apart ; there are running sores ; general condition indifferent.

These 4 women were not interrogated about syphilis, because the truth will be unattainable.

5.—M., Koli, 20, born and resident ; leprosy for 4 years : now visage dark, bronzed with signs of T. L., especially on ears : trunk unaffected, nipples hardly changed, hands not changed except by numbness on back : feet in same state, but outer toes of the left foot seem to be destroyed at tips : numbness. Parents dead ; were free : no brother ; 2 sisters, both well : one older than he. His F. M. (paternal grand mother) had the disease in this village : she died some 30 years ago. Other taint not known. Not married. Contact possible : was aboard-ship when disease came on : it is increasing ;

lives alone : no running sores, general condition bad, intelligence low and stunted—he looks like a satyr. Ulceration of soft palate ; denies syphilis.

6 and 7, brothers ; Kolis.

6.—Elder, 25, born and resident here, not travelled, leprosy for 6 years ; it began with numbness on hands, spreading upwards. Now nothing on face : trunk unaffected, except a few old stains. Nipples undeveloped : hands slightly changed as in A. L. : little finger of left hand stunted and next rather bent ; sore on inner side of wrist : widespread numbness, even of palms of hands. Feet more affected, especially the left ; great absorption and displacement of toes ; sores at heel and on opposite foot, beneath great toe. Marks of burning on limbs, from accident.

7.—Younger, 18, born and resident, not travelled. Leprosy for 7 years, or one year more than his brother. It began with numbness of hands. Right ear is changed in form but only as result of accident, but lower part seems tumefied as if from incipient T. L. ; other signs of this on the face : nothing on trunk : nipples barely changed. Hands immensely mutilated : on right side fingers reduced to stumps and some on left, the others being shortened : it is curious to notice the condition of the middle and ring finger of left hand, on which the nails remain yet unchanged ; there is numbness here. Feet even more altered : one foot reduced to a stump, and on right foot only the little toe and stunted great toe remain. There are excoriations here.

F. dead, free : M. had the disease and died 13 years ago, being affected for 6 years in this village. There are no other sons than these two boys ; sisters are well : they are both older than the brothers : no one affected but the mother ; no previous taint. No. 6 (elder man) married and has a daughter of 4 to 5 years : well ; No. 7 (the younger) is not married. Contact with other lepers is denied : origin of disease in both men not known : both living and working on board-ship, when it appeared : it is increasing : they live together : running sores in both, general condition tolerable, both denying syphilis. Their sisters live in this village and have children ; well. Mother died before either was affected, know of no other sailor leper in their ship.

8.—M., Koli, 10 or 12 years old : born and lives here, never travelled ; leprosy for 7 years, it therefore began when he was a mere child of 3 or 4. First appeared on little finger of right hand (probably vesicles) which afterwards became bent : then the next finger and next : soon the other hand was altered (2 to 3 months) and now feet are altering. At present nothing apparent in face : on back light patches, in loins (also on arms, &c.) in front nothing visible : nipples undeveloped. Hands greatly affected as in N. L., fingers tumid, ulcers at knuckles, interstitial absorption and necrosis going on together : bending and stiffness of digits : not much atrophy of palm, inflammation and results perhaps hiding it ; numbness on dorsal surface, but both palms are also numbed (which indicates implication of median nerves), on right side the palmar numbness is limited to the wrist : on left side, it is extending along the forearm in front. Feet little altered, but much bronzed, and skin of sole cracked : little toe of right foot appears wasted. The lad seems fairly well grown and is strong in body. F. alive and well (present) ; M. alive and well. One younger brother of 6 well—3 sisters one older, 2 younger, well : no taint in family. Parents were born in this village. Occasion of contact frequent : origin of disease unknown ; boy lived as usual and as others. It came on here : disease spreading : lives apart : general condition fair, is intelligent.

9.—M., Koli, age 10 or 12 years, born here, not travelled : 6 to 7 years sick : first there was an eruption of pale patches ('carolia,' 'dámleb') on front of body (perhaps elsewhere), followed by numbness of hands, &c. Nothing on face but doubtful puffiness : on trunk are still traces of pale-reddish spots, and in loins traces of small pale nodules. Hands deformed especially the right, little finger there gone and next, thumb bent. Some fingers of left hand excoriated at back and stunted, nails unaltered, excoriations at elbows, widespread numbness including even palm of right hand (vesicles in inner wrist here). Feet much more changed especially right foot, great toe of which is now festering ; foot is stunted, great toe and next of left foot are atrophied. Numbness in right foot, possibly morbid soreness of soles. Parents dead : free. An older brother well, and an older sister. F. bro.'s son (paternal cousin) had the disease in the village, and

died about 10 years ago, being then about 12 years of age; they cannot now say how long he had leprosy. Nothing more is known of his ancestors, but afterwards it is said that F. U.'s son (grandfather's brother's son) had the disease: he died more than 30 years ago in this village. Not married: contact possible: cause of disease unknown: the lad is fairly grown and intelligent enough: is said to be still growing: disease arose here: it is spreading: he is an orphan: is supported by his aunt and lives apart. There are running sores on feet: he goes freely about the village, and plays with other boys.

The youngest leper yet seen: nerve disease predominant and growth of frame hardly checked. Here are crowds of children playing about: have any of them the disease? No suspicion of syphilis in these children.

10.—M., Koli, 25, labourer, born here, not travelled: 7 years' leprosy, it began on ears—swelling of right ear; then on cheeks, &c. At present, well-marked T. L. on face and ears: not much visible on trunk, but indications of old eruption; nipples enlarged. Hands not greatly changed, but bronzed (like face), and little finger of right hand with the next one, are stunted: also little finger of left hand. Numbness on back, seemingly limited to wrist: skin here finely wrinkled. Feet much bronzed and wrinkled; little deformity, sores on sole of right foot: numbness here.

F. had leprosy and died 4 years ago, after 5 years' illness: M. dead, free; three brothers, free; all younger than he: no sister: no other taint known. Married, a daughter of 4, she and wife well. Contact uncertain: cause of disease unknown. Was a ship-labourer when first affected: living as usual; disease stationary: partly isolated, there are running sores: general condition yet tolerable, never syphilis.

11.—M., Koli, 30, labourer, born and resident here: 6 years leprosy, it began with an eruption of pale patches (*dádur*) on skin: then feet became numbed and hands. On face nothing: little on trunk: on left arm pale spots reaching as high as shoulder: fingers of left hand inflamed, shortened: right arm and hand seen to be quite unaffected: no numbness there. On left side numbness exists only as far as wrist, but it is present in the palm. Of the feet, the left is also the most changed, there being atrophy and distortion of some toes: numbness below the ankles. F. dead; free: M. alive and free: a younger brother and sister are free: F. B. (paternal uncle) had the disease in this village, a very long time since. Married: a son of 6, free: contact denied: cannot account for the disease: ate and drank as usual—stale fish and liquor, like the rest was working a board-ship when it occurred: it is increasing: lives apart, there are sores: general condition fair: denies syphilis. A case of apparent neuritis, and unilateral; but there is an eruption, and therefore it cannot be simple neuritis.

12.—M., Koli, 25, labourer, born here, and has not travelled far; leprosy for 8 years: there seems to have been an eruption on the skin. At present, marked T. L. with much bronzing on face. Trunk also affected in a characteristic manner, there being a wide diffusion of small nodules and pale patches in the skin: nipples enlarged. Skin of forearms in same state: hands bronzed, and right hand bronzed in palm; of both, fingers swollen: nails unchanged: no numbness: middle finger of right hand inflamed. Feet somewhat affected: great toe on left side reduced to $\frac{1}{4}$ normal size, with bronzing here and numbness in front. F. dead; free: M. alive and well and has married again: no brother or sister, his father having died when he was an infant. No family taint. Not married; denies contact: cannot account for the disease: was eating and working as usual when it came on in this village: it is stationary: lives alone: there are sores: general health indifferent: denies syphilis.

13.—M., Koli, 40, born and resident here; leprosy for 7 years. There was first an eruption, and then numbness. Face shews decided T. L., ears much enlarged: little visible on trunk: nipples enlarged, with the areola: hands bronzed and swollen immensely: nails destroyed: excoriations on knuckles: numbness, extending to just beyond wrist: feet more affected: on right side most toes are gone, and some of those on left side are wanting: numbness.

F. dead, free: M. had the disease, and died 8 years ago, after an illness of 10 years in this village: two younger brothers alive and well: a younger sister died 8 years ago of leprosy, lasting 6 years. Father's brother (paternal uncle) had leprosy: and father's sister (paternal aunt): these people

lived and died in this village. Details not recollected: all seem to have lived in the same compound, as is usual for family connections. Married: 3 daughters of 10 and 5: no son. Contact with other lepers possible: cause of disease, unknown: lived and worked as usual: disease is spreading: lives apart: there are excoriations: general condition indifferent, denies syphilis.

14.—M. Koli, 55, born here and resident: 7 years' leprosy. There were swellings on wrists, vesicles on fingers. Nothing particular visible on face of this miserable subject, but ears look swollen: eyes sore: on trunk nothing visible now, nipples enlarged. Both hands are quite destroyed, not a single finger being left: widespread numbness. Right foot also nearly destroyed, as regards the toes, and left foot is affected: numbness here too.

Parents dead, free; brothers free; two sisters alive and well. Denies all taint. Married: two sons of 15 and 10, and a daughter of 7, well—denies contact; origin of disease unknown. Lived as usual and is now apart: there are running sores: denies syphilis: a wretched object.

15.—M., Koli, 35, born here: leprosy 5 years, it began with sores on soles and tingling of fingers, followed by numbness. Now some slight signs of T. L. on face: hair scanty on brows and ears turgid: on trunk nothing seen: hands swollen: fingers stiff and excoriated at back. Right little finger bent and ulceration along inner side of palm: nails unchanged: numbness at dorsum and in forearm, not in palms: it seems to begin in the fingers (*e.g.* on left hand). Feet worse, second and third toes gone, and great toe on left side stunted: numbness here reaching up legs, sores in soles with numbness. F. dead; free: M. died of leprosy 12 years ago, after an illness of 7 years: this woman was mother of Nos. 6 and 7 by second husband; no brother; a sister older and well, and her child; no other taint. Married, a daughter of 3: contact possible: origin of disease otherwise unknown: was working here as usual, when it came on: has sores: general condition fair; is not separated; had a chancre 8 years ago in Arabia and took physic: no signs of secondary symptoms; still works amongst other people.

Memo.—The L. mother married twice and Nos. 6 and 7, and 15, are half-brothers: by first husband she had a son and a daughter, son long after became leprosy: daughter remains well and is the elder: by second husband she had 2 sons, and 2 daughters: the sons are partly younger and both are leprosy; daughters well: all these children were born before the disease appeared in her, and those born last, or nearest that time, were soonest affected: but the female children are not affected; only the males. Both husbands reported well. A remarkable instance of strong maternal influence.

16.—Died 3 weeks ago. A. L.; M. 22. Without family taint.

Memo. for Kutpar.

Intermarriage is forbidden: but whilst children of brothers (*káká-kákána*) and of sisters (*másíná*) may not marry, the children of a brother and sister may (*mámá fuiná*). Here are at least 5 Koli clans, the largest being the Dolassia, within which intermarriage is forbidden; the several clans intermingle freely with each other.

Diet. Some Kolis call themselves Talupda, but they eat fish. Not much fresh fish is caught here, and there are no fishermen properly so called; every one goes to work in the neighbourhood, either at Mhowa as common labourers or field labourers, or on board-ship, lading and sailing. The fish which is commonly consumed is dried-fish: the smaller kind comes from *Diu*, whence the Portuguese send a ship-load or two annually: other dried-fish comes from Bombay. There are no fish-curers here: no salting of provisions. The average gain from labour may be Rupees 2 per mensem, but employment is intermittent. Troops of men, women and children may be seen crossing the flats in early morning, on their way to work in town or field; others go to the wharf near. There are no ship-owners or part ship-owners here: none are rich. The people purchase their grain in Mhowa, perhaps spoilt grain is sometimes bought: ashes are mixed with jowari and *bejri* to keep them, and sand is mixed with the dhalls. They buy of retail dealers, and know nothing of the admixture of mercury with these ashes. The people are fairly clothed, and seem content: children are very numerous. Stale fish is not eaten, they say, but the larger dried-fish cannot be always 'good': they consume much 'chass'

and that not over-fresh. All seem to live alike. A little wheat is eaten only on holidays.

No public prostitution: possibly there are hidden prostitutes: the Koli women having often a bad name.

22nd February.—To *Bhadrod*, 4 miles N. W. of Mhowa: in a plain intersected by rivulets, near the sea—375 houses: population (2,239) chiefly Panchouli, Brahman, Wani, Koli, Ganchi, artificers, &c.; river-water is used: fish not eaten, except by Kolis alone. No guinea-worm: cholera occurs, it was here lately; no mycetoma: leprosy not unfrequent. An irregular, dirtyish place, built on uneven ground.

N.B.—Two cases of leprosy in addition to those in list were incidentally found: there may still be others.

1.—M., Mochi, 40, born here and resident: leprosy for 7 years; it came on with numbness in hands and feet. Nothing on face or trunk; nipples unchanged: hands altered as in A. L., some fingers being inflamed and wasted at tips: little and ring finger of left hand also bent and stiff, with an ulcer above its wrist; palm benumbed. Feet more affected: on left side metatarsus and nearer phalanges are gone; remaining part of toes thrown back and little changed: of right foot toes also distorted: numbness as high as knees, and vesication above.

F. dead, free: M. had the same disease 12 years ago, and died after an illness of 6 years: there were 5 sons and 2 are leprosy—one here and one gone to Benares, a younger son. Two older sisters are well. His brother was affected before him. All lived in same room with the mother, a little apart. All other taint is denied. Married: 3 sons, 2 of whom were born after the beginning of the disease. Denies contact and attributes the malady to eating mango-juice, which caused fever &c. Never eats fish: was living as usual when the disease came on, it is stationary; lives apart, there are sores: general condition tolerable; intelligent, denies syphilis.

There were 2 other lepers in this village when the mother of this man died, and 20 years ago there were only 2, therefore the disease has increased. His leper brother lived here for 2-3 years before leaving for Benares.

2.—M., Wani, 38, sells oil; born here, and has travelled a little; leprosy for only 7 to 8 months, it seems to have followed an attack of indigestion (vomiting after food, &c.) Now there is turgidity of face and ears: on trunk a copious eruption of raised, reddish patches, rounded in contour and blending: such patches cover the whole back, and there are large reddish surfaces in the loins: on the front of the chest the spots are small and in the form of rings. Left hand shows signs of incipient N. L.: feet more affected: on left side all the smaller toes are gone, and great toe is much reduced in size; this foot is bronzed black and benumbed. Right foot bronzed, but not yet distorted. Parents dead: 3 brothers and 3 sisters, all well: no taint in his family. Married: 2 girls of 5 and 7, well. Cannot say about contact: cannot account for the disease, except that it was preceded by dyspepsia: was living and working as usual, when it came on in this village: it is increasing: there are sores: general condition fair: his children live with him: syphilis is denied. A noteworthy case.

3.—M., Pachouli, 35, born here, has travelled: leprosy for 6 to 7 years. It began with a sense of heat, followed by numbness in limbs and eruption. T. L. on face: on back nothing, but on front there are red spots and fading patches of eruption: nipples enlarged. Fingers swollen, skin wrinkled and dark, nails and little and ring fingers of left hand defaced: skin of arm and forearm red and thickened. Feet more affected, on the left side great toe is gone and another: on right foot, one toe is gone: skin of leg numbed and dark and wrinkled.

Parents dead, free: an elder brother and sister well: married. His first wife deserted him; had an infant son who died, free: denies contact: cause of disease unknown, was living as usual and working in the fields at *Bhamodra* (9 coss away) when it came on: afterwards he came here with his family: disease stationary: lives apart: there are running sores. A marked case of obscure origin: leprosy exists at *Bhamodra*.

4.—M., Dher, 35, born here, and resident, not travelled far: affected 20 years; the disease began with numbness. Nothing on face. Trunk covered with scaly marks; there is probably

a leprosy eruption: nipples enlarged. Hands terribly affected as in N. L.: fingers reduced to mere stumps, which are swollen: nails remain at tips. Feet even worse; on right side nothing is left in front of tarsus; and on left side the toes are barely to be made out. There is numbness on both sides. F. died free, and M. also; a brother here, younger and well; no sister; denies all taint. Married; two daughters of 7 and 1—sad facts. Contact denied; was working as a labourer, living as usual in this village, when the disease came on: it is now stationary: does not live apart: there are running sores. General condition bad. When the disease first appeared, was living in a room where his cousin, brother and aunt were, and continued to live with them, and now associates and eats with the rest. *N.B.*—If this be neuritis, why should it be transmitted to offspring and others? Yet such occurs; *vide* these notes *passim*.

5.—M., Pacholi, 35, died a month ago; a leper for 4 years—with no taint: probably T. L.: children here, 3 sons and a daughter, who are well. Statement of the Patel. *N.B.*—There will be no difficulty in marrying these children, if the necessary money can be raised.

It being incidentally mentioned that two other persons were suspected of disease; these were sought for and they came to Mhowa for inspection. It turns out that they are confirmed cases. The official list was therefore defective, *vide* Nos. 6 and 7 below.

6.—F., Lohar caste, 19, stays at home, born at *Bhadrode*, not travelled: 4 years' disease. There are fresh cracks in palms of hands and great numbness: she was told to dip the fingers in hot milk, and vesication followed with bending and stiffness: yet earlier than all, there was an eruption on the body (front) of small white spots which have increased in number and size, and now cover a large surface: shortly after this, the hands were affected. At present, on face are traces of white patches; ears free, a suspicious thickening of brows and cheeks, but no loss of hair. The trunk is covered with large pale patches of arborescent form, and having reddish ridges: size varies: numbness doubtful. Hands affected as in N. L. especially the right hand; skin hardly changed as in aspect; little and ring finger are here free from the changes noted on middle and forefinger; thumb less changed: all fingers on left hand are affected: numbness of hands, and forearm, most on the right side. Feet less changed: right great toe deformed; skin of sole cracked; there was numbness on right foot, but it is now less: numbness seems everywhere to have diminished since the late monsoon.

Father well, works at his trade: mother well: younger brother well—2 sisters (one elder and married) both well: all taint is denied. Married, husband well; the disease came on a year after marriage and she remained with him for a time, and even now she visits him in Mhowa (where he works) at the *Holi* and *Divali* festivals: menstruation regular: no pregnancy. Yet her mother allows all this. Contact with other lepers ignored, fancies the disease followed eating copiously of mango-juice mixed with ghee and goor: ate much curds, too. Was at *Bhadrode* when it came on and living as usual: it is spreading: is not practically separated: there are running sores: general condition fair. An obscure case as regards origin, if not from contact with other lepers.

7.—M., Koli, 20, drawer of water, born at *Bhadrode*, not travelled for; 3 months' disease. Had fever for 6 weeks, then swellings all over; then spots came out, and numbness of hands. At present, there are large characteristic spots on forehead, a few smaller ones on cheek; these have pale centres, and a raised, narrow, pink edge; form rounded; tendency to blend. Perhaps the large patch extends upon the hairy scalp (hair abundant and black), it encroaches on brows (hairs hardly fewer or pale): there is marked numbness in centre of all patches, large and small, where the latter are half inch or more in diameter—for even then their peculiar character is clear. Bars unchanged. There are similar spots in front of left shoulder and a larger one on tip of left shoulder, others below this: a single spot of small size on epigastrium. Nipples unchanged. On the back is a spot of reddish tinge, but below right scapula and in the loins are several transversely-placed spots, one being of large size from blending of others: at the side of the trunk are two or three others of small size: upon the upper limbs (lower not examined) are similar spots—back of arm and forearm, partly front of arm, outer side of elbows, &c., there is some approach to symmetry in their disposition: upon the hands are similar spots less well shewing the distinction of border and centre, upon the palms:

these livid, pinkish, raised patches cover the thumb, the palmar aspect of first row of phalanges and the hypotenar eminences: both palms are thus attacked: the spots are insensible, the intervening, normal looking skin is not. On the dorsum the spots have more the aspect of others elsewhere. When rubbed the edges of the spots assume a white scaly hue, and the centre becomes scurfy: nails unchanged: fingers not deformed, but rather swollen and stiff. The legs are in same state, round spots and spreading patches in dorsum of feet: no distortion: numbness here and in right sole, where the skin presents an abnormal aspect.

Parents free from disease, and so brothers and sisters: denies all taint: is not married, not having means: contact with other lepers unknown: thinks the disease may be due to eating fish and oil, &c., mixed, but he lived as others when the disease came on at Bhadrode: it is spreading: dwells apart: no running sores, general condition fair: denies syphilis: there are spots on the penis like those on the trunk and arms (he states).

A case remarkable from the great clearness and numbness of eruption; the latter shews the origin, course, spreading and termination of the true leper spot. Here is L. L. quite like that of Taj Mahomed (*vide* large work, plate 1). On close examination of right arm, numbness is found to extend beyond the contour of the new patches, but there its range exactly corresponds to a pale level discoloration which is probably the remains of a previous patch, at first like those now flourishing: the benumbed surface is here quite distinct from healthy skin and, so far as appears, the cutaneous nerves usually attacked are not affected, though the main trunks themselves may be, by extension of disease from the skin which is the seat of the patches, along some of the cutaneous filaments.

22nd February (sameday).—To *Talgajarda*, between Mhowa and Bhadrode also in the plains, upwards of 300 houses: population 1367, who are Kunbis, Panchoulis, Bhurwads, &c.; food—bajra, jowara; urid, mung: well-water is used (two wells, no steps); guinea-worm said to occur, but it is rare: cholera happens. Four cases of leprosy in list. No peculiarities noticed in this village.

1.—M., Pachouli, 20, born here, has not travelled; leprosy for 5 years, it began with numbness in left hand. Nothing on face except scantiness of hair on brows; on trunk nothing peculiar: right nipple enlarged; hands affected as in N. L. 'Claws' with vesicles. Little finger of left hand most affected: numbness extending up the arm: feet more changed: all the toes are cut off as it were; numbness from below the knees. F. died of the disease 10 years ago, had been affected for 15 years: he was born in this village: M. alive and well, an elder brother well; no sister: there was some earlier taint in his family, but he cannot recollect in what direction. Not married: contact not known, nor origin of disease. Eats and lives as usual with his mother, apart; disease stationary: there are running sores; general condition bad. Father had the like form of disease, and was the first leper here. Here is N. L. transmitted; see case 4 above (Bhadrode).

2.—M., Kumbhar, 30, labourer, born here and has travelled a little: leprosy for 3 years, it began in cold season, with blebs on great toe of left foot, afterwards on fingers, &c. The face shews signs of early T. L.; hairs gone from brows, a little thickness of rims of ears; eyes staring; nothing now visible on trunk, nipples hardly large. Hands bronzed and deformed; fingers swollen, stunted and probably partially absorbed (early A. L.); little finger of right hand bent, numbness as far as elbow, vesicles on finger: feet changed in same manner and numbness to knees: great toes partially absorbed.

F. dead, free; M. dead, and 2 brothers and sisters, all were well: family taint is denied. Married; no children, but his wife has left him. Denies contact with other lepers: cause of disease unknown: no peculiarities in diet or in mode of life here: disease increasing; lives with others, eats alone: there are sores; general condition fair; syphilis denied. Residence not near that of No. 1.

There has been a Datar Pir shrine here for 20 years, to which lepers sometimes resort for intercession: the two men above-mentioned belong to the village and do not worship at the shrine. There are now two other lepers come for help from elsewhere.

3.—M., Koli, 55, born at *Khadapur* (where leprosy exists) near Gogha, here for 6 months only. Duration of disease 2 years (?). There was first an eruption on body, then the toes became affected. On face are spots like L. L. with some flushing and darkening of cheeks: ears unchanged: trunk covered with a pale eruption of arborescent disposition and very widely spread: the same exists in front (it is like my drawing of the woman in large work, plate 6), nipples rather gun-capped. On arms similar spots. Hands bronzed; blebs, without distortion: numbness from below elbows: feet more affected: great toes absorbed, and sores on left side; numbness from below knees. F. dead, M. dead; and also brother and sister, all free from taint. Married; 2 sons and a daughter grown up, free, some are quite young, but all were born before beginning of disease; denies contact. Was eating (not fish) and working as a water-carrier, as usual, when the disease came on at Mhowa. It is spreading: there are running sores: general condition bad. No benefit from the shrine: syphilis denied. Came to Mhowa from *Dial*, where are other lepers, so that he has been in way of contact. A bad case of obscure origin, in an elderly man.

4.—F., Mussulmani, 35, born at *Timana*, where she lived till 12 years ago. Leprosy since the age of 7. Nothing abnormal now apparent on face: on back some very pale white spots. Hands reduced to mere stumps, an extreme degree of deformity. Formerly there was numbness, but now tactile sensation has returned: muscular power remains. Feet in similar state: even the tarsus seems partly destroyed, remnants of toe-tips left, however.

F. dead; M. alive and well. A young sister and brother are alive and well. No family taint. Was not married at her home, but when she came here 12 years ago, the Fakir in charge of the shrine married her: he is since dead: has two children, son 5, daughter 7, both very healthy-looking though born long after disease began. It came on at *Timana* where are other lepers; there are running sores: general condition fair: does not live apart, an intelligent woman. This woman seems to have outlived her malady; was it mere neuritis? No; for there are spots.

25th February.—To *Kheri*, 4 miles to the west, near coast line: a dilapidated village perched on one of the sandy and rocky hills, bounding a salt-marsh: a poor place of 80 houses, inhabited solely by Kolis: food as usual and probably scanty: fish is eaten when available, it is caught by poisoning the pools of sea-water when the tide goes out, and no nets or boats are used; it is, therefore, only occasionally obtained: there are no fishermen proper; dried fish is sometimes brought from Mhowa, but on the whole the quantity of fish which is consumed, is but small. People work in fields, in towns and on ship-board. All are labourers; in the rains they cultivate bits of land about their home. There are some eight Koli clans here. Salt is manufactured by the *Agria Kolis*.

Although outward circumstances are similar to those at *Kutpar*, yet there is no leprosy here; it is quite unknown, they say—I noticed some suspicious spots on one lad, but nothing decisive was made out.

To *Gujarda*, 2 miles further on and in similar position: 60 houses of the same irregular, dilapidated construction, surrounded with rubbish of all kinds and equally swarming with juveniles of both sexes. Here, too, the people are all Kolis. Food—bajra for the better off, jowari for the more indigent; urid will not grow here, so they eat mung. Water from a well and a banded excavation, it is brackish, but serves: the well is near a salt-marsh, it is being repaired. Guinea-worm occurs sometimes in July, last year there was scanty rainfall and but little seen of this parasite. One leper is acknowledged here; he is the first they have seen.

M., Koli, 50, labourer, born here, not travelled: disease for 4 years (!) It began on the feet. On face nothing striking: on back traces of light spots of large size: nipples unchanged: hands somewhat affected: little and ring fingers on left side wasted and bent: inflammation of right fore-finger; numbness doubtful: feet more changed; outer toes of right foot drawn up and back, upon tarsus: great toe

almost absorbed; left foot inflamed: inner toes all gone; numbness. Parents dead: 2 brothers and a sister alive and free; all taint is denied. Married; 2 children of 3 and 5, well. Denies contact; never leaves the village (except to Mhowa). Attributes the mutilation of the left foot to an accident, but right foot is wasted by disease only, he thinks. He has become a Bhugist or devotee, and for 15 years has eaten no fish. Disease arose here, and is not spreading (?): there are running sores; he is not separated from his family, but works still; denies syphilis. An obscure case of A. L.

The people here eat fresh fish when they catch it: they seldom eat dried fish, which has to be purchased: would eat meat, if they could afford to do so. Here are similar insanitary conditions to those of Katpur, only more aggravated, and yet there is no leprosy. True, the village is small and not so near to Mhowa, and the houses are perhaps more open, but poverty and poor diet and clothing, are at least equally evident. What is the cause of this difference? A special influence at Katpur, which may be repeated infection from lepers at Mhowa, or in particular the presence of T. L.—probably the more virulent form of disease and not yet introduced into Gujarda?

To *Dugheri*, 2 miles further on: a similar position amid low sandy and rocky hills with 'dunes' and arid plains around: salt-marshes near; vegetation scanty; ground-water near surface: a village of miserable construction and as the rest above, quite inferior to hamlets in the interior: about 70 houses and 335 inhabitants. The people all Kolis, distributed in 5 or 6 clans: there are a carpenter and blacksmith with some Dhers. Water from a well dug on the sandy soil: food as usual. Four lepers are registered: one is away begging at Mhowa and three are seen:—

1.—F., Koli, 35, born 4 miles off, here for 20 years: leprosy for 3 years: there was first an eruption on the body, then the hands became affected. On the face nothing peculiar: on the back a few very faint whitish patches: hands much deformed as in N. L., the terminal phalanges being absorbed; nails remain; atrophy of palms and remains of blebs; no marked numbness: feet less affected, they appear to be bronzed, and are said not to be benumbed, but this is doubtful. Parents dead; 4 older brothers; no sister; all free. All taint is denied. Husband alive and well, and 2 daughters of 17 and 8, and 2 sons of 5 and 4. Contact is denied: cause of disease unknown: was living and working as usual (labourer) when it came on at *Mahadeo*, a hamlet close by, where she stayed a few months in the cold weather; disease stationary; she lives apart; has running sores, and general condition is indifferent.

2.—M., Koli, 45, labourer, born here, has been to Mhowa, disease for 2 years; it began in cold weather with swelling of hands and feet; then blebs on left inner wrist and on right side, near same spot; then sores on left sole and beneath right great toe. Nothing abnormal visible on face: on trunk about the neck and chest, the eruption elsewhere known as "sibbla" here called 'carolea.' Numbness of both hands extending just above the wrist, with signs of commencing N. L.: feet rather more changed: left great toe partly destroyed; open sores. Parents free; no brother, 2 older and younger sisters, also free. Denies all taint: married, no children: contact denied; knows of no cause except an attack of indigestion from eating certain vegetables with sour condiments; otherwise lived and worked as usual in this place, when the disease appeared: it is increasing. He does not live apart. There are sores; general condition fair: denies syphilis. Nipples a little large perhaps. Another obscure case.

3.—M., Koli, 16, born here, and has not left the village (?): leprosy for 10 years. It began with blebs on the fingers and on feet; no eruption. On face now nothing peculiar; sight of right eye lost after small-pox; nothing on back but scars of pock: nipples normal: hands greatly mutilated as commonly seen, mere stumps of fingers left; excoriations; little atrophy of palms; no loss of feeling or muscular power: feet even more deformed, mere traces of toes remain, but there is no atrophy of the stumps and tactile feeling is only a little defective. Parents free: no sister: 3 younger brothers well: all taint is denied. Contact unlikely, for he is the earliest leper here. Was a child when disease came on. It is now nearly stationary; he is separated. There are running sores;

general condition indifferent, his growth being stunted. The first leper recollected here, but it appears to me that the people are not telling all they know: they are timid and cunning.

25th February.—A case of leprosy came to me at Mhowa from *Dudhala*, 5 coss on the road to Kundla: it is the one entered in the official list.

M., Koli, 25, labourer, born at a distance, not on the sea-coast: at *Dudhala* since infancy; leprosy for 3 years. At first there was fever, and eruption on the hands; latterly the face became affected. Decided signs of T. L. on face, tumefaction and bronzing, ears enlarged as usual: on right ear *tragus*, on left ear *antitragus* much tumefied: no numbness. On back obscure traces of eruption (scabies intermixed); hands not deformed, numbness on back of right hand, and on right forearm, outer side. A scaly eruption in palm of right hand (psoriasis?), bronzing and incipient nerve disease. Feet similarly affected; numbness on dorsum of right foot, and in both legs at outer side (*musculo-cutaneous N.*): nipples enlarged, nails unchanged. Parents free: no brother; 2 sisters, older and younger, free: denies all taint; attributes the fever to eating unripe and raw wheat when hungry: was living and working as usual, when disease came on: it is increasing, lives separate; no running sores; had sores on penis—scabies? Chancre denied; ate fish from the river, fresh, two to three times a month, has rarely eaten dried fish. There was a Kumbhar leper in the same village, who went to *Rajkote* 5 to 6 years ago; had T. L.; lived at a distance from this Koli, who denies ever having associated with him: no other leper now at *Dudhala*: he has been to *Kundla*, *Mhowa*, &c., before the disease came on; general condition tolerable. A case pointing to infection.

26th February.—To *Neswad*, 2 miles north of Mhowa, about 80 houses of indifferent construction, population (522) chiefly Kolis and Brahmans—a large section of the latter, 10 houses out of 20 working at agricultural pursuits with their own hands. Food as usual: water from river and wells: guinea-worm occurs. One leper here, who is the first known to have appeared within living recollection.

F., Koli, about 15, born here and has not travelled; leprosy for 6 years, beginning on the face, where, at present, there are decided signs of T. L.; ears enlarged, nose sunken. On trunk, a suspicious roughening of the skin, as if from past eruptions: nipples not enlarged. Hands bronzed and wrinkled. No numbness or distortion: feet in similar state: guinea-worm in the legs: nails look deformed: no numbness. F. here, well; M. alive and well; a younger brother and four sisters, all well. No family taint. Not married: not yet menstruated; contact with lepers denied, but possible (e.g. in Mhowa); cause of disease unknown. Eats fish as do other Kolis: was a common labourer: disease stationary. She is partly separated, has no running sores; general condition indifferent: her growth is stunted since the beginning of the disease. Saw the younger children of the family, they look well, and two older sisters are married and away. Syphilis is denied by her father, and there are no signs of hereditary disease in these children. Leprosy unknown here, till this well-marked case occurred, it is said.

To *Umniavadar*, 1 mile to the east of *Neswad*, a small hamlet with trees around; one leper was reported here, but he died 2 months since. The *patel* is intelligent, and states this man to have been a Brahman named *Gopal*, *et. 30*, belonging to the village and affected for 8 years with A. L. He has left young sons. His F. F. was a leper, and also a great-uncle, who died 2 years ago; all these people were males and seem to have had A. L.; they were born in this village, this man's grandfather being the first leper known here. The family are *Pandur Brahmans*. The people do not regard the disease as necessarily transmitted, and *Gopal's* two daughters have just been married. They are inclined to believe in contagion, but hardly act on such conviction. Leprosy is attributed to indigestion.

A noteworthy and trustworthy memorandum.

To *Tarid*, 2 coss to the north in the same wide plain, and near low hills: more isolated than usual and rather better built: trees and a stream: salt-marshes around: 225 houses;

990 inhabitants, chiefly Kumbhars, there are Wanias, Brahmans, Kolis, &c. Food-grains, bajra, jowara; urid (only); fish not eaten: water from river and from wells during rains: no guinea-worm: cholera is now here; no mycetoma (few cotton-fields around): three male lepers are known. One has left the village lately: M, Ganchi caste, 15, T. L. for 3 years: gone to *Sedarda*: 3 coss off, where some of his caste reside and where leprosy exists. His sister died here of leprosy 2 months ago; she had it for 5 years; her age was 20; the father of these two children was himself a leper and he died here 5 years ago, after 3 years' illness: in all three instances the disease was probably T. L. The mother had died before the family came from *Sedarda*, and nothing is known about her state. The father worked at his trade till incapacitated. He was the first leper recollected in this village; he used to go about to Mhowa, &c. The following cases were seen:—

1.—M., Kumbhar, 40, labourer, born at *Paswi*, here for 5 years, has travelled to Mhowa, &c.; leprosy for 2 years; it began in cold weather with vesicles or abscess on right hand; cannot say about an eruption. On face nothing unusual; on the back are large pale patches not symmetrical, but crossing over the back and largest in loins; not benumbed: similar patches exist in front. Nipples hardly changed. On shoulder pale spots and on right arm; right hand is affected as in N. L., fingers gone, thumb remains; left hand does not seem to be affected. No numbness, except on tips of some of the affected digital stumps of right hand. Feet more changed, especially on left side; right great toe reduced in size; it is more reduced on left side, and the two adjoining digits there are also affected: no numbness admitted upon rough trial: the feet look bronzed. Parents dead, free; brother also free; no sister: denies all taint: married; three sons of 14, 12 and 7, and a daughter, all well. Denies contact: cause of disease unknown. Was living and working as usual when it came on at *Rampura*, which is 3 coss off, and where he lived for a year, the disease appearing after 7 months' residence; states there is no leper (?) in *Rampura*. Disease stationary; he lives apart; there are excoriations; general condition fair; syphilis denied.

2.—Another man is shown who presents suspicious flushing of the face and brows, and there are widespread light marks on the skin; both ulnar nerves are enlarged, especially that on the right side. Nothing peculiar on the hand, nor any numbness: feet bronzed, but no numbness: nipples slightly enlarged. A Kumbhar, 40, makes pots, born here and has not travelled far: his face has been swollen for a year: no family taint; has several children, all well, and has not been intimate with the other leper-man: is not separated: syphilis denied.

A rather doubtful case, but the condition of the ulnar nerves, as perceptible to touch at the elbow, is remarkable; they are felt as large, firm cords. Other indications of leprosy are also noticeable.

One of the patels here, an adult, shows the scar of a cut (by a sword) on the inner side of the forearm (4 inches above wrist) which has doubtless severed the ulnar nerve, because the ring and inner fingers are bent and wasted, &c., just as in N. L. and there is atrophy of the *interossei* M. including the adductor of the first interosseous space, but he states that now sensation is not impaired: the temperature of these two inner fingers and of inner side of palms is very perceptibly cooler than elsewhere in the hand, and the integument here, too, is thinned. The sword-cut was inflicted 30 years ago; and its results are fairly illustrative of nerve-lesion, quite comparable with the leprosy.

28th February.—To *Wagnagar*, 2 miles S.W. of Mhowa, about 250 houses, in the plain, built as usual, dilapidations and dust; population 1,322, Koli, Pachouli, Wani, Dher. Food as common: water from the adjoining small river; no wells: guinea-worm occurs among the Kolis or water-carriers, who, however, are apt to drink all sorts of water. Cholera occurs; no mycetoma. There is known one leper here, who is now away: also a tradition exists that 30 years ago a Koli woman had the disease. The absent man is a Koli, 35, probably affected with A. L., for 5 years: no children: his younger brother is here and quite well. Father a leper, probably T. L., he died 25 years ago after an illness of 2-3

years, in this village where he was born: his father, uncles and brothers are not affected. Nothing is known of the leper woman above referred to. The Kolis here will eat fish, yet the leprosy disease is very rare.

6.—*Thana of DATTA.*

Has an area of 51 square miles and 24 villages, of which only 5 are reported as containing lepers, but this estimate is defective, as I know. At least two lines of leper villages cross this narrow strip of independent land, thereby carrying a series without interruption; see especially that one to the north, as marked in MAP 1.

29th February.—*DATTA*.—A large town in the plains, with low hills around: 860 houses, population Wani, Memon, Karak, Wadari (Kunbi), Kunbi, Rajput, Brahman, Koli, shepherds, artificers; Mussulman sepoy. Food; jowari, bajri, wheat; urid, mung; sweet oil; no one eats fish, except such as is imported. Water from river, seldom from wells. Guinea-worm is known, but does not here arise: cholera occurs: no mycetoma (there was a case a few years ago). At present time 2 lepers are reported, but one is gone to *Bhaonagar*, he seems to have T. L.

Case seen.—M., *Garassia*, 31, born here and resident, has not travelled any long distance. Leprosy for 11 years. It began on feet with vesicles and then affected the hands. Face peculiar, like N. L., nose sunken, dark tint beneath orbits, some facial palsy on left side: fatuous expression, no tumefaction of ears, &c., or traces of eruption now visible; trunk not affected, except by a few faint spots on back; nipples unchanged. The hands are perfect 'claws.' Skin unchanged and no numbness; the feet are extremely distorted; no numbness is detected. Father died 22 years ago, after 16 years' illness from T. L., he was born and died here, at the age of 42; M. dead, free: brother died last year, *æt.* 35, and a sister died in infancy, both free: no other family taint is admitted. F. bro. of this man is here: the head-man of the place and is certain that there has been no leper in the family, except his brother and nephew. His brother was the older one of 4: 2 are dead, 1 dying 15 years ago of fever, *æt.* 35: 2 brothers are here, fine portly old men in the full vigour of mature life. No taint on mother's side; is not married; cannot say about contact or cause of disease—was here at home when this came on: it is not spreading: lives apart, running sores, general condition indifferent; syphilis denied. The youngest uncle has adopted this man, and when the disease appeared would not sanction a marriage. On enquiry it seems there were 2 other lepers known at *Datta*; Wani, and dying here, leaving no family. They came from another village and were resident only for a short time: not related to each other, or to the above men. They are said to have died before this man's father was born.

There is a current idea that by eating fish the disease comes on, and that it is commonest amongst Kolis: leprosy is not popularly regarded as contagious (yet they keep the leper somewhat apart), nor is its hereditary character always admitted, because facts are sometimes against this view.

A striking sight, for in an old and aristocratic family appears a leper man and his son: the latter a perfect contrast to the surviving uncle and relatives: a marked case of N. L. as his father's disease seems to have been of T. L.: here is much mystery, yet some indication of value.

7.—*District of TALAJA (Bhaonagar).*

A narrow district, extending from the coast line northwards towards *Sihor*; a large river passes through it. Area 220 square miles; population 135 to the square mile: it is rather crowded with 78 villages, of which an unusually large proportion are of small size: towns are few

Leprosy is very common: near $\frac{1}{4}$ of all villages are attacked, and one in 500 persons. A few old foci of disease exist on the coast, but in general the malady is much more recent here than elsewhere (mean duration of all cases 5 years), and it seems to have infected new places rather than broken out afresh in old spots, where on the other hand, the complaint is lessening. A large part of known leper localities was visited, and some striking details were elicited.

List of L. villages;—the chief town of TALAJA may be omitted from want of due information. On or near the coast are *Pithalpur* (3), *Partapara* (1), *Bhungar* (2), *Kherala* (1), *Methla* (6), *Jhanjmer* (5), *Rajpura* (7), *Gadhala* (2), *Mangela* (1), *Khander* (3), *Uchri* (1), *Mahadeopura* (1), *Gopnath* (1), *Manar* (2), *Dakana* (1), *Sartanpur* (1), *Shelawadar* (1) *Phulsar* (1). Inland:—*Thalia* (4), *Ghantaowala* (1), *Dihor* (4), *Neswar* (2), *Bharoli* (2), *Bhadrawal* (3), *Timana* (3), *Mandwali* (1), *Bela* (2), *Piparla* (1), *Dhardi* (1), *Isora* (1), *Gorkhi* (5), *Deoli* (1).

Note.—Around Gopnath every village may be said to have lepers, with hardly an exception; inland, those exempt are more numerous. A line seems to run towards Dihor northward, and communications take place with leper-villages in adjoining districts. At Jhanjmir the malady is recent and curiously simultaneous: at Gorkhi a whole family of youths are lepers. The account of Rajpura (a once noted focus) is interesting. Facts bearing on the migration of lepers also occur in the notes, and there are some in favour of contagion.

1st March.—To *Methla*, a hamlet 6 miles to the south of Datta, $\frac{1}{4}$ mile from sea-coast: built on north side of a low hill, composed of laterite, wide saline plains and marshes with salt-pans on the one side, and sand-hills on the other: a poor place of about 60 houses; but a rich array of memorial-stones and remains of good architecture in a large well (wao), masonry tanks near, &c.: a striking locality once probably of importance, now insignificant. Population (378) entirely of Kolis, and comprising 6 families (*Barria*, *Kakud*, *Palia*, *Sawan*, *Mer*, *Bhil*), but there is one house of *Wania*, sepoy and barber. Food: jowari, bajri, urid, mung, mut, kalti, sweet-oil: water from wells—from the fine old wao (sweet, but scanty in hot weather), and from the recent 'kuwa' excavated through the laterite close by, and furnishing a constant supply of rather brackish water; this was built 3 years ago in order to remedy a scarcity often much felt. Formerly there was a great amount of guinea-worm here, but since the new well was made, the affection has gradually disappeared, or nearly so; a remarkable fact, but to be variously interpreted: *e.g.*, now there is plenty of water for use without having to dig up the bottom of the wao, or taking bad water from other sources: formerly there was not enough without these aids. It is the popular notion that guinea-worm is attributable to drinking bad water, but on consideration it is at least as likely as not, that the worm here was due to frequent wetting of the feet in treading the lower steps of the old wao. Never cholera here; no mycetoma. There are now 6 lepers known (4 in the list): it was said that 7 or 8 years ago there were none, but this statement is not accurate (*vide* No. 2). The people occasionally eat fish fresh from the sea, but no one follows the occupation of fishermen, and there is a singular unwillingness to acknowledge the means and manner of catching fish; only one man is induced to own that he

sometimes fishes (*i.e.*, makes holes or pools in the sand, where fish are left on tide receding), and it is evident that this article of diet is but seldom sparingly partaken of; salted fish is never eaten, and the ordinary dried fish is not found in the place: fish is not cured here. These remarks apply generally, and at Datta as well as other large towns, the killing of fish for food is very strongly discountenanced by the local leaders; the importation of dried fish is conducted quite privately. In these parts of Kattiawar; there is nothing like the large consumption of fish in Norway, Burmah and places in the Concan. Only fry and small fish are caught here, and none larger, perhaps, than 4 to 5 inches, although with small nets that a man can throw, considerably larger fish might be procured in plenty. A primitive race; here the ghar-wala—hus-band: notice the coyness of adult Koli women (and lepers too) who will not shew their faces in an assembly of men, unless the latter expressly hide or turn aside their faces—men admitted the propriety of this prudish reserve; and in order to see the back of a leper woman, I had to request every man present, the patel included, to move to a distance.

Cases seen.—1. F., Kolin, 30, born at *Thalia* near here (leprosy exists there), at *Methla* for 20 years, has not travelled: disease for 4 years, it began on fingers with boils (or blebs?) then came on feet, in the hot weather. Nothing on face (pale spots?), on the back pale spots; the hands are true 'claws' with blebs on fingers, and numbness in palms and at back, extending a little way up the forearm. Feet distorted as usual in N. L.; great toes turned aside and reduced in dimensions; numbness here and reaching a little way up the leg. Parents dead, free; 2 brothers, one older and younger, free; a sister is also free from leprosy; all taint is denied in her family: married; husband alive and well; a son of 2 died 10 years ago; 4 daughters, two died in infancy, and two of 20 and 10 are alive and well, with the children of first. Contact with other lepers not admitted (but it surely cannot be denied); origin of disease unknown: was living as usual and working in fields here, when symptoms came on; they are now quiescent: she is separated: there are excoriations: general condition indifferent.

2.—M., Koli, 25, labourer, born here, has not travelled far; leprosy for 8 years; there was first an eruption of pale spots, followed by swellings on the face 5 years ago, then hands (2 years ago) and feet became affected. On face T. L. well marked, nose depressed; skin of trunk quite studded with nodules, and there are obscure traces of an eruption: hands affected as usual in T. L., fingers swollen and excoriated, but nails unchanged; numbness as far as shoulders: feet in same state: nipples and areolæ are enlarged. F. died of leprosy, when this man was 2 years old, at *Rojia* (near), having been a leper for 7 years and resident at *Rojia* for 2 years, the previous remaining 5 years being passed in this place. After death of father, M. and sons came back here to live. Mother alive and well; is now away at *Gudhala* (where are lepers): his elder brother has had leprosy for 15 years; sisters older and well; no earlier family taint is known. Order of children:—1, girl, free; 2, boy, L. (No. 6); 3, girl, free; 4, boy, L. (No. 2); fathers' disease began 30 years ago in this village. Not married: contact probable: cause of disease unknown: lived and worked as usual when it came on: it is now stationary: there are sores: general condition bad: lives apart with his brother (*see* below): syphilis denied.

3.—M., Koli, 45, field-labourer, born here, has not travelled except to *Gogha*: leprosy for 5 years; it began in cold season with boils on the feet, and then on hands. On face nothing peculiar, nor on trunk; nipples unchanged. Claw-hand with great absorption; numbness from below elbows: feet greatly deformed; toes all gone; numbness from below knee. Parents free: F. B. had the disease at *Batikara* before this man was born; his children are said to be well: elder brother dead, free; married; wife alive and well, but blind: 2 sons of 10 and 5; 2 daughters both older; one is married, all and their children well. Contact doubtful (?); origin of disease unknown; he lived as usual when malady came on here; it is stationary: he is separated, but his blind wife cooks for him: there are sores; general condition bad.

4.—M., Koli, 30, born here, has not travelled; leprosy for 4 years, it began with boils (blebs) on inner side of right palm, then boils on feet: was at the time a labourer. Nothing peculiar on face or on trunk; nipples unchanged; hands affected as in N. L., especially right hand at inner side, and the left is beginning to be affected, in the same locality: numbness on both surfaces of the hands, limited above at the wrist. Right foot now affected with abscess and sores; no numbness in the feet; nails unchanged in hands, where remaining. Parents free: there were 6 brothers; he is the second; the rest are well: no sister; knows of no hereditary taint; is married, wife well; a daughter of 4 also: contact with lepers not admitted; knows of no cause: disease is now stationary: he does not live apart: there are sores: general condition indifferent: syphilis denied. The young daughter was born before the beginning of his disease.

5.—M., Koli, 30, born here, has not travelled: leprosy for 4 years, it began in the monsoon, in the face, then spread to the body and on limbs. Well-marked T. L., and advanced: left cornea opaque: skin of back rough and wrinkled: hands greatly mutilated, stumps of finger swollen and ulcerated; widespread numbness: feet similarly affected, right foot most: numbness here too. Parents alive and well; of 5 brothers he is the second son: 2 sisters, older and younger, are well: there is no family taint: married, wife well, and a son of 6. Contact denied; origin of disease unknown: was eating and living as usual, when the complaint came on here; it is increasing: is apart: there are running sores: general condition bad. His brother is the patell, a strong-looking, healthy man: syphilis denied.

6.—M., Koli, 30, brother of No. 2: had had leprosy 14 years and now offers a complete illustration of T. L., approaching the sad end—a most miserable object, deaf and blind: history like that of his brother. Lives in the hovel of twigs and leaves, erected in his field $\frac{1}{2}$ mile away from the village, for the last 10 years; is unmarried. Nipple effaced on left side, on the right is a perfectly round, low swelling, corresponding to nipple and areola,—an unusual appearance and indicating that the mammary organs (in part, at least) are liable to attack in leprosy, just as are the glandular generative organs of man. Such indication is confirmed by a few other instances I have seen, more especially in nodular disease.

My visit to this old, primitive and somewhat secluded village was of special interest from the unusually large number of lepers who were found, from the concurrence of both the chief forms of disease in great severity, from the evidence of heredity and the obvious possibility of contagion, and from the local tradition that leprosy is not of long standing in this spot. Here was seen, too, an example how even fairly well-to-do lepers are treated by their friends and relatives, namely, by solitary banishment to a distant hut not adapted to effectually shelter even a naturally-protected animal, and, in addition, without the semblance of medical aid. That no complaint was heard is not, in my opinion, any justification, whatever, of longer indifference on the part of those whose duty it is to enquire, to suggest and to work on behalf of the afflicted lepers of India. See PLATE at end.

To *Vunjodri*, a dilapidated village, 4 miles to S.E. of Datta, situated in the plain, and on a slight eminence: 60 houses, population (340) chiefly Kolis, there are also a few Garassias, Wantias, Brahmans, Kumbhars: usual food jowari, bajri, urid; sweet-oil: water from well: no guinea-worm, cholera or mycetoma. Four lepers here, although the name of this village has been omitted from the official list of affected places.

It appears that 10 years ago there was a leper-man who died here, and 20 years ago there was no leper: the first known was a Bhurwad (A. L.), he belonged to another village and travelled about with his flocks; he died after about 5 years' disease, beginning in this village. It is not quite certain there was no other leper before him, but afterwards (7 years ago) a Koli woman died here, who had fever and swellings of the ears, which were supposed to indicate incipient leprosy. Cases seen:—

1.—M., Kumbhar, 55, born at *Jhanjmir*; here for 15 years, has travelled a little: disease came on (?) a little before the last monsoon: there was an abscess in the great toe of left foot, and another on the right: other toes are affected and probably the disease is of longer standing than he states. Nothing certain on face or trunks: nipples unchanged; hands almost unchanged in aspect, but they are benumbed, from elbows downwards, except in palms of both sides: vesicles on fingers (from fire), nails unchanged. Feet much more affected; all toes atrophied; skin bronzed and wrinkled; left great toe much absorbed, on right side inflamed; numbness as high as knees and including soles. Parents free; of two elder brothers, one died of leprosy in Pratapara. 3 or 4 years ago, having had the disease 1 year (in the foot like this man): four sisters, all free: no other family taint. Is married, wife dead, free: three sons, the eldest a leper (No. 2): the others are aged 9 and 2; three daughters, youngest a leper (No. 3); the older girls are married and well, and their children. Brothers and sisters of No. 1:—1, boy, L.; 2, girl, free; 3, girl, free; 4, boy, free; 5, boy, L.; 6, girl, free; 7, girl, free. Two of his own children out of six are also affected. Contact with other lepers is uncertain, and cause of disease unknown: was living and working as usual here, when the symptoms came on; never eats fish; makes pots here: disease increasing: he lives with his leper children (the leper daughter acting as cook): there are sores: general condition indifferent: syphilis denied.

2.—M., Kumbhar, 20, born at *Jhanjmir*, here for 16 years, has not travelled; leprosy for 12 years, there was an eruption of 'carolea' in trunk, then face swelled, and afterwards hands and feet. Now decided T. L. in face, hairs gone, nose depressed, leonine aspect, &c. The back is covered with light patches; nipples a little enlarged; hands tumefied, and fingers swollen; nails converted into dark scales: widespread numbness on dorsal surfaces: feet affected in same way, excoriations about front of ankle and considerable numbness. Not married: contact probable: cause of disease unknown, it came on here, and is spreading: general condition bad. Son of No. 1.

3.—F., Kumbhar caste, 15, born at *Jhanjmir*, here for 10 years, all the family having moved together hitherwards—disease began in her five months after it commenced in her brother, the boy (No. 2), and likewise with an eruption on the skin. There is well-marked T. L. on the face with sunken nose, but a rather less advanced degree of disease than in her brother; marks of a pale eruption on the back: hands swollen, little finger of left hand bent, nails unchanged: feet less altered but yet affected: numbness on back of hands, and adjoining part of forearm; no numbness in the feet. Unmarried; was living as usual and in the same house as Nos. 1 and 2, when the disease came on: it is spreading: she is not separated: there are excoriations: general condition bad. The family of No. 1 (L.): SONS.—1, æt. 20 , L. (No. 2); 2, æt. 10 , free; 3, æt. 2 , free. DAUGHTERS.—1, æt. 23 , free; 2, æt. 18 , free; 3, æt. 16 , L. (No. 3).

4.—M., Brahman (Mooljee Jeta), 35, beggar, born at *Pratapara* (almost the next village), here for 16 years: has not travelled far; leprosy for 11 years or almost the same time as it has lasted in Nos. 2 and 3: was there then some exciting cause at work? Early symptoms too, alike, for there were first patches on the skin, which then became benumbed: afterwards the hand became distorted. Now there is puffiness of cheeks and brows, of long standing and attended with numbness. There is a most characteristic eruption on the trunk consisting of very large, raised, pink-colored patches of rounded contour, and blending into great plaques extending across the back like mail: the centre of these large patches becomes pale, seemingly depressed and reverts closely to the sound skin in aspect, only appearing smooth as if atrophied; here there is complete numbness, but in the spreading, broad, pink borders sensation remains and may be even greater than natural: this border is 2 to 3 inches across, abrupt towards the exterior, obliquely and coarsely wrinkled on surface, and gradually fading towards the interior or centre, there being still, however, a distinct boundary in most places. On the front of the chest and abdomen, such large patches are not to be seen, but there is here a recent and small one ($1\frac{1}{2}$ inches in diam.; quite round and already presenting an incipient distinction between edge and centre); over left axillary fold and on shoulders, outer side of arms

&c., are similar larger fading patches. Even on the back it is likely that previous spots have existed, for the skin looks pale in parts and is probably benumbed. Nipples unchanged: hands 'claws' with vesicles on them; right hand most affected; on left side ulnar nerve beginning to be enlarged, it is the most implicated on right side. Feet also affected, the outer toes being drawn backwards and absorbed, but not the great toes: numbness in both hands and feet. Parents free: no brother or sister: denies all taint. Married; no children. Wife separated on account of this disease. Contact and cause unknown. Was eating and begging as usual here, when the disease came on. It is increasing; there are sores. General condition bad. For 15 days he has had fever daily and there are with this, fresh leprous spots: the fever comes on with chills in the after part of the day; he has had it before; it is the true leprous eruptive fever.

2nd March.—To *Mangela*. A village in the plains, inland and placed on a hill; a small irregularly built place: about 30 houses. The people here are Charuns, except Rajput (4 houses), Rubari, Bhurwad, barber, Sutar, Bhungy, sepoy who have a house each. It is an old village. Food—bajri, jowari and bunti, a mixture of the two; urid, mung: water from tank or bed of a stream in which holes are dug. No guinea-worm or cholera: no mycetoma. At first the presence of a leper here was denied, but they at last produce one man; they feared he would be taken away, but on understanding my object were quieted: a very reticent set of people.

M., Charun, 39, drives bullocks, born here, has not travelled far but has been to sea-coast a few miles off: leprosy for 2 years, it began at the end of the hot season; he had been eating sugar, &c., at a marriage festival and became sick; a month afterwards, swellings began to appear on the body all over (urticaria?) which subsided in a few weeks, the ears were simultaneously affected and the hands: no fever. At present there are hardly any perceptible marks on the face, but perhaps a roughening of the skin on forehead and cheeks may be indicative of former eruptions; rims of ears are studded, with small, pinkish nodules; also the lobules; a turgescence of the tragus, equally characteristic: nothing on the palate. The back is covered with a pale reddish, elevated eruption, only islets of sound skin remaining, with scalloped edges: in front, the skin about the shoulders and outer side of arms, shews a roughness and wrinkling which are indicative of former outbreaks: nipples slightly enlarged. Hands bronzed at the back; palmar surfaces pink and turgid, and nails unchanged. There is no numbness; possibly, hyperæsthesia: feet in similar condition—back of toes looks pink; no numbness. Parents free; four brothers of whom he is the youngest: there is an older sister, all well: denies all taint. Married: a son of 8 years, and a daughter of 12: well. Contact with other lepers denied. Cause of disease unknown. Was eating and living as usual in this place when the complaint came on: it is now subsiding: he is not separated: no sores: general condition good: syphilis denied. Has lived in no other village than this, but has been to the coast.

A striking case of early leprosy seemingly of spontaneous origin but there are four lepers in the adjoining village of *Vunjodri*. The other brothers look well.

To *Bunghur* in the wide plains 2 miles from the above: 25 houses also populated chiefly by Charuns: there are a few Kolis and Rajputs, total 76: food as usual, bajri, jowari, urid, mung, mut; water from a well; no guinea-worm: no cholera; no mycetoma, but they called the following case the foot-disease, which it is not. There is leprosy here.

1.—M., Koli, 30, labourer, born at *Methavada*, here for 5 years, has travelled a little; 5 years ago he pricked the foot with a thorn, and since then it has become deformed: 4 months ago (!) the hands began to be affected. Left foot has lost great toe and next; and the adjoining toes are wasting; the foot is shrunk: sole cracked: numbness in front and in outer ankle: hands shew only blebs on the knuckles and inner side of palm; they are bronzed; no loss of feeling or muscular power: nothing elsewhere. No leprosy in his family, and children well: contact denied: cause not known, does not eat fish: the disease came on here: it is increasing, he is not separate: there are sores: general condition fair.

Probably N. L. and certainly of obscure origin.

2.—M., Charun, 45, herdsman, born and resident here, has not travelled far: leprosy for 4 years, it came on in the cold weather, with sense of heat at left forefinger, followed by a rash. At present nothing on the face: the back is covered with a most characteristic eruption, the patches are of large size with raised edges and level, pale red, uniform centre, contour rounded; additional small spots near: probably the larger ones are benumbed, as well as the apparently sound skin in some parts. Nipples not changed—hands greatly deformed as in A. L.: inner side not the most affected: atrophy of fingers with the persistent nails at the tip: numbness on hands and in forearm (pale patches on arms): feet less affected, the two great toes alone implicated; numbness in them.

Parents dead, free: he is the third son of five; two sisters dead, all free. No family taint. Married; three sons, of 25, 10, 5, and a daughter of 8, all well. Contact is denied. Origin of disease unknown: was living on milk and bread when the disease appeared here: it is now stationary: is not separated: there are running sores: general condition indifferent. Syphilis is denied. He is not related to the leper (also a Charun) in the adjoining village of *Mangela*. Origin obscure; symptoms characteristic.

To *Borki*, 2 miles further on in the great arable plain, and also on a hillock, in a long, low range of hills; 35 houses: people Ahir, Koli, Rabari, Brahman and a barber, Food, bajra, jowra, mung; water from pits in the bed of a stream. Guinea-worm occurs here; 5 to 10 cases yearly—here is no built-up well: cholera unknown; no mycetoma: no leprosy and none for 40 years at least. The place seems poorer and more dilapidated than usual.

To *Gadeshwar*, 1 mile further, in a similar position: 40 houses, people Ahir (a branch of Rajputs who marry with Garassias), Koli, Brahman, Wani, Lohar, &c. Use bajri and jowari urid and mung: water from the pits in the bed of a stream; no guinea-worm, or cholera or mycetoma: no leprosy admitted, but by a sort of chance a case is found; the people not being willing to acknowledge the disease.

M., Kumbhar, 25, potmaker, born and resident here, has travelled but little; disease for 3 years, it began in the monsoon, and suddenly at night with numbness in the joints, knees and elbows; afterwards the feet and hands became numb. Nothing on the face or trunk; the true 'claw-hands'; right hand most affected. Numbness from elbow downwards: feet less affected, but still with marks of nerve-disease, and there is numbness from below the knees. Parents free; 4 brothers, he being the youngest: was carrying grain to *Kuntaoda* (where he stayed only two days), when it came on; it is now stationary; he is not separated: no sores, general condition tolerable (he still works): syphilis denied. A. L.: eruption on trunk doubtful. Was it caught at *Kundla*? Was there dengue at first? There is l. at *Kantaoda*.

2nd March.—To *Kotra Mota*, on a peninsula of high rock, jutting into the sea; a fortified place of old, now a collection of hovels and ruins: about 30 houses all of Kolis, excepting one of a barber: food—jowari, bajri and mut: water from an old well, and a new one (kuwa) is building. There is guinea-worm here, but since the last two years there has been but little, and this change appeared to have followed the cleaning out of the old well. No cholera or mycetoma: no leprosy now, and none within living memory. Fever occurs. The people though Kolis, cultivate ground and serve as labourers at *Mhowa* and *Datta*, where they go and earn one to two weeks' wages per month, a few work on board-ship: they earn 2 to 2½ annas a day. Their chief sub-castes are Baria, Chal, Ankur, Wanshia, Sawan, and these are of lower degree. They eat fish both fresh and dry, the former is caught by poisoning with a berry the water left in pools in the rocks; the dried fish is brought here by traders or travellers from *Mhowa*: such nets as are used are hand nets, and hooks are unknown. Fish is consequently scanty and of small size—it is not at all largely consumed: not enough grain is produced to meet local needs, they buy grain. The

village is decreasing in size, it is a poor place and hygiene is quite disregarded; the air however must be good. The people are poorly clad, they are not unintelligent, but they are very obstinate and reticent. There is a shrine of the 'Sondevi' to which people resort from around, to repay vows on recovery from illness. All castes come, perhaps 100 persons a year, bringing their own food: there is no priest here and no money is spent. The natives never saw a leper amongst the pilgrims.

This is a noteworthy case, for the general conditions of life are not unlike those of Kutpar, where leprosy is so common (p. 31). The local differences here are higher position, freer circulation of air, less crowding, no swamps but high land (much of it cultivated) around, less drinking, and a different geological formation. The people are hardly diverse in their houses, diet and clothing. To account for their exemption from leprosy is difficult, for the disease happens around and there is not such an utter isolation of the inhabitants, that importation or contagion could not occur. Only the ventilation and air are better than at Kutpar. The water-supply has to be examined: natural drainage may be better.

The fort was built by Kima rajah (jat Waja Garassia) some 800 years ago; it is very picturesque, and the sandstone rock is strikingly sculptured by sea and air.

Kotra Nana is half a mile inland from the above, and placed amid low hilly ranges: 40 houses, mostly poor, and irregularly built on lime-stone and sand; a few trees; population almost wholly of Kolis: food, &c., as usual: fish is eaten: water from deep wells—a large wao is being finished, which furnishes water for home use and irrigation of distant fields (two miles off). An active and numerous population. There is no leprosy here. Another exceptional locality: it is rather retired from traffic.

To *Bambhor*, a hamlet in the plains, 3 miles south of Datta; only 4 houses belonging to a family of Babaris, who possess flocks and herds: no leprosy.

To *Badarikia*, also in the plains nearer to Datta, isolated; trees: 25 houses: people chiefly Kolis and Ahirs: food—jowari, bajri, urid and mung: water from a 'wao': there is guinea-worm here at the beginning of the rains; no cholera or mycetoma: no leprosy is admitted.

Two other hamlets nearer Data are also reported as free from disease, and the exceptions are noteworthy. Thus it is seen that villages both at the seaside and in the adjoining plains, may be free from leprosy: although their apparent condition and situation, the diet, race and even movement of population, are altogether identical with those of villages which are infested with this malady. Localities in seemingly parallel circumstances are diversely affected, even when adjoining each other; and these notes offer evidence enough of such differences. I am, however, aware that my memoranda are defective upon points which, after all, may be precisely those of greatest import. Time would hardly allow of more than a glimpse at the commoner conditions.

Ath March.—To *Kherala* in the plains 4 miles to S.E. of Datta; on a slight rising ground: upwards of 40 houses: population Koli, Rajput and a few mixed castes. Food—jowari, bajri, urid and mut: water from well (kuwa): no guinea-worm: cholera occurs: no mycetoma (little cotton is grown, but there are a few crops of it). Only one case of leprosy, and it is positively asserted that there was none here 20 or 30 years ago.

M., Sutar, 40, born here and resident, has not travelled much except to Bombay, which he used to visit periodically,

staying for several months or even a year or more. Leprosy for 3 years; there were first blebs on the right hand at outer side of fore-finger, then on the other hand: numbness followed, with impairment of muscular power. Nothing peculiar on the face: on back suspicious reddish patches, with numbness in loins where colour is pale; an eruption on neck and a spot on back, called 'carolea' which looks red, as if erythematous: nipples unchanged. Hands shew incipient N. L. most marked in the little and ring fingers: whole hand weak and tremulous on both sides; nails oblong and convex: a sore on left fore-finger: there is numbness on both surfaces of hands and forearms, as far as elbows, and at back of arm: feet look flushed and dark: a sore on right great toe: third toe of left foot is alone singularly shortened, this is attributed to a thorn-prick, but really appears to be the consequence of interstitial absorption, and the same toe in the opposite foot is beginning to be affected: numbness came on on the feet only a year ago: the right foot is most changed, being already generally shrunk. F. dead, free: M. alive, free: three brothers all older, dead and free, a younger sister, dead and free: all taint is denied. Is married; 3 sons all died young: 3 daughters, 2 dead, 1 alive and well, *æt.* 4. Contact with lepers even in Bombay is denied: was living as usual; never ate fish and occupation as at present, when the disease came on here. It is now stationary: lives with his mother: has sores: general condition fair. Cannot get at the truth of matters from either this man or the villagers: these Kolis are proverbially close. They sometimes eat fresh fish which comes from Madawan: the dried fish is brought by a Memon trader. On account of the universal antipathy here prevalent to killing animals and eating flesh, even the Kolis are loth to say much about their animal diet: the more influential and independent Bajput has less scruple, and also the Mussulman.

To *Pratapara*—a mile to the S.W., an old village: 60 houses: population (364) chiefly Kolis; there is one Lohar, Brahman, Barber, Kumbhar and Kojah. Food—jowari and bajri, urid, mung, mut: water from wells or holes dug in the stream, it is sweet: no guinea-worm: no cholera: no mycetoma. One case of leprosy: the patell at first denied there was any leper here 20 years ago, but now it is admitted that 13 years ago a Mochi leper came hither and died after 2 years' residence; he left no one behind. There is no leper here connected with the family of Mooljee at Vunjodra; saw one of his relatives, well; (*vide* p. 39). Case seen:—

M., Koli, 35, labourer, born here, not travelled far (has been to sea-coast): leprosy for 7 years. It began on the face, where is now well-marked T. L., with his black complexion he looks like a satyr: probably stains on the back and front; nipples enlarged; hands and fingers swollen; vesicles: right thumb shortened: nails unchanged. Feet not more altered; except that some nails are stunted or gone. Hands and feet bronzed: numbness on both. F. dead, free: M. alive and well; 4 brothers all older, 2 dead, all free; 3 sisters, all older and free: denies all taint. Is married; 3 daughters, of 17, 10 and 5, the last born after his disease began: all well and the wife: eldest daughter has 2 children who are well. Denies contact; cause of disease unknown: was living and working here when it came on: it is stationary: he lives apart: there are excoriations: general condition indifferent: denies syphilis. Did not live near the Mochi.

Note the frequency of tumours of face and scalp (sebaceous?) in these parts.

To *Jhanjmir*—on the land side of an elevated and fortified peninsula, jutting into the sea; an antiquated town of some 150 houses, a few being fairly built; 632 people, Rajput, Garassia, Brahman, Koli, Wani, Mochi, Sui, Jogi, Bharwad, Bhawa, Dher, Sepoy, Memon, Bhungy, Barber, Kumbhar. Food—jowari, bajri, urid: water from wells of both kinds; there is some guinea-worm: cholera rare, but 10 years ago there was an epidemic here, which is attributed to incantations of the Bhungis, who made earthen images or fiends which had the power of killing people and even individuals, whose names were mentioned. These low-caste people were

at last driven away, but when their images were broken up, a man died in the town for each one so broken: then the disease stopped. Another explanation of this epidemic is the spread of cholera along the route of a 'jatra' from Bombay to the Palitana shrines, when many pilgrims and others died.

Five years ago there were 6 lepers here: there were 2 Kolis and a Brahman amongst them, who died 10 or 12 years ago; also a Bajput woman (20 years) and a barber (30 years) formerly in this place: nothing further known. The complaint is increasing by common testimony. Cases seen:—

1.—M., Rajput, 30, labourer, born here and resident, has travelled a little: leprosy for 4 years; it began in cold weather, with swellings on body which have subsided, then on face and hands where they now remain. T. L. and much bronzing on face. There are marks on the back of a faded eruption: nipples enlarged: hands bronzed: nails of little and ring fingers of right hand deformed; no marked numbness: feet in a similar state; nails here much deformed; bronzing: no numbness: great toes absorbed a little. F. dead, free: mother died 12 years ago of leprosy; she was 'sati' on her husband's death, and had been a leper for a year: he is an only son: has an older sister here and well. His mother's brother (maternal uncle) had the disease and died at Datta 10 years ago, at. 30, and having had T. L. for 10 years. No later taint admitted, but the man allows some other leper ancestor was mentioned by his father. Is married; wife free: has a son of 4. Contact denied: cause not known: lived as usual and was working here, when the disease came on: it is stationary: lives apart, no sores; general condition fair: no loss of muscular power.

2.—M., Bhawa, 50, beggar, born at *Pasvi*, here 10 years, has wandered about: leprosy for 4 years; had first a red eruption, followed by swelling of face and hands. T. L. well marked on face: skin of back, of deep-red tint, and seemingly thickened with scattered nodules: nipples enlarged, and hair scanty in front. No numbness. F. dead, free; M. alive and free, and denies all taint; 3 brothers, he is the second son; an older sister is dead, 2 younger alive and well. Is married, wife well; no son; 3 daughters—one (25) half mad, one of 18 mad, one of 5 dumb: his wife has taken to opium-eating from grief, and the younger child now consumes opium. Denies contact with other lepers: origin of disease unknown, except it followed indulging in mango-juice and sugar, made hot; this feast occurred at a marriage festival at Kutpar, and the swellings, &c., followed immediately on his return home. Disease spreading: he is not separated; no sores: general condition fair. The mental affliction of his own family has no apparent connection with his leprosy.

3.—F., Rajput, born at *Doogam*, 20 coss off, here for 25 years, has not travelled; leprosy 4 years; there were first pink spots on the body, followed by swellings of face. On face T. L. not very marked, but clear; on trunk a few scattered nodules and hands bronzed; nails unchanged; no numbness: feet in same state, one swollen but not benumbed; she still does her house work. There are scattered nodules in the skin. Parents dead, free: 2 younger brothers, well: 3 sisters, 1 older, all well; no family taint: husband dead, was well: a son of 20, well (another died as an infant), and 2 girls of 15 and 10. Contact denied: cause not known, was living as usual and at home here, when the disease came on: it is increasing; she is not apart: there are no running sores: general condition fair.

Learn that 4 years ago an epidemic of fever with delirium, pains in joints and a universal rash occurred in the town; almost every one was attacked; very few died. This malady was the dengue and it spread all over the country. The people call it 'rangila' (the name of a god). A curious thing is that all these lepers date their disease from an attack of dengue; at least the latter accompanied the onset of leprosy. It may mean that lepers amongst others caught dengue, yet there is a singular coincidence in dates of beginning of leprosy (T. L.), which seems to point to a common cause or origin, and there seemed no designed concurrence in the narratives

of these three people. See also the instances at *Dihor*, below, page 48.

4.—M., Rajput, 45, labourer, born and resident here; travelled a little: leprosy 4 years (no previous attack of 'rangila'): there were white spots on the skin, then sores formed on hands and feet. Nothing on face; there are wide-spread light spots on the back; nipples a little gun-capped; hands bronzed, one hand much deformed as in N. L.; but fingers are swollen, and there is no atrophy of the palm: there are sores: right hand has little finger shortened and also middle finger; nails unchanged: numbness below elbows. Left foot also much changed; great toe absent; numbness in both feet and from knees downwards: little change in aspect of right foot.

F. and M. dead, free; a brother dead, older: no sister: no family taint. Married, wife well; a daughter of 8, well. Contact denied. Origin of complaint unknown. Was living and working in fields when the disease came on here: it is increasing in the hands: he lives apart; running sores: general condition bad. His disease bears the same date as all the rest, namely, from about four years back.

5.—M., Garassia, 35, labourer in fields: born here, not travelled: leprosy upwards of 4 years. Has had distortion of fingers such as seen in N. L., but fingers are swollen, right hand most affected; all the fingers being absorbed at their tips: no numbness (?). Feet not much altered in aspect; bronzed; not benumbed. On face nothing but bronzing: on back dark stains which may be of no import (it is difficult to get any clear statement from this man). Parents free; no brother; an elder and younger sister well: no family taint: is married, sons well; they are quite young: denies contact and knows of no cause. There is psoriasis or eczema of the palm, which reappears annually in the cold season. An obscure case but doubtless leprosy: the head Garassia being present, others are perhaps unwilling to speak freely.

6th March.—To *Rajpura*, 1½ miles to west of Gopnath: a hamlet on the sea-coast, placed on a small peninsula, jutting into the sea, and composed of sandstone and limestone interblending; once protected by a round fort, now and for the last 15 years in a state of decadence: 44 houses, mostly dilapidated and poorer than common, much *debris* and several ruined tenements, memorial-stones, &c. Population (200) wholly of Kolis (Mahawani, Mori, Sawan, Japar). Food—jowari, bajri, mut: water from an old well near. No guinea-worm: no cholera; no mycetoma. Only 3 lepers here now: 20 years ago there was no case, and the first known was the woman Deoki, No. 1 in the list below: she was born and shewed the disease here, was a labourer and had been about the neighbouring villages; was married and turned out of home by her husband, being made a beggar; her brother became a leper: no children. No. 5 was the second leper: he was a distant connection of No. 1, and was born here, acquiring the disease in this village. After this time the complaint became common. Many of the lepers, perhaps most, seem to have been related; and intermarriages of families seem always to have been common.

The people are very poor, wholly uneducated, without a priest and prejudiced; they live chiefly by working as labourers, and own no land of their own. They eat fresh fish, but it is not abundant.

Dengue fever occurred here three to four years ago, it is not supposed to have had any connection with leprosy, which was then declining. This disease seems to have become suddenly frequent, and it has now become much less common: its decadence is attributed to deaths and emigration of the affected; there are no instances of recent origin of the malady. The explanation of this rise and fall of leprosy is not clear, for both heredity and contagion might be supposed to still exert their effective influence in maintaining the complaint. Mode of life has not changed, they say, and

at present it is difficult to suppose any real improvement in social position has of late occurred. When the disease began to be common, people became afraid of coming or staying here, and consequently the village is less prosperous and populous than formerly. For its size, however, the number of inhabitants is not less than usual, and children of all ages abound. The patel and the other old residents promptly call to mind the names and other particulars of former lepers here: they know that it was reported the village was a 'leper colony,' but say this is no longer the case: the disease is in fact, dying out. In the official list the present number of lepers at Rajpura was put down at 7, but there are really only 3—a discrepancy doubtless owing to the late disappearance of a leper family of Kumbhars. I am assured that there are now only 3; none are said to have fled or hidden themselves on account of my visit; the people indeed are reticent, but their statements are tolerably consistent and memories certainly prompt and concordant. The surviving form of disease is mild, and this is a significant fact.

Such is a summary of enquiry, which it was long anticipated would be of unusual interest. It was thought that at Rajpura facts of much importance might be gleaned, because of the asserted abundance of the leprous disease; yet it is found that here is really no particularly wide-spread prevalence of the malady; nor has there ever been, perhaps, a great excess of lepers over what is found in some other localities, and, in short, a supposed exception resolves itself into the ordinary run of instances.

List of Lepers lately deceased at Rajpura.

No.	Name.	Sex.	Date of Disease.	Place.	Age.	Duration of Disease.	Form of Disease.	Hereditary Taint.	Remarks.
1	Deoki.....	F.	1861	Rajpura.....	25	4	T. L. ...	{ Sister.	1st case, known.
2	Bhaelo.....	M.	1863	Do.....	7	3	T. L. ...	{ Brother.	
3	Mackvano.....	M.	1870	Bhaonagar.....	25	3	A. L. ...	None.	
4	Vasto.....	M.	1872	Do.....	30	4	T. L. ...	None.	
5	Rukhi.....	M.	1864	Rajpura.....	18	5	A. L. ...	{ Brother.	
6	Raso.....	M.	1868	Do.....	14	3	T. L. ...	{ Do.	
7	Chordo.....	M.	1869	Mhowa.....	16	4	T. L. ...	{ Son.	
8	Davai.....	M.	1870	Rajpura.....	13	3	A. L. ...	{ Daughter.	
9	Rae.....	F.	1874	Do.....	8	3	T. L. ...	{ Mother.	
10	Maloo.....	F.	1866	Do.....	30	5	T. L. ...	None.	
11	Vasto.....	M.	1871	Do.....	16	4	A. L. ...	None.	
12	Kimlo.....	M.	1872	Mhowa.....	10	5	A. L. ...	None.	
13	Devaseo.....	M.	1873	Rajpura.....	8	2	T. L. ...	None.	
14	Bhimo.....	M.	1873	Do.....	25	5	T. L. ...	None.	
15	Rasi.....	F.	1873	Mhowa.....	20	4	T. L. ...	{ Mother.	
16	Jamal.....	F.	1873	Do.....	8	3	T. L. ...	{ Daughter.	

Nothing satisfactory learnt about the descendants of these people; no descendants are named.

There are at present date 3 lepers here; all seen and all A. L.

1.—M., Koli (Sawan), 25, labourer, born here and resident, has been to Mhowa; leprosy for 4 years, there was first an eruption; a few months ago right hand became affected. Now nothing on face; a wide-spread, pale eruption on trunk (light-cloud-like) rather symmetrical, nipples unchanged: right hand a 'claw'—two inner fingers most affected, atrophy and vesicles in palm. He attributes the distortion to frequent work at the hand-mill; left hand has fore-finger stunted and skin is dark; numbness only on right hand, which is strictly limited to palm and dorsum below the wrist: no numbness on left side. Feet not changed.

Parents free, brother free: no sister: no family taint. Married, wife free; daughters of 6, 5, 4 and 1, all well: denies contact: attributes the disease to abandoning the object of his worship—'Meldi-deo'—and becoming an atheist. Was living as usual, and driving bullocks here, when the disease came on; it now seems to advance every third month: is not separated: there are sores: general condition tolerable: denies syphilis: still eats fish, when available.

2.—M., Koli (Sawan), 20, born and resident here; had been to Mhowa; leprosy for 13 years, so that it began when he was a lad of 7; there was first an eruption of small spots, which was followed by distortion of the fingers; doubtful flushing of face, &c., on back dubious traces of small light spots: right hand greatly mutilated; all fingers being reduced to mere stumps: left hand the true 'claw' with some interstitial absorption; no numbness here, but both surfaces of remnant of right hand are benumbed: no loss of muscular power. Nothing on the feet, except that they look bronzed: no numbness.

Parents free, 3 younger brothers free; and 4 older sisters with their children: no family taint, but see No. 3: is not married. Denies contact: cause of disease unknown. Was tending cattle when it came on here: it is now stationary: he does not live apart, but with his mother: there are excoriations: general condition fair, still strong and can fish with a net; syphilis denied. A striking case of N. L.

3.—M., Koli (Sawan), 15, labourer, born and resident here, has been to Mhowa: leprosy for 7 years, it began in great toe—on left foot there was numbness, and this part is still the most deformed—injury from a thorn is referred to at the commencement, afterwards hands became affected: nothing on face or on back, that is decisive: nipples probably a little enlarged; there are very characteristic large pale patches on outer side of both arms, which look like driving clouds, and are rather symmetrical: similar patches exist also in fore-arms, the back, reaching as low as wrists: all have a defined free border, which has a reddish tint but is probably hardly raised: no numbness in the spots: duration 4 to 5 years: hands wasted, and fingers resemble an incipient 'claw' with vesicles; no numbness here, nor is skin changed in aspect. On the lower extremities patches of same kind probably exist: feet more changed, inner side of left foot in front is absorbed, so that the toes are either mere remnants or are turned all away: numbness in both dorsum and sole in front; a spot on little toe is still somewhat sensitive. Right foot much less changed, but great toe is atrophied, and the next bent inwards and swollen; no numbness here.

Parents free: he is the second of 4 sons: 3 sisters (2 older): all free: his paternal cousin No. 2 has the disease: no one else in his connections. Not married; contact with other lepers is denied (but surely possible); cause of disease unknown, was living and working as usual at Rajpura when the disease came on; it is now stationary; lives with his mother; there are excoriations; general condition fair: syphilis denied. He still works in the fields. An instance of early but very chronic A. L.

To Pithalpur, in the plains 2½ miles from the sea, low sand-hills around: 150 houses; population (642) Koli, Karak (Kunbi), Brahman and mixed castes; jowari, bajri, wheat, urid and mung are eaten: water from wells. No guinea-worm, or cholera or mycetoma. Now there are 3 lepers

(1 is absent); 10 years ago there were more, and this list is given from memory of bystanders.

No.	Names.	Sex.	Place of Birth.	Place of Death.	Date of Death.	Begin-ning of Disease.	Dura-tion of Disease.	Age at Death.	Form of Disease.	Remarks.
1	Gallo	M.*	Here ...	Here ...	3 Mos.	1866	10	25	A. L. ...	
2	—	F.	Do. ...	Do. ...	1861	1859	2	30	T. L. ...	
3	Vallo	M.†	Do. ...	Do. ...	1869	1863	2	35	T. L. ...	
4	Dalee	F.	Do. ...	Do. ...	1864	1860	4	40	T. L. ...	
5	Janee	F.	Do. ...	Do. ...	1856	1853	3	40	T. L. ...	
6	Poopli	F.	Do. ...	Do. ...	1874	1869	5	40	A. L. ...	
7	Ramko	M.	Do. ...	Do. ...	1871	1867	4	22	T. L. ...	
8	Naram	M.	Do. ...	Do. ...	1870	1868	2	30	T. L. ...	
9	Luximon ...	M.	Do. ...	Do. ...	1870-1	1863	3½	28	A. L. ...	
10	Magoo	F.	Do. ...	Do. ...	1869	1867	2	50	A. L. ...	

* Has a son who is well—s.w. him.
† Had 2 sons—free from disease.

‡ Another son of 15 named Jathloo was free from leprosy.

Late Lepers at Pitthalpur.

Of most lepers in this list, no affected descendants were named.

Cases seen.—1. F., Kolin, 30, born at *Mangola* (page 40), 20 years here, has not travelled; leprosy 4 years, beginning with a sense of heat in body and numbness in hands, &c.; one month since an abscess in sole of foot. Hands as in N. L., fingers partly bent, numbness in palms: feet similarly affected, great toes swollen: on trunk a scurfy eruption; on face nothing peculiar. Parents free; two brothers and a sister, all elder and free; no family taint: is married, husband well; no son; 2 daughters of 15 and 5, well. Contact with other lepers not admitted: cause of disease unknown; lived as others and worked as labourer, when the disease came on here; it is now spreading: lives apart: there are no sores: general condition fair.

2.—M., Koli, 32, labourer, born at *Gudhuli* near here, 15 years in this place; has travelled around: leprosy 2 years, beginning in cold weather. Nothing special on face; on back large pale spots of characteristic form; no numbness; inner fingers of both hands gone, no numbness; great toe of left foot shortened, no numbness. F. free: mother had leprosy; both parents are dead; has an elder and 2 younger brothers, free; an elder and younger sister also free: it is reported his M. S. (maternal aunt) was a leper; she died many years ago. Is married, wife free: no son, a daughter of 12, also free; denies contact with other lepers, and is ignorant of cause of disease: lived as usual, and worked as a labourer, when the disease came on here: it is spreading: he is not separated; has no sores and condition fair: syphilis denied.

Mother has gone to *Kalsar*, 40, born here and has travelled; a leper for 7 years: has symptoms of A. L. (great toes gone from both feet: feet swollen: little fingers of both hands lost, &c.). Parents free, 3 younger brothers and 5 younger sisters are all well. His F. S. (paternal aunt) named *Dali* (see No 4 in the list above) was a leper. Married: 2 sons and 3 daughters, all free (report). Compare experience here with that at *Rajpura*; in both places leprosy seems to be declining and the form of disease is mild.

5th March.—To *Khandera*, in the plains 5 miles north of *Gopnath*; 100 houses and increasing, people (374) Koli, *Garassia*, *Bhurwad*, *Brahman*, &c. Food—jowari, bajri, urid, mung: water from a built well (*kuwa*) repaired with stone walls 2 years ago, and from a rivulet: before the well was built up, there was much guinea-worm; now there is very little: they think that the well-water was contaminated with dirt falling in, before the stone walls and sides were added. No cholera lately: no mycetoma (very little cotton cultivated near); 3 lepers here now: it is asserted that 30 years ago, and less, there was no leprosy here, the first known case being the following (but see page 46 for other lepers in this small place).

1.—F., Koli caste, 30, born and resident here, has gone about in search of employment; leprosy for 7 years, beginning with a sense of heat, with swelling of hands (1. hand first) and induration of fingers; afterwards feet similarly affected. Now nothing particular on visage (a sebaceous tumour on forehead); on back of trunk traces of a pale eruption; hands much deformed, all fingers mutilated and reduced to mere stumps (A. L.); numbness in hands and forearm, till near elbows: feet greatly destroyed, especially the left, all toes more or less gone, with numbness here too. Parents dead and free; no brother or sister; no family taint: she is married; husband well; no son; a daughter of 5 well (she has some pale spots on the cheeks, but is in good health—these pale spots are common in children and are often, at least, only superficial scars). Denies contact with other lepers; origin of disease unknown, was eating and working as a labourer in this place, when the disease came on; it is not spreading: she is not separated; there are excoriations; general condition indifferent. A striking example of A. L.

2.—M., *Garassia*, 35, labourer, born here and resident, has travelled a little: leprosy for 6 years, there were large blebs on front of knees, then an eruption on skin, swelling of ears, &c. Now there are on face decided indications of T. L., rims of ears greatly nodulated and wrinkled, nose beginning to sink at tip; on back a roughened, dark appearance of the skin probably indicating a previous (acute) eruption; nipples hardly changed; hands bronzed and fingers tumefied; skin of palms cracked, blebs at tips of fingers; numbness chiefly on dorsum of hands and forearm, muscular power remains: feet hardly more changed in aspect: they seem black and shrivelled: no interstitial absorption, numbness from knees downwards including soles. Parents dead, free; no brother: 7 older sisters and their children, all free; no family taint: is married, wife well and two sons of 10 and 8, no daughter; no contact with other lepers; knows of no cause of his disease, was eating as usual and driving bullocks in this place, when the disease came on: it is stationary now: he lives apart: no running sores; general condition fair; he still works; syphilis denied. Saw some of his healthy relatives, who deny a family taint. A significant case.

3.—M., *Bhurwad*, 25, shepherd, born here and has not wandered far, a leper for 6 years; swelling of the face came on first. Now there are the signs of T. L.; the leonine look; of both ears lobules chiefly implicated and of enormous size: on back nothing visible; nipples enlarged: skin very fair. Hands seem hardly changed, but they are benumbed at back and are bronzed: muscular development and power considerable: on feet nothing visible, but there is numbness at back of leg below (lesser sciatic nerve affected?). F. dead, free; M. alive, well; an elder and 2 younger brothers, and a sister well: no family taint. Is not married: knows of no contact and of no cause: was working in fields when disease came on; it is now stationary: does not live apart: no sores: no syphilis: a large strong man. Another significant case of the severer form of disease.

Passed through *Neswad*, a small hamlet of 6 houses, inhabited by Kolis, and situated between *Khandera* and *Mahadeopura*; the outward conditions appear identical and intercourse must be frequent, yet there is no leprosy here. The people are few, possibly too few in proportion, or absolutely, to contain a susceptible subject—is this so? Similar remarks apply to the village of *Ambala*, which lies between *Uncheri* and *Gudhula*, and is altogether devoid of lepers:

yet it is of larger size than Neswad, and its exemption perhaps more difficult to explain.

To *Mahadeopura* in the plain 2 miles west of *Khandera*; about 25 houses; people chiefly *Kolis*; others *Rajput*, *Bhurwad*, *Kumbhar*, *Barber*. Food—*bajri*, *jowari*, *urid* and *mung*; water from a rivulet, and holes dug in bed of stream. No guinea-worm, cholera occurs; no mycetoma. One leper only—the first case for 15 years, at least, and extraneous in origin.

M., Mochi, 18, works as shoe-maker, born at *Wauri* (some miles off) and here for 5 months only: disease for 5 years, it began with vomiting after a surfeit of mangoes; then swellings on body (which have since recurred). At present, the signs of leprosy are but slight: there is dubious turgescence of ears and face; nipples decidedly enlarged; nothing now visible on trunk: hands benumbed from below the wrists: numbness of feet at back and sides: no distortion of fingers and toes. He has now an acute attack of itch (inflammatory) on both hands, and on trunk, &c. Parents well; an older and younger brothers, and a younger sister well. F. B. (paternal uncle) was a leper at *Uncheri* (see below) and died there 8 years ago, for 3 years diseased and at. 20 (he was the youngest of 5 brothers): no other taint. Is not married: might have been in contact with his uncle; was living as usual when the disease came on at *Bordi* (10 miles off): is not separated: no running sores: general condition fair: is well grown. Faint but real disease of severer form; there is leprosy at *Borda*.

To *Uncheri*, in the same wide arable plain and further inland, placed on a slight elevation: 125 houses and increasing; 637 people—*Koli*, *Kunbi*, *Wania*, *Garassia*, *Rajput*, *Dher*, &c. Food—*jowari*, *bajri*; *urid*, *mung*, *nut*: water from a talao in rains and in cold weather, from a well (*kuwa*) in hot season which was built 6 years ago for irrigation, but proving to yield sweeter water than that of the tank was brought into general use: guinea-worm very rare. Cholera rare (11 years ago 200 persons died): no mycetoma. Now one case of leprosy: some others are recollected who are entered in the following list, as given from memory.

Former Lepers at Uncheri.

Name, Caste and Sex.	Birth-place.	Place of Death.	Date of Death.	Age.	Form of Disease.	Duration of Disease.	Remarks.
Bhaklo Bhawan, Mochi, M.....	Here ...	Here	1856 18	45	A. L. ...	18	F. S. (aunt), named Amla, died 1872, 8 years diseased, aged 50, see also p. 17 above. No taint.
Adobhai Amabha Garassia, M.....	Do. ...	Here	1660 8	60	A. L. ...	8	
Daya Arjoon, Koli, M.....	Do. ...	Dis. began...	1852	30	T. L. ...	7	
Ameo Oedde, Wania, M.....	Do. ...	Dis. began...	1857	30	T. L. ...	6	

Case seen.—F., Bhungy caste, 20, born and resident here,

has travelled a little; leprosy for 5 years, it began with blebs and numbness on fingers of right hand, which were followed by mutilation, &c. Now nothing visible on face or back (cursorily inspected), in front there are small pale spots; hands greatly mutilated as in A. L.; two inner fingers of left hand quite gone, and most of the others; no marked numbness: feet also greatly mutilated, all the toes being more or less affected, feet are swollen and ulcerated. Parents alive and free: 3 younger brothers are well and a younger sister; no family taint: is not married: knows of no contact and cause of disease unknown: was living and labouring in this village when the disease came on; it is not spreading; lives with her family, there are running sores; general growth and condition fair; but she is quite a cripple. No clear inference here.

To *Gudhula*, a hamlet on sea-coast 1½ mile north of *Gopnath* point, where the coast is low and foreshore muddy; 70 houses of usual construction, memorial-stones &c.: population 350 chiefly *Koli*, also *Memon*, with *Bhurwad*, *Wania*, &c. Food—*jowari*, *bajri*, *urid*: water from a 'wao' near; there is guinea-worm, perhaps 10 people yearly get it. Cholera last occurred 11 years ago: no mycetoma: one case of leprosy, and this the first known. In this village there never was an approach to the number of lepers once found in *Rajpura*, and the place never deserved the name of a 'leper-colony'—a term I once heard applied to it; hence again popular estimation has proved erroneous, or the truth is withheld from me.

Case.—F., *Kolin*, 45, born at *Otha* (some miles off), here for 30 years, she used to go about in search of labour; leprosy for 5 years. Now she is a cripple: nothing peculiar on face, but nose depressed: neck and trunk seamed with long scars, the result of wandering ulcers of the skin, and on limbs are same, in arm-pits and groins, especially left below *Poupart's* ligament: there is slight but decided atrophy of hands as in N. L., and this is more marked on the feet, especially on left side. A few scattered soft and ulcerating nodules in the skin, above inner elbow, &c. No affection of the voice and teeth. Parents free from leprosy, but the mother had the same 'boils' and sores as this woman, on her body; an elder brother is well, and also 2 elder sisters: no family taint: husband died of cholera 4 years ago, and had not syphilis: there are 4 sons here, all strong and well, the youngest at. 11; no daughter. Contact with other lepers is denied and cause of disease is unknown: ate common food and was labouring when the disease came on here. It is increasing: she lives apart in a verandah: there are running sores; general condition bad.

Here is a case which shews an apparent combination of leprosy with syphilis or struma—most possibly the latter, which may have descended from the mother, and there are no signs of syphilis in the youngest child.

The eldest son (at. 22), strongly built, has a pink scar on the left cheek which dates from his youth (strumous? leprosy?): his left hand is strikingly deformed, precisely as often occurs after destruction of the ulnar nerve, and in fact this nerve at the elbow is enormously enlarged upwards, it is not tender, but unquestionably much diseased: the opposite nerve is felt to be of the usual size, &c. The man attributes the deformity of his left hand to having once had a guinea-worm in the hand, but there is no mark of a scar (such as have followed worms in his legs), and probably no accident of the kind could account for the present symptoms. There is numbness just along the inner margin of the hand, including the little finger: no numbness in the forearm, and the hand is yet useful. It is doubtful if the temperature of the skin on the ulnar side of the palm is not lower than on the outer side. The muscles of the thumb, &c., are quite plump. A very striking case—was it not leprosy neuritis? If so, how derived and why limited? The injury dates from his youth: the young man is married. His skin seems free from marks.

10th March.—Case seen at *Gopnath*: resident in a hut in the fields, one of a small cluster, lodging a few labourers and herdsmen.

M., *Koli*, (*Bhil*), 40, born at *Rajpura* (p. 42), here for 22 years, has travelled to *Mhowa* &c., was a field labourer: leprosy for 20 years, he had first guinea-worm in the feet, and

afterwards an eruption : feet were first affected with leprosy. At present, nothing marked in the face (is blind from corneal disease), pale patches on trunk, nipples enlarged : hands extremely mutilated, nothing is left of the fingers, numbness as far as elbows : feet similarly affected, a mere remnant of the great toe on each side being left with its nail stuck on curiously, at the centre of the stump of the whole foot.

F. here, hale and free from leprosy ; M. dead, was well ; F. S. (paternal aunt) died at Rajpura 10 to 12 years ago ; had been a leper 7 years : was of adult age, born at Rajpura and had no children. He is not married : knows of no contact with lepers or probable cause of his disease ; was living and eating as usual when it came on at Rajpura, working in the fields : it is now stationary ; there are open sores ; general condition fair ; is intelligent enough, though a miserable object to look at : syphilis denied. Hear of another case from Rajpura who died here 7 years ago, so that the late leper-population of that place emptied itself freely around, and that unquestionably not to the benefit of the community.

11th March.—To Sartanpur, close to sea-coast at mouth of Satrunjya river, a growing wharf here ; salt-marshes around, and low-lying coast ; 214 houses, mostly very poor ; 980 people—Koli, Wani, Khoja, artificers, &c. Food—jowari, bajri, urid, mung, mut : water from a well (kuwa) : no guinea-worm ; cholera occurs, there were 14 cases lately, the last 5 days ago ; mycetoma not known.

One case of leprosy here now, others are recollected and given as follows :—

No.	Sex.	Name.	Caste.	Place of Birth.	Place of Death.	Date of Death.	Duration of Disease.	Age at Death.	Form of Disease Taint.	Remarks.
1	M.	Kora Arjun...	Koli ...	Here ...	Here	1864	5	45	M. L. ...	A surviving son is well.
2	M.	Ana Barid ...	Do. ...	Do. ...	Suicide (drowning.)	1862	4	60	M. L. ...	2 sons and a daughter, well.
3	M.	Mouri Wala...	Do. ...	Do. ...	Here	1874	7	35	M. L. ...	2 sons and a daughter, well.
4	M.	Gulko Najoo...	Do. ...	Do. ...	Cholera here.....	1875	3	17	M. L. ...	Unmarried.
5	F.	Sona	Kolin...	Do. ...	Here	1866	3	40	M. L. ...	2 sons and a daughter, well.
6	F.	Rani	Do. ...	Do. ...	Do.	1860	8	50	M. L. ...	Son and daughter, well.

Another doubtful instance is remembered : case seen :—

M., Koli, 40, priest and beggar, born and resident here, has travelled a little : leprosy for 2 years, coming on in cold weather, with numbness in feet. Now, nothing abnormal on face ; on back large light patches, and smaller ones in

front, all of characteristic aspect ; nipples unchanged : hands bronzed but hardly deformed ; middle finger of right hand inflamed ; pulps of finger-tips rather prominent, vesicles : feet more bronzed, some toes (great toes) absorbed, sores on left side ; numbness as far as ankle, also on dorsum of hands. Parents free ; is the youngest of 3 brothers, the elder of whom was also a leper (he died at Khandera [p. 44] 7 years ago, was born here, and ill for 8 years ; at. 60 when he died, and probably had M. L. ; had a daughter (who died free) : there were an older and a younger sister, both well. No family taint. He got the disease at Khandera, where he and his brothers used to go. Is married, wife well, 4 sons dead, free ; 3 daughters, all born before his disease appeared, and all well. Contact only with his brother : no other cause of disease known—only he used to eat much sugar and rice : living as usual, begging, never ate fish : disease stationary : is not separated : there are sores : general condition fair, had syphilis 12 years ago.

His other brother died at Alang 5 years ago, and was also in the habit of visiting the elder leper at Khandera, but he was not affected with this disease.

To Dakana, 2 miles to north, in the plain : about 70 houses ; population (379) Koli, Kunbi, Brahman, Wani, Bhurwad, artificers and low-caste. Food—jowari, bajri ; mung, urid : water from both kuwa and wao : guinea-worm prevails ; it was extremely prevalent before the kuwa was built 15 years ago, then only the wao was used, and water was scarce ; now the people make use of the common well-water during the rains and part of cold weather, and when this source fails, resort to the wao or well with steps. The common well was built by a Kunbi for irrigating his fields near here, but as the water turned out to be sweet and as the owner is gone, people drink this water, and thereby guinea-worm has become less frequent than before. A clear case against wells with steps. Cholera occurs : no mycetoma. One leper here now : by common consent he is the first case known within the last 20 years. A village of average construction and inhabited partly by Brahmans who are agriculturists as well as priests, and very intelligent men. No one eats fish, even the Kolis who are Talubdas and divided into Dabi, Jambnam and Barria clans.

M., Mochi, 30, born at Rajpura (p. 42), has travelled ; here for 20 years : leprosy for 2 years. It began in cold weather, with blebs on right hand and numbness at the back. Now, nothing on face ; on trunk (back) several large pale spots ; in front, others smaller and more recent : both hands are perfect 'claws'—remarkable vesicles on fingers, &c., nails unchanged, sores ; numbness exists, but little and limited, and bronzing : the feet are bronzed but not much deformed—only little toe of the left foot is drawn back for an inch—curious—numbness is present ; nipples unchanged. Parents free ; he is second of 4 sons, others well : 4 sisters, 2 older than he and free : denies all family taint. Is married ; no son ; 2 daughters of 10 and 6, well. Contact unknown, and cause of disease : was eating and working as usual when the disease appeared here. It is spreading : lives apart : there are sores : general condition indifferent : denies syphilis. Could the disease be latent from his childhood passed at Rajpura ?

12th March.—To Gorkhi, 1½ mile S.E. of Talaja, a poor place on banks of a river and upon a low hill : about 70 houses. Population (443) chiefly Kolis, a few Wania, Rajputs, artificers and low castes. Food—jowari, bajri, urid, mung : water from well and river : some guinea-worm occurs, and cholera : no mycetoma. Leprosy is rare : 40 years ago there were 2 lepers ; a mother and a daughter of Rajput caste, both died here, the daughter two years after the mother ; both probably had M. L. Their disease began here, where the husband lived, this girl was their only child : she died 35 years ago. The next case was that of a Koli woman, who 13 years after her marriage became a leper, and after 3 years' illness died 8 years ago : in the intermediate interval no other case occurred : the old husband is here and well ; the leper wife came from Bajun, 8 coss off,

nothing is known of her relatives : their first child (boy) died a year old ; afterwards there were 5 other boys who are all lepers ; no female child. The old man states there was no disease in his family, nor, so far as he knows, in that of his wife ; he does not know how she got the disease : their 5 leper sons are shewn. Name of father Muloo Wasta : the family are Barria Kolis.

a. Runchore Muloo, Koli, *et.* 20, works in fields, born here, has not travelled ; leprosy for 7 years ; it began with a bleb on the right great toe ; face wrinkled and pinched, nose depressed, ears large, not now thickened ; skin of trunk marked with rough patches, nipples doubtfully changed. Hands greatly destroyed : no finger having more than one phalanx left, but thumbs less mutilated : inner fingers gone : not much general atrophy of the palms : nails not specially affected ; their representatives remain at tips of stumps ; numbness of hands and half way up forearm : feet—similar wasting of toes, interstitial absorption with thickening, numbness on dorsum and in legs : vesication at knees ; a weak miserable object, prematurely aged, but not at all a dwarf.

b. Bugwan Muloo, 14 (brother of a), helps in irrigating fields ; born here, has not travelled ; leprosy 4 years, it began with roughening of skin, swelling of fingers. Now there are decided signs of T. L., on face ; bronzing, eyes staring, nose sunken, huge thickened ears : skin of back red and thickened, also of shoulders, outer side of arms, &c. ; nipples small. Little deformity of hands, only slight bending of inner fingers ; no numbness ; bronzing. Feet not changed to greater extent : over shins, skin is thin and shiny.

c. Vitloo Muloo, 12 (also brother), field labourer, born here, has not travelled : duration of disease uncertain—probably over a year or more. Now there are decided signs of T. L. on face—ears much enlarged and nodulated, eyes staring, cheeks puffy, excoriation on alae of nose. Nothing visible on back or front ; fingers look puffy, and left little finger is bent : feet bronzed, but no deformity : possibly some numbness on back of hands ; nipples unchanged.

d. Kalya Muloo, 10 (brother), tends cattle, born and resident here, has not travelled, even to Talaja ; leprosy for 1½ years, it began with blebs on left foot. Now face decidedly bronzed and shewing incipient T. L. ; ears affected ; nothing on back ; in front redness of skin alternating with paleness ; nipples enlarged : on hands both little fingers swollen and bent : all fingers are swollen, bronzed taper and straight ; nails unaltered ; no numbness : vesicle at inner ankle, bronzing of skins, numbness in parts of both feet and legs.

e. Gopal Muloo, 9 (youngest brother), born here and has not left the place ; leprosy for a few months. There are tumefaction of the features, staring of eyes, thickened ears, bronzed hands, and swollen taper fingers ; perhaps the little fingers are the most affected ; nails unchanged : feet also bronzed, and toes puffed and red : no numbness in either hands or feet and nothing unusual on the trunk.

The mother of these lads shewed the disease in 1865, she died in 1868 : her eldest son became a leper in 1869, the other children in 1872, 1874, 1874, 1875. The origin of the disease is obscure ; previous family taint is unknown, and the village was free from lepers, when this outbreak occurred. When the woman became sick she was placed a little apart, but the boys used to take her food ; no attempt has ever been made to separate the children, and all lived in one room. Syphilis is not suspected in any of these cases. Saw their house—the home of this family—a poor place consisting of one long chamber, bare of furniture. The lads live in a but in the fields, where they are employed almost the whole year. (How like the mountain huts of the Norwegian lepers, &c.) They do not gain money, and their father still supports them. The people in the village wished them to live outside. Their father would willingly send them to an asylum, and they are cases precisely suited for transmission to a suitable place of refuge, did such exist. The elder cousin of these lads is here, and in good health. The present instance is one of the most impressive I have met with of perpetuated leprous plague.

To Deoli, 2 miles further on ; 100 houses ; population (449) Pachouli, Brahman, Wania, Koli, Garassia, artificers and low-castes. Food—jowari, bajri ; urid, mung : water from a well : no guinea-worm : cholera rare : no mycetoma. One case of leprosy now : no other mentioned as ever recollected

but this, a Mochi, named Mego Govind, born and died here 1861, after an illness of 2 years, at the age of 45 ; probably had M. L., and had travelled : left 3 sons and a daughter who are well (see below). Instance seen :—

M., Bhurwad, 35, beggar, born here and has travelled a little ; leprosy for 17 years : at first swellings of hands, feet and face, which remained for 3 or 4 years. At present, on the face are the marks of T. L., nose sunken, ears swollen but wrinkled, skin of back red, rough, wrinkled and nodulated, especially in loins : nipples enlarged. Hands much bronzed and fingers rather shrivelled, vesicles and sores on them ; traces of eruption on arms, which are benumbed, as well as skin of hands, feet in same state, dark and shrivelled, without any marked deformity. Parents free ; he is the second of 3 sons, well ; an elder and a younger sister are well. Denies all family taint—married and wife separated on account of this disease : no children. Contact doubtful, and cause of disease unknown ; was eating and living as usual (pasturing cattle) when the disease came on at Harmatia, some 4 coss from this (*vide* p. 8) : it is stationary : lives alone : there are running sores : general condition indifferent ; syphilis denied.

Memo.—Saw 2 of the 3 sons of the Mochi Mego (see above) they seem healthy, but there are spots on the trunk of one, Amro by name, which look suspicious : no other symptom, except perhaps some nerve-disease in fore-finger of right hand : he works still at his trade : nipples a little enlarged. If asked to diagnose the state of this man, I should not be able to do so with perfect certainty ; probably he is as yet free from disease, but possibly not so.

To Isora, half a mile further on : 40 houses : people (196) Brahman, (cultivators), Koli, Bharote, Bhurwad, &c. Food—jowari, bajri ; urid and mung : well-water : guinea-worm rare : cholera rare : no mycetoma. It is said there is no leper here and never was any. The following however is a suspicious case, which I saw.

M., Koli, 60, labourer, born at a distance : here 15 years ; has travelled a little ; the old man has malformation of fingers ; those of left hand (two inner fingers) are bent ; this happened he states in his infancy, but there are other signs of nerve-disease, thus the ulnar nerve at the elbow is decidedly hard and nodulated ; of right hand fore-finger is gone and little finger bent : ulnar nerve at elbow much enlarged. On the feet are similar appearances of early N. L.—with vesicles : great toes are withered. Duration of these symptoms a year or less. Is the third of 4 sons : no sister : denies all taint : his family of 5 well : syphilis denied. What does this signify—neuritis in old labouring people, very chronic and limited to hands and feet : a local cause—a degeneration or infection ?

Piparla—2 miles further on—not visited, but the patel is here, and gives the following information. There is now one leper there (one is entered in lists), whose case is thus reported :—

M., Brahman, 20, farmer, born here ; has travelled : leprosy for 5 years : has probably M. L. Parents free : 2 younger brothers and a younger sister also well : no family taint : is not married.

Other lepers recollected at Piparla are these :—

1.—Rajput, man, died 1856, and leper for 7 years, at age of 50 ; had M. L., no descendant in the village : his mother had the disease before him.

2.—She was born in Dihor and became diseased at Piparla : she died about 40 years ago, (1836), at the age of 60.

3.—Barber, named Ando Lanyo ; born at Piparla, and died there 10 years ago (1866) at the age of 30 : had been a leper for 5 years and disease began in Piparla. No family taint and he has left children who are yet well.

Piparla is in the plains, has about 80 houses : has a population (500) of Brahmans, Wania, Kolis and Kumbhars : food, &c., as usual : no guinea-worm, &c. Here then is a cluster of infected villages, where leprosy still lingers and even thrives.

13th March.—A long day. Visited the hamlets of Balar and Borla which appeared to resemble the others, and in them leprosy was declared to be unknown. These were seen on way to Bela, are Garassia villages and the people unusually reticent. Once again arises the question, how and why

certain villages escape which are placed in a line of natural traffic or intercourse? Certainly locality and ordinary circumstances can have but little influence here, one would think; and the affected subject or individual is the proper object of study.

To *Bela*, 6 miles north of Talaja amongst low hills; of the usual construction; 50 houses, population (313) Kunbi, Ahir, Mochi, Bhurwad, Kumbhar, Wania, Koli, Dher, &c. Food—bajri, jowari; urid, mung; water from river; no guinea-worm; no cholera; no mycetoma. The following are former cases of leprosy known to the villagers.

1.—F., Jesoda (Kunbi caste), born at Bhopara, died here at the age of 55, disease began here, lasted 10 years and she died in 1866; had A. L. and her grandfather (F. F.) also had the disease. Her children were these—1st, daughter (well), 2nd, daughter (well), 3rd, son (well), 4th, son (L.), 5th, son (well), 6th, son (L), and 7th, daughter (well). All the daughters were well: the 4th and 6th children, who are sons, alone are lepers: the eldest son is the patel of the village. Another son (No. 5) lives in another village; the 2 leper men are here (see below). On their father's side is no taint known. Examined the patel (No. 1), he has bronzing and a puffed aspect of face with carolea (tinea?) on the trunk, but there is no anæsthesia, or visible mark of undoubted disease.

2.—M. (Wujo), Wania, born at Dihor, died here, where also the disease came on, A.D. 1868, after 12 years' illness, aged 45; had M. L.; not married, and therefore no children; had 2 older brothers. One still alive at Dihor (see below), and the eldest was a leper who died at Dihor, 1862, after 20 years' disease (M. L.?) at the age of 60.

3.—M. (Ragunath Bhurio), Brahman, born at Neswad (not far off), died here, where he got the disease, 10 years ago (1866), after 5 years' disease (T. L.), at the age of 60. He was the third of 4 sons—the youngest man is here and well, the others are dead. Has left a son with 2 children in this village, all well.

Instances seen:—

1.—M., Wunji Mula, Kunbi, 30, field labourer, born at Bela, has travelled to Benares; leprosy for 2 years. It began with cracking of cuticle of palm and soles. At present nothing especial on face; nor on trunk; nipples a little large: doubtful eruption on arms, where skin looks rough and dry (white on scratching), thickening and cracking of cuticle of palms: little fingers bent and stiff: there is numbness here; hands yet strong: ulnar nerves at elbow probably enlarged, specially on left side. Feet not changed, except great toes, which look partly absorbed: numbness on the thickened soles.

F. dead, well; M. dead, a leper, history as above (No. 1); is married, wife well, 2 children died in infancy. Denies contact: cause unknown: was eating common food, and working in fields, when the disease came on here: it is now stationary; is not separated; no running sores; general condition good; a strong, muscular man; syphilis denied.

2.—M., Kurson Mula, Kunbi, 25, farmer, born here, has not travelled: leprosy for 2 years. Nothing on the face; of trunk the back and front are covered with large, pale patches which are benumbed and do not perspire. Nipples a little enlarged; arms covered with the same furfuraceous eruption as the above, but more marked and here there is numbness, while in the islets of sound skin there is tactile feeling. All this is very clear. The left hand is already affected in a characteristic manner, the two inner fingers being bent, stiff and shortened: there are vesicles and wasting. The right hand is beginning to shew the same thing, the two inner fingers being yet the only ones affected; skin of palm is thickened, cracked and benumbed, as in the above case. Feet look bronzed dry and shrivelled; commencing absorption of great toe of right foot and the next; dorsum of left foot shews feeling only in front, where the skin is soft and reddish; numbness on the heels: whole foot numbed on right side, except middle part of sole (arch) and numbness extends up the legs.

These are remarkable cases of early disease, beginning about the same time, and in the same village. The only healthy brother is again examined, he shews an eruption in the flexures of the arms, axilla and elbow, which at first glance resembles that in the lepers, but it is quite different in nature; it has, too, more defined margins and more rounded

(the arborescence of parasitism), there are also small isolated spots, like drops or splashes, on the skin all round: here is no impairment of sensation and hence a difference, for in the other men the dry and scurfy skin is benumbed. Yet the future of this man is subject of concern, for leprosy may still appear in him.

No. 2, history continued. Not married; contact denied; cause unknown, was living as usual, when the disease came on at Bela, it is increasing: he is not separated: there are no running sores: general condition yet good: a strong young man and muscular, but his left hand is beginning to be weak. Brother of No. 1 and son of the leper-woman before named.

Same dato.—To *Dihor*, a fortified town amongst the hills and by side of a stream; built 300 years ago by Amirji Govind, a Garassia chief: wells, towers, and gates remain, dilapidated—houses (400) close set, common quality, perhaps a growing place and situated on the road to the capital (Bhaonagar): population (1,665) Wania, Brahman, Ganchi, Mussulman, Basar (dyer), Ahir, Koli, Jogi, Khoja, Sakhia (dyer), artificers, Bhurwad and low-castes: little cotton grown about here. Food—jowari, bajri; sweet-oil, chillies; urid and mung: water chiefly from stream, and holes made in its bed. There are a few wells. No guinea-worm; cholera occurs at intervals. There are 4 lepers known here: others are recollected, as in the following list, by old residents.

Sex.	Name and Caste.	Age at Death.	Date of Death.	Duration of Disease.	Birth Place.	Death Place.	Beginning of Disease.	Kind of Leprosy.	Leprous Ancestors.	Leprous Descendants.
1	M. Munna Anandjee, Brahman	42	1868	4	Dihor	Dihor	Dihor	M. L.	Father leper	A son of 15, well.
2	M. Dayto Anandjee, do.	50	1870	10	Do.	Do.	Do.	M. L.	Do.	One son, 2 daughters, well.
3	M. Hera, Koli	55	1861	5	(F)	Dihor	Dihor	M. L.	None known	Son a leper.
4	M. Waha, do.	25	1864	6	Dihor	Do.	Do.	M. L.	Father leper	F. leper. None.
These men are father and son; nothing more is known about them.										
5	M. Wajee, Wania	40	1870	6	Dihor	Bela	Dihor	M. L.	(See p. No. 2.)	
6	M. Kalo-Vira, do.	55	1856	12	Do.	Dihor	Do.	M. L.	Daughter of 20, well.	
7	M. Harju Koar, do.	60	1868	7	Do.	Do.	Do.	T. L.	2 sons and a daughter, well.	
These three men are brothers, No. 6 is eldest; family taint unknown.										
8	M. Velo, Garassia	40	1846	10	Dihor	Dihor	Dihor	M. L.	None.	2 sons well.

No female lepers are brought to mind.

Cases seen at Dihor :—

1.—M., Rako, Garassia, 50, landholder, born here, has travelled; leprosy for 4 years (had not 'rungila'), it began on feet, then face and hands affected. At present, there are on face well-marked signs of T. L., general intumescence, nose depressed, &c., the swelling is less than it was: on back, remains of large patches in red, raised, rough skin: nipples a little enlarged: fingers swollen, red, bronzed and wrinkled, no want of feeling except in palm (?): toes in same state, nails also beginning to change: no numbness (possibly hyperæsthesia).

Parents free, no brother or sister, no family taint: married, wife well, 6 sons and 2 daughters, are well: contact with other lepers uncertain: cause of disease unknown: was living as usual here, when the disease came on: it is lessening (natural subsidence?): lives apart: there are no sores: general condition fair: syphilis denied.

2.—M., Garassia, 25, labourer, born at *Bharoli* (near, *v.* below), he was brought here when a month old, has since travelled; leprosy for 2 years; it began with numbness at back of right arm, which spread; latterly had an eruption in the skin. Now there are pink swellings on brows, cheeks and especially ears—very clearly incipient T. L.; the back is covered with deep red or pinkish flushes, alternating with pale spots; in the loins are distinct nodules in the skin: no numbness here; nipples enlarged: skin of arms is covered with small nodules, isolated and of small size; fingers swollen, blunted at tips; little fingers stunted, and most changed; the nails are changed and on left hand, the ring-finger also is bent: there is perhaps hyperæsthesia, except on inner side; there are also benumbed patches on arm and forearm, without evident change in aspect of skin, except from the nodules which are everywhere found, and the feet are similarly altered: there is numbness below the knees except in the soles and a few other places in the skin: perhaps the numbness is limited to area supplied by musculo-cutaneous nerve and some other skin-branches.

Parents free and also a younger brother of 12: no sister: no family taint; is not married: denies contact, even with No. 1; cause unknown: was eating as usual and working in fields when the disease came on here: it is increasing: lives with his old mother and his brother: there are no running sores: general condition good: syphilis denied.

3.—M., Rajput, 40, farmer, born here, has travelled a little; leprosy 4 years, it began with indigestion: it followed 'rungila,' there were first swellings of face. Here are now marks of T. L. in general intumescence and ears enlarged; skin of back marked with very large red patches, not very distinct: nipples enlarged; skin of arm in same state; no deformity of hands, which seem to be tremulous; no numbness; feet not changed in aspect, right great toe seems small; no numbness here. Parents free, no brother, one elder sister, who with her children is well; no family taint: married: wife free: 3 sons of 15, 14, 7: 2 daughters of 3 and 8; all well. Contact unknown, and so cause of disease; was living as usual, when the malady came on here; it is stationary: he is not separate; there are no running sores; general condition fair; syphilis denied.

4.—M., Brahman, 45, born here, has travelled; leprosy 7 years, it began on second toe of right foot, then on the other foot. Now there are marks of T. L. on the face; nothing apparent on back or front; nipples enlarged; skin of arms red and excoriated about the elbows and along ulna: hands little altered but little fingers both affected, vesicles, numbness below elbows: feet more changed, all the toes being stunted and nails distorted; feet are swollen: numbness from below knees. Parents free: 2 older brothers free, and so 4 sisters (2 older): no family taint, but he is related to the two Brahmans in the above list (Nos. 1 and 2) 7 generations back. Married, wife well; a son of 12, and 2 daughters of 9 and 18, well; denies contact and cause of disease attributed to not drinking water as usual at night; was eating and begging as accustomed, when the disease came on here; it is now stationary; lives apart; there are excoriations; general condition bad: syphilis is denied.

N.B.—There was much 'rungila' (dengue) here exactly 4½ years ago, and two of these four cases of leprosy began about then. Compare experience at Jhanjmir, *vide* page 42.

To *Bhadrawal*, 2 miles from Dihor towards W., a large village picturesquely situated amongst the hills and with trees

around: 175 houses; people (570) Ahir, Panchouli, Koli, Wani: their food, jowari, bajri, &c.: well-water, there is a 'wao': guinea-worm prevails. Cholera is here now—it seems to have been introduced a few days ago, the people seem apathetic, and the sick are left to die unaided. On brief enquiry hear of 2 former lepers here, both Ahirs and men: see also No. 3 below.

1.—Malo, born and died here 3 months ago, a leper for 3 years, age 45; had M. L. (?); no taint. 2.—Ranoo, born and died here 20 years ago: 5 years a leper, age 30: had M. L. (?); no taint; 2 sons and a daughter, are now alive and well.

A dirty village, many children have bad eyes and itch seems common: one leper in the lists; 3 are found, and a fourth is too sick to move from his bed. Cases seen :—

1.—F., Ganchi, Mussulman, 50, works herself at the business of pressing oil, was born at *Paswi* (near), at *Bhadrawal* for 25 years, has not travelled: leprosy for 3 years, it began with desquamation (?). There is nothing now on the face; on the back large, pale patches: hands little changed, but the little fingers are red and swollen, on right side a vesicle on its pulp: no numbness: feet in same state, a sore on left sole, but no numbness: it is said the vesicles and sores are owing to a burn. Parents free: 5 brothers (2 older) and a younger sister, all are well; denies all taint; is a widow, husband was free: 2 sons here, and a daughter well. Contact with other lepers denied, and in fact she does not admit she has leprosy: was living and working as usual at *Bhadrawal*, where these eruptions appeared; they are now stationary; she is not separated: there are no sores: general condition fair.

This woman is properly regarded as a leper, though herself very unwilling to own it: her two sons are with her: they are examined.

a.—æt. 35, oil-presser, born here and has not travelled; signs for a year in an eruption, and now there are most characteristic spots on the back, of various sizes, some pale, others red and evidently recent: they extend to the shoulders and exist also on front of chest and abdomen: nipples a little enlarged: the skin of arms shows similar spots. Hands both flushed, bronzed and wrinkled; no numbness: feet in same state, and toes look flushed: no impairment of muscular power. Face also to me seems flushed; cheeks and nose and rims of ear are decidedly tumefied and red. Married: 2 daughters of 3 and 1½ years; denies contact, but lives with his leper mother. These symptoms came on here and are attributed to eating much oil and chillies. The eruption is now subsiding and he has ceased to indulge in oil; syphilis is denied. A fine strong young man whose future state is certainly matter of concern, though not felt to be so.

b.—æt. 25, born here and resident with the others. This strong young man does not shew any evident signs of leprosy that can be seen on a cursory inspection.

N.B.—Recommended his separation at once; and with reference to the possible influence of oily diet and contacts, was in these cases reminded of facts and opinions gathered in Crete.

2.—M., Wania, 42, keeps a shop, born at *Bhadrawal*, has travelled; leprosy 5 years; it began with numbness on feet and then on hands: a miserable subject. Nothing peculiar on face: anæmic; eyes sore, skin of back uneven, but no decided eruption: nipples unchanged; hands much distorted, specially two inner fingers of left side and most of fingers on the right; the thumbs are the least changed, there is interstitial absorption of the fingers with wasting of palms, but numbness only on the affected fingers themselves. Feet are equally distorted, all the toes being reduced in size and most of them displaced; the right foot is worst—here is true interstitial absorption of the phalanges: there is numbness, especially on right side. Parents free, a younger brother is well and 3 younger sisters: no family taint. Married; wife well: two sons of 13 and 8, and two daughters of 14 and 8, all well; does not know of contact or of possible cause; was living as usual, when the disease came on here: it is subsiding. Is now alone: general condition bad: wife and children are separated.

3.—The following is hearsay.—M., Karak, 15, field labourer, born here, has not travelled; leprosy 2 years, A. L. (?) has eruption on skin with fever at the present time. Father was a leper, born and died here about 6 years ago, affected

5 years and 25 years of age : had the same disease as his son (T. L.?). F. F. also had leprosy. A younger brother and the sister are well. Is married, but has not joined his wife. Inevitable contact with his father: the disease began here and is increasing. (As there is actual cholera in the same yard I did not visit this lad at his sick home, from motives of common prudence regarding my family and camp.)

Neswad, three miles to the north of Dihor, amongst low hills : not visited for want of time : there are said to be 25 houses and a population of Brahmans, Ahirs, Kolis, Bhurwads : food—jowari, bajri ; urid, mung : well-water : no guinea-worm, or cholera or mycetoma. The patel who is here at Dihor and others, positively state (but see No. 2) there was no leprosy at Neswad before the two following cases which have been brought for inspection to Dihor.

1.—M., Koli, 40, farmer, born at *Deoli* near Talaja (p. 47) : at Neswad 3 years, living before at Deoli, has travelled : leprosy for 3 years, or after he went to Neswad ; it began on the hands with blebs and a sense of heat. Now there are signs of T. L. on the face, hairs gone from brows, ears red and puffy, &c. ; there are obscure red spots on the back and front ; nipples enlarged : hands hardly changed, but left little finger is bent, &c., the pulp of the opposite one wasted : numbness of finger-tips, left hand wasted : feet hardly altered ; some numbness of soles. Parents free : he is the second of 6 sons, who, with their children, are well ; 2 younger sisters also well : no family taint : is married ; wife well and six young children (5 sons) ; contact denied ; cause unknown ; was eating and living as usual when the disease came on at Neswad ; it is increasing : lives alone (?) : there are excoriations : general condition fair : muscular power not impaired (?).

2.—M., Brahman, 50, farmer, born here, has travelled : leprosy 4 years ; it began with numbness on fourth finger of right hand and at right elbow, with vesicles. At present, face shews decided signs of T. L. with bronzing ; nothing on back : nipples hardly changed ; hands little altered, numbness on inner side of right hand ; nails unaltered : feet hardly changed, but there is numbness on the back of both feet and also of legs in front, half way up. F. died a leper 7 to 8 years ago at Neswad ; does not know where he was born, or when his disease began, was leprous 8 years and died at the age of 65 (?) ; had T. L. M. free ; no brother or sister, his mother having died soon after his birth. Married ; wife eloped with another man ; no children : denies contact ; cause unknown ; ate common food and was farming at Neswad, when the disease came on : it is increasing ; lives alone, there are no sores : general condition fair ; syphilis is denied.

Bharoli (not visited, time pressing), 2 miles north of Neswad, amongst the hills, said to have 60 houses and a population of Koli, Garassia, Wania and Ahir castes, &c. : food as usual ; river-water : no guinea-worm, or cholera or mycetoma. It is stated there was no leprosy before the following cases, which are brought to Dihor for my inspection.

1.—M., Lohar, 30, works at his trade, born at *Walukar* (5 coss off), at Bharoli 16 years, has travelled ; leprosy 4 years, it began with an eruption. At present, the face shews decided signs of T. L., nose much enlarged ; there are distinct nodules and there is numbness on brows and cheeks, &c. ; back covered with small nodules of livid tint, this is less marked in front of chest : nipples like gun-caps : there is a similar eruption on outer side of arms and forearms : hands swollen, bronzed and wrinkled ; nails changed to clumps of horn : numbness on hand and in forearm. Feet changed in same way, and here too is numbness. Parents free : he is eldest of 3 sons, a younger sister also well. M. B. (maternal uncle) had the disease at *Padwa*—a village also near Gogo, where he was born and became diseased about 4 years ago, he was 35 and affected like this man and had no children. The nephew here has twice visited this uncle before his own disease came on, and when the uncle was already affected, so that contact is clearly admitted. Is married, wife well, a son of 5 born before his disease, and 2 daughters of 8 and 6, are well. Cause of disease unknown : was living as usual, when it came on here : it is now spreading ; lives alone ; there are sores : general condition fair : syphilis denied ; still works as a blacksmith, though the left hand is weak. There is leprosy at *Walukar*.

2.—M., Koli, 35, labourer, born here and has travelled but little ; leprosy for 20 years, it began on right hand (he refers to an accident at this date). There is nothing on the face ; probably an eruption on the back : right hand much mutilated ; two inner fingers and thumb most shortened, also little finger and thumb of left hand ; these changes are characteristic of neuritis ; there is not much atrophy of the palms ; bronzing ; no numbness : feet not altered in aspect, nor nipples. Parents free ; no brother or sister ; denies family taint : married late in life, wife not with him ; no children : denies contact : attributes the affection to injury caused by the falling of a piece of wood on his hand, but this explanation seems hardly admissible ; the accident occurred at *Bharoli* ; no changes in symptoms of late ; lives alone ; there are sores : general condition indifferent : syphilis denied. How was the local neuritis caused ; can exposure, pressure, heat, injury, &c., induce inflammation of the nerves, irritation of skin, &c., which lead to leprosy-like symptoms ?

To *Timana*, a fortified place at the foot of hills, 6 miles north of Talaja, contains about 200 houses ; population 1,000—Brahman, Wania, Ahir, Koli, Khoja : food—jowari, bajri ; urid, mung : river-water : no guinea-worm, cholera rarely, no mycetoma. On enquiry hear of the following early cases of leprosy :—

1.—Khojo, born and died here 1873, leper of 5 years, age at death 42 : M. L. ; F. F. had the disease : 2 sons and 2 daughters are well.

2.—Jego Mompel (*Bhawa*), born and died here 1851—duration of disease unknown : age 40—T. L. ? : taint unknown : 3 sons and 2 daughters are well : brother a leper.

3.—Luximon Mompel (*Bhawa*), brother of No. 2 : born and died here 1846—10 years a leper, age 25, T. L. ? Unmarried.

There are 3 lepers here now, who are seen :—

1.—M., Sutar, 30, born here, has been to Bombay : leprosy 3 years, beginning with numbness in the feet. Now there are indications of T. L. on face ; on back, large, pale patches ; hands not much changed ; nothing on feet, but numbness below ankles. Parents free : younger brother free : no family taint : is married, a daughter well. Contact not known, nor cause of disease : was living as usual when disease came on here : it is lessening : is not separated : no sores : general condition fair : syphilis denied.

2.—M., Garassia, 25, born here : leprosy for 3 years, beginning with numbness of feet and hands : nothing on face : probably spots on the back : perfect 'claw-hands' : feet less changed : great toes only stunted. Parents free : is the younger of 2 sons ; no sister : no family taint (but see No. 3) ; his brother is the *Garassia* here : married, a girl and boy, both well. Contact denied ; cause of disease unknown : the latter came on here while he was living as usual, it is subsiding ; lives apart ; no sores ; general condition fair : syphilis denied.

3.—M., Garassia, 55, born here, has travelled : leprosy for 3 years, it began with numbness in the feet. Now there are signs of T. L. on the face ; right hand deformed, the fingers (three inner) being bent *backwards* ; no numbness ; other hand free : nothing on feet ; no numbness (?). Parents free : 4 brothers free and a sister : no taint is admitted. Married, 4 sons, wife and a daughter, all well : contact denied, cause of disease unknown : was leading usual life when disease came on here : it is stationary. This man is F. B. (paternal uncle) of No. 2.

N.B.—A somewhat hasty visit to *Timana*, and the people did not willingly communicate. Was No. 3 leprosy ? It seemed so.

Case seen at *TALAJA*, the head-quarters of the district.

M., Koli, 30, beggar, born at *Malawada*, here 3 years, not travelled ; leprosy for 12 years, beginning with indigestion and blebs on fourth toe of left foot. On the face signs of T. L. : on back large, red, raised patches : nipples enlarged : hands and fingers numbed ; fingers stumpy and swollen ; vesicles on them : feet in same state : no absorption as yet, but bending of little fingers, &c. Parents free : is an only child : taint not known. Is married, wife well, and daughter of 5 : contact denied—knows of no cause or of other lepers in his village ; was begging (as a priest) when the disease came on at *Borda* (where leprosy exists) : it is spreading : is separated, being a wanderer : there are sores : general condition bad : syphilis denied. This man lives in a cave on the sacred hill of

Talaja, and is supported by charity in the town : his name is Bhágo Kero : he would go willingly to an asylum.

It is said there are other lepers in the town of Talaja, but their presence is not registered, and time did not allow of personal search. This place is of historical interest and the seat of a famous shrine, perched on a picturesque, conical hill, the minor counterpart of Palitana.

14th March.—To Rampura, 2 coss west of Talaja in the wide arable plain : 30 houses : population Abir, Koli, Mochi, Bhurwad, Garassia, &c. : food as usual : well-water. No guinea-worm : cholera rare. No leprosy here and none is recollected by the oldest inhabitants, yet so far as appears, conditions are identical with those found elsewhere in small hamlets which are infested with the disease.

To Shilawadar, 2 miles further on, by side of a stream about 60 houses, people (350) Kumbhar, Pachouli, Koli, all equal in numbers. Food as usual : river-water : no guinea-worm, cholera rare, no mycetoma. Leprosy occurs : former instances :—

1.—M., Koli, born and diseased here, and died 1868, aged 40, after 10 years, A.L. ? : taint unknown : his two sons here are well.

2.—M., Koli, died here 1860, æt. 30, leper 4 years : had A. L. which was acquired at Gudhula : taint unknown : no children. Case seen :—

M., Kumbhar, 30, makes pots, born at Talaja, here 12 years, has travelled ; leprosy 2 years (?) ; had first 'rungila' 4 years ago, the attack subsiding, afterwards blebs came on at fingers and elbows. Nothing now on face, nor on back or front ; on hands vesicles, numbness from below middle of forearm, chiefly on dorsal aspect : nothing on feet, but numbness exists from ankle downwards. Parents free, so a younger brother, and a younger and older sister. F. B. is a leper at Vunjodri (vide p. 39) : married, wife, son and 4 daughters well : contact and cause unknown ; was living as usual when the disease came on here : it is stationary ; is not separated : there are excoriations ; general condition fair : syphilis denied.

To Phulsar, 2 miles onwards : 30 houses : people (172) Koli, Kunbi, Bhurwad, Dher. Food—jowari, bajri ; urid, mung : water from rivulet (marsh) or holes in its bed : there is often much guinea-worm, but when water is taken from the stream itself, there is none. No cholera now : no mycetoma. At present there is here one leper (Bhurwad) ; there was none before him.

M., æt. 40, tends cattle : was born at Shilawadar (above), here for 8 years : 2 years leprosy ; parents free ; no brother, three sisters well : taint not known. Married, has 4 sons and 3 daughters, well. Th disease came on here : it is increasing : he does not live apart. The symptoms began with a sense of heat and an outbreak of blebs on the fingers : an eruption followed which comes and goes and is rather like psoriasis ; it occurs on the back of the hands chiefly. There are also, now, signs of incipient T. L. on the face in slight tumidity and oiliness of the features and ears : on the back below is a patch of psoriasis ; the skin is also largely pitted with scars from variola : nipples decidedly enlarged, especially the right : hands swollen and tender ; the scaly patches came out more in the cold season and are attended with itching ; no distortion of fingers : feet in similar condition with psoriasis on the backs chiefly ; no distortion, or numbness, that can be detected by rough examination ; the scaly eruption does not follow the course of the nerves and is not limited (so far as noticed) to the area of any one nerve, it looks as if intermixed with scabies or eczema : there is much itching at night. There is most decided enlargement of the ulnar nerve at both elbows—hence the case is one of leprosy. Of the sisters, one is older : all family taint is denied—his youngest child is 4 years of age. Contact unknown : at the beginning he had eaten curds at night and had vomited ; 14 days after, an eruption came on on the fingers : was living as usual when the disease came on at Phulsar ; there are no running sores : general condition fair ; syphilis denied. Can there be in this case a combination of nerve disease with psoriasis, and is this combination significant ?

District of DUSKROHI (Bhaonagar).

16th March.—Trapaj, 6 miles east of Talaja, in the plains, with low hills around ; the head-quarters of a district and containing about 450 houses. People (1,847) Brahman, Wania, Garassia, Karak, Kunbi, Khawass (Rajput), Koli, Bhurwad, Khoja, artificers and low-castes. Food—bajri, jowari ; urid, mung : water from wells of both kinds, stream and ponds : there is some guinea-worm ; some cholera lately : no mycetoma.

The following is a list of lepers who are recollected : at present there are 10 such known, and it must be said that their disease is increasing. The town itself is growing in size ; houses fairly built, but conservancy is neglected as elsewhere ; a purely agricultural district all round.

Name.	Sex.	Caste.	Birth Place.	Disease Place.	Death Place.	Death Date.	Duration.	Death Age.	Form of Disease.	Ancestors.	Descendants.
1 Shumar	M.	Satar	Here	Here	Here	1851	?	45	M. L.	Notaint(?). Nephew No. 2	None.
2 Ramji	M.	Do.	Do.	Do.	Do.	1861	12	30	M. L.	His F. Bro. is No. 1	Brother here and well.
3 Jairam	M.	Do.	Do.	Do.	Do.	1870	10	35	M. L.	Brothers ; taint ?	No children.
4 Hari	M.	Do.	Do.	Do.	Do.	1851	15	50	M. L.	F. is No. 6.	Do.
5 Jeti	F.	Kunbi	Do.	Do.	Junabghur	Dates long back			M. L.	D. is No. 5.	No other child.
6 Jewo	M.	Do.	Do.	Do.	Here	Dates are far back			M. L.	Brothers ; taint ?	
7 Moti	M.	Brahman	Do.	Do.	Do.	1870	?	42	M. L.	Died a week ago	
8 Sujan	M.	Do.	Do.	Do.	Do.	1876	12	25	M. L.	Unknown	
9 Pan	F.	Wania	Do.	Do.	Do.	1872	10	40	M. L.	Unknown	
10 Gopal	M.	Brahman	Do.	Do.	Do.	1861	10	50	M. L.	Distantly connected ; taint	Sons and daughters well.
11 Nana	M.	Do.	Do.	Do.	Do.	1861	8	59	M. L.	None	Daughters well.
12 Mangalee	M.	Garassia	Do.	Do.	Do.	1864	6	30	M. L.	Unknown	None.
13 Lala	M.	Wani	Panchpipila.	Panchpipila.	Do.	1874	6	35	M. L.	Do.	Do.
14 Jeto	M.	Karak	Here	Here	Do.	1836	15	60	M. L. ?	Do. ; none	Probably first case here.

All the known existing cases at Trapaj were not seen, and of these absentees the following notes are given on hearsay.

1.—M., Wagri, 25, beggar, born and diseased here : a leper for 10 years. Taint unknown : not married, no brother or

sister : disease stationary : lives alone, has gone away to beg in the country villages around.

2.—M., Kunbi, 40, farmer, born here : leper 3 years, probably A. L. His M. F. (mother's father) is No. 6 above : parents free : a younger brother is well, no sister, disease probably M. L. : lives with mother and brother.

3.—M., Brahman, 35, grain-seller, born here : leper 2 years, has probably M. L. Parents free, elder brothers well, no sister : married, a daughter is well : no family taint : lives apart.

The following cases are seen :—

1.—M., Ahir, 35, farmer, born here, has travelled a little : sick only a few months ; there was first a bleb on the right fore-finger. On the face, now, are signs of early T. L., back covered with red, raised patches ; one nipple is enlarged ; fingers hardly changed, but there are vesicles and numbness on dorsum ; feet more altered, nails breaking up into clumps ; numbness in front of dorsum, not on soles. Parents free : he is the fourth of 6 children ; two sisters are well : no family taint : is married, wife well, and a daughter of 3 : no contact ; attributes his disease to withholding belief in a certain deity ; was living here as usual when the disease came on : it is stationary : he is not separated ; there are sores : general condition fair : a strong, healthy-looking man—syphilis denied. A typical case of incipient nodular disease.

2.—M., Ganchi, 32, oil-presser, born here, not travelled : leprosy for 6 years, it began in cold weather, with fever and swellings ; latterly the hands became affected. Nothing visible on face, but expression rather vacuous : nothing on back, nipples unchanged ; only the left hand is affected—'the claw'—no numbness at all : feet affected, especially the right one, probably as the hands, but the man is unwilling to take off his shoes on account of their being tightly tied on to his deformed stumps of feet. This seems to be a case of neuritis, or nerve-lepra.

3.—M., Khawass, 20, agriculturist, born here, has not travelled : leprosy for 5 years, it began with an eruption 'round as a pie' (copper coin) and of pink color. Face most strikingly changed, T. L., fully developed ; ears very large ; nodules and ulcers on palate : voice hoarse ; nose not sunken ; the true leonine expression : nipples much enlarged ; skin of back a little roughened and more decided marks of eruption in front of chest ; skin of arms roughened, fingers bronzed, swollen, taper ; nails unaltered, palms flushed : no numbness. Feet in similar state, the toes livid, swollen and sensitive. Parents alive and free, is the eldest of 4 sons ; 3 sisters, 2 older, all well : denies all family taint : not married : contact with other lepers unknown : had eaten 'ladwa' (native sweetmeat) at a marriage-feast for two days, and after a month this disease came on : was otherwise eating and working as usual here, when the disease appeared : it is now stationary : is apart : no sores : general condition tolerable ; syphilis denied. A striking case of true leprosy, however originating.

4.—Raoul (Jogi), 28, wandering minstrel and beggar, born here, has travelled : leprosy for 3½ years, it began with eruption of red spots on the skin. Now on face are marks of T.L., nose sunken, face bronzed ; skin of trunk roughened ; nipples enlarged. Hands swollen and fingers ; nails changed into clumps : sores on left forearm ; no numbness, except where sores are ; feet more changed, nails mere masses of horn, and toes somewhat atrophied ; no numbness. Parents free ; he is the fourth of 5 sons, and the younger brother is also a leper (No. 5) ; 2 sisters are well. All earlier family taint is denied : is married, no child alive : contact denied, and cause of disease unknown ; was living as usual here when it came on, and was pasturing sheep ; it is stationary : he lives alone : there are excoriations : general condition bad : syphilis is denied.

5.—M., Jogi, 25, born and resident here, has travelled : leprosy for 4 years or for a little longer than his brother. It began with an eruption of red spots. Now there is well-marked T. L. on the face, and much like No. 4 ; ale of nose much enlarged ; skin of back rough ; nipples enlarged ; hands bronzed and wrinkled, rather puffy ; skin atrophied, nails changed ; no numbness. Feet in a wretched state : right foot much ulcerated ; on left foot the nails have grown to a great length ; atrophy of soft tissues, excoriation of ankles and skin, but no numbness except on fourth toe of left foot. Married and has 2 daughters of 10 and 7, well : contact denied : cause unknown. Was living and eating as usual

when the disease came on here. Was then a wandering minstrel : his malady is increasing ; syphilis denied.

Both these brothers were living in one courtyard when their disease appeared ; their families were with them, and other relatives were residing close by, who are not affected. There are 3 other brothers alive in the town, who are variously occupied and are all well. The men live in the same house or enclosure their father lived in : I visited this place and noticed open sheds, touching each other, for the lepers, with other wretched dwellings for cousins, &c., close by. The younger brother was first and is most diseased ; a year after it began, he went on pilgrimage to Benares and then doubtless endured much exposure and privations. *Memo.*—Lepers exist amongst pilgrims, and hence a possible mode of disseminating their malady.

6.—Went to the house of a Brahman woman, who is suffering from worms in the nose and lives in a most wretched place : there seems to be incipient A. L. in bending of a little finger : a widow ; 2 sons ; no daughter ; well. Though termed a leper, this woman presents, perhaps no perfectly valid marks of leprosy disease, which were noticeable on such cursory inspection as was possible at my visit : there is said to be no taint in the family. The miserable accommodation to be seen for the sick poor is frequently appalling, and of all it is worst suited for chronic maladies.

The remaining subject in the official list of 10 lepers is the man who is alluded to as No. 8 in the above list of former subjects at Trapaj : he died here a few days ago.

The following case from the neighbouring hamlet of *Bhopada* was forwarded for inspection,

M., Wani (Kapol, high caste), 65, seller of oil and born at Trapaj, has long resided at Bhopada and frequently visits Bombay, staying there for long intervals : symptoms for 20 years ; they began with blebs on the left hand at outer side of fore-finger, and eight years afterwards, the corresponding place on the right hand was similarly affected. On further enquiry, he states there was first an eruption on the arms, and how long it had prior existed, he cannot say, as it gave no pain or uneasiness, and as regards the spots on the back he cannot tell how long they had existed. At present, there is nothing visible on face or ears : on back are 4 or 5 large, and a few small spots, all of which are pale, level, with a narrow pinkish border, possibly a little raised, certainly attended with hyperæmia : surface of skin hardly changed in aspect over these pale surfaces, but seems a little atrophied : no impairment of sensation any where, yet on trial with the aphemetric compass, it frequently happens that two points are not felt as two, when this distinction is perceived on the adjoining unaltered skin. There are only a few small spots in front of chest and abdomen ; nipples unchanged. On shoulders and arms are similar spots symmetrically disposed : hands are changed only along back of outer side, including thumb and fore-finger ; here is numbness and a constant succession of vesicles, most abundant on left side, but generally quite symmetrical. These vesicles come of themselves both day and night, they commence by small spots, which sometimes dry up, at others grow into larger blebs, appear at no fixed periods and at no certain seasons ; are not caused by manual labour, and they leave behind white scars like those following ordinary vesicles. Feet not changed, except that the nails of the great toes look small, but the patient attributes these changes to accidents. Parents free : is the eldest of 8 sons, all free : 3 younger sisters are also well, and all family taint is denied. Is married, wife well, 7 sons from 35 to 13, and 4 daughters grown up, all are well, with their children. Knows nothing of contact with lepers or of a possible cause of his complaint, except perhaps scepticism as regards same deity. Was living as usual at Bhopada when the disease came on ; he had been to Bombay before this, as well as since. Symptoms do not alter, there is no pain, &c., only the spots persist : he does not live apart : there are excoriations : general condition good for an old man : syphilis denied.

A case for diagnosis :—Two years ago it was said in Bombay not to be leprosy ; the contrary now seems to me to be the truth, and both ulnar nerves are certainly affected at the elbow : to outer appearance nerve-affection is limited to the outer branch of radial cutaneous nerve, but this is attended with leucodermoid spots on the back and some features of nerve-leprosy (specific neuritis). Opinion : the old man has

a mild form of leprosy, and his children may have the same or worse; one son is examined; he looks well and healthy. There is reported to be no leprosy at Bhapada—a place of 60 houses and about 2 miles off, but the patient has frequently visited Bombay and other infected localities.

17th March.—To *Katwa*, 1½ coss to the east of Trapaj towards the coast; about 45 houses; Koli and Rajput are the chief castes. Food—jowari (bajri does not grow without irrigation here), mung and mut: water from a rivulet: guinea-worm occurs; cholera is rare; no mycetoma. Here is a village built in the usual irregular manner, not clean, full of people and quite free from leprosy. There is no recollection of its having prevailed during the last 25 or 30 years; those persons who were questioned seemed, however, to be very reticent and are possibly disinclined to acknowledge the presence of the disease. The village has been founded only 60 years, and 40 years ago there were only 5 houses: it has suffered from famine and been almost depopulated, but during the last 5 years it has again increased in size. Negative fact of value if true, yet see below.

To *Munar* near the above, towards the sea; about 90 houses; people (536) Kunbi, Brahman, Bhawa, Rajput, Wania, Bhurwad, artificers, &c. Food—jowari, bajri; urid, mung: water from a stream. No guinea-worm; cholera occurs; no mycetoma. No leprosy here; this is positively asserted, and the name of the village is not in my official list. On further enquiry, however, a leper-man (Karak by caste and named Gigo) is said to have died here: he got the disease at Jampara whence he came and brought it with him, and he died 20 years ago, having been here only 3 years: age 60: probably had M. L.: family taint unknown: has left a son and 2 daughters, well and living here. Saw the son, a strong man of 30, who shews no evidence of leprosy and all his family are well. Another leper is then recollected, also a 'Karak,' she was a woman named Putti Bojo, born near Gogha and died here soon after the death of the above man, being a leper for 8 years: age unknown: probably had T. L.; left 2 sons, one is here and looks free; there also was a daughter, who died young and free. The son has healthy children. At last it is admitted that there is a leper here now; he comes forward.

1.—M., Rajput, 30, labourer, born here and has travelled: has lived at Palitana for 16 years; leprosy for 3 years—it began in the cold weather with round white spots on the skin, and afterwards the fingers became affected. At present, nothing on the face; the trunk is covered with pale patches, which still retain indications of a growing border, form rounded, size various: these spots are benumbed, even when of small size: nipples unchanged. On the skin of the arms are the same kind of spots: the right hand is mutilated, the three middle fingers having lost their two terminal phalanges; the fore-finger of the left hand is similarly mutilated: nails unchanged; the right hand is also wasted: there is numbness on both surfaces of the right forearm and hand: the left hand is benumbed to some extent on the back. Feet not so much altered: right foot looks wasted and dark, and the great toes of both feet seem to be withered; there is numbness from the knees downwards. F. free; M. alive and free; he is the third of 4 sons; 4 daughters are well; no family taint for eight generations back: he is married, wife and children well. No contact recollected and cause unknown: was working and living at Mokerka (*vide p. 7*) when the disease came on, it is now stationary; lives apart; there are excoriations from vesicles: syphilis doubtful, if real it would date 15 years back, there is a small scar still visible, testes are small; general condition fair; there are enlarged inguinal glands, but their significance is not necessarily great in this case.

Yet another leper is seen.

2.—F., Brahman, 50, weaver, born at *Degwani* (12 coss from here), 12 years resident at Munar; has not travelled; leprosy for 6 years—there was first an eruption (dadra), which seems to have begun at the left hand, now mutilated. Nothing peculiar on the face; there are large white spots in the loins,

which are numbed: the left hand has the three inner fingers bent as claws, and the thumb is stiff; nails unchanged on the three bent fingers, but on the thumb and fore-finger they are atrophied, and this is the case with the corresponding nails of the right hand. The change is peculiar; it consists of a wasting of the matrix, and sinking in of the nail, which becomes folded, wrinkled, coarse and of dark colour. The feet are not apparently changed. There is numbness of the left hand corresponding to the three fingers which are bent, but not on the outer part; no numbness of right hand; there is numbness, too, on the dorsum of the right foot.

Parents free; and 2 older brothers and 2 younger sisters; no family taint: husband and family are well. Cannot say about contact, and cause of disease is unknown. Was living as usual, when the malady came on; it is not spreading: she is not separated; there are no running sores: general condition fair: a feeble woman with a pale skin, and, as I think, an undoubted leper.

To *Alang*, a mile nearer the sea, and containing about 100 houses. People (638) Koli, Garassia, Kunbi, Brahman, Wani, Khoja, Bhurwad, artificers and low-caste. Food—jowari (no bajri), urid, mung: water from a stream there is some guinea-worm: cholera rare: no mycetoma. There is said to be no leprosy in this large village, and it is professed that not a single case can be recollected in the place. The village seems rather better built than usual and cleaner. There are several Garassias here, whose presence at my séance intimidates the common people, and probably the real truth has not been elicited. *Memo.*—Afterwards (*vide p. 55*) Alang was mentioned as the birth-place of lepers.

18th March.—To *Nawagam Nana*, 4 miles N.E. of Trapaj, about 60 houses; people chiefly Garassias, Kolis, there are also Ganchis, Bhurwads, &c. Food—jowari, kulti, urid, mung: well-water: no guinea-worm: cholera rare: no mycetoma. No leprosy either now or previously. The place is near the sea, but no one eats fish here. The village has been prosperous, but lately fever has been very bad, and many people have died. Leprosy exists around, but has never found footing here, according to common report.

To *Paniali*, near Kukad, amongst low hills and placed on a rise: a village once fortified, and with many memorial-stones: now a poor-looking and dilapidated place of about 65 houses. People (320) Koli, Garassia, Khoja, Bhurwad, artificers, &c. Food—jowari, bajri; urid, mung: well-water is used. No guinea-worm: cholera rare: no mycetoma. Leprosy exists.

List of lepers recollected by old residents:—

1.—Nani, F., Bhurwad, born here, acquired the disease here and died here 12 years ago: a leper 6 to 7 years, age at death 17: no taint (?); had M. L.: F. S. (paternal aunt) of No. 8.

2.—Haribi, M., Garassia, born, diseased and died here 13 years ago, aged 25; a leper of 10 years: unmarried. F. and 2 brothers affected (Nos. 3, 5 and 9); had M. L.

3.—Haimatsing, M., Garassia, born, diseased and died here 12 years ago, *æt.* 35; leprosy for 10 years: 2 sons and 2 daughters, eldest son (Bhimjo) (No. 6.) a leper, the other died free; a daughter, eldest child and now here (No. 3 below) a leper; the other daughter free. Father and brothers (Nos. 2 and 5) lepers; had M. L.

4.—Mando, M., Koli, born, got disease and died here 15 years ago, *æt.* 35, leper for 8 years, M. L.: taint unknown. Elder brother is here and well—2 sons and 2 daughters free. Nephew a leper, No. 2 below.

5.—Ladubi, M., Garassia, elder brother of Haimatsing (next in age) and Haribi (youngest), born, diseased and deceased here 20 years ago, aged 40: leprous 8 years, M. L.: 2 daughters and their children free.

6.—Bhimji, M., Garassia, born and died here 11 years ago, *æt.* 12; leper 4 years, had T. L.; son of No. 3: F. & B. (2 and 5) lepers and his sister.

7.—Vihobi, M., Garassia, born and died, 25 years ago, *æt.*

50; 8 years a leper, form of disease unknown, one son well; cousin of Nos. 2, 3 and 5.

8.—Rajio, M., Bhurwad, born, acquired the disease and died here 8 years ago, *æt.* 12; leper 6 years; had a brother and 5 sisters (is the third child, 2 elder being girls), mother here with an infant, all well and father, too.

9.—Ladibi, M., Garassia, died here 35 years ago, *æt.* 40; leprous 4 years (M. L. ?), father of Nos. 2, 3 and 5, was the first of his family affected, so far as known: no one recollects if there was any other leper before him: neither of his 2 daughters had the disease, and the son of one is now alive and well; the other daughter had no children. All the family used to live in one room, and how the sons got the disease, whilst the daughters escaped, cannot be explained by the people, or, assuming the accuracy of this striking narrative, by myself as well.

Lepers seen are the following:—

1.—M., Koli, 30, labourer, born here, has travelled a little; leprosy for 2 years; it began with swelling, and vesicles on hands and feet. At present, nothing on face; on back are light pale patches of characteristic form, there are also dark nodules in the skin scattered about; pale patches in front; nipples enlarged, especially the right one; hands swollen, but not yet wasted; right hand most affected, two inner fingers, also two next and thumbs, here there is swelling with little change of colour and very characteristic shortening; the fore and middle fingers, and the little finger of left hand similarly changed, not the others, the ring-finger being apparently quite healthy. There is a copious eruption of scabies (and psoriasis) at these joints, the elbows, &c.: there is numbness at lower part of forearm and hand, on both sides. Feet in same state, swollen with stunted toes, but not quite so marked; numbness here, below middle of legs. Parents free; a younger brother and 2 older sisters also free; denies all taint. Married: wife, 4 sons and 4 daughters—all young—free. Contact with other lepers not admitted; cause of disease unknown, it is spreading; does not live apart; was working as usual here, when the disease came on: there are sores: general condition fair: syphilis denied. *N.B.*—Was in partnership with No. 3 in the above list. Here scabies seems to have aggravated the local symptoms.

2.—Koli, 25, labourer, born here and resident; leprosy 3 years; it began with swelling of face and ears, in hot weather. Now on face are decided signs of T. L.; on trunk numerous small patches of character intermediate between nodules and spots, and the same are found elsewhere; nipples a little enlarged; hands bronzed puffy; skin wrinkled, but no deformity; some numbness on back of left hand, which seems a little wasted. Feet in similar state: an eruption of eczema (?) at lower part of legs, where the skin is said to be numb. Parents free—2 older and 1 younger brothers, and 4 sisters, well: F. B. (paternal uncle) had the disease (see Mando above—No. 4); is not married; contact doubtful; cause unknown; living and working as usual here, when the disease came on; it is stationary; lives apart; there are excoriations; general condition indifferent; syphilis denied. Gums red and spongy; no bleeding. *N.B.*—The uncle Mando used to live near the house of this man.

3.—F., Garassia, 22, born and resident here, has not travelled; leprosy 10 years, beginning with white spots and then with blebs on fingers and toes. At present nothing on face: on trunk remains of patches: hands greatly mutilated, only stumps remaining; numbness: feet in same state, it is said, they were not examined. Her father was No. 3 in above list: M. well; 2 brothers, one a leper, the other and a younger sister (died at 16) without disease. F., B. and F. B. had the disease. Not married; was necessarily in contact with F. and B.; other cause unknown: was eating as usual and living in the common house, when the disease came on. It is stationary; she lives apart: no sores (?); general condition yet tolerable.

Report of the two other cases, not now present at Paniali.

4.—M., Malo, 30, born and resident here: leprosy 6 years, has symptoms of T. L. Parents dead and free, 2 brothers, older and younger, well: the elder brother had a son who died 8 years ago of this disease, at the age of 7; he seems to have had an eruption of nodules all over the body; no sister; no other taint (?). His F. F. and Nani's F. F. (No. 1 in above list) were brothers, and he is also related to Rajio (No. 8).

Married, wife and son of 10 well, no daughter; he is a Bhurwad (shepherd) and has tended sheep for years. The disease came on here; it is stationary; he does not live apart. The man is now gone away with his flock to some distance, and will not return before the beginning of the rains.

5.—Deoji, M., Bhurwad, 14, born and resident here: leprosy (M. L. ?) 1 year. Parents alive and well, an elder brother well and two children; 3 older sisters well: no family taint: is not connected with the above Bhurwad: not married: is now a shepherd with his father: the disease came on here—he is not separated. The old Patel now states that this lad is connected with him in some distant degree; he also states that Malo (No. 4) is a distant relative, so that there exists a family connection and therefore a possible taint in this family. In Paniali are four separate families of Bhurwads, and besides some married sons who have houses of their own. All these people are connected, but they insist that the marriage of even distant relatives is not allowed. In this respect, however, several of the common castes seem to differ. All think that a connection by the mother's side is not so close as by the father's side. As regards leprosy, they imagine here, that the disease may be communicated by eating food together, smoking the same pipe and sleeping together, and perhaps through being shaved by the same barber (*i.e.*, razor). They further suppose it may be thus communicated from a leper who does not shew fully developed disease, or even before he is suspected. They cannot say why women rarely get leprosy.

Memo.—Remarks by villagers of average intelligence and coincident with popular ideas, elsewhere elicited from the same class. Surely the history of leprosy in this village is significant, but whether of heredity or contagion I will not now discuss.

18th March.—Kuhad. A large and old village in the same hilly range as Paniali, and in British territory; about 350 houses. People—Kunbi, Koli, Brahman, Wani, Khoja, Garassia, artificers, &c. Food—jowari, bajri; urid, mung; water from wells. No guinea-worm now; 15 years ago there was much, but about that time all the three wells in use were cleaned out, and after that guinea-worm has not re-appeared. There is a 'wao' here, but it is used for irrigation only and has been in ruins for 50 years. Cholera rare; no mycetoma. Three lepers here now—it was at first positively asserted that there had been no previous case, but on the Garassia headmen being requested to retire from my assembly, other old people summoned courage and spoke out, and finally a Garassia himself helped to give the following information.

Notes of former lepers in this large village—

1.—Wagla, M., Rajput, born at Paniali (close by), shewed the disease here, and died here 7 years ago, *æt.* 40, a leper for 6 years, M. L.: taint unknown; unmarried, being the offspring of an illegitimate union between a Garassia and a female servant. Such unions are discountenanced. *N.B.*—Hence the disease may be amongst the Garassias themselves.

2.—M., Bhoglo, Jogi, born, became leprous and died here 10 years ago, *æt.* 65, M. L.: no taint known—had 2 sons and a daughter, one son was a leper; the other son and the daughter are alive and well.

3.—The son of No. 2, born and became leprous here, died at a distance, *æt.* 35, after 10 years' disease, M. L.: married, but about his children nothing is known.

4.—M., Pascia, Mochi, born, leprous and died here about 15 years ago, *æt.* 40, a leper of 8 years, M. L.: previous taint unknown but his mother has the disease. Has a son and daughter free.

5.—M., Lukha, Khawas, became leprous, and died here about 15 days ago, *æt.* 60, a leper of 10 years, M. L.: taint unknown; has left a daughter, who is well.

Memo.—It is possible there may be others known, but great difficulty is experienced in getting at these names whose significance is undoubted with regard to the propagation of disease.

The following cases were seen here :—

1.—M., Mochi, 40, works at his trade; born here, has travelled; leprosy for 5 years, commencing with vomiting, &c. Now decided signs of T. L. on the face; nose much depressed; on the back obscure remains of eruption and perhaps numbness in the loins; nipples a little enlarged; hands bronzed, not emaciated, fingers thickened and stunted; nails not particularly affected: little and ring fingers most of all changed; numbness on back of hands, and also of the palms on both sides; skin of arms roughened in places: feet in a similar state, ulcers on outer toes of left foot. Parents free: an elder brother is dead: a sister well: no disease in his family. Married, 3 sons, youngest 7 years, a daughter of 10. Contact not known; but possible; cause of disease unknown: was living and working as usual here, when the disease came on: it is stationary: lives apart: there are sores: general condition indifferent: syphilis not known.

2.—F., Mochi, 50, born 1½ coss away, here 40 years, has travelled a little; leprosy 2½ years, beginning with a sense of heat in the soles of the feet, followed by numbness in feet and hands. Now nothing peculiar on face; on back a few large pale spots, in the loins, which are benumbed; hands hardly changed, the fingers are numb; and so back of hands and forearm as far as elbow. The muscular power of the hands is a little impaired, but she is still able to work at the spindle as before. Feet shew nothing peculiar; numbness exists on soles and front of dorsum, as well as up the leg on inner side.

Parents and 3 brothers are dead—eldest brother was a leper; he had lived at Rajpura, and died at Junaghur; the others were well; 3 younger sisters are well, denies all family taint. Married; 4 sons, the second was a leper (No. 4 in above list): no daughter. The youngest son is here, a strong man; he and his children are well. Contact unknown and so cause of disease: was eating and working in fields as usual, when the disease came on here: it is now stationary; does not live apart; no sores; general condition fair. *N.B.*—She was affected after her brother, who had visited a notorious leper-locality.

3.—M., Koli, 30, labourer, born at *Alang* (where is no leprosy, p. 53), here 15 years, has travelled a little: leprosy 3 years, it began with blebs on the left fore-finger. There is some bronzing and tumefaction of the face, with slight facial palsy on left side: back covered with marks of an eruption; nipples enlarged: hands much bronzed and nails on left fingers are misshapen, skin of arm on outer side marked with remains of spots; numbness on back of hands and forearm, excoriations at elbows, &c. Feet in a similar state: right foot swollen and its little toe gone; great numbness here. Parents dead, free; 3 brothers, one of whom is older, a younger sister, all free; no family taint. Married; three sons, the youngest of 4 years; no daughter. Contact with lepers unknown and cause of disease; was living and working as usual when the symptoms came on here; they are now stationary; he lives apart; there are sores; general condition bad; syphilis doubtful, but denied.

N.B.—The DUSKROHI district is next re-entered.

19th March.—To *Jaspura*, a fortified village amidst the hills 2 miles from Kukad, towards the sea, and in a barren district: 175 houses and about 688 people—Karak, Kunbi, Brahmin, Koli, Kumbhar, Wani, Khoja, &c.; food as usual—water from a stream. No guinea-worm. At first I could not hear of any old lepers here, but after questioning learnt there was a woman (Karak by caste and named 'Doli') born at *Bhumbli* (*vide infra* p. 57), who died here a leper 12 years ago: the disease was acquired in this place and lasted 5 years: she was 40 years of age and probably had M. L. She was distantly related to the patel and had four daughters who, with their children, are well. A single case is at last shown.

F., Wani, *set.* 56, born at *Naria*, here 40 years; symptoms for 4 years, beginning with a sense of heat in the sole of the foot, and numbness. Nothing peculiar in the face, but the nose is sunken; obscure marks on the back; hands affected as in N. L., some fingers being withered and stunted: numbness from below the elbows, feet now changed, being dry, bronzed, shrunken, deformed and benumbed. Parents were

free: a brother and sister are free and their children: all family taint is denied. Married; three sons and a daughter, who with their offspring are well. No known contact with lepers; cause of disease unknown; was living as usual here, when the symptoms came on; they are now stationary; she is apart; has sores on the left great toe: general condition indifferent—a weak, thin woman, and a striking case of 'neuritis'—probably specific.

To *Sonsiya*, 4 miles S.E. of Kukad and close to the sea-coast; upwards of 60 houses; 357 people, who are chiefly Kolis and Garassias: food as usual, water from a stream. No guinea-worm. Leprosy occurs, and the following cases are recollected by old men here.

1.—M., Koli, born and became leprous at Chopra, 48 miles off; died here 25 years ago, *set.* 40, a leper 4 years, had M. L.: brother a leper (No. 5): descendants unknown.

2.—M., Koli, born and died here 25 years ago, *set.* 30; a leper 8 years, had M. L.: no family taint, but wife and daughter were lepers (Nos. 3 and 4).

3.—F., wife of No. 2, Kolin, died here 16 years ago, *set.* 35; a leper 5 years, had probably A. L.: taint in her family unknown; husband and daughter lepers.

4.—F., daughter of Nos. 2 and 3, born and died here a year after her mother (No. 3) a leper 7 years, *set.* 20, had M. L.: not married.

5.—M., brother of No. 1: born at Chopra, became leprous here and died 20 years ago, *set.* 35, a leper of 5 years: no descendants.

6.—M., Bhurwad, born at Padaria, became leprous there and died here 6 years ago, *set.* 32, a leper 15 years, had M. L.: taint unknown: a son is still well.

7.—M., Koli, born here and has lately left the village, a wandering leper, *set.* 25, and 6 years affected with M. L.: a son and daughter are here with their mother, all well, who separated themselves from him: no taint in her family known.

The following cases are seen :—

1.—M., Lakho Ram, Charun, *set.* 35, buffalo-grazier, born and resident here, has not travelled. Leprosy for 8 years, it began with blebs on the hands. At present on the face obscure signs of T. L., nose a little sunken; on the back rough spots indicating a previous eruption; nipples enlarged: skin of arms also roughened; hands bronzed, swollen and much mutilated; there is numbness as far as the shoulders: the feet are in a bad state, swollen, mutilated, inflamed and even gangrenous on the left side. A strongly-built man, but now a most miserable object. Parents dead, free; is an only child, denies all taint: married, wife well, and 2 daughters of 15 and 16; contact with other lepers not known, but possible; cause of disease unknown; was living and working as usual in this village when the disease appeared; it is now stationary (?). Is alone: there are sores; general condition bad; syphilis is denied. A very pronounced example of severe disease.

2.—F., Kolin, *set.* 30, born 2 miles off, here for 20 years; disease 3 years, it began with an eruption on the head which spread to the trunk, and which has now the form of scaly tubercles of small size occupying the positions of leprous nodules, but not of the usual character: no nerve symptoms. Parents free and all brothers and sisters; no family taint; has a son and two daughters, who are well. Contact with lepers not known; the eruption is spreading: there are no running sores; general condition fair. The son here is a strong young man, with no signs of syphilis about him.

NOTE.—The eruption is like psoriasis mixed with prurigo; I do not think the disease is leprous, although it is reckoned as such by some of the people here. In this village leprosy seems to be on the decline, if all the facts were divulged to me.

To *Miti Virdi*, a hamlet of some 40 houses on the coast; about 200 people, who are chiefly Kolis: food as usual, water from a well (*wao*). Guinea-worm is rare. A poor place, though picturesque, and the people prejudiced: here is a much-frequented shrine raised on the rocky shore, and

hither a frequent assemblages of pilgrims. It is asserted there is now no leper in this place: the following information is collected. *Former lepers*:—1. M., Koli, born at Isora (*vide p. 47*), lived here 3 years and left 4 years ago for Junagurb, where many lepers assemble, *æt.* 40: had M. L., taint unknown and no descendants here.

2.—F., adult, was born here, became leprous at Sonsiya (*vide p. 55*) where she was living with her husband: she came back here for two months, being then a leper, and finally went to Bhaonagar for relief, her son is at Sonsiya still. The following case is shown as one of 'dadar'—a certain skin disease:—

1.—M., Koli, *æt.* 20, farmer, born here and has travelled a little; during the last hot season an eruption appeared, at first on the back, &c. Now, there is a wide-spread outbreak of round patches, varying in size, which in front (and perhaps the fresher ones) are of reddish hue with a pink border, almost level; behind, the spots are fading into pale stains: the whole resembles 'chloasma' in some respects, but there is no local irritation and the limbs are becoming implicated. The hands seem bronzed and rather atrophied, there are vesicles and excoriations on them and skin of palm is dry, wrinkled and darkish: no numbness exists. Feet in like state: no numbness except perhaps in soles. Parents and 2 younger brothers well: no family taint; married. Is not regarded as a leper, is not separated; lives on the usual diet and is in good general condition: syphilis is denied. A well-formed, bright young man, but possibly a leper for the symptoms are at least suspicious; his future will show whether true leprosy can begin with patches resembling parasitic chloasma.

Then an undoubted leper is brought forward—

2.—F., Kolin, *æt.* 35, labourer, born at *Khadapar* near here (*vide below*), long resident in this place; leprosy for 3 years, beginning on right foot with an abscess beneath the great toe. Now, nothing peculiar on the face, but the nose is a little depressed; skin of back rough; hands mutilated, especially the right one, but no change in aspect of skin nor (what is remarkable) any numbness that is readily detectible. Feet even more mutilated especially the right, which is extremely shortened, toes drawn up and back on the metatarsus in a sticking manner; no numbness except under the front part of the foot. Parents and two brothers and a sister (older) are well: is married, husband dead (free), a son and daughter still infants: no contact with lepers, no known cause of these symptoms: was living here as usual when they came on; they are advancing; her children are with her: there are running sores: general condition indifferent. A case of obscure origin, but there is leprosy at her native place; see below.

To *Khadarpar*, 2 miles inland from Miti Viridi; a retired and fortified place picturesquely located in the low hills: about 175 houses and 780 people, who are of Garassia, Koli, Wani, Bhurwad, Ahir, Dher, &c., caste; food as usual; water from a well. No guinea-worm. It is affirmed that there never was any leprosy here until now; one case is shewn:—

M., Garassia and related to the head-man; *æt.* 35, farmer, born here, but has travelled to the nearer large towns: leprosy for 1½ year, it began with swelling in the ears, cheeks, &c. At present, there are on the face the signs of early T. L.: back covered with large and small livid, raised, rounded or irregular patches, the former seem to be subsiding and are furfuraceous; all are very characteristic of an acute eruption. Similar spots extend to the limbs: on the front of chest and abdomen there are fewer and smaller patches; nipples a little enlarged: skin of arms (outer side) and forearm similarly affected, hands bronzed and wrinkled: there is perhaps hyperæsthesia: no deformity of the digits: lower limbs and feet in a like state.

F. alive and well: M. also free: 2 younger brothers well and their children: 4 sisters and their offspring are well: all family taint is denied. Is married: family well, his last child (son) is aged only 5 months. Contact with lepers and cause of disease are unknown; was living as usual and driving bullocks, when the disease came on here: it is lessening (*i.e.*, there is an abatement of the acute symptoms—

H. V. C.): he is not separated: has no running sores; general condition tolerable: syphilis is denied.

A well-marked illustration of early and acute disease, however originating.

20th March.—To *Chaya*, an isolated hamlet amongst the hills running near to and parallel with the coast (in British territory): about 25 houses, people all Kolis: water from a well, no guinea-worm here. There is no leprosy in this small hamlet and has not been within living recollection. An out-of-the-way place, into which the disease may not have been introduced. Coarse grass crops on the low hills, and shallow soil.

To *Kharsalia*, further on in the same line: upwards of 100 houses and 600 people who are Koli, Ahir, Garassia, Wani, Brahman, &c.: food as usual: water from a stream and also wells. No guinea-worm now, but 5 years ago there was much and at that time a well was in use which was a mere excavation in the ground, and this falling in, the people had to resort to the river only; since then guinea-worm has become very rare. Cholera was lately very bad here, 40 men having died. On close enquiry I hear of a case of 'Patia' and one of 'Kodia': the latter is an old woman with leucoderma on the hands, feet &c., since birth: nothing more is visible and the discoloration has not spread. 'Patia' is an old man who has a scaly eruption on his back (psoriasis?) and whose fingers and toes are curiously atrophied and bent forward at their tip, the nails also becoming very convex in both directions: there is no other deformity and the affection does not seem to be leprous. Family taint not admitted.

To *Bhar Bharia*, a hamlet of 15 houses amidst the same sandstone hills, westward of *Kharsalia*; the 70 or 80 people are all Kolis; food—jowari, kulti, mut; water from a well (*wao*). No guinea-worm: one leper.

M., Koli, *æt.* 25, labourer, born here, has not travelled: disease 8 years. Now, the man has all the signs of T. L. on the face and limbs, well-marked. F. had the disease; M. free; he is the second of 4 sons, the 4 daughters are older; all well: no other family taint. Is married and has 3 sons, the youngest of 6. Admits of no contact even with his own father: cause of disease unknown: was eating common food and labouring here, when the symptoms came on: they are now stationary: he lives apart; there are sores; general condition bad: syphilis is denied.

F. was born, lived and died here 7 years ago, *æt.* 55, having been a leper 5 years, and affected like this son of his; he was the first known leper in this place.

The people go to sell their grain in Koliak (see below) where leprosy exists.

To *Hathab*, an old, fortified place in this plain, close to the sea, north of the above: about 200 houses and 1,000 people, almost all Kolis, the remainder being artificers, traders, &c. Food—jowari, mut: well-water. No guinea-worm. There are reported to be two lepers here now; it is positively stated that excepting the F. and brother of one of these two, there has never been any leprous disease in the place.

1.—M., Koli, *æt.* 50, labourer, born here, has travelled a little: leprosy for 20 years. Now, nothing peculiar in the visage except a little facial palsy: there are some pale patches on the trunk, best seen in front: hands greatly mutilated as in N. L., mere remnants of the fingers being left: numbness is confined to parts below the wrist. Feet more affected; he cannot without trouble remove them from the shoes in which they are, as it were, closely packed. F. was a leper: M. free: of 3 sons he is the youngest, the second was also a leper, the eldest son was free: no sister: denies all family taint, meaning direct or earlier taint; is not married: no contact even with his brother: cause of disease unknown: was living as usual when the symptoms came on here, they are now stationary: he lives apart; there are sores: general con-

dition indifferent: syphilis is denied. A very striking case of A. L.

F. born, became leprous and died here 30 years ago: nothing is known of his family. B. born, became leprous and died here 12 years ago, *æt.* 40; had M. L.? The elder brother died of cholera 25 years ago.

2.—An old woman is brought forward who is not a leper, but only a poor decrepit creature, stigmatised as leprous by the malice, she says, of her son's wife.

I have an impression that in this place the whole truth regarding leprosy was not told me.

Thence to *Koliak*, a town with some trade, near the above, imbedded in trees, having about 300 houses and 1,362 inhabitants, in caste Wani, Koli, Kumbhar, dyers, artificers, Brahman and Dher. Food—jowari, nut, mung, oil, chillies, &c.: water from a stream. Guinea-worm occurs. Leprosy is known here, and the following instances are mentioned of former disease.

1.—M., Kumbhar, born and became leprous here, died at Junagurh 20 years ago, *æt.* 45, had M. L., was connected with No. 1, below: a surviving son is well.

2.—M., Bhawa, born, became leprous and died here 15 years ago, *æt.* 50, had A. L.: family taint unknown: no descendants.

Cases seen:—

1.—M., Kumbhar, *æt.* 28, farmer, born at *Isora* (*vide* p. 47) and has not travelled far: leprosy for 3 years, it began with an eruption (*dadar*) and afterwards the fingers became curved. Now, the face has already the vacant expression of A. L., ears unchanged: the back is covered with a most characteristic eruption of pale reddish spots, of various size, some having distinctly raised margins and depressed centre; on the front, generally, they are of smaller size and fewer: numbness is either absent or slightly marked. Hands the true 'claws'; no numbness in them: feet unchanged and without loss of feeling: nipples unaltered. He is weak, but not from muscular debility. F. alive and well; M. dead free; he is the elder of 3 sons and has a younger sister, no taint in his family (but see above No. 1): is married and has now a son of 9 months old; other children have died young. Contact with lepers is denied and he cannot account for his disease: was eating and working as usual here when it came on: it is lessening (?): does not live apart: there are no sores; general condition indifferent: syphilis is denied. F. is present—a fine old man: how did the son acquire this disease? It is almost certainly not mere 'neuritis,' but true lepra.

2.—M., Kumbhar, *æt.* 50, farmer, born here and has travelled: lived at *Piparla* (where is leprosy) for 25 years: has had the disease 6 years; it began with blebs on the second and third toes of the right foot. Now, nothing peculiar on the face, doubtful traces of eruption on the back; hands much mutilated—the right especially—in the usual manner: numbness at back of hands and forearm, but not on their front surface: nipples rather gun-capped. Feet affected: absorption of great toes on both sides; some numbness here too and on the soles. Parents free, and an elder brother and sister: denies all taint: married, wife well, no sons alive, two having died in their infancy: three daughters grown up and free. Contact denied: cause of disease unknown: was living as usual here, when it came on; it is not spreading: resides with his family: there are no sores: general condition tolerable: syphilis is denied.

3.—M., Kumbhar, *æt.* 35, farmer, born here, has lived at *Piparla* (where is leprosy, see p. 47) and returned here 4 years ago: leprosy for 12 years: first had pains in the limbs, both hands and feet. Now, well-marked A. L. on the face—partial paralysis—there are slight but decided patches of eruption on the back, of large size: nipples hardly changed. Hands extremely mutilated, on the right side are mere remnants of fingers, on the left none except of the thumb; here there is anæsthesia of the stump of the hand extending a little on the forearm, but on the right side hardly any loss of feeling. Feet almost equally mutilated, the atrophied toes which remain being drawn back upon the tarsus: there is but slight numbness anywhere here. Parents free: an elder brother is alive and well, two other died in their infancy: an elder sister is dead,

three younger sisters are alive and well: all family taint is denied, but still he is a distant connection of No. 1. Married: wife dead, free: two sons of 10 and 7 years; a daughter of 18: contact denied; cause of disease unknown: was living as usual and working as a farmer at *Piparla*, when the disease came on; it is now subsiding (?): he lives apart; there are sores; syphilis is denied. A most miserable object.

4.—M., Wani, *æt.* 30, keeps a shop; born here, has travelled. Leprosy for 12 years, it began with an eruption on the skin. At present, there is nothing on the face except obscure light patches: there are large light spots on the back, but no numbness is detected in them; nipples unchanged: hands much bronzed, inner fingers bent and stiff with some wasting and interstitial absorption, cracks across the joints on both palms and dorsal surfaces. Feet less changed; they are bronzed, but not numb. Parents free, so elder brother and so an elder and younger sister; no family taint, is married; wife well; two sons of 6 and 4 are yet well. Contact with lepers is denied: cause of disease unknown, was keeping his shop when the symptoms came on; they are now subsiding: he lives apart, but still attends to business: there are excoriations: general condition tolerable; syphilis is denied.

5.—F., *Bhurwad*, *æt.* 25, born and resident here: leprosy for 10 years, first there was an eruption on the face. Now, some signs of T. L. there, and nodules in the cornea of the left eye: pale spots on the back; hands affected as in T. L., the fingers being puffy, dry, shortened, but not much wasted: feet changed in a similar way. Parents free and a brother and two sisters: all family taint is denied: she is married, her husband deserted her; no children. Contact with other lepers is denied: cause of disease unknown: was living as usual when the disease came on; it is lessening (?): is quite alone or, as she says, she lives 'with Purbhu,' *i.e.*, with God. Her caste-people here have built a decent hut for her in their own quarter, and her brother gives her food: other relatives reside in this place, but none of them are lepers except she.

This woman is the only one affected with T. L. amongst the five individuals now seen, and it is a chronic case.

To *Ratanpur Nova*, nearer to Gogha and the sea-coast, a small village of about 50 houses and 123 people, who are chiefly Kolis: food as usual: well-water. There is guinea-worm here: leprosy occurs. Former lepers mentioned are these:—1.—M., *Bhurwad*, born, leprous and died here some 20 years ago, *æt.* 25, having M. L.; probably some family taint: no children. 2.—F., *Kolin*, born, acquired disease and died here 25 years ago, *æt.* 30; had M. L.; family taint unknown: no children. No others are recollected.

Saw the following case.—F., *Kolin*, *æt.* 12, born here and resident, may have been carried about in infancy to *Gogha* (where lepers exist). Disease for 6 years, beginning with swelling of face and ears. Now there is decided T. L., on the visage, intumescence, smoothness and oiliness of the skin, &c.: on the back traces of an eruption: hands unchanged except by bronzing and glossiness: nail of one thumb deformed: feet also little altered, yet nails converted into clumps of horn: numbness probably exists in the extremities, but the child being rather dull, it could not be estimated. Nipples little knobs and larger than natural. Parents alive and well, and also a brother a year old, also a sister of 3 years: family taint unknown (denied by her father), contact with other lepers and cause of disease unknown: was living as a child here when the symptoms came on: they are advancing; she is kept a little apart: there are sores: general condition tolerable: probably no syphilis. The child was first examined alone; afterwards her father was questioned: she is fairly grown: has not menstruated, and is dull of apprehension.

So far as could be learnt, in this case the disease seems to have begun *de novo*, for of late years there had been no other leper in this village; in some adjoining villages the malady is rife enough.

21st March.—To *Bhumbhli*, a town 3 miles south of *Gogha*: about 450 houses and 1,847 people, who are Karaks, Wanis, Brahmans, Ahirs, Kolis, Kumbhars, Malis, artificers, &c. Food—jowari, bajri; urid, mung: water from tank and well. Guinea-worm is rare: leprosy is infrequent. Former instances known to memory:—1.—M., *Muss*, born at *Rampur* (near here, where is leprosy), died 5 years ago, *æt.* 40, had M. L.; family

taint and descendants unknown. 2.—M., Bhurwad, born and died here 40 years ago, æt. 40, had M. L., taint unknown; no descendants. 3.—F., Wania, born at a distance, became leprous and died here 12 years ago, æt. 35, had M. L., taint unknown; a surviving son is well. 4.—M., Memon (Mussulman), born and died here 8 years ago, æt. 45, had A. L. ? Taint unknown or doubtful: unmarried.

Cases seen:—1.—M., Brahman, æt. 40, beggar, born here, has travelled: leprosy 3 years, it began with bending of the fingers which was attributed to an accident. Now, nothing peculiar on the face: on the back traces of a pale eruption: nipples unaltered: hands mutilated as in N. L.—right hand the most, the terminal phalanges of fingers being absorbed: left hand a 'claw,' and partly absorbed, it is benumbed only in front, over the fingers themselves and in the palm rather than in the dorsum: the right hand seems not to be numb, it is not wasted like the left: feet also affected, the right great toe being most changed: here numbness is found only below the toes, where also are vesicles. Parents free; he is the youngest of 5 sons, the rest and an older sister were well: denies all family taint: is married, no son, a daughter of 17, well. Contact with lepers, doubtful: cause of disease unknown: was living as usual here, when the symptoms came on; they are lessening (?): he is not separated: no sores; general condition

fair: syphilis is denied. This case seems to be A. L. and not mere neuritis; for there are spots on the back.

2.—F., Kolin, æt. 25, labourer, born here, has travelled about; leprosy for 5 years, it began with a white eruption on skin, followed by mutilation of the extremities. At present, nothing very peculiar on the face, but there is a vacant expression indicative of slight facial palsy on the left side: on the back are traces of a pale eruption and also on the front of the trunk. The hands are more affected, but in the same manner as in No. 1 above, the right hand being the most deformed: there is no numbness. The feet are also considerably affected; the small toes of the left foot being drawn up and back: numbness here. Parents free, two brothers and three sisters, one older, are also well (the latter is here); no family taint. Contact unknown; thinks her disease began with an attack of indigestion: was living and working as usual in this town when it came on: it is stationary: she lives apart: there are running sores; general condition indifferent: syphilis is denied. A case of A. L. marked and of obscure origin.

Having now reached Gogha—the port of embarkation for Surat and Bombay—at the very close of my allotted leave, further enquiries in *Goghabad*, &c., were not attempted, and here my journal ends.

SUPPLEMENT TO DIARY.

In order to complete the description of leper-areas, I here add brief notes of the remaining districts of Bhaonagar and of other sections, which though not personally visited, have yet furnished information needful for the general analysis, which will be found in Part 2. This additional information has been collected chiefly by the same agency which proved so accurate before, and since it accords with all well-founded data, no hesitation is felt in its incorporation with the rest.

8.—REMAINING DISTRICTS OF BHAONAGAR.

Extending in a northerly direction from Duskrohi, Palitana and Kundla are the six districts named below. Vide Map I.

The *Bhal*.—A low, coast-lying area of some 160 square miles and situated to the north of Duskrohi, with which it is in fact continuous. Here, however, the physical conditions are unfavourable to material prosperity; hence villages are few (20 in all) and small in size, and there are no more than 35 persons to the square mile. Elevation of the land but 30 to 40 feet above the sea, and much marshy and barren soil. Leprosy is wanting in this area alone, notwithstanding the propinquity of affected villages to the south.

The district of *Sihor*.—Central, inland, of irregular form and hilly; having an area of 180 square miles, 51 villages (one-half of which are small in size) and a comparatively dense population of 180 to the square mile. It adjoins Duskrohi (on the east) and Talaja, &c. (southward), and above a century ago its chief town was the capital of the State. Here is an area where one might expect to find old and abundant leprosy disease, supposing that this malady be continuously transmitted from generation to generation; yet though the mean duration of present cases is longer than usual (8·5 years), there is very little leprosy in Sihor: it is widely scattered, too, but not irregularly, for the general arrangement of leper-villages in groups or lines is well enough illustrated here.

Affected localities are the following:—Sihor, the capital, with 10 lepers and few recent cases; Pipalia (1), Khakharia (1), Deogana (4 lepers and some recent disease, the place adjoins Talaja and Gogha series), Rajwadar (2), Waral (2), Khakharia (1), Nawa Sarod (2 lepers, the hamlet adjoins Palitana series). Some villages are arranged around the capital; none are isolated from other affected places.

District of *Umrata*.—Inland, low-lying and flat; to the north-west of and adjoining Sihor; of irregular form, having an area of 220 square miles, 55 villages and a population of 160 to the square mile. There

is very little leprosy here and its mean present duration is remarkably short, *viz.*, 6 years; there is no old disease, and these two last features seem to point to a late augmentation, or possibly a recent introduction, of the leprosy complaint.

Affected localities are these:—Umrata, the chief town, 5 lepers and some fresh cases; Chogat, a smaller town with 4 lepers and all recently affected; Timbi (1), Parwala (2), Sanosra (1), Iswaria (1), Dhasa (2 lepers, this distant town belongs to another series, it is on a main road), Bochadya (1 aged leper woman, the village is connected with a series of 3 or 4 others in which only old disease is found—a remarkable instance of past contemporary infection, and the group in question is placed between Umrata and the next northern district).

District of *Gadhda*.—N.W. of Umrata, inland, of irregular form, extending over 200 square miles, having 39 scattered villages and a population of 120 to the square mile; the general elevation is 150 feet. There are 7 known leper-localities, *viz.*, Gadhda (chief town) with 10 lepers; Lakhanka, near and with 4, Mandwadhar (1), Khopala (1), Gordka (1), Bhindar (2) and Derala, a hamlet with one leper and adjoining a village belonging to another State also affected with recent disease. The mean duration of present cases is 7·5 years; there are several recent cases, but none of very long standing. The arrangement of leper-villages in each of these sparsely affected districts is such as of itself to suggest a communication or transmission of disease from place to place, and all affected localities are connected.

District of *Botad*.—Inland and the most northerly of the areas under notice. Extent 250 square miles, elevation 2 to 300 feet, 40 villages (few small) and 120 persons to the square mile. For some reason, leprosy here either dies out or has not yet sprung up; for there is but one known case in the large village of Latidad; it is of a herdsman aged 30 who has been a leper for 7 or 8 years, and who was consequently affected at the beginning of manhood. Latidad is not in direct connection with any known leper village in my lists, but it is near the border of another district respecting which no information is available. Here ends a line of continuous country, along which leprosy is seen to gradually and completely subside as we proceed northward or away from the coast-line, where this disease may be said to be common.

District of *Lilia*.—Quite inland, and on the south broadly joins Kundla: area 160 square miles and population 150 to the square mile. Here are 35 villages of which only 7 are of small size—a feature seemingly peculiar to these more inland districts of Kundla and Lilia, when compared with the rest of

Bhaonagar. As elsewhere, we may associate the presence of leprosy with the larger-sized inhabited places; yet here in Lilia the disease is far less intense than in Kundla, and it has obviously a less active character. Lilia has $\frac{1}{3}$ of its villages infected, but the mean duration of present disease is very prolonged, *viz.*, 9 years (in Kundla it is 6.5 years) and of its 7 leper-villages, 2, at least, have very old disease. Known localities are the following:—Lilia, chief town (2), Nana Lilia, a mere village (2 old cases), Bodia, another near village (2 lepers, one old, one recently affected), Sanalia (1), Jatroda (1), Saldi (1), Putalia (2, one old-standing), Amba (4), Tibdi (1), Kutana (1), Panchtalaoda (2, an offset next Palitana), Asodar (1), Bhingrar (1, old) joins Lati. Lines of communication are evident enough in this district, where seemingly *isolated* villages are found directly to adjoin affected localities in neighbouring States; and facts of this sort are, I may add, quite unanticipated, for until all my information was fairly pieced together, the local conjunction of leper-villages in and outside certain political limits, was necessarily unproved.

This is the last of the sub-divisions of that Bhaonagar State which offers so complete and fair a representation of a definite area (including both coast and inland sections), well adapted for an investigation of the kind now in hand.

9. DIVISION OF GOHELWAR.

A considerable portion of the country, including Palitana, which lies amidst and around the districts of Bhaonagar, is classed under the above heading, and I have the following leper returns pertaining to this division. No common description would apply to the rather scattered sub-sections, and hence it must suffice, if I append the lists as they stand, referring to my maps for indication of position, &c.

Palitana has been above referred to, and so the thana of Datta. The thana of *Chok* is a small district of 50 square miles, situated amidst the hills south of Palitana and including 26 villages, of which only 5 are reported to have lepers. The position and arrangement of these five, however, is significant of a close association: thus Chok itself (2 lepers) is a centre around which are placed Jhalia Amraji (3), Rohisala (2), Bhandaria (1), and Bodanones (1). I am not able to state the duration of disease in these instances, and, therefore, will only add that this compact Chok series is not distantly connected with some adjoining affected localities.

The thana of *Lati*, to the north of Lilia, includes 9 villages and only Lati itself is reported as containing a single leper, whose disease has lasted 6 years. The town is connected with other leper villages.

The thana of *Songadh* embraces some areas scattered near Sihor, Umralla, &c., having 25 villages, of which 6 are known to contain lepers. These are Kapurdia (1, old disease), Bhojawada (1, recent), Chabadya (1), Rajpura (1) and Pipalia (2). Songadh itself was visited: *vide* page 5. No inference is possible here, except that the disease is not distributed by chance; for each of the above localities is directly, or indirectly, connected with others affected like to it.

The thana of *Wala* is north of Umralla: of the 55 villages it contains, none are reported to contain lepers except the chief town of Wala (1 middle-aged herdsman, 8 years affected). I notice that several villages in Wala are near those in the Bhal—a non-leper, coast-district, and those in Botad—another non-leper district, whence the inference that here leprosy has either not obtained a footing, or has died out: facts seem to point to the first of these hypotheses.

The thanas of *Babria* and *Kotra pita* have been included in one Return which gives a total of 20 villages and 11 of them infected with leprosy. These localities are all situated to the west of Umralla, &c.; they offer remarkable evidence not only of the frequency of disease, but of its connected distribution. Babra (7 lepers), Chamardi (1), Dered (1), Dharai (2), Nilaola (2), Kariana (1), Derdi (4), Sultanpur (1), Kotra pita (3), Raipur (1), Ingorala (2).

The thana of *Chamardi* is reported with 10 villages, of which 3 have lepers; these latter are intercalated with others belonging to Umralla, &c., and are as follows:—Chamardi (1), Alampura (1), Gadhali (1).

So far as I can learn, in all these smaller sections of Gohelwar, the amount and duration of leprosy disease which now prevails, correspond in great measure to the same features in the nearer Bhaonagar districts; and the general distribution of leper-villages is also similar. The Babra thana, however, seems to be more than usually infested and especially noteworthy is the instance of Derdi, which stands in marked local relation to a group of places apart belonging to Umralla (Dhasa), Songadh (Pipalia), Lati and Lilia (Bhingrad): in all these localities, excepting Lati, there is much old disease, and not far distant (Gadhali, &c.) is another compact series of towns with even more prolonged leprosy. The significance of these persistent foci, as they may be termed, appears to be considerable, with reference to near outbreaks of recent disease.

10. TALUKA OF GOGHA.

(Ahmedabad Collectorate: British territory).

A low, coast-lying district, intercalated between Duskrohi and Talaja, and of irregular form: area 223 square miles, persons per square mile 151.7: there are 65 villages, and of these 15 are entered as containing lepers; they are as follows:—Gogha, the chief town and port (10 lepers, but probably not all affected with true leprosy), Tansa (6), Kukad (personally inspected see 1 Diary under date 18th March), Pirmahadeo (1), Chuniali (1), Dhrupka (2), Nana Khokra (1), Walukad (1), Lakria (1), Bhadli (1), Trimbuk (1), Ukla (4), Hoidar (2), Badi (1), Padwa (2). The duration of the malady in any of these places, is not stated: their arrangement, however, is not less significant than elsewhere of local connection, as may be seen on inspection of Map 1; and more particularly am I struck with the position of the three last-named villages with relation to Koliak, which seems to indicate a close correspondence of disease in space.

DETAILED LEPPER LIST (Official),

Showing Sex, Name, Age, Caste and Residence of 601 affected individuals.

1. STATE OF BHAONAGAR.

*District of Duskrohi.**Mouje Budhel.*

- M Kala Jeena, 40, Kunbi
 F Bai Prem (widow), 30, Kunbi
 F Bai Walabai, 40, Kunbi
 F Bai Aji, 45, Sindhi
 M Khimabhai Hematbhai, 30, Garassia
 M Raja Aja, 22, Kunbi

Mouje Sidhsar.

- M Gordhan Rupa, 32, Bhawa
 M Kalidass Haridass, 30, Bhawa
 F Bai Vuloo, 40, Garassian

Mouje Sampara.

- M Rana Vasta, 30, Koli

Mouje Wartej.

- M Mahomad Manji, 60, Mussulman
 F Mubai (wife of Bhuga), 35, Kolin
 F Jeejan (unmarried), 20, Meman
 M Waga Wala, 35, Mochi
 M Vera Kessow, 35, Dher
 M Jhusa Bhuga, 40, Dher
 M Heera Nuthoo, 35, Wania

Mouje Nari.

- M Ruwa Ghela, 30, Sutar
 F Bai Rahabai, 35, Garassian

Mouje Trapaj.

- M Chugan Vujeram, 27, Brahman
 M Yusram Haja, 20, Wagri
 M Nuthoo Jeena, 20, Khawass
 M Sadool Vira, 27, Jogi
 M Kurson Vira, 30, Jogi
 M Juja Buda, 40, Kunbi
 M Mouji Huvesar, 35, Brahman
 M Sumla Oomer, 32, Ganchi
 M Wali Ramla, 40, Ahir
 F Bai Mooli, 50, Brahman

Sakrasar.

- M Kala Peetamer, 40, Sutar

Jaspura.

- F Bai Jumkoo, 50, Wani

Sonsiya.

- M Lakha Rama, 30, Charan
 F Bai Jusoo, 45, Kolin

Paniyali.

- F Bai Rooplibai, 20, Garassian
 M Mala Poonja, 35, Bhurwad
 M Dewa Suva, 35, Koli
 M Mahava Dorda, 25, Koli

Khadapar.

- M Hematsidh Jeewabhoy, 30, Garassia

Mitiwirdi.

- F Bai Mooli, 30, Kolin

Bhumbhli.

- F Bai Mithi, 18, Kolin
 M Iswar Mukan, 45, Brahman

Ratanpur Nawa.

- F Bai Mani Gula, 11, Kolin

Rampur.

- M Raja, 40, Koli

Thordi.

- M Peetamar Dewram, 35, Brahman
 Kobri.

- F Bai Pootli, 40, Kunbi
 Bandaria.

- M Prema Bawa, 50, Wania
 M Wela Jechand, 35, Wania
 M Karson Mala, 40, Kharak
 M Monjee Laljee, 42, Brahman

Sartanpur.

- M Bhana Wala, 30, Koli
 M Gula Jusa, 32, Koli

Lakhanka.

- M Gula Jusa, 32, Koli

Kharsalia.

- M Hama Goond, 50, Koli

Bhar Bharia.

- M Kurson Megha, 30, Koli

Hathab.

- M Dania Mahava, 40, Koli
 F Bai Prema, 35, Kolin

Koliak.

- M Pola Pooja, 30, Kumbhar
 M Dana Juga, 50, Kumbhar
 M Ruda Suva, 45, Kumbhar
 M Khima Chamba, 30, Baosar
 F Bai Jema, 22, Bhurwad

*District of Talaja.**Pithalpur.*

- M Jootha Jeewa, 41, Koli
 M Daya Khowan, 35, Koli
 F Bai Dai, 30, Kolin

Partapara.

- M Bhaya Bodha, 45, Koli

Kerala.

- M Kala Harja, 35, Sutar

Methla.

- M Bhola Madun, 35, Koli
 M Bhona Madun, 25, Koli
 M Pacha Ramsee, 50, Koli
 M Ramsee Narun, 30, Koli

Jhanjhmer.

- M Bavan Nana, 25, Rajput
 M Rana Ata, 35, Rajput
 F Bai Ram, 40, Rajput
 M Bhurevgar Dewgar, 45, Bhawa
 M Manabhoy Chandabhoy, 30, Garassia

Rajpara.

- M Sidi Juga, 25, Koli
 M Jesa Bala, 12, Koli
 M Napa Ramjee, 20, Koli
 M Rana, 60, Kumbhar
 M Choda Rana (son), 16, Kumbhar
 F Prem (daughter of Rana), 10, Kumbhar
 M Muloo Jetha, 30, Koligar

Gudhula.

- F Bai Fooli, 50, Kolin

Mangela.

- M Dadabhoy Khodabhoy, 35, Charan

Khandera.

- M Haja Lukha, 15, Bhurwad
 M Kadabhoy Khutabhoy, 40, Garassia
 F Bai Ram, 30, Kolin

Uncheri.

- F Bai Ratan, 16, Bhungy

Mahadeopura.

- M Runchod Gopal, 17, Mochi

Gorkhi.

- M Runchod Moola, 25, Koli
 M Bhugwat Moola, 15, Koli

Thalia.

- M Mewada Jetha Sewa, 20, Brahman
 M Jeyshunkur Jetha, 25, Brahman
 M Khima Ram, 50, Sutar
 M Jeewan Jula, 12, Brahman
 Ghantarwala.
 F Bai Jumna, 18, Brahman

Pulsar.

- M Suva Khoda, 40, Bhurwad
 Dakana.

- M Bhugwan Govind, 30, Mochi
 Sartanpur.

- M Dhuna Mohanji, 48, Koligar
 Dibor.

- M Rasabhoy Surtanji, 55, Garassia
 M Rajgor D. Shunker, 60, Brahman
 M Jooabhai Puyebhoy, 25, Garassia
 M Giga Bhan, 50, Rajput

Neswad.

- M Daya, 40, Koli
 M Ghela Khoda, 50, Brahman

Bhadrawal.

- M Hunsraj Toda, 45, Wania

Bharoli.

- M Mitha Jeewa, 35, Kumbhar
 M Narun Taya, 30, Koli

Timana.

- M Bapooabhai, 50, Garassia
 M Jumjeebhai, 30, Garassia

Mandwali.

- M Pitamber, 43, Sutar

- M Hajo, 47, Rajput

Bela.

- M Kurson Moola, 20, Kunbi
 M Nanjee Moola, 30, Kunbi

Piparla.

- M Roopa, 20, Brahman

Dhardi.

- F Bai Haibai, 47, Sutar

Isora.

- M Kurson Dosa, 60, Koli

District of Mhova.

Ages omitted. Ch. stands for child.
 Castes in English equivalents.

Mhova.

- F Mulloo Pacha, Potter
 M Kalla Gopa, Barber
 M Dhohkia Runchod, Bunia
 M Nuthoo Fathoo, Arab
 M Bugwan Jeitah, Khutree
 M Nathoo Hajee, Oil-dealer
 M Dooda Hameer, Sugur
 M Jeva Asmal, Oil-dealer
 F Bai Gupa, Mochi
 M Lakha Bhola, Koli
 M Kunna Musri, Koli
 F Malli Lakhah, Kolin
 M Latha Washa, Sweeper
 M Visha Washa, Sweeper
 M Virah Washa, Potter
 M Rupsh Mooljee, Bunia
 F Marin Hameer, Rajput
 Ch Bugwan, Rawul
 M Juga Danna, Potter
 M Malick Putapty, Arab
 F Deo Jiva, Khuruk
 F Ameer Giga, Kolin
 M Hurry Ruda, Potter
 M Vusram Vusta, Bhatia
 M Anund Jussa, Blacksmith

Kutpore.

- F Runni Pacha, Kolin
 M Deva Itala, Koli
 M Rutnah Vira, Koli
 M Vella Virra, Koli
 M Rukhud Mepa, Koli
 Ch Soma Etasamut, Koli

Ch Khoda Pacha, Koli	F Koomree Amba, Oil-dealer	M Deosi Vasta, Puncholi
F Malli Natha, Kolin	M Amba Alli, Oil-dealer	F Gomty Ramdass, Sadoo
F Rupai Dooda, Kolin		M Dada Bogha, Mussul.
Ch Lakha Jiva, Koli	Belampore.	F Jivi Jinna, Kolin
Ch Lakhao Poonja, Koli	F Bai Mannoo, Potter	M Ghodad Kala, Dher
F Daya Dama, Kolin	M Kurson Amba, Koli	Muchoodra.
F Rasa Gothud, Kolin	M Jiva Chanda, Koli	M Rookdad Mepa, Koli
F Rukhad Noghun, Kolin	Goodurna.	F Jetha Aruk, Charun
F Khodor Mepa, Kolin	M Attia Raja, Tailor	Kharry.
F Danna Punja, Kolin	M Narun Vija, Koli	F Jaloo, Charun
Guzardah.	M Rupa Giga, Khured	Nani Khirall.
F Kinna Dossa, Kolin	Kussan.	M Hada Kurson, Dher
Neswad.	M Russa Giga, Jogi	Baburradhar.
Ch Nanoo Bhoza, Koli	Kootwada Nana.	M Mula Musri, Dher
Tured.	M Anund Ramjee, Brahman	Balapur.
Ch Kubla Mamjee, Oil-dealer	Saloli.	M Jodha Shiyal, Koli
Ch Ruttai Mamjee, Oil-dealer	F Raje Godur, Kolin	
M Wagha Pandoo, Potter	Deogud.	<i>District of Kundla.</i>
Dundass.	M Ranna Mala, Sweeper	Mouje Kundla.
M Magho Vurlo, Potter	Khary.	M Mulji Motichund, 20, Wania
M Megha Goind, Dher	M Raja Jiva, Tailor	M Raichand Motichund, 25, Wania
Mota Jadra.	M Kanna Jiva, Koli	M Jairam Jiwa, 42, Wania
M Tricum Gopa, Bunia	Kulsar.	M Samji Naran, 19, Wanja
Koombhun.	M Khoda Kala, Koli	M Hunsaraj Jina, 39, Wania
M Mepa Giga, Koli	M Rajah Hada, Koli	M Naran Hira, 50, Wanja
M Rudah Mori, Koli	Diyal.	M Mola Wasraw, 70, Kumbhar
Doogheri.	Ch Jivram Madowjee, Brahman	M Bhaga Kuchra, 50, Koli
M Ram Vusram, Koli	Otha.	F Bai Kamar (unmarried), 22, Wanand
F Danni Rooda, Kolin	F Nathi Vulli, Mussul.	M Jetha Juwa, 41, Kumbhar
Ch Nanka Coombah, Koli	Turedy.	F Bai Parwati (married), 50, Wani
M Dyah Kurson, Koli	M Jethabhoy Nathoobhoy, Garassia	F Bai Galal (married), 50, Wani
Dolia.	Khootowda.	M Narweram Gungaram, 35, Brahman
Ch Bijul Soora, Barber	M Giga Jiva, Shepherd	F Bai Bevi (married), 55, Wani
Pudiarka.	Ch Kurson Jiva, Shepherd	Sawar Samapadar.
M Shia Lakha, Shepherd	M Vana Kuma, Koli	F Bai Kumar (married), 35, Khatri
Gudhuda.	M Kanna Luxooman, Dher	M Aju Manji, 50, Mussulman
M Jiva Kantha, Koli	Loosudy.	M Beehar Godar, 28, Kunbi
Bhadroad.	M Munsoor Poonja, Arab	M Nathu Hamir, 25, Koli
M Bhuga Mava, Mochi	Kikuria.	M Meram Harji, 30, Wanja
M Vijanund Pita, Mochi	F Jussoo, Kolin	M Madha Godad, 45, Kunbi
M Rasa Mayab, Puncholi	Thorala.	M Kachera Chya, 60, Khatri
M Dossa Desoor, Koli	M Giga Vitha, Potter	M Jasmat Jiwa, 55, Mochi
M Kurson Dulla, Bunia	Sedarda.	F Bai Lachoo, 40, Bhawa
Khatsoora.	M Kilia Amud, Oil-dealer	M Jutha Kulan, 30, Mochi
M Giga Vasha, Koli	Oogulwan.	M Jasa Giga, 23, Sagar
Anugunka.	M Anna Giga, Puncholi	F Bai Dewoo, 35, Dher
M Runnabhoy Dessabhoy, Carun	Bordy.	M Sawa Uka, 50, Kumbhar
Kuntasur.	M Giga Diva, Puncholi	F Bai Jusu, 60, Ond
M Adum Hajee, Oil-dealer	Kurla.	M Khoda Bhima, 50, Dher
F Bai Jussoo, Dher	M Heera Ranna, Potter	About 12 more names have been ascer-
Ratole.	Gorus.	tained, in addition to the above two lists.
F Jethi Punja, Kolin	M Juga Naza, Koli	Dhajdi.
Tulgajura.	M Hunsपुरy Rampury, Sadoo	F Bai Kunkoo, 32, Jogi
M Jiva Poonja, Punchlee	Vudal.	Jhabal.
M Arjoon Vusram, Potter	M Luximon Poonjab, Potter	M Tida Hers, 40, Lohana
M Poonja Lackha, Potter	Doongur.	M Odha Bhima, 22, Sonar
F Poonjee Ramanjee, Beggar	M Musry Nathoo, Puncholi	M Boota Bhima, 20, Sonar
Wagnuggur.	M Bhugwan Baber, Barber	M Megha Kurson, 25, Bhurwad
M Muyah Arjoon, Koli	M Runna Veera, Shepherd	Badhda.
Voommiawadur.	M Ayar, Mussul.	M Runchod Gowa, 22, Lohana
M Gopaljee Nursai, Brahman	F Zoonoma Fakeer, Mussul.	M Magha Gowa, 42, Lohana
Rajawadur.	F Bibi, Mussul.	M Lukha Vurma, 25, Mochi
M Poonja Rhiman, Mussul	Dungurpurdah.	M Govin Madan, 41, Rajgar
Nanahjadra.	M Jussa Jetha, Potter	Wanda.
F Bai Pann, Brahman	Jizukha.	M Gopalji Odha, 30, Khatri
Bhadra.	M Bhaya Kadwab, Puncholi	M Magha Jetha, 22, Wania
M Jetha Naryen, Sweeper	Doodhala.	F Bai Dahi, 36, Kunbi
M Jinna Runchore, Brahman	M Bhica Jetha, Koli	Piawa.
Bugdanna.	Khera.	M Anderji Nema, 50, Wania
M Kurson Heera, Jogee	M Nathoo Samut, Koli	Wansiall.
M Danna Lakha, Carpenter	Bamunia.	M Kala Jetha, 40, Darzi
F Puna Bhima, Mochi	F Hurbai, Potter	M Arjun Jetha, 30, Darzi
Borla.	F Wallec, Puncholi	M Vulabhji Govindji, 50, Brahman
F Amri Jadha, Shepherd	Rajoola.	M Kursat Raja, 28, Koli
Kurmadia.	M Dada Khul, Mussul.	F Bai Ajoo, 55, Kolin
M Ram Jusmut, Carpenter	M Taja Khan, Mussul.	Pithaodi.
		M Ramana Saya, 55, Koli
		F Bai Beni, 38, Kunbi
		M Abu Nurse, 54, Kunbi

Mota Jhinjhoda.
 M Rugnath Nuthoo, 45, Wania
 M Gala Lakhman, 26, Sonar
 F Bai Vijli Somi, 14, Sonar
 M Rooda Bhoja, 35, Sagar
 M Uka Giga, 30, Kumbhar
 Bhekra.
 M Hajam Wala, 35, Barber
 Sejal.
 M Rooda Maya, 40, Kumbhar
 M Manda Wadavis, 55, Kunbi
 M Pata Sawasi, 35, Kunbi
 Mekda.
 M Kadha Hada, 50, Barber
 Selna.
 M Harji Radhur, 28, Koli
 Rabarika.
 M Karamsi Jeram, 40, Kunbi
 Mota Bhamodra.
 F Bai Mina, 35, Kolin
 M Sadool Kana, 45, Koli
 F Bai Dhudoo, 22, Kolin
 Jesur.
 M Kumal Jeewa, 30, Sindhi
 M Juma Jeewa, 22, Sindhi
 M Sadool Kana, 45, Ayar
 Hipawadli.
 M Jootha Waghjee, 57, Brahman
 F Bai Raj, 45, Bhawa
 F Bai Jasoda, 40, Kunbi
 M Jasa Bhaya Bodhra, 62, Kunbi
 Gujarda.
 M Rana Veera, 44, Koli
 M Khoda Govin, 65, Kunbi
 Thansa.
 F Bai Bena, 27, Kolin
 F Bai Poona, 26, Kumbhar
 M Raja Aba, 30, Dher
 Mesanka.
 M Karson Dhuna, 60, Koli
 M Booda Rom, 52, Babari
 Kedaria.
 F Bai Jetha, 20, Kolin
 F Bai Thaki, 20, Kolin
 Krankach.
 F Ravulbai Dhunde, 22, Rawal
 Juna Sawar.
 M Rana Gusela, 40, Rawal
 M Madhurjee Hemjee, 60, Wania
 Dhar.
 M Ragho Raja, 32, Kunbi
 M Rama Jusa, 35, Darji
 Shedawadar.
 M Wagajee, 30, Rajput
 M Vunmalidass Kundass, 28, Bhawa
 Phiphad.
 M Miga Saja, 40, Miya
 Thordi.
 F Bai Koower, 40, Ghanchi
 M Walio Lukmon, 18, Barber
 M Kala Kana, 35, Darzi
 Abrampura.
 M Lukman Dewraj, 28, Wanja
 M Uga Mula, 50, Dher
 Ambardi.
 M Sato Wira, 45, Koli
 M Bhana Daya, 32, Wania
 Dolti.
 M Heera Desoor, 55, Ayar
 M Heera Dewa, 40, Rajput
 M Rana Khoda, 40, Kunbi
 Adsang.
 M Ramjee Koora, 60, Kunbi
 F Bai Koower, 40, Mussulmani
 Bagoya.
 F Bai Oseer, 45, Mussulmani

Mota Agria.
 F Bai Sona, 18, Kolin
 F Bai Mana, 30, Hindu
 M Praga Kooda, 45, Hindu
 Raidi.
 M Vuroo Kunthdram, 30, Kathi
 Jira.
 F Bai Jeewa, 20, Kathi
 Nana Bhamodra.
 M Bhuga Gigia, 35, Ayar
 Karjala.
 M Nuthoo Rama, 45, Bhawa
 Khadkala.
 M Kathila Khadjee, 40, Koli
 Bhuwa.
 M Vusta Poonja, 50, Sagar
 F Bai Ruton, 45, Sutar
 Nesdi.
 M Kumursee Deoram, 40, Kunbi
 Boral.
 M Kala Doods, 26, Kunbi
 M Purma Jeewa, 45, Kumbhar
 Shimran.
 M Biba Dosa, 28, Sagar
 M Rama Hajee, 25, Mussulman
 Jambuda.
 F Bai Heeroo, 50, Pancholi
 Dadbia.
 F Bai Sujoo, 40, Salat
 F Bai Malun Kathiman, 35, Kolin
 Wanot.
 F Bai Walee, 32, Kumbhar
 Wawera.
 M Jeewa Mitha, 50, Khoja
 M Kurson Lukha, 30, Koli
 Ghanla.
 M Bhuga Deo Anand, 30, Kumbhar
 F Bai Raj, 40, Pancholi
 Meriana.
 M Ratna, 45, Kumbhar
 F Bai Jeewee, 70, Kumbhar
 Luwara.
 M Musri Dhuna, 40, Kumbhar
 Khadsali.
 F Bai Lachoo, 60, Kunbi
 Madhda.
 F Bai Sugoo, 40, Babar
 District of Bhotad.
 Latidar.
 M Kurson Bogha, 30, Bhurwad
 District of Gadhd.
 Mouje Gadhd.
 M Tura Abhram, 50, Khatki
 M Nuthu Humir, 35, Ahir
 M Amra Lakha, 50, Koli
 M Verakala, 40, Kumbhar
 M Baga Humir, 40, Mamun
 F Rajbai Gega's daughter, 30, Rajgur
 M Dhuna Tulsi, 45, Wania
 M Runchod Shama, 30, Koli
 M Daya Jeva, 30, Wania
 M Maraj Moolji, 50, Bhavsar
 Derala.
 M Duda Mura, 50, Koli
 Mandwadhar.
 M Haja Vera, 50, Charun
 Khopala.
 M Heradas Chituldas, 32, Bhawa
 Lakhanka.
 M Jusa Deva, 40, Jogi Ravudio
 F Bijulgunga, 35, Kolin
 M Bhugla Jeva, 16, Koli
 M Jatha Jusa, 25, Lohana
 Goradka.
 M Purma Ramji, 55, Koli

Bhimdad.
 M Hathavji Ramji, 55, Wania
 M Lala Vira, 50, Lohar
 District of Umrala.
 Mouje Umrala.
 M Harka Parma, 25, Bhaosar
 M Gunga Sumar, 40, Meman
 M Beniar Wasta, 50, Wania
 M Alli Wira, 35, Gabiaro (dyer)
 F Bai Baba, 50, Kunbi
 Timbi.
 M Bhima Mullu, 40, Rajput
 Bhocchadya.
 F Raju (wife of Gunesh), 70, Kunbi
 Chogatt.
 F Juvul (wife of Maga), 50, Kumbhar
 F Pan (wife of Pudma), 40, Kunbi
 M Nania Gola, 15, Koli
 M Dania Pacha, 50, Jogi
 Sanosara.
 M Hera Suvdas, 30, Kunbi
 Iswaria.
 F Sarabai (widow), 60, Meman
 Langala.
 M Vakuth, 22, Brahman
 Parwala.
 M Khopar Kana ?, 35, Koli
 M Kula Dhuna, 38, Kunbi
 Dhasa.
 M Chand Kasur, 40, Sepoy
 M Rama Lakha, 25, Rajput
 District of Lilia.
 Mouje Lilia.
 M Fakir Badunsha, 25, Fakir
 M Sulaman Lukmanji, 28, Bora
 Saldi.
 M Raguv Natha, 32, Koli
 Jatroda.
 M Vusram Kursun, 51, Kunbi
 Putalia.
 M Narun Jeva, 22, Koli
 M Mungun Vaga, 40, Mochi
 Amba.
 M Jairam Puma, 32, Kunbi
 M Ookurda Maram, 42, Kathi
 M Giga Maram, 35, Kathi
 M Purma Rays, 32, Mochi
 Nana Lilia.
 M Jasa Lakha, 22, Koli
 F Kulu (widow of Lakha), 42, Kolin
 Tibdi.
 M Vala Khema, 60, Kunbi
 Kutana.
 M Bhugwan Jeva, 42, Koli
 Sanadhiya.
 M Vusta Ramder, 40, Ahir
 Bhodiya.
 M Lukhmichund Jaduvji, 28, Wania
 M Giga Dosa, 30, Kumbhar
 Panchtalaoda.
 M Ruda Deva, 60, Kumbhar
 M Luxmun Kona, 15, Kumbhar
 Bhingarar.
 M Geva Lakha, 50, Kunbi
 Asodar.
 F Bai Raya, 47, Koli
 District of Sihor.
 Mouje Sihor.
 M Meha Chumbjivun, 32, Wania
 M Nana Bhugwan, 25, Rajput
 M Chand Oomar, 25, Mussulman
 M Chamb Balim, 50, Mussulman
 M Giga, 30, Koli

F Gunga (wife of Khuwasbukun), 30, Khawass
 M Khoda, 50, Sutar
 F Jumna (wife of Khuwas Urjun), 50, Khawass
 M Bhana Hada, 40, Rajput
 M Bhil Raja, 50, Bhil Pipaliya.
 M Nogha Dosa, 50, Koli Khakhariya.
 F Amna, 50, Siparun Deogam.
 F Lukhmi, 35, Dher
 M Sagmal, 55, Rajput
 M Vera Bhugwan, 45, Vamund
 F Bai Rudi, 50, Mir Rajawadar.
 F Bai Kasu, 20, Rajput
 M Jeva Kala, 45, Koli Waral.
 F Bai Manu, 30, Wania
 F Bai Manu, 40, Charun Khakhariya.
 M Kulan Rutna, 40, Durji Nawa Sarod.
 M Lalkursun, 25, Babar
 M Jasa Bogha, 32, Koli

2.—*District of Palitana.*
 Palitana.

M Lalla Hira, 25, Mahar
 M Bhawan, 40, Kunbi
 F Amrat, 15, Sutar
 F Hurry, 25, Bawan
 F Rambai, 25, Brahman
 F Dev, 50, Kolin Gariadhar.
 M Luxmon Lavana, 40, Kunbi
 M Dhakarsy Moolji, 30, Kunbi
 F Bai Kasla, 37, Kunbi
 F Bai Rakmai, 50, Kunbi
 M Luxmon Abba, 35, Kunbi
 M Rahiman Shabhai, 50, Pinjari
 F Bai Jivee, 32, Lohani Parwadi.
 M Samat, 40, Koli
 M Ramlo Muckwano, 30, Koli Chonda.
 F Bai Jita, 35, Salat Gariadhar.
 M Abdool Rajbhoy, 50, Borah Moti Waodi.
 M Doodo Govanu, 40, Kunbi Adapor.
 M Kessow Veranee, 25, Kunbi Panchtobra.
 M Mavjee Giga, 40, Walad
 M Arjan Bavryo, 35, Koli Wirdi.
 M Natha Bhagwan, 25, Koli Nani Wavadi.
 M Megho Magro, 20, Dher Welawadar.
 M Wallo Karsanno, 40, Barber
 M Alo Khogno, 30, Rabari Jamanwao.
 M Bhaga Shama, 60, Dher Mokhada.
 M Luxmon Ranchod, 22, Kunbi Budarko.
 M Bhima Giga, 40, Koli
 F Jivee Bhima, 30, Kolin Ralgod.
 M Ram Bario, 55, Koli Thadach.
 M Meta Ranchod, 55, Wani
 M Gordhan Gobar, 22, Wani
 M Govind Puna, 20, Koli Nanipaniali.
 M Giga Bheja, 50, Koli Butiow.
 M Bhima Wella, 45, Walad Luwarwao.
 M Poona Khina, 55, Bagio

Mota Garajio.

F Daughter of Malu Wellarolia, 40, Kolin
 M Ami, 60, Sepoy
 3. *Gokelwar—Tanna of Chok.*
 Mouje Chok.
 M Roopa Moni Obaoda, Koli
 M Wana Poonja, Koli Jalia Amraji.
 M Mava Bhugwan Pateria, Koli
 M Khaber Gigo Khodano, Koli
 F Bai Nanbai, Kolin Rohisala.
 M Mala Juga Judow, Koli
 M Joda Vala Bhandaria.
 M Dhoondho Mebano, Ahir Bodanones.
 M Rama Bava Thilo, Koli
 Tanna of Datta.
 Mouje Datta.
 M Amersing Adabhoy, Garassia Borda.
 F Bai Mina
 F Bai Mesi, Kolin
 M Kassum Ooomer, Mussulman Paswi.
 M Jusso Raja, Kumbhar Nana Kamlon.
 M Runchod Sangaw.
 M Rugho Megho, Koli
 Tanna of Songadh.
 Kapurdi.
 M Waya Narau, 18, Bhurwad Bhojawadar.
 F Dhani, 45, Kunbi Chabadya.
 M Govind, 45, Khawass Songadh.
 M Nanka Kala, 9, Koli Rajpara.
 M Mali Poraja Ano, 25, Bhungy Piplia.
 M Govind Ookarda, 35, Walud
 M Harji Dewji, 38, Brahman
 Thana of Chamani.
 Chamani.
 F Wife of Leja Kana, 50, Kunbi Alampur.
 M Jalam Sagharambhoy, 40, Garassia Gadhali.
 M Jassa Bhagar, 45, Kumbhar
 District of Babra.
 Babra.
 M Selar, 35, Ghanchi
 F Sona, 50, Ravel
 M Poonja, 60, Ghanchi
 M Dalloo, 40, Sepoy
 M Jasraj, 30, Lohana
 M Narun, 50, Koli
 M Jamabha, 30, Ghanchi Chamadi.
 M Poonja, 50, Sepoy Deria.
 M Piro, 25, Ahir Gharai.
 M Aboa, 40, Kumbhar
 M Jewoa, 40, Koli Nilaola.
 F Suri, 18, Kolin
 F Wali, 25, Kolin Kariana.
 M Pirbhoy, 23, Pinjari Derdi.
 M Jama, 80, Ghanchi
 M Calo, 52, Bhurwad
 M Pitambar, 42, Koli
 M Panghoa, 40, Koli

Sartanpar.

M Kalo, 50, Koli Kotdapida.
 M Nathoo, 55, Kunbi
 M Hada, 50, Kathi
 M Trikam, 56, Lohana Raipur.
 M Madhow, 25, Rajgar
 F Ramoo, 10, Kolin Ingarola.
 F Lachhi, 20, Kolin
 Taluka Wala.
 Wala.
 M Ratna Jasha, 50, Bhurwad
 Taluka Lati.
 Lati.
 M Soni Devaita Kurson, 32, Sonar
 4. *District of Gogha.*
 (Ahmedabad Collectorate.)
 Imperial territory.
 Mouje Gogha.
 F Bai (wife of Walla), 65, Kolin
 F Wife of Huphee Oosman, 25, Mussulmani
 M Jeewa Bawa, 70, Mussulman
 F Wife of Lukma, 20, Bheel
 F Jewa Kallu, 25, Bheel
 F Jorwal Kala W., 22, Darzi
 F Manock Hussain, 50, Mussulmani
 M Ramchunder Jawan, 35, Wania
 M Hurjee Moolla, 40, Mali
 M Essa Fuzoo, 70, Mussulman Tansa.
 F Jejobai, 50, Kurak
 M Makoo, 3, Ghanchi
 M Jesoo, 60, Bhurwad
 M Lukmidass, 60, Bairagi
 M Gugutbhoy, 25, Garassia
 M Amloo, 35, Karak Kukad.
 M Rajoo, 35, Koli
 M Junoo, 50, Koli
 M Rumloo, 40, Koli
 M Jusloo, 60, Mochi
 F Jethoo, 60, Mochi Pirmahadeo.
 M Megha Dewa, 50, Koli Chuniala.
 F Bai Tejoo, 25, Kolin Dhruphka.
 M Kulla, 40, Koli
 F Nauli Gobur, 35, Kolin Nana Khokra.
 F Rama Lakha, 50, Kolin Walukad.
 F Bai (wife of Parwati), 45, Lohana Lakria.
 M Meroobhoy, 35, Garassia Bhadli.
 F Dugoobai, 40, Garassian Trimbak.
 M Dhunna Wella, 50, Koli Pudwa.
 M Megha Bhugwan, 37, Lohar
 M Koban Nursee, 43, Bhacsar Bhadi.
 M Kaloobhoy Mawabhoy, 38, Garassia Oookla.
 M Tijabhoy Pachabhoy, 50, Garassia
 F Bai (wife of Hakoo), 45, Karak
 M Kuma Bhugwan, 20, Mali Hoidar.
 F Bai (wife of Wala Nana), 30, Kumbhar
 M Bawa Kalla, 25, Koli

Note.—Probably all the above in Gogha district are not true lepers; some having 'white' spots only.

A TOUR IN KATTIAWAR.

PART II.

Analysis and Comments.

1.—The general prevalence of leprosy in Kattiawar.

This datum is measurable (a) by the ratio of affected individuals to total population: thus in the Bhaonagar State there being 472 lepers to 363,817 persons (capital excluded), this ratio is 1 : 771. [In the late general census of the Bombay Presidency the returns gave 158 lepers or 1 : 2,500 of the whole population and are therefore very defective.] Smaller States have a less proportion, but as there is reason to believe their returns are not always precise, I confine my attention at present to those from Bhaonagar. Lepers, however, being usually males and adults, more exact ratios are the following:—1 leper child to 3,000; 1 leper male adult to 300 and 1 leper female adult to 1,100; and if we take the four more infested districts of Bhaonagar (which are all connected), these ratios rise to 1 : 1,800; 1 : 200, and 1 : 850 respectively. Thus viewed, the prevalence of disease may not seem very considerable, yet the proportion of grown-up men who are disabled thereby, is well worthy of notice; and this is still more the case when certain limited areas are discussed—(see next heading).

(b) Another measurement is based upon the proportion of inhabited localities which is infested: thus, since 201 in 652 towns, villages and hamlets of Bhaonagar contain lepers, this ratio is 1 : 3.22, and it sufficiently shows how largely diffused is the great malady. Separate districts differ from this mean, and as many as one-half the villages may be affected, or only one in forty. In general, there is 1 leper to 5 square miles of country; but there is commonly more.

(c) The prevalence of disease is also indicated by its intensity: thus leprosy might be wide-spread, yet rare; and sometimes it is so, but sometimes both wide-spread and frequent. (1). The mean number of lepers in each village, &c., is generally small, viz., 2.4, and in the worst districts it seldom exceeds this. However this datum becomes so much modified in details, that its significance is of no other practical value, than that of showing how little liable leprosy is to assume an epidemic character—and happily so; yet we should recollect that the malady is of long duration, and hence the suffering produced by its presence does, in sum, equal that caused by more abounding and acute disease. (2). Intensity, again, may be estimated by mean duration: thus if the majority of lepers had long-standing disease, the inference would be that their malady is on the decline, and *vice versa*. I find at the present day the mean duration of all recorded cases to be 6.75 years, which having regard to the chronicity of the pest, sufficiently indicates its existing activity of development. What misery is in store for scores of sufferers, will be sufficiently apparent from these figures—a consideration still more enforced by the fact, that the term of 6 or 7 years does not represent the mean total duration of even the more acute or severe form of disease. The slower variety, which is hardly less unendurable, commonly lasts for double, or more than double, the time mentioned; and when these two

forms are intermingled (which is not unusual), the mean duration of suffering varies with the predominance of either kind: as a rare event, T. L. has a tendency, under favorable circumstances, to subside, as it were, into the milder form of A. L.

2.—Leprosy in topographical and political areas.

It would be superfluous to analyse every political sub-division in the country under notice; therefore, as Bhaonagar is the best known and by far the largest, embracing both coast and inland tracts, it will be taken as a sample of the rest; and this may be correctly done, because all the data fairly correspond. The political differences, too, are unimportant with reference to the subject in hand; but topographical distinctions call for particular notice. The two most prominent facts elicited by my analysis are these:—(a), the leprosy disease is most predominant in populous coast-areas; less so inland. A long line of barren hills (600 to 800 feet high) marks the distinction just stated; it may be said to commence westward of the capital and passes first southward, then westward, almost parallel with, and at a distance of 12 to 20 miles from the sea-coast: at the west, near Kundla, these hills subside into a broad watershed, across which is free and uninterrupted communication between coast and interior; elsewhere, the way is more or less impeded. Now, the Kundla district which has thus the freest passage to and from the coast, is precisely that area over which leprosy prevails to an extent comparable to its frequency coastward: whilst in Duskrohi, *i.e.*, at the opposite end of the hilly range, the transition from coast to interior is still somewhat checked; and here, as we pass inland beyond Sihor, we find a decided and even abrupt diminution of disease. True, the districts immediately beyond the hills, *e.g.*, parts of Kundla and Palitana, are much infested, but these areas have a reflex communication, as it were, with the coast; and there, too, further in the interior, leprosy ceases to become otherwise than rare.

(b) The disease subsides also north of the Bhaonagar creek and hilly range, in directions where both coast and inland areas exist. The Bhal is particularly noteworthy as a considerable, though rather barren, maritime area, where leprosy is quite absent; and this fact is sufficient evidence that mere proximity to the sea, has nothing to do with this disease. It might seem that scanty population and limited movement of people, were the sole cause of this exemption; yet better peopled and flourishing districts on the west of the Bhal (Wala, &c.) and to the north-west (Botad) are infested but very slightly indeed, and, in short, about these parts leprosy seems to have left, or not have reached, the country on both sides of a line running between the chief towns in the Bhaonagar districts, which form the northern parts of the State. Here the demarcating hilly range no longer exists, and the whole tract is a little elevated, undulating and not infertile plain.

Thus, as a combined feature, we find the leprosy disease gradually but decisively diminishing from south coast to north, and inland towards the north-west: and especially does it disappear northward of the capital. To a certain extent, a parallel example may be found in the peninsular portion of W. India, for the Concan (coast-lying) is rather more infested than the Deccan (interior); but neither here nor in Kattiawar, is the limitation of leprosy to the coast nearly so marked as in Norway; and, on the whole, ideas based on European experience do not apply to India with general strictness.

My next point is the mode of distribution of the disease in Kattiawar; and now, for the first time, I have noticed a certain method of dissemination, which deserves

particular attention. Taking the more infested districts, we find that while much of the surface is covered by disease, yet that even in Duskrohi, Talaja, Mhowa and Kundla (adding Gogha and Datta), leper-villages are not indiscriminately scattered; and the remark everywhere applies within these areas. Thus, the chief town always represents a chief 'focus' (whether of radiation or concentration I will not here discuss): next, the villages immediately around are affected, and beyond these pass off, as it were, 'lines' of leper-localities in various directions, which may meet and blend, or become continuous, with similar lines in adjoining districts. Examples are these:—around the capital of Bhaonagar are Nari, Tersimia, Rewapura; Wartej, Sidsar, Sampara and Budhel—the last four being all on a main road to Gogha, which further westward has leper-villages all along its course: around Sihor is another group; so round Palitana and Kundla; notably round Mhowa with its suburb of Kutpar; and so with Datta, Talaja, Trapaj and Gogha. Again, the larger towns and villages may also be regarded as secondary foci (as it were): witness Gariadhar (Palitana taluka), Wanda (Kundla district), Kuntaoda M. and Sedarda (Mhowa d.), Dihor (Talaja d.), Koliak (Duskrohi district). The 'lines' of leper-villages in all these more infested areas, are usually evident enough in the larger MAP; good instances are those connecting Jesur and Kundla, from Wanda to Mesanka northward and southward across the hills from Hipawadli to Vadali; also from

Kundla to Rajula, from Dungar eastward, and a very clear line from Bagdana to Talaja; others from Talaja to Trapaj, and along the sea-coast to Koliak and Gogha. Interruptions in these tracks are so rare that they may be regarded as confirmative exceptions, for I do not pretend to say that leprosy has passed in one direction only along the routes indicated—it may have come in opposite directions and not quite met: the most marked exceptional instance I have met with, is that of Nana Jhinjodra, a little eastward of Kundla (see the Diary for Feb. 9, page 24). In some cases a 'group' of leper-villages may be found clustering together, though not unconnected with other affected places; there are such groups at Mesanka and other places in Kundla, at Dugheri (see Mhowa), Gopnath and Dihor (Talaja), Paniali (Duskrohi). At present, I find hardly a single instance in which a leper-village does not form either a 'focus,' or a part of 'lines' or 'groups' such as those now mentioned.

Next advert to the less infested areas, a similar methodic distribution of leper-villages will be found. Thus the inland districts of Sibor, Umralla and Gadhdha, Lilia and Palitana, and even Babra, all display these striking features of 'foci' and lines of infested places, where alone leprosy is to be found; and from the circumstance of their isolation amidst numerous uncontaminated localities, such lines become even more distinct than they are in coast-lying and other areas more largely attacked.

By aid of the map and the subjoined table of statistics,

NORMAL AND LEPER STATISTICS OF THE BHAONAGAR STATE.

Districts.	Position.	Area in Square Miles.	Population.	NORMAL.				DISEASE.							
				No. of Villages.	Persons to Sq. M.	Village to Sq. M. 1 in	Mean Population of Villages.	No. of Lepers.	Lepers to Population; 1 in	Lepers to Sq. M. 1 in	Leper Villages.	Leper Villages to Total Villages; 1 in	Lepers to L. Villages.	Leper Village to Sq. M. 1 in	Mean Population Leper Villages.
Duskrohi	Coast	220	27,385	51	130	4.3	537	61	450	3.6	24	2.1	2.54	9.1	689
Talaja	Coast	220	28,952	78	135	2.8	371	56	517	3.7	27	2.8	2.04	8.1	452
Mhowa	Coast	620	84,432	181	140	3.4	469	141	600	4.4	60	3.	2.35	10.3	610
Kundla	Inland.....	550	74,455	103	140	5.3	716	131	568	4.2	52	1.94	2.47	10.3	1,047
Lilia	Inland.....	160	29,950	35	150	4.5	684	21	1,140	8.	13	2.7	1.6	12.3	934
Sihor	Inland.....	180	32,265	51	180	3.5	632	23	1,400	8.	8	6.3	2.8	25.	2,043
Umralla	Inland.....	220	34,824	55	160	4.	633	13	1,935	12.	9	6.1	2.	24.4	1,112
Gadhdha	Inland.....	200	24,027	39	120	5.	616	20	1,200	10.	7	5.5	2.8	28.7	1,388
Betad	Inland.....	250	27,896	40	112	6.2	697	1	27,896	250.	1	40.	.025	250.	1,423
Bhal	Coast	160	5,361	20	35	8.	281	0	.....	...	0	.....	...	.....	.....
Totals and Means.....	.....	2,780	363,817	652	125.8	1:4.2	563	472	1:771	1:5.5	201	1:8.22	2.3:1	1:13	1,067

my present and subsequent remarks will be made quite clear; and one can hardly help searching for some reasonable explanation of the phenomenon in question. In this place, I will only observe that fortuity or chance can hardly be held responsible for such marks of method; for even if amongst the several ways, in which leper-villages might be distributed in one area where they are numerous, it should happen that a focus, group and line be formed, it is not likely that a precisely similar arrangement should obtain in three or four other like areas adjoining; and still less is it probable that in all other places, where leper-villages are but few, the latter should still assume an identical disposition. Again, I have

failed to detect such a concurrence of local physical characters, as might serve to account for this distribution-method; and, so far as I know, neither climatic nor telluric conditions—as general elevation, hills and valleys, water-course and currents, vegetation and cultivation, kinds of soil and substratum, &c.—are so invariably alike as they should be, upon any hypothesis of this kind which may be proposed as sufficiently applicable to the case. Also, if we enquire of general population-features, no clear light appears: for example, the mean density of population all over Bhaonagar being 125.8 persons per square mile, the coast-districts have near 140 (excepting the Bhal with its 35), and the next adjoining districts

have upwards of 160 (Palitana and Babra have many more); whilst the two most northerly have over 100: hence if there be a discrepancy it is neither great nor fixed, and does not correspond to known frequency of disease. And the ratio of villages to the square mile, varies in no manner relative to absolute variation of leprosy: for Talaja has 1 village to 2.8 square miles, Mhowa 1: 3.4, Duskhrohi 1: 4.3, Kundla 1: 5.3—all these being much infested areas; whilst inland districts, little infested, differ not greatly from one or other of these, as may be seen in the table—only here the villages are generally rather more sparse than the mean.

Failing thus to perceive in statistical characters the desired clue, I would turn for guidance to such dynamical features as change and movement of local populations, degrees of intercourse between adjoining and distant villages, between villages and towns, towns themselves, and towns with capitals or other towns, &c., belonging to adjoining areas which have not yet come under scrutiny. The circumstances of my enquiry, as that of a stranger and passing visitor, being such as to exclude the possibility of verifying this view in detail, the question must remain for future consideration; nor should I attempt to judge if the leprosy plague has followed a particular track, in attaining its present distribution. However, I would insist upon the evidence above submitted that disease is now disseminated over the land after a certain fashion only; and as a possible solution of this enigma, I repeat that no leper-village is found to be isolated; but, on the contrary, that all such villages are connected with others immediately adjoining—the rare unaffected spots intervening, being temporary or incidental exceptions. For myself, all these data may be said to point to transmission of the leprosy disease by means of human intercourse.

3. Leprosy in towns, villages and hamlets.

From what is above stated, we might expect to find that lepers are present chiefly in the more populous habitations of man, and such is the case; although I was not prepared for the striking results given below. As a matter of convenience, places with not more than 100 inhabitants are here termed 'hamlets': those with not more than 400 are called 'small' villages; those with 500 to 1,000 are 'middle sized' villages; those having 1,000 to 1,500 inhabitants are 'large' villages: 'towns' have upwards of 1,500 people in them. The 652 villages, &c., of Bhaonagar (excluding the capital) presenting over one-half of hamlets and small villages, under one-third of middle-sized villages, less than one-tenth of large villages and rather over one-twentieth of towns, as now defined; the ratio of leper-villages in each section is as follows:—1: 5.7 of smaller places, 1: 2.6 of the medium sized, 1: 1.7 of large villages and 1: 0.2 of towns. Hence if an upright cone shall represent (as it may) the relative proportions of towns (apex) and small places (base of cone): an inverted cone will represent the same proportions of leper-localities, which become larger as we ascend and not as we descend, the scale of comparative populations.

Briefly, total villages, &c., being plus $\frac{1}{2}$ small, minus $\frac{1}{3}$ medium-sized, $\frac{1}{7}$ large:—

Leper villages are $\frac{1}{5}$ of small, plus $\frac{1}{3}$ of medium-sized, $\frac{2}{3}$ of large.

Free villages are $\frac{4}{5}$ of small, under $\frac{2}{3}$ of medium-sized, $\frac{1}{3}$ of large.

Amongst themselves, leper-villages are about $\frac{3}{10}$ small, $\frac{4}{10}$ medium-sized, $\frac{3}{10}$ large; therefore, villages of all dimensions being liable to have lepers in them, those of medium-size are so affected rather oftener than others. Only 5 in 43 hamlets contain lepers, whilst 29 in 43 towns have them; and, again, the mean population of all inhabited localities being 564, that of leper-localities is 1,067 or

nearly double, whence clearly appears the disposition of leprosy to fix itself in places larger than the average; and this statement everywhere applies. A further discrimination may, however, be useful; for, in Kattiawar, the most numerous villages on the coast are those having not more than 200 inhabitants, towards the north those with 300, and westward or more inland the most numerous villages have 5 to 600 people: while leper-villages do not correspond hereto, having coastward a mean of 4 to 500 inhabitants, northward an average of 5 to 900, and westward a mean of upwards of 500. Thus, when the disease is anywhere common, it may be said to affect by preference villages of 4 to 500 people—a circumstance which may be connected with a normal activity of people occupying villages of such dimensions: when leprosy is rare, it is found almost wholly in larger places. The mean ratio of leper-villages to total villages being 1: 3.22, it is noteworthy that in the several classes of habited localities, this ratio is found only in places having 3 to 400 people (such places being only one-eighth of the whole); whilst in smaller localities it rapidly falls to 1: 8 or 9, and in larger places it gradually rises to 1: 1 or even 5: 1, so that it is clear the disease tends towards larger collections of men, and such is the main lesson we derive from these general data.

Details are as follows, beginning with coast-areas. In the Bhal where leprosy is absent, there are only 20 villages, the largest of which contains about 1,000 people and 11 being hamlets, or little larger; and herein lies one probable reason of exemption, for we have just learnt that the disease is everywhere little prone to appear in small places. In the remaining coast-areas (including parts of Kundla and Sihor) small villages are comparatively numerous, yet they are seldom attacked so largely as are large places; for instance only one-third in Duskhrohi, one-fourth in Talaja and one-fifth of small places in Mhowa, have lepers; so that when disease is even frequent, it does not necessarily overflow or descend into such smaller localities. Westward in Kundla, however, leprosy is now unusually prevalent, and most of the medium-sized villages south of the water-shed are affected with disease—and that, I may add, of recent duration. Lilia, north of and virtually a continuation of Kundla, has also many leper-villages (13 in 35 total); but at the opposite extremity of the whole area, we find in passing northward from the coast a decided and rather abrupt diminution of leper-localities. Thus whilst around Bhaonagar (Duskhrohi pergunnah), leper-villages are quite frequent, yet in Sihor they are only 8 in 51, in Umrata 9 in 55, in Gadhdha 7 in 39 and finally in Botad 1 in 40. Excepting in Sihor (which embraces a prolongation coastward) hardly any small villages here contains lepers. Finally, bearing in mind that for the whole of Bhaonagar leper-localities are 1: 3.22 (i.e., 201 in 652), we find that for coast-lying areas they are 1: 2.5 and that for inland districts they are only 1: 4.3. The table above will furnish the separate items for each district (see column thirteen), but it will be an advantage to distinguish large and small places, both free and affected, and this may be done as follows:—

	Coast Series.	
Duskhrohi	contains 51 total villages of which 28 are small and 23 large.	
Talaja	contains 78 total villages of which 60 are small and 18 large.	
Mhowa	contains 189 total villages of which 129 are small and 57 large.	
	60 leper villages of which 23 are small and 37 large.	
	Inland Series.	
Kundla	contains 104 total villages of which 31 are small and 73 large.	
Lilia	contains 35 total villages of which 7 are small and 28 large.	
Sihor	contains 51 total villages of which 27 are small and 24 large.	
Umrata	contains 55 total villages of which 25 are small and 30 large.	
Gadhdha	contains 55 total villages of which 21 are small and 17 large.	
Botad	contains 49 total villages of which 18 are small and 22 large.	
	1 leper village which is large.	

Talaja is the only district in which the number of small

leper-villages, is in actual excess of that of large leper-villages; but it is also that district having the greatest normal excess of small villages: everywhere else, both coast and inland, leprosy has mostly attacked larger places. We see, too, that apart from the abrupt diminution disease undergoes in passing inland (compare Dus-krohi and Sihor which are contiguous and fairly alike), there is a kind of regularity in its dissemination which is noteworthy; thus, all four first-named and most infested districts above have about $\frac{2}{3}$ of large and $\frac{1}{4}$ of small villages affected. Afterwards descending in the scale of frequency, the tendency to location of disease in large places becomes very manifest. Again, let the three first districts be put together as a coast series, and let the three next be amalgamated as an inland series, then we find as follows:—affected small villages are about $\frac{1}{4}$ and $\frac{1}{5}$, affected medium-sized villages are over $\frac{1}{3}$ and near $\frac{1}{3}$, and affected large places are $\frac{6}{7}$ and $\frac{5}{7}$ respectively; these ratios, too, offering much less dissimilarity than might be anticipated, were there not some underlying influence, which seems to determine not only the absolute but the relative frequency of leprosy, as regards groups of men in whom the disease appears. This subject will be further discussed below, under heading 5, para. 2, 'Spread of Leprosy.'

I have stated that the mean population of all leper-villages, is nearly double that of total villages in Bhaonagar generally; and, in detail, we find that the former always exceeds the latter, but not so much coastward as inland. For example, these three coast-districts give 459 as normal mean population, and 583 as mean population of leper-villages; and three next inland districts give 677 and 1,341 respectively; further inland, the disproportion is even greater, so that it becomes evident the diminution of disease interior and northward, is associated with its location in places of larger, and much larger, population than the mean of all places in the areas infested. In other words, as leprosy is less developed, so it tends to appear only in the more populous villages or towns.

The degree to which leper-villages are infested will be considered below, but I may here observe that of 202 such villages in Bhaonagar, 105 (or over one-half) have but 1 leper; 48 (or near one-quarter) have 2 lepers, and 49 have 3 or more lepers in them: there being a rather striking uniformity in these ratios, for the districts taken separately. As to the dimensions, &c., of the several villages thus classified, the following brief comments are subjoined.

My analyses include the distinctions of *single l. v.* and *multiple l. v.*, or places having one, and places having two or more lepers in them; and the summary of results is this:—small villages have seldom more than 1 leper; but in Talaja with an adjoining part of Sihor, and in Kundla they have in general 1.6 : 1: medium-sized villages have seldom more than 2 lepers; exceptions chiefly Talaja with a maximum of 3: large villages have seldom more than 2 lepers; exceptions in Talaja and Gadhdha (4), Dus-krohi (3), in several districts less than 2: the largest places, towns, &c., vary considerably, but there are always most lepers in them. In Dus-krohi, we find the number of lepers gradually increases according to size of villages attacked, which would seem to be a likely event; yet in Talaja, the comparatively few medium-sized villages are those having most lepers: elsewhere, the predominance of disease in the large towns is decisive.

On classifying 271 total known localities, I find 115 inland and 156 coastward: in both areas the proportion of vill. with one leper is the same, *viz.*, 1 : 1.65—a remarkable coincidence; vill. with two lepers are rather more numerous (proportionally) inland, *viz.*, 1 : 3.5; vill. with 3 lepers much commoner coastward, *viz.*, 1 : 12; vill. with 4 lepers about inland, *viz.*, 1 : 11.5; but those with upwards of 4 lepers are most frequent coastward. On the whole, while the starting-point (vill. with one l.) is the same, there is a more uniform series coastward than inland; but Kundla resembles the coast-districts. The disease, then, advances in

no fixed proportion: *e.g.*, Mhowa presents a series of 41, 11, 5, 3, 5 and Kundla one of 14, 12, 5, 3, 1, corresponding to villages with 1, 2, 3, 4 and *plus* 4 lepers respectively: and when most frequent, it expands at the two extremes of such series, preserving meanwhile a certain common mean. In drawing these comments to a close, I would remark that the bare number, or even the proportion, of leper-villages which are to be found in a country, may be of less significance than the dimensions and position of such villages. The first-named data do indeed indicate the general amount of disease, but more is to be learnt; and when we discern the fact that infested localities are usually important villages and towns which, besides, have a definite local relation to each other, then the interest of the subject rises considerably. Until now, I have been unaware of these last-named, valuable data; and, for the future, could suggest no enquiry regarding the wide-spread leprous plague of India, more likely to be profitable than an extended research of the kind attempted in these few pages.

Leprosy in hamlets.—Disease springing up in a small cluster of dwellings, must always attract the particular attention of sanitarians, because of the seemingly greater facilities then presented, for detecting disease in its lair. Hence I append the following *memorandum*. Places having not more than 100 inhabitants are here termed hamlets, and they comprise, in Bhaonagar, not more than $\frac{1}{4}$ of all inhabited localities. 36 of the 45 hamlets are found in coast-districts—namely, in Mhowa 17, in Talaja 11, in Dus-krohi and the Bhal 8; and here only are found the 6 hamlets known to contain lepers. In 12 small places, nearly all situated in coast-areas and not containing more than 50 people, no disease is present; and as these unaffected spots are all of their size I can find, we learn how little liable the like are to become infested. Hamlets are not, usually, close to large villages or towns; but, as with other localities, when affected, they are always in direct communication with adjoining leper-homes. Dus-krohi, Talaja, Mhowa, in this order have more leper-hamlets in proportion to hamlets free of diseased inmates: Talaja has absolutely most. I have inspected the lepers from 4 of the 6 affected places—*vide* the diary for Gopnath, Bhungar, Neswad and Bharbaria (Khera and Bodla were not visited), and find that their disease may have been introduced; three times, at least, it may have been hereditary. Both mild and severe disease were present: all the sick were males: duration of complaint varied from 1 to 20 years: Bhungar (with 76 persons) and Neswad near Dihor (with 54), had each 2 lepers; the rest have only 1. No peculiarity seems to attach to the affected places, which appear to have been attacked in the same incidental manner as larger habitations, and certainly in far less proportion: hence the occurrence of disease in these small spots, is simply evidence of the wide dissemination of leprosy in the more infested coast-districts: even recent complaint may reach them. At Gopnath, the single leper was an immigrant, and in the other three places I know of, while evidence often pointed to indigenous origin of the disease, there was always a possibility of its really extraneous introduction.

Non-leper villages.—Whenever convenient, I visited such places for information complementary to that which it was my chief object to acquire. Of the 35 non-leper villages seen, 23 were inland (chiefly in Palitana and Songadh) and 12 in coast-areas (Dus-krohi and Talaja mostly): there is nothing peculiar about them; their dimensions were small or medium-sized; they are situated near or amidst affected places. With one exception (Akwada near Bhaonagar) the existence of previous disease was always denied—a circumstance which, if even proximately valid, points to the late appearance and spreading tendency of prevailing disease. Generally, it was impossible for me to account for the absence of leprosy in these places, especially in those on the coast, like Kotra Mota and Kotra Nana, &c.; and, in fact, the immediate question soon became—not how did this happen, but why

were near localities, or any localities, ever attacked? The distinction here implied is important. Very rarely, I heard of leprous individuals who were born in one of these non-affected spots (e.g., in Alang on the coast); so that it might be that the latter had become emptied, as it were, of their leprous population and the circumstance been forgotten; there is, too, another series of places where existing disease is now declining and which must soon become void of lepers. Such places are, with one exception, on the coast, and I may mention Sartanpur as an instance; but the converse fact holds good, that more numerous than such, are villages near which have lately become affected, so that here we see the conjoint phenomena of subsiding and uprising disease—the latter most prevailing.

Summary of this section.

1. Wherever found, leprosy is most frequent in villages beyond the mean in size.
2. When in much infested districts, small villages abound, they are not infested beyond a certain proportion.
3. When in like areas, small villages are fewer than the mean, they are still affected to a similar extent.
4. Under all circumstances, the proportion of large villages which are affected, exceeds that of small villages; and when leprosy is at its minimum, it attaches to a large village.
5. Hamlets are seldom the home of lepers.
6. Single leper-villages are everywhere more frequent than multiple leper-villages.
7. In much infested areas (whether coast or inland), single leper-villages maintain a nearly uniform proportion to the multiple.
8. They are commonly large villages, but not so in districts with many small villages.
9. When small villages are few, the ratio of single leper-villages remains nearly constant.
10. When leprosy becomes rare, the proportion of small single leper-villages is reduced.
11. Multiple leper-villages are always fewer than the single, but in much infested districts their proportion is nearly uniform.
12. They are commonly large villages, and may be so always in much infested areas.
13. Non-leper villages are not outwardly distinguishable from infested localities.
14. All leper-localities are connected, and they are universally arranged in groups or linear series.

4. *Leprosy in the Individual: leper statistics.*

Under the first heading, I propose to utilise the copious notes of leper cases which are furnished in the Diary, by some brief comments on the form, commencement and termination of the leprous disease, as now witnessed in Kattiawar.

Forms of leprosy met with.—I have already pointed out that there are two chief signs, phases or forms, namely, a nerve-affection and a skin-eruption, and may here repeat that when the first predominates the affection is commonly termed nerve-lepra or anæsthetic leprosy (A. L.); and when the skin-changes consist of prominent or accumulated growth, it is known as nodular or tubercular leprosy (T. L.). The distinction thus implied is an important one, for as tubercular leprosy is undoubtedly the more severe and acute form, its comparative prevalence becomes a valuable indication of the intensity and activity of disease in an infested country.

a. Frequency of the two kinds of leprosy.—In Norway the severe form is somewhat the commoner, and so in Crete and Syria, but in W. India the milder variety rather predominates. Thus of 262 lepers seen in Kattiawar, 125 or 44 per cent. may be regarded as having T. L., and 137 or 56 per cent. as instances of A. L.: hence

the inference that leprosy, if not very severe, is still a sufficiently flourishing malady in this province.

b. Their topographical distribution.—I had long wished for some opportunity to enquire into this point, which is one hitherto almost overlooked; and I have, therefore, closely scrutinised these new data, with the following results. Everywhere in the more infested districts (which alone were visited) both forms of disease are closely intermingled; and of 89 inspected leper-localities, 36 had A. L. only, 28 had T. L. only and 25 contained both varieties: on the whole, there is rather more T. L. inland, and rather more A. L. on and near the coast. Again, when there is but 1 leper in a village (wherever situate), or when there are 2 lepers, then A. L. is commonest; but where there are 3 to 5, or 6 to 8 lepers in a village or town, then T. L. predominates; and where there are upwards of 10 lepers in a town, the milder form again becomes the more frequent, though here the inference is of modified value because lepers are not seldom immigrants from outside. A. L. by the mutilations it produces, soon disqualifies for labour; but it does not at once greatly affect the general health, and hence the now destitute leper is still able to wander about and beg. T. L. if at first less disabling, sooner interferes with the bodily health; and long journeys then become impracticable. Generally, A. L. is slightly more diffused than T. L.; but not universally, for in the coast districts of Duskrohi, Talaja and Mhowa, I found 90 cases of the former to 76 of the latter, and inland at Kundla and Palitana, 38 cases of A. L. to 48 of T. L. When one comes to individual localities, there is often a remarkable predominance of one or other form; thus in the first two villages I inspected there were found either T. L. alone (Budhel) or A. L. in excess (Wartej); other instances may also be quoted—see for T. L. alone Jesur, M. Jhinjodra, Bhadada (all inland) and Jabbal, Dihor, Gorkhi (all coastward): A. L. in numbers is more rarely seen alone, but it was so at Hipawadli (inland), at Dugheri, Rajpura and nearly so at Koliak (coast). From series like these, there appears a tendency in both mild and severe disease, to propagate its own kind; but no rule obtains. Before entering a leper-village, one cannot surmise correctly the form of disease which shall be met with; and, in brief, I think that individual rather than local circumstances do, in some way, determine the result. Such circumstances may be common in a family, for I find that of 12 couple of leper-brothers, 8 had both T. L., 3 had both A. L. and in only 1 pair was there divergent disease. I should add, however, that both forms are sometimes seen to alternate in a family, and that the distinction of the two kinds has reference solely to amount or degree of disease. T. L. may on subsiding leave only permanent deformity and numbness; and nerve-disease may precede the nodular form.

With regard to *sex, age, &c.*, women are more subject than men to the milder affection; thus whilst of all lepers females are about $\frac{1}{4}$, of all with T. L. they are only $\frac{1}{5}$, but of all with A. L. they form $\frac{1}{3}$. Age seems to hold no special relation to the appearance of either form of leprosy; only in Talaja, I note a not inconsiderable number of related and unrelated children, under 15 years, with T. L. As to the influence of temperament in determining the advent of the mild or severe disease, it is difficult to decide whether or not the individual temperaments (apart from race) which we notice amongst Europeans, are to be seen in natives of India: only I have thought that a 'lymphatic' habit of body is less rarely associated with nerve disease than a 'spleen' habit; yet there are exceptions.

Lastly, I am unable to state what are the characters of leprous disease in the less infested districts of Kattiawar, where the malady may be either increasing or diminishing; yet information of this kind might aid us in ascertaining the conditions under which the strikingly diverse forms of leprosy respectively do flourish, and I

would venture to suggest that in future returns of lepers, two columns be added for entry, first, of cases showing numbness and mutilation of fingers and toes (A. L.), and secondly of those showing swellings of ears, face and trunk (T. L.); it might also be shown when both these groups of symptoms concur (Mixed L., which is virtually T. L.). The people themselves understand the distinctions here implied, and their popular names seem to shadow them forth: thus 'sun,' 'sunbahiri' is numbness or nerve-lepra; 'kod' is the skin eruption; 'ragt-piti,' 'pat,' 'pat-garmi' is the tubercular disease or a mixed form. Entire confidence, cannot be placed in these common names, but an intelligent clerk would be able to carry out a useful classification of disease, in any future enumeration of affected persons.

2.—*Mode of commencement* of leprosy.—It is interesting, and not unimportant, to learn how lepers express themselves on this point.

(a). *Early symptoms*.—In 137 cases of A. L., I find that nerve-affections, such as heat, pain, tingling, numbness, &c., were definitely named as an early symptom in 35, and including vesicle or blebs, abscess or sore, in 68 or one-half the whole: 22 times an eruption was the first sign noticed, and then neuritis follows. The rest could give no clear account of the approaches of their insidious malady, and I am of opinion that the non-painful skin affection, oftener than is indicated, had heralded the complaint.

(b) *Part first affected*.—In 42 of 84 men, nerve-disease began in the right hand 22 times, and 11 times in the left; 5 times in the right foot, and 4 times in the left; or altogether in the hands 33 times, and in the feet 9. In another series of 42 cases, it began in both hands 24 times and in both feet 18: altogether, one or both hands were first affected 57 times, and one or both feet 27 times. These are the only localities ever named. Women with A. L. also have the hands oftenest affected (thus hands 13: feet 6). Vesicles and numbness are commoner than eruption (L. L.) amongst men, in the ratio of 30 and 23 to 16: in women, numbness and eruption are commoner than vesicles (12 and 6: 3)—a difference possibly due to their less sturdy manual and tramping occupations.

(c) In 36 instances, or nearly $\frac{1}{4}$ of the whole number I inspected, T. L. began with symptoms of nerve-disease, and this estimate may be below the truth: it commonly begins with an eruption of reddish spots on the face, hands, feet or trunk; also with swellings (the so-called 'tubercles'), bronzing or desquamation, which are all sometimes attended with fever. Dyspepsia is mentioned as a precursory symptom in T. L. oftener than in A. L.

These data confirm previous experience and the inference therefrom, that leprosy disease very frequently, at least, commences upon such exposed parts of the body as the hands, feet or face—whence is encouraged the idea of an infection from outside. It is noticeable, too, how frequently 'neuritis' is named as an early sign, and this may be partly due to its being attended with some personal discomfort: I formerly supposed that the inflammation of the nerves which is peculiar to leprosy, was its primitive and essential sign; and even if a skin-affection (slight or transient) do actually precede—as is likely—still, for diagnosis, such early symptoms as neuralgia, numbness, &c., are often those alone available. We learn from the above data that ultimately severe disease may begin with comparatively mild symptoms, and the lesson is a valuable one for prognosis.

3. *Progress and termination* of leprosy in Kattiawar.—Notwithstanding the mild climatic influences of this country, its infesting plague is not less hurtful and destructive than the same malady elsewhere. Here no sight is more affecting than that of a leper at home. For her or him there is absolutely no aid or attention, other than such as ignorance (however well-meaning), indifference or prejudice may entail. Not a tithe of the lepers in the province are in reach of medical aid, and

not a hundredth part have a suitable dwelling-place. I have had occasion to note all the manifold inconveniences and sufferings, which the worst degrees of disease inflict upon its victim, but must refrain from their enumeration. Be it enough to say that leprosy in these parts is a severe and, as yet, an unmitigated evil: it runs its usual course unassuaged, and the last scene of all is too often witnessed with an impatience not calculated to satisfy or encourage those humane sentiments, which it is surely our duty to inculcate.

I have no data for ascertaining the mean duration of leprosy in Kattiawar, but infer that it is as prolonged here as elsewhere, and may extend from 6 or 8 years (T. L.) to 15 or 20 years (A. L.). My large work contains some information derived from other sources, whence it appears that the mortality in asylums of T. L. is about double that of A. L.: that the mean age of lepers at death is, in Norway, about 42 years, in the W. Indies about 32 years, and in Bombay about 37; those affected with T. L. dying at 36.2 and those having A. L. at about 50 years. In Bombay I found 46 per cent. of the males died between 30 and 50, and 51 per cent. of females at 20 to 40 years.

LEPER STATISTICS.—Sex, age, caste, occupation, &c. of lepers.

1. *Sex*.—It has long been known that in India, male lepers are greatly more numerous than are affected females; thus, my estimate for this Presidency was as 4.3:1 respectively: in Kattiawar, the ratio is similar but rather less diverse, viz., 3.3 males: 1 female, or by percentage 69.4 and 30.6 respectively. I have already stated that the normal population rates are about 57 and 43 per cent.; whence is evident the greater liability of males to the leprosy disease. Different parts of the country vary in the proportion of their leper-sexes, but in none having considerable numbers of affected persons, are females most often affected or are the sexes even equally attacked. Coastward, the districts show a slightly larger ratio of female lepers (viz., 32.3 per cent. or 1:3.1), while inland it is otherwise, females forming 28.6 per cent. or as 1:3.5; and in both areas there are local divergences worthy of notice:—thus in Talaja (coast) males are as 6:1, and in Lilia (inland) they are 9:1: at the extreme north (Gadhda), where leprosy is comparatively rare, there is but 1 female in 20 lepers, but as in Umralla, which is close by, there are 5 females in 14 subjects, no rule can be said to obtain universally, and when the number of lepers is very small, the presence or absence of a single infested family may make a great difference in the sex-ratio. The main fact, however, as above stated and notwithstanding certain objections, always hold good.

A brief comparison of our eastern data on this interesting point, with others from Norway, Crete and Palestine, serves to show that experience in India is somewhat peculiar: thus, as regards Norway, in general the two sexes are affected in proportions very near the normal, but in particular parishes I find (*vide* Addendum at the end), variations of excess in either direction, which are considerable and only rarely equalled in Indian villages or towns. In Crete, too, the sexes are very evenly attacked; and the difference is not great in Palestine, even in isolated instances. The normal populations of India have a slight but decided excess of males, and the leprosy a very large excess.

As regards sex in the mild or severe forms of disease, I find that of the former (A. L.) women are $\frac{1}{4}$ of the whole instances seen in Kattiawar, and they form only $\frac{1}{2}$ of all cases of T. L. When the hereditary transmission of leprosy is admitted, the male line is specially named by males; and perhaps it may be said, that men are most exposed to the originating cause of disease (whatever this may be), or to predisposing causes, i.e., to various hurtful influences.

2.—*Age*.—(a) *Present age*.—Here, as elsewhere in Wes-

tern India, the leprosy disease will be found most prevalent during the most vigorous periods of life. In much infested districts, only 5 per cent. of lepers are children under puberty, and in less infested parts only 2 per cent.; the entire normal population having 44 per cent. At from 16 to 30 years of age, 36 per cent. are found on or near the coast; 27 per cent. inland: from 31 to 45 years, the common percentage is about 38: at from 46 years onwards, but 18 per cent. of lepers are found in the worst districts, and 33 per cent. in those least infested: 9 per cent. only of the normal population belongs to this period. There are some interesting local variations; thus, when disease is rife, it is found amongst rather younger individuals, and in Talaja—a long infested area,—the earlier general age of lepers is noteworthy. Leper girls are proportionately more numerous than leper-boys: and so leper-women after the age of child-bearing proportionately increase.

These results are in general accordance with previously acquired data; and for evidence of this I may refer to page 150 of my large work, where, too, collateral data are recorded regarding age of lepers at death (*vide* p. 140).

(b) Age at beginning of disease, as learned from the sick.—From this source of information we find that the malady may begin at any period of life soon after birth. I have never met with leprosy in an infant, nor have I seen it in children under the age of 5. My tables show that 16·7 per cent. of lepers (girls proportionately oftenest) date their malady from childhood, in the more infested districts (specially coast); whilst elsewhere, about 9 per cent.; and that 39 per cent. acquire it between 16 and 30 years coastward, 45 per cent. inland; where also 14 per cent. date the complaint after 45 years, but only 11·8 per cent. in the infested coast areas. The instances of later origin I find to be chiefly of the form A. L. and some are possibly instances of simple neuritis. In both sexes T. L. commences at an earlier age than A. L.; yet this rule does not hold for Norway. That leprosy is never congenital in date is an important practical point, for it encourages the hope that by suitable isolation and general treatment, the children of lepers and others who have been particularly exposed to infection, might be reared in future safety; and that disease commonly appears in the course of adolescence is also a significant fact, which indicates that under ordinary conditions, even full bodily health and strength are no guarantee against its onset.

3. *Caste: Occupation, &c.*, of lepers in Kattiawar.—This subject is of interest, but it could be fully discussed only with the aid of more complete normal statistics than are available. I have no means of ascertaining the relative numbers of even the more common castes, whether in whole or in separate districts; and hence must be content with a bare enumeration of the results of my leper-census. The castes of 577 known lepers being on record, I note the following items:—common castes—*Kolis* 151 lepers, most frequent in coast-areas and especially in Talaja and Mhowa; *Kolis* however form a considerable proportion of the leprosy population in some inland districts, since in Palitana, Gadhda and Babra, they are also about $\frac{1}{2}$ of the whole; in Kundla they are rarer found: everywhere, their occupations pertain to agriculture or common labour. *Kolis* are usually poor and indifferently lodged and fed: they will sometimes eat fish, &c., but the large section (talubdas) rigorously abstaining from animal food are by no means free from this disease. *Kunbis* or the farmers proper, are much less often affected (47 in all); but in Kundla there are more of them leprosy than of *Kolis*, and in Palitana, Umralla, there are also several: there are no leper-*Kunbis* in Mhowa and only two in Talaja—a striking contrast. *Kunbis* never taste animal food; they are fairly lodged and fed and may be wealthy. I have seen most marked disease in these well-to-do and abstemious families; and that the upper ranks generally are not spared, is shown by the 'Garassia' class (not strictly a caste) who are usually the

hereditary land-owners; 19 names are in the lists, all are coast residents, and in detail of the Duskrohi, Gogha and Talaja districts. This circumstance seems to show that where leprosy becomes common or has long lasted, it spares not the higher sections of the community; men of known ancestry and high social position being occasionally affected (see Datta, &c.). There are 25 *Brahmans*, who also are found in the coast-districts (7 in Talaja only)—additional evidence of the wider permeation of leprosy in these parts: there are hardly any lepers of this high caste in the inland areas. *Brahmans* as priests, &c., never want decent food and lodging: in a few villages they are the agriculturists. The respectable *Wanias* amount to 32 and the majority are found in Kundla, particularly in the chief town of that name, which in this respect contrasts greatly with the adjoining town or suburb (nearly equal in size) of Sawar Samapadar. Here is further proof that leprosy spares not the well-to-do merchants, shopkeepers, &c., of the more prosperous areas. *Wanias* are like *Brahmans*, &c., strict vegetarians: in Kundla they often have the milder form of disease. *Rajputs* (14) may be of any social grade and are not necessarily rich men: they are chiefly in service, once the military: several lepers among them are found in Talaja and also in the Sihor district which adjoins—a noteworthy limitation. *Kumbhars* (potters by trade) number 45: they are commonest in Kundla and the coast. *Bhurwads* (herdsmen) only 16, chiefly in Mhowa and the south: a very small proportion; these people live more in the open air and mix less long or intimately than others, with large settled populations. The number of oilmen (13) (*Ghanchis*) in Mhowa and Babra alone is noteworthy: I once thought that (*e.g.*, in the Deccan) these pressers of oil are particularly liable to leprosy, from predisposition possibly due to an oily state of clothes or skin; and in Crete this idea seemed supported by evidence. *Pancholis* (10) are rustics sometimes leprosy in Mhowa. In Kundla a few *Wagris*—so-called low-caste aborigines—are lepers. *Ayars* (also in Kundla) are a local race sometimes affected; and so the *Sagars*, in the same district: a few *Charans*, a pastoral people, or agriculturists, like those just mentioned, are found in coast-areas; *Raouls* are still fewer; *Kattis* (10) in Kundla and Lilia, are another indigenous race of farmers, labourers—once like *Kolis*, *Rajputs*, &c., apt to be turbulent; a few *Lohanas* (agriculturists, &c.) are found inland, westward. *Bhils* (aborigines) are very rarely lepers.

Artisans are not spared, thus there are *Sonars* (goldsmiths), *Sutars* (carpenters), *Lohars* (blacksmiths), *Mochis* (shoemakers) and *Khatris* (weavers of one kind); *Durzis* (tailors) and *Babars* (barbers), whose possibly close official connection with the persons of other lepers was a point I always bore in mind, but without eliciting clear evidence of contagion.

The low-caste *Dher* and *Bungy* (scavengers, weavers, messengers, &c.) are not specially attacked with leprosy (13 and 5): they live apart, are poor and will eat almost every kind of food.

The mendicant classes of devotees are widespread, if not numerous; several are lepers: thus *Bhawas* (9) in Kundla oftenest, and *Jogis* (8 on coast mostly), *Sadus*, *Fakirs*, &c.: and these instances appeared to me noteworthy, from the possibility of their contributing to the spread of disease during their long wanderings, and in the crowding of people at 'jattras' or pilgrimages.

Reverting to the influence of occupation, I have lately received (through the kindness of Mr. Peile) a memorandum from an old native practitioner at the inland town of Nowanagar, Mr. Shet J. Vittelji, who remarks that "the disease seems to prevail most among the 'Ghanchee' people"; he adds that it does not appear to have increased of late, but that no register of lepers has been kept at Nowanagar.

Mahomedans or *Mussalmans* follow various occupations: they will eat animal food, are seldom wealthy in these

parts, and are sometimes lepers (28). Most are of indigenous origin, being converts in bygone days: those affected are found chiefly in Mhowa and Kundla. Sub-divisions in my list are Memons (traders), Khojas (ditto and not infrequent at petty courts), Borahs and Khattris or weavers (a common occupation), and Sepoys.

I find also *Sindhis* and *Arabs* (in Mhowa—the nearest maritime area to their former homes) amongst the number of lepers: and there are a few other isolated individuals, also strangers, in the list. Altogether about 45 castes of Hindus, 5 divisions of Mussalmans and 5 of other races have been enumerated. No European or half-caste is entered.

The several districts of the area under consideration offer the following peculiarities as to the caste of their lepers:—Coastward—Duskrohi has most Kolis, Kunbis, Garassias, Brahmans and Wanis: Gogha has Kolis, Garassias, Malis (agriculturists) and Kharaks (labourers): Talaja has Kolis, Garassias, Brahmans, Kumbhars and Rajputs: Mhowa has Kolis, Kumbhars, Ghanchis, Mussulmans, Brahmans, Dhers, Bhurwads, Babars, Mochis, Charans, Jogis: Kundla has Kolis, Kunbis, Wanis, Kattis, Khattris, Wagris, Sagars, Ayars, Mussulmans and artisans: Lilia has Kolis, Kunbis, Kumbhars: Palitana has Kolis and Kumbhars; Sihor has most Kolis, Rajputs and Khawas: Umralla has some Kunbis, Kolis, Rajputs and Mussalmans: Gadhda has Kolis and Wanis. Botad has a single Bhurwad; Wala also one Bhurwad: Lati has a Sonar leper. Babra has Kolis and Ghanchis: other scattered towns and districts of Gohelwar and Songadh have instances (mostly isolated) of one of the commoner castes named above.

In conclusion, under caste of lepers I find that there are noteworthy peculiarities, in these several detached areas, which seem to point to the following conclusions:—(a), in the most infested districts there are caste-groups which are disproportionately large to normal relations: (b) in the same districts the higher, or less accessible, castes may be largely attacked, either as a final outcome of the leprous epidemic (so to speak) or because they are most fixed in residence, or from their being virgin soil (as it were) for a renewed outbreak: (c) in adjoining towns separated individuals of the same rare caste may be attacked: (d) in many larger villages or towns special castes are implicated, which though common enough, are yet particularly often named: and (e) in the less infested inland areas we notice a larger variety of castes in proportion to number of lepers, than elsewhere; a circumstance which may be indicative either of original variety of infection, or of multiform points in subsidence of disease. In short, whilst leprosy attacks all castes and races, it yet probably does not attack them proportionately to their respective populations, preferring rather certain groups, large or small, in certain areas; and this doubtless in accordance with local events, which would have to be specially searched out. A somewhat prolonged local enquiry, therefore, is necessary for full elucidation of the points now indicated; and the above suggestions may serve as a guide thereto.

With reference to the influence of occupation in inducing the leprous disease, I have not detected any new facts. The great majority of men who are affected toil at field-work on the ordinary crops, and many women are field-labourers: cotton-pickers as lepers have not come before me. Women, too, make up the cow-dung cakes used for fuel, which are piled up in every house for months—are they ever a medium of infection? Potters work with wet earth, sometimes mixed with dung: shoemakers with leather, often rotten; dyers with foul liquids, &c. Disabled lepers are sometimes occupied in watching the crops. The constant handling of dirty cattle is universal, and uncleansed animals are usually lodged at night in the closest proximity to men. Tradesmen deal in cotton and piece-goods, and there are weaver lepers. All people daily handle grain and uncleansed agricultural implements. In elucidation of the prime datum that leprosy first manifests itself upon exposed or unprotected integu-

ment—notably the face, ears and limbs—nothing has suggested itself, beyond the idea that hard manual or foot-work, constant contact with vegetation-products and soil, pure and impure, contact with skin and excreta of ill-fed domestic animals, and incessant exposure to heat and dust, may be both predisposing causes and actual media for the conveyance of disease germs. The latter, if there be such, are an independent agency; and assuredly, the hardest labour will not produce neuritis—certainly not specific neuritis—without the superaddition of some sort of essential influence. What this is can be ascertained only by inspiration, or by close enquiry on the spot—means yet failing or untried. The occupation of fishing has no part in the production of Kattiawar leprosy.

5. The present history of leprosy in Kattiawar.

A.—Its origin.

Respecting the prime origin and early progress of the disease here, I have not succeeded in procuring any definite information; and therefore passing over these interesting topics, I proceed to an analysis of certain data which concern only the present state of matters. I would remark, however, that the history of other lands clearly shows that leprosy may be introduced amongst a people, and may spread or decline and finally disappear; yet of the essential conditions under which all these phenomena take place, not much is known, because it happens that such events have hitherto occurred in countries and at times, when and where competent observers were not present. It is quite certain that the malady in question has long prevailed in India, and I know of no reason why it may not have been subject to exacerbation and decline, just as is supposed, on good grounds, to have happened in Norway: the question remaining still *sub judice*, what are the conditions attending such movement of the pest.

My enquiries long since elicited evidence that leprosy is not evenly or universally spread over large areas, and a fair instance in point is this one of Kattiawar. Thus, the malady may be said to be endemic in certain districts, and to occur sporadically around them: I am not aware that it ever assumes the characters of a true epidemic. After gaining a footing, it would seem to slowly spread in some directions, whilst it may at the same time decline in other parts; thus spreading and subsiding locally, yet not without following a kind of method or regular course. And, without forcing analogy between individuals and society, such may be said to be the course of the malady in personal subjects.

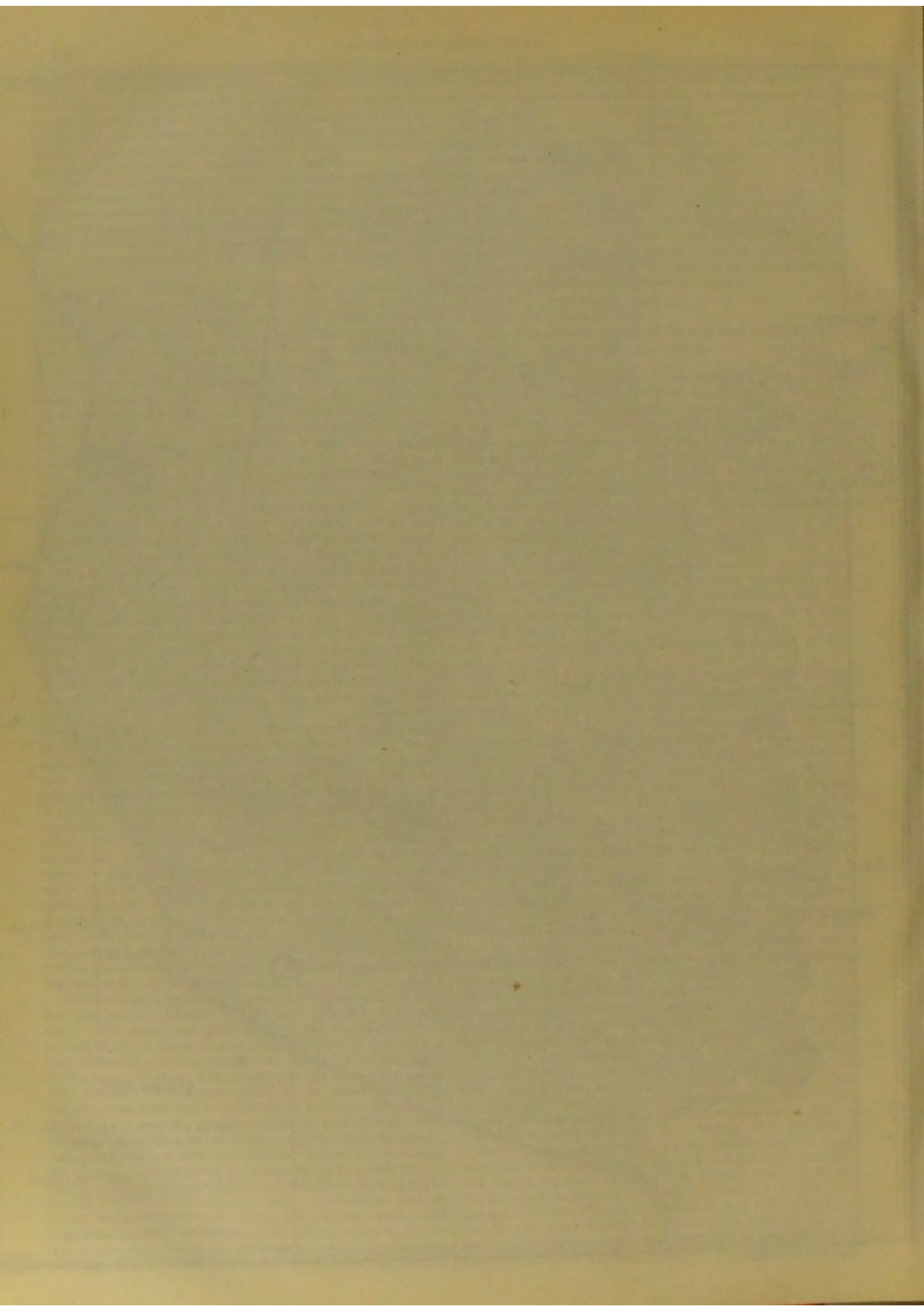
I have above shown what are the present tracks of leprosy in Kattiawar, and what its preferred locations; and now turn to a point of more immediate concern, *viz.*, the alleged *duration* of existing disease. None of the hearsay evidence or traditions which were collected, carry back its history beyond the earlier part of the century, and one must assume, in the absence of written records, that either village authorities are short memoried or there was really not much earlier disease. A notion widely prevails, that the coast-districts about Talaja have long been the chosen haunts of leprosy, but I did not find old disease to be common there. On the contrary, setting out the whole area under notice—as is done in MAP No. 2—we see that scattered over the land, are several instances of long-existing complaint; this is doubtless chiefly A. L. or the milder form, but it must serve:—for example, old leprosy will be found between Gadhda and Umralla in the extreme north; next, on a line leading thence southward to Lilia and Kundla; and, again, starting at Sihor old disease may be traced *viâ* Bhaonagar through the Duskrohi district to the sea-coast at Hathab. There is another line of old cases from Kundla eastward through Palitana, while south of Kundla are remarkably few such; also very few in Mhowa (coast) where they give the impression of divergence from (or



SECOND MAP

SHOWING
 NO OF LEPEBS IN EACH VILLAGE
 Figures outside circle
 (When no fig then one leper only)
 NO OF YEARS DISEASE HAS LASTED
 Figures inside circle

For names of Villages see first Map.



convergence to) the chief town—the rare distant villages or towns with old disease (as Sedarda, Monpar), being in probable connection with tracks passing through neighbouring districts: there are a few old foci of leprosy in Talaja near to Gopnath and Trapaj, but here such are very sparse. On the whole, then, it appears as if leprosy had been widely, yet not irregularly, scattered over the country, and once had almost died out on the coast; whilst quite recently, it had become re-kindled, as it were, and again pervades the land, but now chiefly coastward and in districts having freest communication therewith. Perhaps the old foci, as I have termed them, were the starting-points of this new outbreak; they are themselves not without a connected or somewhat regular position, and now we note that no village with lepers is strictly isolated from other affected places: almost certainly the route taken by existing disease is not a fortuitous one. Fresh localities are amongst those lately attacked; and, I would repeat, it is not an inconsistent supposition that the lines of advance depend in great measure upon such local conditions, as course of traffic or intercourse, and general movements of the population.

Still considering the possible origin of present disease, I have analysed my notes of 40 villages having but *one leper* in them with a view of learning if there be any peculiar conditions attached to such instances, which would elucidate this subject. Of 22 villages containing a single case of A. L., 13 were on the coast (10 being small places with not more than 100 houses) and 9 were inland (6 being small): in the 9 latter there was rarely any history—doubtful or decided—of pre-existing lepers, while in the 13 coast-lying villages there were 9 with a probable, and 4 with decided history of previous disease; and hence the inference that fresh disease is now extending inland. Of all subjects, 13 at least were born in their village; 7 at least were born at a distance and these were found inland; hence here the fresh disease seems to have been introduced. Contact with other lepers was admitted as possible 17 times, stated as unlikely 5 times: hereditary taint was comparatively rare, *viz.*, 1 direct, 3 collateral or distant, amongst the 19 males; 1 collateral in 3 females. All the sick were adults, the youngest being a lad of 18 and a woman of 20. The duration of disease was rather recent, *viz.*, 10 times under 3 years, 4 times under 6 years, twice under 9 and 6 times longer—the longest being in coast-villages. There were 18 villages having a single case of T. L. and these not necessarily small villages: 13 were on or near the coast, and 5 inland. There was usually a history of previous disease in the former (pointing again to the longer establishment of disease in them), seldom so in the latter. 16 subjects were males having a mean age of 35 (or less than above in A. L.); 2 were females with a mean age of 13.5 (much less than above in A. L.); 13 were born in or near their village, a few inland dwellers had immigrated. There was a clearly possible contact with lepers 9 times, and all the rest had travelled: direct hereditary taint obtained in 3 men (2 being coast dwellers): duration of disease 7 times under 3 years, 5 times under 6 years, thrice under 9, and thrice of longer standing. I note that T. L. often seems to follow A. L. Respecting the above data, the circumstance that most of my single leper-villages are in coast-areas is an accidental one, for altogether there are quite as many such inland (the equal proportion is remarkable, it is 1:1.6 of all leper-villages); hence whatever their significance may be, it is not limited to one area. Coastward, the mean population of single leper-villages is less than that of total villages, inland the reverse holds good; but as this mean is everywhere smaller than the mean of all leper-villages, we may suppose that the sparseness of disease is somehow connected with sparseness of people. Since coast-lying places have a history of previous disease oftener than the inland, we may infer that in them the malady is oftener derived; whilst inland, it is more frequently an importation. Generally there is nothing but their smaller size which distin-

guishes single leper-villages, and even this feature is not invariable. That single leper-villages are commonly extending out-lyers, seems to follow from their local connection and the brief mean duration of disease: their constant proportion to other leper-villages, indicates a fixed rate of advance of leprosy; and as features of fresh disease, we note many adults, many immigrants and little heredity. The greater prevalence of T. L. inland, is attended with evidence of more frequent importation of the malady there; and in general, T. L. has wider dissemination amongst young subjects.

I have also analysed the notes of 12 villages having each *two lepers* only. Of these, 7 in 10 in coast-areas had some previous history of disease: contagion seemed always possible, at least; 18 of the sick were men: a pair of leper women was never seen: heredity was acknowledged in about $\frac{1}{3}$ of all cases; age generally adult and form of malady A. L., four times A. L. and T. L. existed together, sometimes A. L. alone. 10 of 23 individuals were born outside their village, and so 5 women out of 6: duration of complaint seldom over 6 years. Search for the precise origin of disease in place with three or more lepers is generally futile: a history of previously affected persons is to be found; heredity or brotherhood obtains, and contact as a cause of disease is likely, but, as usual, seldom admitted. T. L. is proportionally frequent; duration of disease may be remarkably equal (pointing to co-temporary influence, see Jubbal, Jhanjmir, Timana, &c.), as well as diverse.

From the above remarks, it appears that the first appearance of leprosy in a village is attributable to one of three causes:—*viz.*, the pre-existence of extinct disease (? endemic influence), the introduction of new disease, and to seemingly spontaneous outbreak. The fact of every infected village being in direct communication with another such, is significant with reference to the two first-named influences; and that of the wide prevalence of disease, is noteworthy with reference to the last.

Contemporaneous beginning of leprosy.—It is not uncommonly found in a village that existing lepers, variously affected, have first shown their malady at short intervals in succession, or even at near the same time, which is a circumstance worthy of special notice; and it is not rare to find this correspondence in date so close, as to lead to the inference of some co-temporary or local cause being then in operation. Owing to the chronic character of leprosy, however, which necessarily entails delay in its assured recognition, and hence an interval of almost inevitable forgetfulness on the part of the subject, it has not proved possible for me ever to ascertain what was this essential influence; and such important information may be regarded as beyond the scope of a passing enquiry, like my own. For its elimination, an infested district should be visited at short intervals, when by good hap some typical illustration might be detected. The following are instances of simultaneous outbreak—many are worthy of study:—Inland area: Hipawadli (A. L.), Wansiali (T. L. and little taint, 3 cases and two cases appearing together), Mota Jhinjodra (T. L. appearing in pairs), Kundla (much simultaneous disease of both kinds), Jabbal (T. L. 3 cases together). Coast:—Budhel (T. L. 3), Wurtej (A. L. or T. L. 4 cases), Khandera (3), Trapaj (T. L.), Timana (3 co-temporary), Vunjodri (T. L. 3 at same date; compare with M. Jhinjodra and Jabbal), Jhanjmir (a very striking instance of recent simultaneous disease), Kutpar (older simultaneous disease pointing to a former outbreak) and Mhowa. The circumstances modifying the value of these and like data are, briefly, the vague recollections of patients, the natural obscurity of the object and the inclusive fact that almost universally recent disease has occurred; yet after making due allowances, I am of opinion that leprosy does not seldom happen simultaneously in an associated group of persons, and obviously such events are well calculated to

bring to light the true causes of the disease. This subject is commended to future enquirers, who should note (a) contemporaneous disease in wide areas, (b) the same in towns, and (c) in families: it is true, my own notes above accessible, comprise information upon all these points, but their analysis would be tedious and some more facts are desirable. That view of the successive origin of leprosy which at present I am disposed to take, is intimated *passim*; and if I fail to bring proof at every point, it is partly because my evidence depends on a variety of details and inferences, which cannot be shortly expressed without entailing the risk of vagueness or obscurity. It should be remembered, too, that this is a first attempt at introducing order amidst a congeries of facts, the like of which have, for the most part, hitherto formed the bulk of our information, regarding the prevalence in the world of leprosy at the present era.

B. Spread of Leprosy in Kattiawar.—Having already alluded to the existing distribution of disease, I now propose to enquire how this characteristic feature may have been induced; and the term 'spread of leprosy' is intended to mean not only extension of the malady, but as well that rekindling of disease which may or may not overstep former local limits. The questions involved are these:—when, where and how an increase has occurred? Or if no increase, then the same queries with regard to subsidence of disease; reply being arranged under heads of source of information.

a.—Public opinion and local traditions.—Since there has hitherto existed a striking want of public knowledge even of the actual prevalence of leprosy in these parts, no aid in reply to my questions can be expected from the sources just named. Some native officials, indeed, have stated that the malady is now subsiding, yet I cannot place entire confidence in these opinions, having so often heard to the contrary from villagers themselves on the spot. My diary will show this remark to hold good for Kundla district especially. In some coast-parts of Talaja, however (*eg.*, Rajpura), and in parts of Mhowa and Duskrohi (*eg.*, Kutpar and Hathab) there is reason to believe that leprosy is not so frequent now as formerly it was; and on the whole, I should infer that in different localities this malady has really varied in degree, during late times and within limited areas.

b. Special enquiry.—Should it be found that in a large proportion of cases disease is quite recent, we may infer that it is also in an active state and not unlikely to spread. Now the dates of commencement of disease given by lepers themselves are as follows: 53·4 per cent. within the last 5 years; 32·7 per cent. from 6 to 10 years; 8·7 per cent. of dates go back to 11 to 15 years; 4·2 per cent. to 16 to 20 years, and 1 per cent. to 21 years or upwards. Hence over one-half of existing instances (300 in 555) have begun during the last quinquennium; and nearly one-third are no older than 10 years; whilst very few lepers date their disease 15 or 20 years back. It seems to me that these ratios are sufficiently emphatic, yet it must be recollected that they apply to the whole leper-area and are not of themselves demonstrative of increase of disease. For, supposing the average duration of leprosy to be 15 years, I calculate there would be at the present time near 50 per cent. of cases under five years' duration, 33 per cent. under 10 years' duration, and so on, these being ratios which may be regarded as standards of stationary disease; and they closely correspond with the actual numbers I find to obtain, for the whole area under notice. If however leprosy be declining in some parts of Kattiawar, obviously it must be increasing elsewhere, or otherwise these mean ratios will not be correct; and, in fact, I find by analysis of separate areas the following results:—the coast-districts of Talaja, Mhowa and Duskrohi show a decided excess of recent cases (59 per cent.), the first named having no fewer than 74 per cent. of lepers with new disease: one inland district—Umralla—gives 12 out of 18 cases as recent ones, and the instance is as noteworthy

as it is exceptional: Kundla shows a near equality of lepers affected 5 years and under, and upwards of 5 years; Gadhdha the same; while Lilia has a preponderance of the older cases and so especially has Sihor: Babra has much old disease: Palitana resembles Kundla and so Songudh, whilst the few lepers in Gohelwar are chiefly of long standing. From Gogha, Datta, Chok, &c., I have no data on this point. In sum, I find that the more inland and northern districts of Gadhdha, Sihor, Lilia and Babra, show only some 36 per cent. of new cases: whilst the coast-areas and a part of Kundla next to Mhowa, have a predominance of such instances: and, lastly, that intermediate districts, as Kundla proper and Palitana, show an equality of old and new cases. The mean duration of all known cases being about 6½ years, it is only 5 years for Talaja, 6 for Mhowa and Umralla, whilst it is 8·5 years for Sihor and 9 years for Lilia. I note also that around the capital of Bhaonagar (including parts of Duskrohi and Sihor) leprosy seems to be rather older than usual.

As they thus stand, these data seem to point to an increase of leprosy during the present time, on and near the south coast; and to a decrease inland, north or westwards. In Umralla, however, the malady seems to be now augmenting.

Respecting the part taken by the two kinds of leprosy, from my own notes I find that in Talaja, Duskrohi and Palitana both A. L. and T. L. are of nearly equal duration; whilst in Mhowa and Kundla A. L. has the longer mean duration; and from this it would appear that rejuvenescence of disease on the south-east coast applies to all its forms, but that westward, inland, re-production of the malady tends to predominance of the severer form. One might suppose, either that the germs of leprosy are now less vigorous in old-affected localities; or that they thrive less well in poorer subjects, than in better fed and housed people belonging to more prosperous parts of the country.

Taking my second MAP it will be easy to trace the villages with new and old disease, and the impression will then arise that throughout the whole area under notice, leprosy, starting, perhaps, from some old focus, has broken out afresh; and that along lines which are identical with the methodical tracts I have already described. Under the influence of such impression, I assume that we now witness a rekindling of the disease in the coast-areas of Kattiawar, while inland the malady barely or just maintains its ground. In both areas the process seems to be the same, namely, an extension at the margin of pre-existing disease, which by local circumstances is favoured or impeded in both direction and rate—the chief favouring condition being active movements of population. Not seldom large towns have old disease—a fact capable of being variously interpreted, yet since in the near neighbourhood of capitals, &c., a small or medium-sized village with old lepers often exists, the inference would be that this circumstance is partly due to immigration. This topic has been already alluded to, but instances may be named here, *eg.*, Gordki near Gadhdha, Dhani near Babra, Bhimdad near Lati, Nana Lilia near Lilia, Agria near Rajula, Dongarpurda near Dongar, Kutpar near Mhowa, Methla near Datta, Bhopada near Trapaj, Hathab near Gogha and Nari near Bhaonagar.

In the absence of historical records, it is impossible to state with certainty, the direction in which leprosy has originally spread in Kattiawar. Only, seeing that the coast-areas have long been infested and on the whole are most so still, I infer the disease was introduced at the ports here found and has spread inland. Appearances point to Bhaonagar city and its neighbourhood, as being the earliest seat of disease; then overrunning the coast-districts, the malady may have passed inwards over the gap in the hills (themselves real impediments) near to Kundla, and thence have spread northward and turned eastward through Palitana meeting again at Sihor: from Sihor we have a narrow track passing through the chief towns northward, with final subsidence of all disease: and west-

ward, the track is almost equally definite. If the plague be conveyed by man, it could pass only northward from the coast, there being no other vent for the populations here; and the following memorandum rather confirms the views just expressed.

Immigration of persons who have become lepers.—I studied this subject in the hope that some result of value might be acquired, notwithstanding the absence of a normal datum respecting the movement of populations in Kattiawar. Notes of 258 lepers show that 154 were born in the village, &c., where they were found, and 104 were born elsewhere: but in coast-areas, strangers were only $\frac{1}{3}$ and indigenes $\frac{2}{3}$; whilst inland $\frac{1}{2}$ were foreign: hence the indication that lepers inland are much less often indigenous, or in other words, a larger proportion were immigrants; as compared with coast-residing lepers, who are more usually born in the village where they are found. This movement of the leper population is everywhere due mostly to women having changed their residence, presumably on marriage: thus of 60 women lepers, 42 had so migrated from their homes, and the larger proportion of these leper-immigrants into leper-villages are found inland. Doubtless coast-residents in general become inland-dwellers more frequently than the reverse; yet on the supposition that a leprosy taint (or germs of disease) may be conveyed by individuals, it is interesting to note that so it is conveyed chiefly by women or future mothers. As such transfer of tainted individuals prevails mostly inland, perhaps we have here an indication of the manner in which leprosy has been conveyed from one locality to another; and, on other grounds, it is inferred from coast to interior. In every village or small town, most of the adult females will be foreign, and it is no wonder that foreign female-lepers should commonly preponderate: but as in coast-areas the preponderance of leper-women who are strangers is less than it is inland, we may infer that these native-born women are more subject to disease than is the case inland. As to males, native-born lepers always exceed the immigrant, and this is specially true for the coast, and T. L.: yet male migration, even if irregular, furnishes many lepers to localities hitherto wholly or nearly free. Take away all lepers migrating, and the sum of really indigenous disease would be nearly half the total existing amount; it might afterwards become much less than this. Women quit their home at 14 years; their leprosy does not begin till 20 to 30 years, yet that they may have brought a taint or latent predisposition with them, is shown by their being more affected than indigenous women: leper-husbands of these women are extremely rare.

In the course of the above remarks, I have assumed that the spread of leprosy is effected by human agency, that is to say by means of individuals bearing hidden or revealed disease; and such persons it has been implied, would move as others from place to place. This movement may be from one village to the next or some near one only, or it might extend further: many visibly leprosy subjects are simple wanderers; as disabled mendicants, they beg in large villages and especially frequent the capital towns: they hang on to masses of pilgrims, and assemble with them at sacred places of resort. Junagurh was often mentioned to me as a place where many lepers from all parts congregate, and it is known that at Palitana in 1872 during a great pilgrimage excursus, dozen of lepers were collected; and as at this time the General Census was taken, a large number of subjects were entered, who subsequently could not be found, having been dispersed: such, at least, is the explanation I have received of the discrepancy in number of lepers in Palitana, then and now (1876). But my attention was early struck with the fact, that along main roads leper-villages seem very common and thence arose the idea of their being a transfer of disease especially along such lines; nor is the notion unconfirmed by the follow-

ing instance—beginning at Kotra Pita a main road to Gogha passes through Babra, Dherdi, Dhassa (near to Panwala), Sanosra (near to Langala, Iswaria), Jithri, Songudh, Sihor, Wurtej, Sidhsar (near to Sampara), Budhel and Gogha—all of which places have lepers in them: other instances have been mentioned already, and, in short, this view seems correct and of general application. I found it to afford a valuable clue in unravelling some of the intricacies of the subject under notice; and if adopted, it must be held to be most significant in meaning. The several groups of leper-villages which we notice everywhere, are equally noteworthy: that at Chok, in the hills, particularly struck me as suggestive of radiating or converging disease, where no particular bond appears, except connection with the central chief town.

C. Causes and Propagation of Leprosy.

The following remarks are suggested by my late tour.

a. Causative influences.—These may be ranged as follows—climatic and endemic: racial and hygienic; and the specific. That mere climatic agency is essentially concerned in the production of leprosy in Kattiawar, does not appear: nor have I had reason to allot such influence to race, except so far as race is concerned with personal habits, &c., for the distinction of aboriginal and Aryan races is not, in this part of the province, a very marked one. It remains therefore briefly to consider, first, endemic influences: now, these may be either original, as it were, or acquired; and by the former I mean such agencies as those of soil, water-logging, vegetation. Obviously, the known peculiar dissemination of disease might be connected with certain qualities of soil, and it is possible to conceive that a line of leper-villages is necessarily associated with some kind of rock or substratum; yet such facts as I have learned, do not tend to support this hypothesis: and so with regard to local drainage, vegetation, &c., no evidence has been elicited to show that leprosy occurs only under conditions pertaining to these local features. True, the selection of village sites is not matter of chance, being determined by conveniences of some sort, but the latter are various and not special: and not nearly all villages equally placed, are infested. I find no uniformity whatever upon any of these points, and where there are 'blank' areas in the midst of 'infected' ones (such as are found in all the coast-districts), the readiest explanation has seemed to come from different conditions, such as scanty population (*e.g.*, between Mhowa and Datta) or slight movements of people (*e.g.*, west of Mhowa): more detailed information would, however, be very useful. By acquired endemic influences, I mean those following the pre-existence of disease in any spot; and I am far from denying the possibility that villages once the residence of lepers, may retain the faculty of infecting fresh comers, quoad the houses, yards, cisterns, &c., of such lepers be concerned. This notion is, however, as yet also hypothetical; and for support, it awaits the sober scrutiny of facts. My data show that single leper-villages are a moiety of the whole, and at present I am unable to say why this is so.

Hygienic influences.—The elicited fact that, as a rule, leprosy only appears amongst bodies of men numbering upwards of 400 to 500, may be explained on the understanding that such congregations are most likely to give rise to mal-hygienic conditions, which favour the advent of this disease: in groups larger than those just intimated, such conditions may more abound, as does the malady, whether they refer to general sanitation, lodging, food, water, air, and in general the crowding of people together. It is at least curious, that smaller places are comparatively free from leprosy; and even more singular, that a kind of preference is manifested by this disease for medium-sized places, though this point may be connected with other adventitious circumstances than the hygienic. The punishment of the sin of a few offenders in dirt and the like, may extend to their less offending neighbours.

Defective hygiene so abounds in all the places I visited, that I am totally unable to mention one set of mal-influences as especially liable to induce the leprous disease. It is true that the more infested coast-areas (together with Sihor and Palitana) are mostly inhabited by a poorer class of men—the Kolis—who are worst fed, worst clothed and lodged and, in general, worst placed as regards hygiene; yet the inland, wealthier and Kunbi-abounding district of Kundla, is also largely attacked. Mere density of population is not related to leper-distribution, and anywhere, on a small scale, absolutely no relation appears between defective hygiene and their disease. After due consideration, I see, at most, only such connection between these two phenomena, as is known to hold good between bad hygiene and some other specific complaints, such as cholera, fevers, diarrhoea, or better, perhaps, the scrofulous affections; and to my mind, the appearance of leprosy in a locality necessarily implies its pre-existence there or elsewhere. Much more might be said on this interesting subject; but having furnished the materials of discussion and thus summed up, I must be content to end with the remark that whilst leprosy may be truly said to flourish under bad hygienic conditions, yet it cannot be said to arise from them.

Specific agencies.—No assumption so well adapts itself to all the known phenomena of leprosy, as that of a specific cause working according to many of the laws which obtain in other specific diseases. But I need not discuss the general question here, and will only repeat that a fish-diet, the use of unsound grain or indeed any particular diet, has not been shown to cause this disease. It may be useful to recapitulate some of the noxious agencies, to which it is attributed by the peasantry of Kattiawar; they are either external or internal:—thus leprosy has followed syphilitic infection and struma: scaly skin-affections as psoriasis (several instances): the dengue fever (*vide* Jhanjmir and Dihor, &c.): cholera: guinea-worm: child-birth (several statements) or miscarriage: river bathing: fright: epilepsy: the ingestion of mercury: the use of particular foods—acid fruits, oil, oil and chillies, oil and sugar, sweatmeats (not uncommonly mentioned), sour food, mangoes, pickles, meat, bad water, dried fish (*vide* Bhaonagar, under date 3rd January): but of all the causes inducing the dyspepsia to which lepers frequently attribute their disease, the copious use of whey or 'chass' is perhaps oftenest named, and I have in the text above, alluded to this circumstance as one indicating a way in which the system may be contaminated with the leprous poison; for impure and sour milk is known to be a suitable medium for the retention and conveyance of animal or protean poisons. I have also remarked on the frequency with which T. L. seems to follow nettle rash, or some such eruption the result of indigestion; it is at least a noteworthy coincidence. The more local symptoms of A. L., such as neuritis in the limbs, sometimes appear to result from exposure and hard work with hands or feet; or even to begin with accident: in old persons, they are like those of senile changes of tissue, and there are seemingly intermediate stages between specific neuritis and that inflammation of the nerves which as yet is known only as incidental, and very rare. There is some evidence which indicates that T. L. and A. L. may exclusively occur, also that each kind tends to re-produce itself; but to what particular poison or germ leprosy in either form is due, remains unknown: the malady is highly specialised; its nearest analogue is the syphilitic malady, and next comes scrofula. Like both these, it possesses affinities to the more active zymotic diseases; and it not unfrequently develops an acute febrile eruption, which exhibits perfectly uniform characters—thereby assimilating leprosy more than the others, to the eruptive fevers. I find no evidence in Kattiawar of a connection between leprosy and syphilis: the former very often occurs in persons whom it would be a mere presumption to tax with the latter or its sequelæ; nor is there any proof of a

connection with consumption or other form of scrofula. Debility, anemia or scurvy attributable to insufficient or defective food have showed no necessary co-relation; nor have malarious fevers, dysentery or the various constitutional states which are evidenced by internal local complaints: there is no real connection of leprosy with scabies (the itch) or indeed with any particular skin-disease: as regards a common parasitical skin-affection (*tinea versicolor*?) popularly known as 'karolea,' I have noticed a curious similarity in certain features, as is mentioned in the 'Diary.' Men, women and children affected with leprosy may be, and usually are, totally free from any other complaint: they sometimes were strongly built and well-nourished subjects.

The following theoretical expression of this topic occurs in my notes—leprosy may be due to, or fostered by, bad air, bad water, bad food, foul clothing, foul contacts generally (extrinsic agents); or to, or by, bad health, structural degenerations, sexual differences, undefined temperaments (intrinsic agencies). Now, as a rule, outward conditions and intrinsic influences are alike all over the country, and hence, discarding them, we should search for special conditions—these are the presence of other lepers and, perhaps, idiosyncrasy. Limitations by sex and age may be incidences only. L. is comparable to a rare plant thriving in certain localities only: does it propagate itself in an analogous manner, and is its cure eradication? Moulds and mildews seem to occur fortuitously, but there is no chance in the matter; and maladies avowedly contagious are not always common, invariable or uniform in occurrence, but only occasionally so, when their true character becomes established beyond doubt.

b. Propagation of leprosy.—Under this head, I have first to observe that Kattiawar is not a favorable country in which to collect fresh data: for so wide-spread is, or has been, the leprous disease that, practically, almost every one must have been some time or another brought into association, directly or indirectly, with affected individuals. But apart from this circumstance, as I am indisposed to admit that leprosy ever arises in a purely spontaneous manner, its multiplication in such occult way seems to call for no discussion here. All the evidence which I have collected, ultimately points to propagation from individual to individual; and this can occur only outwardly by way of contagion, or inwardly by hereditary transmission.

1. By contagion is here meant the direct or indirect communication of disease, outside the body, from person to person. Mediate or indirect contact is manifold and includes many possible manners of transmission, as by tainted excretions, tainted clothing or other materials, and by aerial or little apparent foul emanations; the efficacy of all such means depending not only upon varied virulence of contagium, but upon favouring or counteracting qualities of the media concerned, and upon similar states of the recipient himself. The direct communication of disease also, is hedged round by modifying influences belonging to both giver and taker; and these influences are so powerful and complex, that the event in question becomes rare enough to be regarded by many as matter of doubt. Finally, if the inadequate circumstances under which strict medical enquiry has hitherto been conducted, be taken into consideration; it is no wonder that the view of contagion, as applied to leprosy, is still much debated. Individually, I am unable to furnish any demonstration of the accuracy of such view; and in the absence of indubitable proof, shall not enter upon a discussion of this vital subject. Only I think that the new collateral evidence of transmission by man, which is furnished by my present analysis of leper-localities in Kattiawar, deserves particular notice, both in itself and as a datum to be further tested; for, regarded broadly, the peculiarly close connection and serial sequence of leper-villages, most obviously points to some method of transmission, and so far as has appeared to me, there is no other agency at

work than man and the surroundings he acquires. It is quite true that numerous negative facts oppose the inference I am inclined to: for example, the view of contagion leaves unexplained the comparative limitation of disease we see in area, towns, villages and families: my data, too, seem to show that leprosy will not overspread certain narrow boundaries; that thus, as it were, it has required about 400 or 500 persons to evolve a single leper, that in larger assemblies no more than one may be found, and that the number mentioned often seems especially adequate. An illustration is this—there is found a single leper-man at Latidad—a place as yet seemingly isolated (I say seemingly because nothing is known of the district beyond the adjacent northern frontier), how did the disease arise in him? Answer—Karson, set. 30, born at Latidad, has not travelled, was at home when the disease appeared; none of his relatives have had leprosy, for 8 years affected and is the first person who has had the disease here: he has not been in contact with other lepers (*memoranda* obtained through the kindness of Mr. Percival). Here a unique case fails to countenance the view of contagion, but confirms that of spontaneity; and I doubt not that there are many like instances. Still the long series of different facts above alluded to remains; also, Latidad is not far from Gordka where an adult leper, affected 15 years, at present resides; and he may have visited the former place. I mention this instance only as an illustration of the difficulties in enquiry, which will prove insurmountable, until by precise experiment or the luck of finding one of nature's proofs, we shall gain definite reply. Perhaps the instance of the husband at Loharwar (*Diary*, under date 14th January) is not decisive, or the dozen others of longer-standing disease: for, in short, the manifestation of symptoms after possible infection, is too slow to permit of direct sequence being assured, in ordinary circumstances. These inconclusive remarks may serve the purpose, at least, of suggesting to future enquirers certain points for consideration: for my own part, I am disposed to give more weight to positive than to negative statements, to view leprosy as a whole and in the light of broad experience, and to act upon the presumption most favorable to the interests of society in general. When one remembers, too, more than one precisely parallel occasion of change of opinion, it would be rash to deny that when thorough research shall be encouraged in India, affirmative facts concerning leprosy will be elicited, such as were in the instances of scrofula and consecutive syphilis, for example. Until the proper tests are applied, negative notions cannot carry much weight: the secrets of pathology being certainly not less hidden from superficial view, than are those of other departments of natural science; and as regards the subject in hand, since we are debarred from direct experimentation, we must scrutinise the phenomena of nature all the more closely, being assured that the needed clue exists.

2 Hereditary transmission.—The following is an analysis of the new data collected in Kattiawar, during my enquiries made upon the spot.

T. L. 106 males: 22 females. Taint in the direct or parental line: 19 per cent. of males, 50 per cent. of females: that through the father (most) and paternal grandfather amounting to 15 per cent. of male, 32 per cent. of female: leper-men had mother lepers in 4 per cent. of the whole, leper women had leper-mothers in 14 per cent.—a striking difference which is consonant with my earlier researches. Taint in the collateral line of uncles and aunts: 10 per cent. of males showed this, 22 per cent. of f.: the father's brother is oftenest the leper-relative (8 and 18 per cent. respectively), the mother's brother is proportionately named oftener by women than by men. Co-equal taint—brothers and sisters lepers: 11 per cent. of males named a brother, 1 per cent. a sister leprous: 9 per cent. of the females had a leper brother, none of the 22 had a leper sister.

A. L. 100 males: 33 females. Taint in the direct line, 14 per cent. of m., 12 per cent. of f. or about equal: here,

too, fathers are oftenest named and by women the paternal grandfather, whilst men curiously name also their mother and mother's father as being lepers, no woman naming either. Collateral taint is given by 10 per cent. of m., and 9 per cent. of f.: it is chiefly through paternal uncle, but father's sister is also named: one man names his mother's sister as being affected. Brothers and sisters as lepers: 11 per cent. of m., 13 per cent. of f.: brothers are much oftenest given.

Altogether, about 30 per cent. of all lepers have some direct or collateral taint: and about 70 per cent. have none. 11 per cent. have a brother or sister leprous, but no other evidence of a family taint. Hereditary taint proper is more strongly marked in T. L. than in A. L. (*viz.*, as 37: 23.3 per cent.)

Were it possible to negative the idea of contagion in all these instances of family taint—of contagion, that is, between parent and child, uncle and nephew, &c., who had many opportunities of coming together—then the series would be emphatically in favour of heredity as one means by which leprosy is now being propagated in India. But it is frequently not possible to admit the absence of likely contagion in a family, and even after all allowances of this kind, it appears that the majority of lepers had no leprous relatives. No instance of a leprous family impressed me more strongly than that of the five leper lads at Gorkhi (*vide Diary* under date 12th March) whose mother was a leper, but it gives no 'certain sound,' for these lads all lived together in one house. They were however, the only lepers in the village.

In short, heredity as a mode of transmission of disease is subject to exceptions, no less than is contagion: and as soon as one difficulty is met by a fair assumption, on either view alone, another difficulty will arise, and it seems to me that as yet we are not enough acquainted with any whole series of cases to warrant valid inference. With our present knowledge, it may be urged that both heredity and contagion can never concur in the propagation of leprosy, because no disease is known which is certainly capable of this double transmission; and since it is highly likely that leprosy has but one single *vera causa*, the admission of one proximate agency will of necessity exclude the assumption of all others. But while one has no right to insist beyond the limits of ascertained data, it is not besides the mark to suggest that communicability of disease-germs may, according to the reasonable doctrine of pangenesis, be essentially of the same nature in both heredity and contagion. Heredity as the exclusive agent in the propagation of this disease, hardly having been maintained by observation in Kattiawar, does not seem to be entitled to the position once allotted to it. In illustration, however, of its rôle as admitted by lepers themselves, I append a few brief notes; remarking that these data are probably defective in number, for several obvious reasons.

Heredity in districts and areas.—In the wholly inland part of Kundla where T. L. predominates, almost all lepers are adults: heredity in some form is frequent, particularly in males affected with T. L. (21 in 35 instances). Noteworthy examples were seen at Wanda, Mota Jhinjodra, Kundla and Jabbal. The mean duration of disease is about 7 years. In the coast-district of Mhowa, A. L. is rather the commonest; the general age and mean duration of disease is less than above: heredity is marked; all 3 women seen with T. L. had relatives affected; remarkable instances of heredity occur at Kutpar,—a place where leprosy still flourishes though of not very recent manifestation. In Talaja is also more A. L. with a great predominance of males and more children as lepers: the mean duration of disease is less than elsewhere, yet heredity is not very commonly acknowledged: it occurs equally in A. L. and T. L.: here disease seems to be newly spreading and, as would seem, that not through hereditary transmission—an important datum, especially when it is recollected that in Talaja leprosy has long been known. For instances of seeming heredity, *vide* the journal for Wunjodri

Gorkhi, Bela Bhadraval, Methla: several males with T. L. and A. L. name their mother as being the affected ancestor—which is exceptional. Duskrohi (coast) shows, in the whole, very little heredity, yet disease is widespread and not old: as usual, it is oftenest named in T. L. and there are striking particular cases at Paniali, Budhel, &c. Reverting to the inland district of Palitana, heredity is not often acknowledged, but the instance of the girl at Pertabgurh seems unusually clear. I do not think it necessary to add to the above inspected localities, those regarding which official memoranda alone are available, because it is evident that this information is defective; and even when the suspicions of the peasantry were quieted by personal assurances, I found it by no means easy to arrive at a knowledge of their diseased ancestry. Few phenomena when actually seen, are more striking than a leper family or assemblage of affected relatives, and mere words do not suffice to convey the impression on the mind thus produced.

As to the comparative prevalence of admitted heredity in coast and inland areas respectively, I arrived at the following results: in general $\frac{1}{3}$ of all lepers mention direct or collateral taint, and this ratio holds good for both areas; but inland the taint is chiefly found in T. L. ($\frac{1}{2} : \frac{1}{5}$), whilst coastward both forms of disease almost equally exhibit a taint: on the whole, however, T. L. is everywhere the kind oftenest transmitted. If taint in the direct or parental line be regarded as most potent, it becomes of interest to ascertain how much of the general taint is due to this line; and I observe that everywhere the direct line in T. L. is $\frac{3}{5}$, the indirect taint amounting to $\frac{2}{5}$; but as regards A. L. while direct and collateral forms are equally frequent inland, coastward the former exceeds as $\frac{2}{3}$ to $\frac{1}{3}$; and this shows that A. L. or mild disease, which tends to be more frequent coastward, is also a form more often transmitted even by parents or grand-parents. Here is evidence, then, that the neuritis of leprosy partakes of the essence of the disease, and is not a mere attendant upon symptoms sometimes regarded as the only specific ones. In my tables of analysis, the preponderance of a family taint amongst lepers who were affected at an early age—or not later than 20 years—is very marked indeed: such subjects are not, indeed, very numerous, but nearly $\frac{3}{4}$ of those found inland (including both forms of disease) had leprosy parents or relatives, and coastward upwards of $\frac{1}{2}$ of them had such taint: nearly every leper showing disease under 10 years of age, had affected relatives; and this series of facts lends weight to the view that a strong hereditary taint predisposes to early manifestation of the malady, or at least that such manifestation accompanies such taint. Complaint appearing after the age of 20 and in the form of A. L. has, inland, virtually no heredity in males, in females $\frac{1}{4}$ had relatives affected; coastward, under $\frac{1}{3}$ of males and $\frac{1}{7}$ of females had such relatives: in the form of T. L. about $\frac{1}{3}$ of all lepers had them, but after the age of 30, disease first appearing may be said to be seldom referrible to a transmitted taint: exceptions being even rare. The application of these data will, of course, depend upon the importance which is attached to heredity and contagion respectively; and it may be that children at home are from their position more liable to contamination from parents, &c., than are grown-up offspring. What one now sees in a leper-family is not always valid evidence, for until the whole future of the offspring of affected parents is made known, one cannot be sure that the descendants are really free; and this consideration has often qualified my surprise on seeing the healthy condition of the younger inmates of a house, who are descended from a miserably affected parent still alive. If they be real

agencies, neither heredity nor contagion necessarily operate early, or even within a limited period of time; and concerning the method or conditions of their influence, I own myself quite ignorant. From one point of view, it may be said that heredity reduces to nearly a certainty the possibility of contagion; but on the other hand, not all leper-parents, &c., have affected offspring. The fact remains, that transmission of disease often occurs in a family by either contact or blood; and were this event even less likely than it is, no one could desire to maintain present circumstances only too accessible to view in India, where a wretchedly diseased and mutilated parent continues to procreate children, whose early life must be passed in poverty and degradation, and whose whole future life may become equally miserable. Words cannot express the horror one feels at witnessing such family relations as obtain *e.g.*, at Bhadada and Hipawadli, and, indeed, at a score of other places mentioned in my diary. Surely it is some one's duty to interfere, even in checking personal liberty, when it is so abused as to become inimical to public as well as private welfare.

Marriage and fecundity of lepers.—Further to illustrate the subject of heredity, I have analysed my notes of 250 individuals now leprosy, including 191 males and 59 females. Of these 68 were unmarried and 182 were married: the majority of the former being affected with T. L. 182 married lepers of either sex had 430 children or a mean of 2.4 children to each marriage, but if infertile marriages be excluded there are nearly 3 children to one marriage—when the female parent is the leper the number of children is under this mean, and *v. v.* when the male.

Details are the following:—there were 124 instances of T. L. of whom 100 males, consisting of 34 unmarried and 66 married with 148 children: of the 24 females, 13 are married with 28 children. Instances of A. L. are 126, being males 91, of whom 21 unmarried and 70 married with 187 children; and 35 females, of whom 33 married with 67 children.

Unproductive marriages are twice as frequent in T. L. as in A. L.: thus amongst leper-fathers, 1:12 with A. L. was marriage infertile, and with T. L. 1:6; amongst leper-mothers with A. L. the ratio was 1:8, and with T. L. 1:4; so that T. L. not only disqualifies for marriage, but has a tendency to render marriage infertile and that most in women. I should add that these last results may be indirect rather than direct effects of disease, and men or women with marked leprosy of either kind have not seldom large families: for precisely accurate information on this important point, recourse must be had to the diary, and here I can offer only generalised statements.

Non-marriage of women is often due to early disqualification from disease: thus of the 13 non-married leper females, 9 were affected as children (8 being T. L.), and seemingly only 4 were single from choice, or accident. The social impost of matrimony does not bear upon men so strictly as upon women.

Man and wife both leprosy is a very rare event (perhaps no oftener than 1:200), and curiously enough the only two living instances here recorded, are found in adjoining villages (Loharwar and Badarko, east of Palitana city): both parents leprosy and all, or any, children leprosy also, has not been seen; and, in short, children affected at the same time as either parent, is an event seldom met with, there being only two instances in my list (*viz.*, at Wunjodri and Kukad). This last statement must, however, be understood to mean that leper parent and child seldom are found living together for a prolonged interval: commonly individuals do not develop their disease, till near or during mature age. A child may be affected before its parent (see Diary for Wunjodri, Nesadi): younger children before elder: children of different ages at the same time. As regards, too, the number of offspring of lepers, there are several contingencies to be taken into account; and, in brief, the history of leprosy in a family

is often most anomalous: for an example of transmission to males only by a female, see case 15 at Kutpar: and to several males in succession, that at Gorkhi: the converse occurs.

Leper-brothers.—In further search of elucidation, I have considered the 12 or 13 cases of leper-brothers who find place in the Diary records from Jesur, Wansiali, Kundla, M. Jhinjodra, Bhadada, Jabbal (inland); and Kutpar, Methla, Bela, Gorkhi, Trapaj (coast). In a family usually only one individual is a leper, and when brothers are affected they are two only—Gorkhi with five being a rare exception: a brother and sister may be leprous together: leper-sisters I have not here met with. Healthy brothers and sisters are found alongside those affected: and all such limitations are as yet inexplicable.

I find T. L. in $\frac{2}{3}$, A. L. in $\frac{1}{4}$ and both, in $\frac{1}{12}$ of my cases (which are oftenest inland): in 7 couples is strong

hereditary taint, in 2 only collateral taint and in 3 none. On comparing together the age, date of disease, family taint, &c., no rule has been elicited: even with strong taint in paternal line, the disease may appear at different date or age, but often it came on at early age; not so with maternal taint: with collateral taint, lepers were older: with no taint, there was yet a correspondence in disease. As regards age of lepers, the mean extremes were 13.4 and 17.7 years for brothers having a strong taint: 17.4 and 41.5 for those with a mild taint; 21 and 27 years for those with no taint: hence taint seems to induce early disease, and the mean age of all leper-brothers is much earlier than usual, for nearly one-half of them were under 15 years. All the men were affected in the same locality.

The individual instances now alluded to are worthy of perusal, but from heredity alone no clear light in their interpretation appears.

SUMMARY AND SUGGESTIONS.—The following is a brief summary of my results.

1. It has been shown that leprosy is frequent—sometimes very frequent—in the part of Kattiawar under review; and this, I may add, to an extent previously quite unanticipated.

2. The malady is not, however, uniformly distributed over the land, being most prevalent in the populous coast-districts and westward; and its mode of dissemination is everywhere highly suggestive of communication by human agency.

3. So large a proportion, too, is recent disease that the inference seems inevitable of an actual over-spreading, as it were, of the pest; and besides, the form of disease is often severe.

4. There is absolutely no public provision for the leprous poor and sick, in the flourishing State of Bhavnagar, or in Palitana and other minor States; and it may be said correctly that the small and distant leper-asylum at Rajkot, is of no practical utility to this part of Kattiawar. What is done with the leper at home, my journal will sufficiently show: thus, I never once found amongst any class and in any family, an affected individual enjoying the benefit of adequate special accommodation made for him. At best, one side of the low, shallow and open verandah possessed by the superior kind of common houses, is allotted as the resting-place of the leper; and when no such verandah exists, the only alternative is to permit the sick individual to remain as an ordinary member of the household, living in the common single chamber with the rest. Subsequently, as further discomforts and objections arise, too apparent to the senses to be longer endured, or as the leper family continues to augment and be more pressed for room, a lean-to of mud and sticks may be erected outside against a gable end, or a stable is chosen

for the lodgement of the leper's rough cot, where he stays sleeping perhaps with cattle, and always most imperfectly protected from the weather. Houseless sick dwell anywhere about the outskirts of a village, or they may be the possessors of a primitive hut in the fields; such, too, as this last is the whole luxury enjoyed by well-to-do farmers, when they have become a nuisance, as it were, to their friends and relatives, and I have figured two of these huts which were seen by me, as examples of the lodging of men having some property (*vide* PLATE at the end). Perhaps leper-women are even worse accommodated; but I forbear to enter into details of this kind, which once to have seen was distressing enough, and to describe is utterly repellant; furthermore, mere words could not render a true picture of the miserable hardships to which I now refer. However well village communities manage their public affairs, no attention is given to the prevention or mitigation of disease. I do not say that lepers are always treated with purposed harshness, or even wholly with neglect; but amongst the poorer classes they often meet with both, and husband, wife or child may be deserted and even expelled from home. At best, the sufferer is most inadequately attended to, separate and decent lodging being, as I have said, seldom given; the needed diet is unattainable, and medical aid is generally out of the question. Sympathy may be felt, but I rarely saw it expressed; and, in short, no better means now offers of elevating the general tone of the people, than the inauguration of a plan for suitably treating their leprous sick—whereby, too, the double end is gained of effecting material as well as moral and physical good—for unquestionably general prosperity depends largely upon the public health.

SUGGESTIONS.—The indulgence of however natural a curiosity, would be but an indifferent excuse for the

expense and trouble of a marching tour, planned under the circumstances of that lately undertaken in Kattiawar; nor did the short time at my disposal, allow of an adequate investigation of such recondite points as the essential cause of leprosy: the main object, however, was accomplished, namely to ascertain the general characters of leprosy and the conditions under which this pest continues to prevail; and at the same time to note what was done for the sufferers themselves. The results being now recorded will speak for themselves, and the following brief suggestions may properly be directed to the practical alleviation of this great social evil; briefly, they comprise only a repetition of what has been already urged upon the attention of the Government at Home and in India.

Putting aside as a quite impracticable object, the adequate medical treatment of leprosy in rural districts, and rather adverting to the perfectly attainable point of the prevention of this malady, I note in Kattiawar the conjoint phenomena not of disease and of want, but of disease persisting in the midst of general prosperity. According to the best authorities the Bhaonagar State, for instance, is everywhere realising the benefits of material progress; yet constantly with these, the leprous pest is certainly not subsiding. True, improvement in social and personal hygiene may not have become in detail very manifest, yet there is a universal change for the better and still no signs of diminution of this evil. Indeed, it would almost seem as if increased general movement and communication between villages and towns, had led to a rekindling, as it were, or transfer of disease; and in short, the good effect of advancing civilisation in checking this social curse has not appeared, but rather—even if merely a temporary or an indirect consequence—the reverse. And I repeat, that nothing has been attempted for alleviating the public, family and individual sufferings which are entailed by passive endurance of the leprous pest. An evil of this kind, when once recognised, cannot be allowed to fester unchecked, without there ensuing the greatest moral as well as physical social degradation. This I take to be a political as well as a professional dictum, the truth of which is indisputable. Experience in India, as in Europe, does not justify the inference that there is an essential relationship between want and this plague: for leprosy occurs in healthy people and in well-to-do families. Formerly, too, it spread in Europe at times of general movement, if not of material progress; and, so far as I can see, its prevention is concerned with individual treatment rather than with general or public changes.

The plan I now allude to, consists in the complete isolation of the leper; and, if possible, his removal to a suitable asylum.

The principles upon which asylums for lepers have

been successfully conducted, are mentioned in my Report to the Secretary of State for India on Leprosy in Norway, &c. London, 1874; and in that document will be found many useful details. With reference to the more practical points, there are doubtless modifications to be made which would be suitable for circumstances in India; nor need too much be attempted at once. It may be suggested, also, that an asylum should take the form of a walled enclosure or village, where occupation could be found for the segregated: there would be, too, separate buildings for those entirely disabled. The questions of maintenance and regulations of asylums, need be discussed only when it has been resolved that a firm effort shall be made to deal with the unchecked and unabated evil, whose presence in the community has now been made sufficiently manifest; and I would repeat my conviction that the peasantry of Kattiawar are fully capable of understanding, and gratefully appreciating, such measures for their benefit as the one herein suggested; and in particular, nowhere, perhaps, is the authority of the 'Durbar' better exercised and better recognised than in the quarter so often named, namely, the Bhaonagar State. The first consideration I take to be, separation of the infested from the healthy; and to a certain extent this might be done at home, were distinct orders issued on the subject. Thus, it should be made incumbent upon those families, who, being in fair circumstances, desire to keep their lepers with them, that these sick be altogether separately lodged, having bed, board and clothing quite apart,—the object being to isolate them so far as is possible. Too often, however, such regulations would be futile, on account of the poverty of the sufferer and his connections, who would not be able to provide the required separate accommodation. I do not suppose that any other obstacle than expense would arise in attempting to enforce this isolation of the sick at their own homes, but even this tolerant measure, when practicable, would need to be maintained by authority; and such being the case—namely, that legal provision is necessary—it becomes a question if it were not better at once to deal with the subject comprehensively. The two main objects being understood to be the protection of the community, and the due care of the sick—objects which in practice become unique—I would suggest, first, that a convenient Refuge be offered to all vagrant lepers, whose further wanderings should then be interdicted; next, that a similar asylum be open to the poorer classes of peasantry, whose compliance with the wishes of the State is to be insisted upon; and thirdly, that those persons who are willing to provide separate maintenance for their leprous sick, should be permitted to do so only upon the condition that the isolation proposed be practically an efficient one. Segregation of the sick becomes

an inevitable resultant, because it would be impossible to furnish individual separation for all; and hence, a common Home for the large majority of lepers would be required.

With the above remarks, my self-imposed task were over, did it not seem desirable to refer to the past history of leprosy in this part of the province of Kattiawar, for illustration of what already has been attempted.

About 27 years ago the then Political Agent addressed to Government, the information that a practice obtained here of lepers drowning themselves in the sea, in or near localities (as Hathab, Gopnath) mentioned in my notes. Colonel Lang wrote—"I found that this practice is much more common than I had any idea of, and although the lepers in most cases voluntarily consent to the self-sacrifice, it is much to be feared that cases occasionally occur when they are very strongly urged, if not actually compelled, to submit to it, partly from the trouble and annoyance their relations have in attending on them when the disease is in its last stage, and still more from a superstitious notion which appears very prevalent amongst the lower classes in this province, that any one assisting in burning or burying the corpse of a leper is very liable to get the disease himself."

Parenthetically, it may be remarked that lepers were regarded as just sufferers; *e.g.*, in a formal engagement against female infanticide passed in 1808 between various Jhareja and Jetwa Chiefs in Kattiawar and the Honorable East India Company, it is urged as evidence of the sin of infanticide, that the Shastras

teach punishment for this is equal to that of other great offences, entailing long detention in hell, and afterwards, on second birth, "the offender will become 'Koreea' (leprous)" and be liable to paralytic stroke, &c.

The result of Colonel Lang's representations was the erection in 1850, at Rajkot, the political capital, of an Asylum for lepers, which still exists. Its maintenance is defrayed out of yearly subscriptions amounting to Rs. 5,278, which are paid by the Talookdars of the Province (*vide* the Preface of this Report), monthly bills being passed by their representative committee at Rajkot: the number of inmates for the last five years was about 50, but for the last two years 37-33 and 31-83: there are no fixed regulations whatever: each inmate gets a ration of flour wheat, dall, rice, &c., no animal food is allowed, but some extras are given when needed. The institution is superintended by a pensioned Hospital Assistant, and it now serves only as a more or less temporary resting-place of the wandering sick. As an Asylum proper, this institution does not seem to have been intended.

Such, then, was the outcome of a sad and somewhat sensational revelation, not apparently the result of deliberate enquiry but incidentally brought to light. After a later and fuller research, I have no such startling facts as this of suicide to reveal, for doubtless the practice does not now obtain: yet I beg it be remembered that the suffering entailed by disease is always the same, and not even suicide could appear more appalling, than do the misery and hardships which are endured at the present hour, by very many poverty-stricken lepers in Kattiawar.

ADDENDA ON MODERN NORWEGIAN, CRETAN AND SYRIAN LEPROSY.

In order to avoid confusion in the text, I have reserved for this place some remarks in comparison of the European and other Eastern forms, with the Indian variety of this disease.

Norway.

1. Amount of disease.—The kingdom of Norway has 1 leper to 833 persons: in Kattiawar there is barely 1 to 1,000; hence on the whole there is less disease here. But such general statement is of little weight, because of the universally endemic disposition of the leprous malady; and there are in Norway, as probably in India, large areas—even provinces—partially or wholly free. When affected districts alone are compared, the preponderance still remains with the European country where *e.g.* there is 1 : 421 as compared with 1 : 553 in Bhaonagar; and this seems to be due chiefly to the fact that leprosy is there strictly confined within certain coast-areas, whilst in India such is not the case. A greater concentration of disease is, therefore, associated with greater prevalence; and if we compare *e.g.* the worst Norwegian bishopric with bad districts in the Bhaonagar State, we find lepers to persons as 1 : 262 and 1 : 500-600 respectively. In further detail, take the Nordre Burgenhus Amt and the Duskrohi district, and we find the same proportions to be 1 : 147 and 1 : 450 respectively; in short, from a study of the admirable official statistics annually put forth in Europe, I infer that marked local accumulation of disease is commoner there than in Kattiawar. My notes add—we see on the W. coast of Norway worse sanitary conditions with a harsher climate, more hurtful food and closer inter-marriage; and hence more and severer disease there. Indeed, particular conditions are so widely diverse in the two countries under notice, that the fact that amidst such diversity, the chronic leprous disease maintains a close general uniformity, becomes striking evidence of the specific character of the malady—or in other words of the non-dependance of disease upon collateral influences.

2. General distribution of leprosy.—It is certain there is always a close identity in the symptoms, course, duration and termination of this complaint; and hence we may assume its proximate cause—if not, as well, the exciting and predisposing causes—to be the same. Any inference, therefore, bearing on the natural history of leprosy which holds good for Europe should apply, *mutatis mutandis*, for the East.

Nothing certain is known of the introduction and earlier history of this disease in Norway (and so here), but of later periods there are suggestive memoranda to be gleaned from Bidenkap's Memoir 'Om Spedalskhed som endemisk sygdom i Norge;' published in Christiania, 1860. This gentleman, whom I have had the pleasure of meeting, undertook a tour in the leper-districts like my own here, having the advantages of being at home, travelling leisurely and less far, and of following in the track of previous enquiry: by-and-bye, perhaps, others may, by favour of the ruling powers, follow in my wake. In Norway, within historic times leprosy seems always to have infested the same area, or nearly so, as at present; and from the close of the thirteenth century until the middle of the nineteenth, it seems to have increased and decreased during several successive eras; without, however, showing such a remarkable augmentation as has occurred during the current century, an increase which has no parallel in other European countries (Bidenkap), but which may have such in India. At least, the disease has become greatly more common since the early part of the century, and that without any particular overspreading of its former local limits. We have seen that such limitation is remarkably definite; it seems to be partly due to the intervention of an elevated and thinly populated mountain-chain; and a similar obstacle to intercourse between coast and interior we find in W. India, where, however, neither "Ghâts" nor "hills" have had the effect of totally interrupting the continuity of disease. This complete limitation of leprosy to maritime areas, then, is not represented in W. India. I may add that the population of the W. coast of Norway is an augmenting one. As to density of population in Norwegian leper-districts, I find that with one exception all of them have fewer—commonly much fewer—persons to the square mile than has the Bhaonagar State, for example. On the whole, as the population diminishes so does leprosy, and the two bear a certain relation to each other, rising and falling together; but immediately on entering upon details, the exceptions to this inference become so striking, that it is evident no rule can be laid down. There are districts in Norway with no denser population than that of Bhal in Bhaonagar, where nevertheless lepers are to be found; but then in detail, the people are massed very differently and it must be

remembered that leprosy is more abundantly disseminated in the former than in the latter country. Were this the suitable occasion, I should be glad to pursue such a fruitful topic as the present; but must now pass on.

3. Local distribution of disease.—Within affected areas it is a feature common to west and east, that nowhere is leprosy equably diffused: in districts quite similar and adjoining, it may be very irregularly distributed: it may abound in small parishes, or in particular localities forming part of an area but little affected in general; it may infest outlying parishes, and it may be found in places not suspected of having the disease. On the other hand, leprosy is not common in the larger towns of Norway, whilst in India we know these are not spared: here, however, such towns rather resemble aggregated villages, and they are without the sanitary advantages which under European civilization attach to the like. Bidekap remarks that the residents of islands along the coast, and of small fishing-villages in even infested areas, may be free from disease; but he thinks that leprosy seldom quits the neighbourhood of water. Here, too, I find that hamlets are seldom the home of lepers; but we know that from south to north, even to the Himalayas themselves, affected provinces are to be seen, where is no superabundance of water.

In further detail, it is noted, in Norway, that leprosy is commonest in the lower and poorer classes, yet those who are better off and still do not attend to sanitation, are not spared; while the more careful upper classes are seldom attacked: all this, with modifications, applies to India. Generally leper-children are few in Norway; they are more numerous in Kattiawar where I reckon them as 1:15 of all lepers—the proportion in Europe being 1:33; yet there as here, there are places where they are frequent and in such the disease is commoner than elsewhere (so probably in Kattiawar, *e.g.* in Talaja). Bidekap narrates instances where several affected children have died in families, without the parents being attacked; he notes that the inhabitants of more infested localities have acquired an acuteness in detecting disease, which surpassed his own faculties, but which he has often found to be quite correct: and a similar remark applies here. He concludes from his observations, that lepers may be immigrants from affected districts; and notes that returning immigrants may convey back the disease to their non-affected homes—remarks, I have had occasion to justify here.

4. Leprosy in individuals.—The total population of Norway consists of males 49·1 per cent., and females 50·9 per cent., the latter therefore slightly preponderating; while the leper-population consists of males 53 and females 47 per cent.—hence is apparent a ten-

dency in their disease to attack males by preference. Such tendency is much more marked in W. India; and it is far in excess of the normal preponderance of males, which obtains here. So that while the subjects of leprosy in Norway are males in only a moderate excess, in India they are remarkably often of the male sex: the reason of this difference is unknown. For comparison with the text, I append the following Norwegian data:—in no division of the country are the sexes of lepers found to vary so much as 2:1 on either side: in Bhaonagar it is not so. In particular parishes, however, the ratio of the sexes may vary much; *e.g.* as much as 6 or 8 m. to 1 f., or as 3 or 4 f. to 1 m.: nothing of the kind is seen in Kattiawar villages. There is, therefore, in Norway a general uniformity, combined with great local variations; in India the common uniformity is far less disturbed. The significance of such variations is very considerable, with reference to the manner in which disease is propagated; but the Norwegian data cannot be made use of in this respect, because they do not distinguish between lepers of the same or different families. A notable instance in my own experience is that of the family at Gorkhi near Talaja, where all five sons are lepers, their mother having been also affected; there are no other children besides these, and the case may be explained as well, perhaps, on the hypothesis of contagion, as on that of heredity.

Single leper-parishes are rare in Norway, *viz.*, only 10·6 per cent. of the whole: whilst the reverse was found in Kattiawar with regard to single leper-villages. The sexes are almost equally distributed in such instances; such parishes are commonest where disease is rarest. In parishes with several lepers, the ratio of the sexes is by no means uniform.

The proportion of the sexes has no fixed relation to actual or comparative prevalence of leprosy, and so far as appears, separate instances can be explained only by a knowledge of individual circumstances; such knowledge has yet to be attained. In sum, then, disproportionate frequency of male lepers in India has its occasional representative in Norway, where, too, female lepers may be in excess; and these data, with others, point to local conditions, which can only be relegated to individual persons, as the determining causes—but if so, then the possibility of contagion, in some form, assumes increased importance.

5. Diseases associated with leprosy.—From the admirable year-books of national health which are published by the Norwegian Government, I have gathered a few memoranda for further elucidation of my subject. An idea still lingers that syphilis is connected with leprosy, but I find that it is rare in the northern districts of Norway, where the latter may be very common; and it is frequent in Bergen town and

southern districts, where leprosy, on the contrary, is very rare. I therefore infer no essential relationship between these two maladies, which otherwise are so truly analogous in many of their characters. Phthisis or pulmonary consumption—a manifestation of scrofulosis—follows leprosy in being rare in the extreme north; but it gradually increases towards the south, and is very common—most common—where there is none of the latter disease. Typhus (including typhoid) is everywhere very frequent, even where there is little or no leprosy. Ague is extremely rare. On the west coast of Norway, there is more leprosy than either syphilis or phthisis.

As to the ratio of the sexes in each instance just named, I note that it varies in syphilis but does not follow the ratio in leprosy; thus there are sometimes more females than males affected in a district, but the last-named disease may not present the same feature. Phthisis may, in parts, affect more females than males; and it does so in the total, hence differing from both syphilis and leprosy. On the whole, the sexes are nearly equally affected in all these constitutional maladies; and no inference of particular value for application to our limited Indian knowledge, can be derived from these Norwegian data.

TABLE of Persons affected with certain constitutional maladies on the west coast of Norway in 1870.

Districts.	Population.	Syphilis.	Phthisis.	Fever.	Ague.	Leprosy.
Finmark	20,329	21	14	165	1	12
Tromsø	45,338	18	20	103	1	20
Nordlands	89,688	46	62	437	..	231
N. Trondhjem	82,489	43	61	250	1	170
S. Trondhjem	109,123	203	165	210	2	169
Romsdal	104,362	85	75	421	4*	288
N. Bergenhus	86,803	7	67	70	..	591
Bergen town	27,703	157	84	160	4*	26
S. Bergenhus	113,403	25	42	364	1	349
Stavanger	104,868	114	231	427	1	167
Lister-Mandal	73,785	200	309	158	..	4

* The ague was imported.

The above coast-districts are arranged from north to south: they comprise about one-half the total population of the kingdom, and in the remaining portion (mostly inland) only 22 cases of leprosy were known in two adjoining areas. 2,017 lepers are entered above, and hence clearly appears the endemic character of their malady. Medical arrangements in Norway are such, as to permit of the record of all instances of persons applying for aid, for there are virtually no practitioners beyond those recognized by the State. It would not be difficult to enlarge these comparative data, and that with advantage; but the above will suffice for my present purpose, and, when occasion requires, the complete relations of the leprous malady in Norway (as a type for India, &c.) can easily be worked out.

Warli.—I have stated that the sea-side villages and towns in Kattiawar are not the abode of fishermen,

who as a class are not to be found in that province, owing to the prevalence of certain religious tenets regarding the sacredness of animal life; but in the Concan of Western India such tenets do not prevail, although many of the inhabitants are equally known as 'Kolis,' and may, indeed, be of the same original stock as the residents of *Kutpar* and other places described in my diary. As an instance, therefore, better comparable with Norwegian villages, I will mention here the village of *Warli* near to Bombay, which I have visited since returning from Kattiawar. It was taken at random and is not, that I am aware of, any way peculiar. *Warli* is a scattered cluster of hamlets situated on the lee-side of a low spit of land, jutting into the sea and forming the western boundary of a small bay: its name is probably taken from that of an aboriginal tribe inhabiting the maritime border of the Ghats about here. Its site is elevated but a few feet above sea-level: the houses are built as usual, and the people (numbering perhaps 2,000) live almost exclusively on fish and rice: their avocation is fishing, and their chief livelihood the sale of fish in Bombay: they are also common labourers on occasion, and women work hard as men. During the rains (which here are heavy, *viz.*, 70 to 80 inches per annum) rice is cultivated in the low-level flats adjoining the village, and it is stored in numerous raised, wooden bins, seen everywhere about. Wheat and other grain, milk, flesh and condiments are sparingly used; unripe mangoes are largely eaten in season, and there are spirit shops in the place: the wells here furnish brackish water, but a supply of good water has lately been laid on. Manners and customs are primitive: hygiene is no more attended to than usual, and a strong fishy odour pervades the locality, which chiefly emanates from the drying-grounds above the village, where suspended on thin rails may be seen quantities of small fish, being converted into the 'Bombay duck.' The adjoining cocoanut plantations are cultivated by the 'Bhandaris' and salt is prepared, not far off, by another primitive race—the *Agris*; but salt is not used to preserve fish—being, perhaps, too valuable an article so to employ. Stale or putrid fish is never freely eaten—of that I am assured. The people are of small stature, fairly nourished and clad: they suffer chiefly from malarious fevers, are liable to itch and other skin-diseases, and commonly display, as it seemed to me, an oily, porous and not overfragrant condition of the integument, which, however, is freely open to air and not unclean. A section of the community were long since converted to Romanism; they are of somewhat better habits than usual.

Here, then, is an illustration of Indian experience for comparison with the conditions on the Norwegian coast, as described in my Report before alluded to;

and however different in details, there is one prominent similarity—namely, the prevalence of the leprous disease. On questioning as usual, I obtained the names, &c., of 12 lepers now deceased—6 of them within the last five years; and I was informed that this complaint is much more frequent now than formerly. Popular tradition does not go further back than forty or fifty years. There are, at present, at least 10 lepers here, and these I have notes of: 4 are males (perhaps others are away at sea or work) and 6 females—an unusual preponderance of the latter which may be associated with the current increase of disease: ages from 9 to 45 years, 8 of the 10 having been affected in childhood or at puberty, and 5 of these within the last six years; form of disease equally A. L. and T. L.—in Norway, the latter almost always predominates; there is a remarkable absence of heredity, for only one girl had a remotely allied cousin affected, and he was a resident here; but an adult leper-woman gave the following history—she has had 9 children, of whom the two eldest were sons and died as lepers, the next two were daughters (now over 20 years in age) who are well; then a third son who died a leper; then followed three sons who died young, and a daughter of 8 still alive and well: after the birth of the latter, she began to show symptoms of A. L. and is now partly disabled thereby—there are also traces of T. L. to be seen: thus this woman became diseased long after her affected children: the husband is well: she still goes about to work in the neighbourhood. In the entire absence of isolation and other sanitary precautions, it may be said that liability to contact with lepers is well-nigh universal; one affected man keeps a shop in the main thoroughfare; another is an immigrant, well previously to coming here: the Christian community lives rather apart, and is much less infested than the others. Totally destitute individuals go to the Dharmasala in Bombay, there being no medical aid or other provision on the spot.

In this village, then, we note much recent and some severe disease, an equality of female lepers and a large proportion of affected children. I have said the instance may not be an exceptional one, and as evidence will add, that almost all of the 59 men and 68 women who are lodged in the over-crowded Dharmasala at Bombay, have come from similar villages and small towns in the coast-area around the capital, and some of these places—*e.g.*, Orun—must have long swarmed with such miserable subjects. Surely, Norwegian experience had nothing more imperatively calling for public interference and aid, than can now be seen in this part of India; and, in particular, does Bombay, with its environs, offer an open field for philanthropic enterprise.

the seat of the leprous disease: thus in 1874, I saw several well-marked instances of both forms at *San Remo*, in the beautiful Riviera of Western Italy, the subjects being peasantry from the neighbouring dales or dwellers in sea-side towns (*e.g.*, *Varazze*): at Algiers I saw a leper-woman from *Alicante* on the near Spanish coast, and also an affected man from *Malta*; both were decided examples of the severer form of disease, and neither was isolated. These sporadic cases proved to me that a completely identical complaint occurs in the south of Europe. In the mainland of Greece, I found, at *Athens*, only one immigrant leper from Crete; but there are villages on the north and south coasts reported as still having affected inhabitants. Formerly this disease acquired the name of 'Elephantiasis Græcorum'—the first epithet evidently referring to T. L.; and it also has the synonym of 'Lepra Arabum'—with as clear allusion to A. L.: such designations embracing, as it seems to me, the two prominent forms now commonest in West and East respectively, and doubtless similarly distributed in bygone times, when the Arab and Greek physicians first penned their observations. We notice that leprosy in Europe now haunts maritime districts, and implicates the lower orders of people only; but neither of these features formerly obtained there, nor do they prevail at present in India.

Several islands of the Greek Archipelago contain lepers, and of them I visited *Chio*, *Crete* and *Rhodes*. In the first-named picturesque and healthful island, leprosy is even common in villages to the north and east: at the capital is a small refuge for lepers, where most unmitigated disease may be seen, in both forms, in either sex and sometimes hereditary in origin. In the larger and often equally picturesque island of Crete, leprosy perhaps even more abounds: thus, the lowest estimate gives 400 as the probable number of lepers, or 1:750 of total inhabitants, *i.e.*, about 1:500 residents in towns and 1:669 dwellers in villages—proportions by no means dissimilar to those I have named for Kattiawar. The higher estimate furnishes 800 to 1,000 lepers; a correct census does not seem to have been made, but it is by no means unlikely that this larger number is not excessive. As in all large areas, the disease in Crete is not uniformly distributed; and the mountain ranges of Sphakia, Messara and Salone are well-known special haunts: in certain districts and sub-districts, the malady seems quite as common as in Kattiawar, *e.g.*, Dr. Gutofsky informed me that in Petro-kefala (district of Chandros) there are 132 lepers, and dispersed in villages of the Candia district there are 148: in Androghora (district of Khondri) 96; in Krizza (Mirabello district) 70; in Daibacki (Messara district) 50; Kazzabas (near Candin) 78; in Aghia-vasil (Ansara) 15: besides, at the three chief towns

Besides Norway, other countries in Europe are still

of Canea (the political capital), Rettimo and Candia (the chief port), there are large leper-villages or refuges, which I visited and have elsewhere described. It is not known if the malady has spread by traffic and intercourse; communication, even with the large towns, I found to be practicable only on horseback, and that not seldom with difficulty, owing to the execrable state of the pathways. The sanitary state of the country villages may be described as most indifferent, and the clothing and habits of the people as far from cleanly. Since the principal crops are of the olive-tree, and a common occupation the preparation and carriage of oil, it is no wonder that to consumption of rancid oil and want of adequate personal cleanliness, the leprosy disease has been popularly attributed. Fish (chiefly dried) is largely consumed by the Greek peasantry, who are superstitiously disposed and very ignorant; but here I never heard of leprosy being referred to the excessive use of fish, and the Turkish population who observe different rites, are by no means free. In short, the villages of Crete cannot be regarded as much, if it all, superior in sanitation to those of Kattiawar; and I think that in its moister climate, nuisances are even more prominent. We find in both countries a remarkable local or endemic limitation of disease; and since the Greek peasant is even less willing than usual (to a stranger, at least) to own an hereditary taint, I was disposed to place much stress upon this feature of the complaint. Subsequent experience in India has shown how it may be explained, and hardly better locality than Chio or Crete for studying the natural disposition of leprosy in a defined area, could be mentioned. I have some particulars of a local outbreak of disease in a village of Chio named *Bolisso*, which point to its recent and rapid multiplication; and the idea of spread by contagion is entertained, even by the physicians who were sent to investigate the matter; their preventative recommendations also include restriction of marriage to healthy persons only—a measure the Greek Church has the power of inculcating, but not the Ottoman. A few particulars of the climate of Crete were kindly given me by Mr. Sandwith, H.B.M. Consul-General of Crete. Rain occurs between the months of April and September, seldom at other intervals: it is occasionally very heavy, and especially so on the mountains. At Canea the average fall has lately been 27.45 inches per annum: the temperature ranges from 37° to 90°; and, in general, the climatic conditions may be regarded as intermediate between those of Norway and India, while at the same time, about equally favourable to the development of the leprosy pest. The geological conditions in Crete (and so for Palestine) are very different to those of either Norway or W. India, and this is evidence of leprosy not being necessarily allied to such telluric influence. With regard to the antiquity of this pest in the island of Crete, I understand that in old Venetian records, there are notices of the great mortality then caused by the disease.

Passing on with the mention of a characteristic example of severe leprosy seen in a girl at *Smyrna*, the next country which I am able to compare with Kattiawar is PALESTINE, the more southern parts of which I inspected during the same tour in 1874. Here also obtains the division of a coast-area and elevated interior, and in both the leprosy disease is frequent; being, perhaps, most common, comparatively

to population, in the low maritime districts. The average rainfall of the country is entered as 10 to 20 inches a year; there is more rain on the hills than in the valleys: mean temperature of the interior 50° to 54° in winter, rising to 82° or 92° in summer, or even higher in the close valleys. Westerly winds are commonest in the rainy season, in the spring East winds and in summer from the North: on the whole, the climate is precarious, and the crops not seldom fail. Ordinary diseases—ague is as common, or nearly so, as in the tropics and it is equally often attended with enlarged spleen: severe malarious (?) fevers are not rare, and in short such fever is the common cause of death. Around Jerusalem, last year (A.D. 1873) it was very bad, and whole villages were depopulated; yet lest it be supposed that malaria is essentially connected with leprosy, I must observe that malarious fevers are unknown on the west coast of Norway, where this disease prevails to the exclusion of other parts.

The following villages of Palestine were inspected with the same object in view, as that I had in my subsequent tour in India: the two first named are situated in the upland interior of Palestine, the last in the lower coast-area:—Inland 1, *Ramallah* (Ram Allah).—This village is situated at about three hours' distance to the north-west of Jerusalem. It is placed on the brow of a hill belonging to the mountain range of Judea, and it overlooks the wide maritime plain extending westward from the foot of this range. The soil is everywhere composed of red earth and limestone, disposed in alternate, parallel layers; and the crops are of wheat, vines and olives. The village, being set on a hill, is exposed on all sides to the air.

The watershed falls are to the east (gradual) and to the west (abrupt). The village is of fair size, and there are upwards of 25 larger houses in the place. These houses are built of stone; and are usually two-storied; the people live above, ascending through a trap-door, and the lower floor is a kind of cellar, used for cattle and stores, and is unpaved. Such was the construction of a dwelling, once the residence of a leper, which Dr. Chaplin and I examined; and we found others were like it. There is no regular drainage: house-refuse accumulates within. Rain-water finds its own path of outflow: here are no cisterns. The place inside is indifferently clean: all sorts of things are heaped together within doors, and there is evidently much overcrowding. Outside the state is very bad; dirt and filth abound. Commonly an ox or an ass occupies the basement part, where, too, are stored agricultural instruments, &c. Ventilation and air-supply are of the scantiest: the superficial area may be 20 × 15, but the doors and windows are small and usually there is no chimney. Repairs and renewals are rarely effected, as one may judge by appearances. The stable is beneath the dwelling-room, and there cattle sleep. Water-supply:—There are no sunk wells or built up reservoirs within the village. Water is obtained from two springs situated at some distance below the brow of the hill: these are named 'ain mizral' and 'ain menjid'; one is used exclusively for cattle, and the other for the people. The latter I visited and found the water scanty, though not foul; it is drawn up by buckets, and is derived from small springs issuing through the rock. When cattle are watered at the same spring in that which furnishes drinking-water,

the ground around the wall of the well has been noticed to be in a filthy state; and then it is conceivable that soiled water might percolate downwards towards the sources of the springs, and thus contaminate the drinking-water of the people.

Inhabitants, Race.—There are Mussulmans of varied origin in many villages; but in Ramallah the people are almost all Greek Christians, and also of Syrian or mixed origin. They are peasants and abound: there are some artisans, who are as well cultivators of the ground. Children are very numerous. Affections of the eye, including 'squint,' are common: physiognomy of the children good, but there is an absence of robustness about them all. Physique of people not amiss; dress is sufficient, but not clean. Food and drink:—Wheat, oil and salt, made into a cake: lentils; seldom meat. Intoxication rare. Intermarriages are said to be not uncommon in all these villages, where families are few. Burials: popular customs and fasts:—The former are not peculiar; the last or frequent fastings, have been mentioned to me as one of the reasons why Greek Christians are more affected with leprosy, than are the Mussulmans. The former are also under compulsion to eat salt fish and at various times; but I am of opinion that a broad view of the leprous plague as it prevails in Palestine, does not support the opinion that Greeks are peculiarly liable to its ravages: see 'Ramleh' below. The average life-period is not, perhaps, unusually short, but the villages are liable to epidemics of malarious (?) fever, during which many people die: individuals have probably little bodily stamina. These statements are based on local information. Mental condition:—The peasantry are intelligent, but they are very ignorant. Here is a good-sized church, with several priests; the latter seem hardly raised above the condition of the peasantry.

Lepers:—Numbers: sex; age; race.—It is asserted that all the cases of leprosy originating here, have been sent to the huts at Jerusalem; and, in fact, I have notes of 5 such cases, now or lately in the capital. Lepers come from houses in all parts of the village, and from the better as from the worse. The places were pointed out. There is no restriction or impediment to the marriage or intermarriage of lepers. It is known that all forms of disease prevail here. Special influences:—food, habits, residences of leper-infested families.—No peculiarity could be elicited on enquiry and examination. Origin of the complaint:—Its spontaneous origin is that commonly admitted: nothing satisfactory regarding heredity could be elicited. The people believe in the contagiousness of leprosy, but no valid data were ascertained upon close examination. The common idea of sexual intercourse at unsuitable times producing the disease, is again mentioned: also bad food and exposure, mental emotion and 'fate.' Customs of the people regarding lepers:—The neighbours noticing signs of the malady (which are kept as much concealed as possible), a council is called of the heads of the village, and if doubts arise as to the existence of leprosy in the individual examined, the opinion of a noted Mussulman doctor is taken. The sick person being condemned by such tribunal, is then compelled to leave the village, and usually goes away willingly: he is regarded as virtually dead. His family may remain, and they, or nearest relatives, take charge of his pro-

perty. All are thus treated, it is said, whether rich or poor; and the assigned reason is fear of contagion and spreading of the contamination. The early signs of leprosy are well known to the people, who are eager to detect the malady: but sometimes the patient manages to conceal the symptoms of the less repulsive form, until a comparatively advanced stage. No distinction is popularly made between nerve-lepra and nodular-lepra. All this time the interference of Government is not required. No slur is supposed to rest upon the members of the family, who remain at home: they mingle with the rest of the people. The clothing of lepers is burnt, it is said: their dwellings, bedding, &c., continue in use. Their children marry freely, if they remain in good health; a little girl, the child of a leper, was pointed out to us amongst a number of other girls, and that not as an object of aversion. When questioned as to the possible consequences of such marriages of healthy with the tainted, the people professed both ignorance and indifference; they answered as fatalists might. Whatever the popular notions may be, contact with lepers can hardly be said to be practically avoided: after expulsion from the village, however, close contact with the affected is unusual. I did not learn that lepers are known as *mauvais sujets*; and they would be allowed to return to the village if their disease had disappeared. Children may be born to lepers before the disease makes its appearance; but after that time, it is the popular idea that there is seldom any progeny. As to any increase or diminution of leprosy in this village, or around, it was said that the disease is about as frequent now as formerly; but that not improbably, it is on the increase: see below. The preceding information was gathered with the help of my kind companion, in reply to questions which I had prepared, but which need not be inserted here.

2, *Beitjala*.—Locality.—The village is situated at an hour and a half's distance from Jerusalem, towards the south-west, on the road to Bethlehem, opposite to Rachel's tomb and close to large ecclesiastical piles, belonging to the Greek Church. Elevation and aspect.—High and upon the side of a hill facing the west: appearance picturesque, and a sacred site. Soil and vegetation.—The usual stratified limestone rock, with but little of the red earth intermingled. Vegetation.—Cereal crops on the hill-sides, with vines and olive trees below, and in the green valleys. Watershed.—Towards the east and north. The village: size.—It contains upwards of 70 houses. Construction.—All buildings are of stone, and some are two-storied; very irregularly placed, both in level and line; mostly massed in one continuous block. Drainage of houses.—There is none of a regular kind: small streams of dirty liquid meander downwards on all sides, through the narrow streets. Cisterns, wells, springs.—No wells, &c., were seen within the village, but there is a deep spring above, whence a scanty supply of muddy water was being drawn for camels. For the inhabitants, water is taken from a copious source situated about a quarter of a mile off, and at the bottom of the hill; where there is a spring fenced in and covered with a stone canopy. At my visit, a picturesque crowd of women was occupied in drawing and carrying water; and some were also washing clothes, near the same spot. The water looked sparkling and clear; it tasted also cool and pleasant. Exterior sanitary

condition.—Here prevails the usual and most objectionable practice of depositing ordure in streets, lanes, paths, and both inside and outside the houses. Consequently bad smells abounded, and the uneven footways were simply abominable. Sanitary condition within.—When low-placed, the interior of the houses was damp, dark and dank; the walls were black with smoke and very dirty. The more elevated buildings were less dismal, but hardly at all cleaner. Ventilation and air-supply.—There are numerous covered and arched footways in this hill-village, which must greatly impede ventilation: the streets or lanes, too, are very narrow, tortuous, unpaved and often steep. There are open spaces partly filled with ruins and rubbish. House-ventilation is effected chiefly by the door; some houses have small windows, others have none: there is a decided want of air, although the village site is admirably open and even conspicuous. Repairs and renewals.—Ruined houses and heaps of *débris* are common: some new houses are building, but most are in great need of repair. Stables and cattle are placed and lodged below the dwelling-room, or in an adjoining space enclosed within the same walls; many donkeys and camels live amidst their owners at home, and mangy dogs abound. The people: race.—Chiefly Greek Christians; a few Latins, but no Turks in this village, which is adorned with large and ornamented churches and convents. There is a full complement of inhabitants, who are agriculturists, carriers, traders, oil-pressers, &c. Plenty of children about, of all ages, who are universally in a dirty and unhealthy condition, especially about the eyes. Many persons were robust and in fair health, but it was noted that a considerable number of sickly people were visible. Costume as usual, dirty and not very abundant; the appearance of the women was sometimes engaging, but they looked very untidy. Food and drink.—Wheaten bread, oil, vegetables, a kind of treacle: rarely meat or salt-fish. There is probably a defective amount, rather than a bad quality of food in this place. Numerous old people are noticed. The people seem rather apathetic, but sometimes not unalert. Ophthalmia, corneal opacities, granular lids, squint and blindness, seemed to be very common. I saw no deformities of the limbs.

Lepers: number, age, sex, race.—There are several lepers still residing in the village: four of these were named to me, and three were seen; but how many others remained concealed, could not be ascertained. The following are brief notes of the three examples of leprosy which came to light.

Case 1.—A woman named Delilah, aged near 30, upwards of 10 years a leper: a native of this place, of which her father is the headman or 'sheikh.' She has marked nodular leprosy, especially about the face, but she can move about and use her hands; she was found at work on a cloth jacket, with her needle. Her father and mother are here, both sick but not with leprosy: they were visited. She lives with her mother in a lower room, dark and dank, but not worse than some others: her husband gave the house, and leaving her, has married again. The woman is not free from sores, and her parents do not hesitate to touch her, when needed. The villagers around did not openly complain, but they would be glad if she were to leave the village. The old man, her father, is of large build and still hale: he is suffering from an attack of 'boils' on the back and arm: at present he occupies an upper chamber. He states that this his daughter (an only child) was a beautiful girl: one day,

some fourteen years ago, she went to work in the fields, where she was assaulted by two men and being terribly frightened, ran home; she became sick a year afterwards, had fever, and then the disease showed itself: at this time she was married, and she had an infant which died soon after its birth. Has lived in a good house all her life. Her father's brother was a leper. *N.B.*—Excessive fear is one of the commonly attributed causes of leprosy. The woman shows no marks of any other complaint: she is a true leper.

Case 2.—Chasne, a young woman of about 25 years, has a most characteristic aspect of nodular lepra, the 'tubercles' on the face being large, very prominent, red and shining: she has been thus affected for two years. When visited, was found engaged on embroidery at the door of the room she occupied, with other members of the family. Was a companion, years ago, of the other woman-leper, and is supposed to have caught the disease from her. Her parents were present and were both hale for elderly people: they declare that no relative of theirs was ever affected with this disease: they have had six children (five girls and a boy), and the patient is the second, as regards age. Chasne has been married 15 years: no children: is now separated from her husband; he—like her father—is an oil-presser and seems to be in fair health. Her brother's wife has become leprous: do these facts point to successive contagion?

Case 3.—A well-built man, aged about 30, presented himself to my notice on the outskirts of the village, having purposely evaded earlier search. He has perfectly characteristic marks of nerve-lepra in both hands and feet: the right hand, particularly, is almost wholly absorbed. There are no signs of disease upon the face; and none, he states, upon the trunk; but this point it was impossible correctly to learn. Denies having been in contact with lepers; has never lived long away from this village: is a muleteer and camel-driver, and still lives at home with his family, who are all well. Has been a leper for 4 years, and for 1 year has had to give up work. Both median and ulnar nerves are affected in this man, and the hands more than the feet: there are sores in the sole under the great toe, as is frequent. He has always lived in the usual manner and denies other kind of infection.

This instance is noticeable as proof of the simultaneous occurrence, in one village, of different forms of lepra; and its accidental detection supports the opinion that cases of disease may be more numerous here than, on a passing enquiry, can be learnt by a stranger.

The two villages—Ramallah and Beitjala—were visited because of their proximity to Jerusalem (where my time was limited), and because it was known that lepers had come from them on different occasions. The evidence of possible heredity and contagion in the latter village is noteworthy; and the leprous plague is clearly not extinct in this upland interior of Judea.

Coast-Area.—*Ramleh*. Locality.—In the low, level plain of Sharon. Position.—N. Lat. $31^{\circ} 59'$: E. Long. $34^{\circ} 52'$. Elevation.—Probably not more than from 100 to 150 feet, above sea-level. Soil.—Clay and sand, mixed with water-worn pebbles. Watershed and Ground-water.—There is no uniform watershed: water stagnates in the hollows, and is found at depths varying from 10 to 50 feet. There is no regular drainage. Vegetation is either scanty or very rank: the prickly-pear has spread everywhere. There are fields of cereals on the outskirts; and olives and other trees. Meteorology.—Details are not available, but it is evident that the climate is warm, damp and equable; but sudden storms of wind and rain, with considerable though temporary depressions of temperature, are reported as not unfrequent. The district in which

Ramleh is placed may be described as a wide undulating plain, intervening between the sea-shore and the hilly, elevated table-land of the interior; and averaging about 15 miles in breadth. The soil is alluvial being partly sand and partly clay: it is very fertile in parts, sterile elsewhere. There are no large water-courses near Ramleh. The town faces the north; it is situated on a slope but a great part is at a low level. The houses are built of stone; many are in complete ruin, and there are the remains of several large buildings of an ecclesiastical character. There are, too, houses of a better class, with an upper storey; but few are in perfectly good condition. The streets are narrow, and accumulations of rubbish are everywhere visible: water and filth run down the centre of the lanes, or collect in pools at corners; and collections of excreta are obtrusively common. Cattle abound, and large herds are nightly driven into the town to be lodged there; sheep and goats are plentiful, and dogs prowl on all sides: horses and asses are stabled in the houses, and the carcasses of dead animals may sometimes be seen in the streets. A few German immigrants live here; and it remains to be seen if they, too, become affected with the pest.

The neighbouring town of *Lydda*—a well-known site—was visited; its sanitary condition is no better than that of Ramleh, nor are the villages and hamlets near in a state more favorable to health.

The people: Race.—Most are Mussulmans; but there are many Greeks, and some individuals of other races. Physique.—Below rather than above, that of the inhabitants of the table-land of Judea. Children, &c., are numerous, but do not seem to abound as is common. Women are less often seen, and old people are comparatively rare. Occupation.—Mostly that of peasants (*fellaheen*): there is a large bazaar, and traders are active. Clothing.—In the town the people are commonly well clad. Food, &c.—Wheat, rice, barley, 'dura': 'urid,' gram, beans: vegetables, olives: oil, salt. Fish is not common: flesh may be purchased. The common people, however, live but indifferently. The water-supply was not specially examined; it is, however, plentiful though of indifferent quality.

Lepers.—Within the town none are to be found, but just where the high road to the interior passes the place, groups of these subjects may be seen from morning to evening, crouched begging at the roadside. Few are natives of Ramleh, but they have congregated here from the neighbourhood, for the sake of the lodging which is afforded them and with the object of seeking alms. They were asked to assemble at their domicile on the morning of December 28th, when notes of their cases were taken, with the aid of an interpreter. Their disease is entirely the same as prevails in Norway, Crete and India.

The Leper-house at Ramleh is situated in a large, ruined convent; probably of Christian origin, and now utterly dilapidated. It is to be found at a short distance outside the town, and is surrounded by rank growth of the prickly-pear and other weeds. The side aisles and upper clerestory passages, have been patched up so as to form rude chambers; where, like owls in the ruin, these miserable creatures nestle. There is no common roof; the pavement is now filthy mud, and water is derived from a well in the middle of the open nave. More utterly wretched quarters for sick persons, can hardly be conceived.

It is said that this spot was once used by the Sheiks as a school for teaching the Koran, and that about 150 years ago, it was given up to these people. Old leper residents assert that the number of lepers is still increasing, and that notwithstanding many die here, the additions augment yearly: last year there were 24, now there are 28, and it may be said that extreme disease here abounds. Other particulars learnt are the following:—the lepers at Ramleh are all Mussulmans; there are no children amongst them: lepers are turned out of their villages by threats, none being allowed to remain, and if any go back to their homes, their children will not receive them. Their property is confiscated, but some allowance for support is often made by their relatives. They are expelled because it is feared that others may catch the disease from them, and because children born after the outbreak of the complaint may, it is believed, also become leprous. Yet no instance of contagion is known here; and the women of the neighbourhood who, for a trifle, wash the lepers' clothes, have not been known to acquire disease (report). Leprous individuals not rarely intermarry in this place, and every facility is allowed for this, as a fee is paid to the 'Cadi' on each occasion. With the Greek Christians, it is otherwise, as has been mentioned already; but amongst Mahomedans, marriage is an affair not dependant upon ecclesiastical sanction. No children have been born to lepers here; and in fact these miserable people are hardly in a condition to acquire the charge of offspring. The occurrence of hereditary disease is fully indicated in my notes, and contagion was obviously often possible. In their homes, these lepers neither followed any special occupation, nor lived under circumstances at all different from the ordinary. They never return to their native-place. At Ramleh are collected, as I have said, subjects from villages in the whole neighbouring district; and at present, their available abode is quite filled.

Besides Ramleh and Jerusalem, there is a third leper-colony at *Nablus*, where more than 70 subjects are said to be lodged in a mosque allotted to them. This locality I had not time to visit: it is situated in the upland interior, north of Jerusalem and at a distance of twelve hours. A picturesque and fruitful place where much olive-oil is produced (hence like Cretan villages): *vide* the Guide-books, which however are mostly silent as regards the leprous pest, and the remark applies to Norwegian manuals.

The mode of recruiting the refuge at Ramleh is described as follows:—the head-man of the village seeing marks of disease in a villager, reports the circumstance to the 'mudir' or district governor, who then sends a convoy to direct the affected person to this place, where he is forthwith left. Government does not aid in their support, so far as could be ascertained; but these people do not seem to suffer from absolute want. I have elsewhere given a brief account of the asylums for lepers, which are at Jerusalem, including the excellent Leper-home founded in 1867 by the Baron Keffenbrinck; and in this place will add only such memoranda as bear upon points elicited by my late enquiries in Kattiarwar. The following is a tabulated list of the inmates of the Homes, or Refuges, which were visited at the close of 1874; and the information here furnished will be useful for comparison with Indian lists.

A--INMATES OF THE LEPER-HOME AT JERUSALEM.

1 No.	2 Sex.	3 Race.	4 Age.	5 Residence.	6 Occupation.	7 Duration.	8 Heredity.	9 Form.	10 Admission.	11 Discharge.	12 REMARKS.
1	M	Muss.	37	Beitunia	Fellah(peasant)	3 years	Mother's side	N-L	1867 Sept. 16	1868 Jan. 19	Married.
2	M	"	45	Silwan	"	3 years	A brother	T-L	1868 Apr. 8	1869 Jan. 11	Married: 3 children, all healthy.
3	M	"	20	Lifta	"	3 years	None	T-L	1867 Sept. 12	Died	Married: had diarrhoea of a dysenteric character for many months before death, and was in a most frightful and leathsome state from the numerous ulcerations and bad odour of the body. No post-mortem examination, lest other patients should be frightened away.
4	M	"	45	Beitunia	"	1 year	A brother and an uncle	T-L	1867 Oct. 28	1872 June 26	Married.
5	M	"	20	Beitjalia	"	8 years	None	T-L	1867 Nov. 15	1867 Dec. 1	Married: discharged for misconduct, died about two weeks afterwards.
6	M	"	50	Bittir	"	3 years	"	T-L	1867 Dec. 11	1868 April 20	Single: left of own accord.
7	M	"	35	"	"	9 months	"	Lepra	1868 Feb. 10	1868 Sept. 26	Married: very much relieved.
8	F	"	50	"	"	5 years	Slight	Nigricans	Oct. 28	1872 May 25	Cured (True leprosy?).
9	M	Xn.	45	Nablus	"	3 years	None	N-L	1868 Feb. 23	"	Married: two children dead, one son aet. 16, well.
10	M	Muss.	18	Ramullah	"	2 years	"	N-L	1868 April 17	"	Single.
11	M	"	18	Saidun	"	2 years	"	T-L	1868 April 17	"	Single.
12	M	"	30	Beitunia	"	2 years	No. 2 is a relative and a brother of his also	T-L	1868 May 12	1871 Jan. 15, died	Single. Always in a cachectic state: disease not developed on admission.
13	M	"	26	Silwan	"	4 years	None	T-L	1868 May 18	1869 Nov. 29	Married: left of own accord.
14	F	Xo.	45	Jifna	"	"	"	T-L	1868 July 21	1868 Sept. 10	Married: has had 14 children. Returned to live in the huts with the lepers.
15	M	"	25	Ramullah	"	"	"	T-L	1869 May 29	1873 Feb. 12	Married 10 years; has two daughters, 3 and 1½ years old: left of own accord—to marry?
16	M	Muss.	35	Beitramah	"	5 years	"	T-L	1869 June 18	1872 Dec. 4	Died: was married and had one daughter.
17	M	"	30	Desert.	Bedawy	2 years	An uncle	T-L	1869 Dec. 27	1870 April 21	Married 20 years: had four children, one of whom is living.
18	M	"	50	"	"	4 years (?)	None	T-L	1870 Feb. 18	1872 Aug. 16	Single: disease not advanced: left of own accord—to marry?
19	M	Xo.	30	Bethlehem	Bead-maker	5 months(?)	"	N-L	1870 April 14	1870 April 26	Married: has a son 1 year old. Left to visit a sick brother.
20	M	Muss.	16	Ramleh	Fellah	6 months	Mother	T-L	1870 June 10	1873 Dec. 29	Died. Very dark complexion, belonged to an Egyptian family of wanderers. Single.
21	M	"	14	Beitunia	"	"	"	T-L	1870 June 25	1870 July 25	Ran away.
22	F	"	20	Deires Sheik.	"	1 year	None	T-L	1870 July 11	1873 July 22	Married. Died.
23	F	"	40	Kribet Kais	"	2 years	Mother and two sisters	T-L	1870 Nov. 23	1872 July 18	Married. Has many black spots.
24	M	"	16	Bitin	"	3 years	A brother	T-L	1871 May 27	1873 July 7	Widower: two children dead; one, 4 years old, alive and well.
25	M	"	35	Benazait	"	"	None	T-L	1871 April 10	Died	Married: had one son in health.
26	F	"	25	J. Nablus	"	"	"	N-L	1871 Aug. 8	1872 July 18	Married: has borne a child, who is dead.
27	F	Xo.	43	Nazareth	"	"	"	"	"	"	"
28	M	"	30	Ramullah	"	2 years	None	T-L	1872 May 13	1872 July 20	Married.
29	M	"	18	J. Nablus	"	4 years	"	N-L	1872 July 21	"	Not married.
30	F	Muss.	14	Beitunia	"	1 year	"	T-L	1872 Aug. 9	1873 April 8	Died. Had not menstruated.
31	F	Xo.	20	Essalt.	"	1 year	None	T-L	1872 Sept. 30	1873 Oct. 14	Married, no children: left of own accord.
32	F	"	18	Beitjalia	"	1 year	None	T-L	1873 Nov. 16	1873 June 29	Married, no children.
33	M	"	30	Abyastinia	Monk	6 years	"	N-L	1872 Sept. 13	1873 June 9	Unmarried. Six years in Jerusalem.
34	M	"	35	Bethatab	Fellah.	"	"	T-L	1873 April 17	1874 Feb. 17	Single.
35	M	Muss.	36	Biere	"	1 year	None	T-L	1873 July 10	"	Married: one daughter 2 years old, living.
36	M	Xn.	35	Ramullah	"	3 years	"	T-L	1873 July 10	"	Married, one son living.
37	M	Muss.	35	Chober	"	5 years	"	T-L	1873 July 24	"	Married, two children, one, 5 years old, living.
38	M	"	21	Bethaninne	"	3 years	Father	T-L	1874 Mar. 7	"	Not married.
39	M	Xn.	25	Ramullah	"	1½ years	"	"	1874 April 4	1874 July 19	Single.
40	F	"	"	"	"	"	"	"	"	"	"

SUMMARY.—The above list is, by permission, extracted from the Register kept at the Leper-home. Of 40 inmates, 10 were females, 30 males; 13 were Greek Christians, 27 Mahomedans; nearly all were peasants; the duration of disease was under 1 year in 3 cases, under 2 years in 5, under 3 years in 6, under 4 years in 8, under 5 years in 3, in 1 case of 6 years and in 1 at 8 years; the form of disease was Nerve-lepra in 7 instances; 30 had the more serious nodular form. Most patients were adults, thus, from 10 to 20 years, were 8 people; 20 to 30 years were 10, 30 to 40 were 12, 40 to 50 were 6, over 50 years of age, 3 people. Any taint of hereditary disease was denied by 23 inmates, or more than half; seven times there is no note on this head: 10 patients acknowledged family taint. Six deaths are already entered.—December 1874.

B—LEPERS IN THE OLD HUTS AT JERUSALEM.

No.	Sex.	Race.	Age.	Residence.	Duration.	Hereditary.	Form.	Condition.	REMARKS.
1	M	Muss.	40	Mishofat	3 years	None	T-L	Fair	Married; two children of 20 and 6 years, well; no other leper in his village. Only 2 months here, before was begging in Moab.
2	M	"	45	Jania	10 years	"	T-L	Bad	Widower; has a daughter of 14 years, well; two or three other lepers in his village.
3	M	"	35	Ramallah	9 years	"	T-L	Bad	Married; has two children of 8 and 6 years, girls, well; five other lepers in his village. Cohabits with No. 4.
4	F	"	35	Mizra	1 year	"	N-L	Good	Married, had a child, dead at 1 year. Since came here: cohabits with No. 3.
5	M	"	25	Bejibreen	5 years	"	T-L	Fair	Single. Case remarkable for both ulnar nerves being diseased, but the nails on one side only affected. Two others in his village.
6	M	"	30	Beitunia	10 years	"	T-L	Bad	Single; Mouth much ulcerated. Four others in his village.
7	M	"	40	Marama	3 years	"	N-L	Indifferent	Single; hands much contracted. None in his village.
8	M	"	20	Mizra	4 years	Mother and sister	T-L	Bad	Single; three others in the village of 11 houses.
9	M	"	18	Doora	1 year	None	T-L	Good	Single; had not been in contact with lepers: none else in his village.
10	F	Christian	50	Beitunia	20 years	"	T-L	Bad	Widow; a daughter of 18, well, not married.
11	F	Muss.	30	Arawia	5 years	"	N-L	Bad	Married to No. 12. No others in her village.
12	M	"	45	Beyond Jordan	12 years	"	T-L	Very bad	Married before and had two children still young (boy and girl), well. A most miserable object; is now living with No. 11. No others in his village.
13	M	"	45	Betia	5 years	"	N-L	Bad	Married; has a girl aet. 4, well. No others in his village.
14	F	"	30	Silwan	4 years	"	N-L	Bad	Married; has a daughter aet. 5, well, another girl in her village is diseased.
15	M	"	45	Bellatab	4 years	"	N-L	Bad	Single. Very bad case: four or five others in his village of 60 to 70 houses.
16	M	"	20	Gaza	4 years	"	T-L	Indifferent	Married. No others in his village.
17	F	"	18	Surbah	1 year	"	T-L	Indifferent	Married to the last subject (No. 16) in this place, a year ago. Her hands are in a bad state. No other leper in her village.
18	F	"	30	Dubwan	2 years	"	T-L	Bad	Single; none in her village.
19	F	"	40	J. Nablus	12 years	Sister	T-L	Very bad	Single; no other in her village.
20	F	"	25	Do.	2 years	"	N-L	Fair	Single. Does not wish to marry.
21	F	"	25	Near Jerusalem	3 years	None	N-L	Fair	Married to a leper in this place. No others in her village.
22	M	Christian	45	Ain' Sinia	3 years	"	T-L	Very bad	Married; a most miserable object. No others in his village.

The remainder of the usual residents are gone to beg in the neighbourhood.

SUMMARY.—Of 22 patients 9 were females, 13 males: 2 only were Christians; 2 were under 20 years of age, 5 from 20 to 30, 6 from 30 to 40, 8 from 40 to 50, 1 was 50 years old. Duration of disease was under 1 year thrice, under 2 twice, four times at 3 years and at 4 years, thrice of 5 years; it had lasted 9 years once, 10 years twice, 12 years twice, and once for 20 years. Family taint was acknowledged only three times. Nerve-lepra was seen 8 times, nodular-lepra 14 times.—H. V. C.

C—LEPERS AT RAMLEH.

No.	Sex.	Race.	Age.	Residence.	Duration.	Heredity.	Form.	Condition.	REMARKS.
1	M	Muss.	30	Near Hebron ...	14 years.....	None	T-L	Fair	Single: no leper in his village.
2	M	"	40	El Ghor.....	3 years.....	"	N-L	Fair	An Arab. Married outside; no children: married here two leper wives, no children. Others in his tribe (ʿan ry) are lepers. N.B.—Fingers strongly reversed backwards; not towards the palm.
3	F	"	25	Near Ramleh ...	2 years.....	"	T-L	Good	Married outside and had a daughter now 1 year old and well: was married to No. 2 here, five months ago when she came here.
4	F	"	25	Beitunia	6 years.....	"	T-L	Indifferent	Married outside and had two children still alive and well, and of 11 and 6 years of age. Others in her village. At present a wife of No. 2.
5	M	"	35	Near Nablus.....	5 years.....	Brother	N-L	Good	Single. Little sign of disease—only dryness and numbness of hands which led his neighbors to compel him to leave the village (this state is termed Kola'abt): his brother is a leper and lives here. There is also some slight pain in the nose with puffiness of the cheeks, but otherwise no apparent symptoms, although at the fifth year of the disease.
6	M	"	12	Do.	2 years.....	"	N-L	Good	Single. Brother is No. 5 and both have the same form of disease.
7	M	"	20	Near Gaza.....	7 years.....	"	T-L	Indifferent	Single. Brother is here: in his village is a leper-family of mother, two girls and a boy.
8	M	"	25	Near Ramleh ...	6 years.....	None	N-L	Bad	Married: no child. Married here to a leper-woman. Hands and feet very bad. Another man in his village affected.
9	F	"	25	Near Jerusalem..	6 years.....	Aunt	N-L	Indifferent	Married: no child. Others in her village, two of them being her relatives. There is loss of feeling in the hands and feet, and paralysis of orbicularis palpebrarum.
10	F	"	50	Do.	20 years.....	Daughter	N-L	Very bad	Married daughter a leper; an older son is well. Is a miserable object with the greatest possible amount of distortion. Other lepers in the same village.
11	F	"	18	Do.	12 years.....	"	N-L	Bad	Married here by the 'Cadi' of Ramleh to a leper-man who is gone to Lydda to-day to beg. The amount of deformity is remarkable. Knows of an instance here where a leper from a Christian turned Mahomedan in order to marry a leper-woman.
12	F	"	20	Near Jaffa.....	15 years.....	Mother	N-L	Bad	Married here to a leper (No. 13). Her mother died here; heard that her maternal uncle was a leper. A marked case.
13	M	"	35	Near Nablus.....	11 years.....	None	T-L	Very bad	Married to No. 12, no children: no others in his village.
14	M	"	35	Near Ramleh ...	8 years.....	Brother	T-L	Very bad	Married to No. 15, no children. Brother died here and there are others from his village of 150 houses.
15	F	"	30	Do.	8 years.....	"	T-L	Bad	Married: no children. Brother is here. No others.
16	M	"	15	Do.	4 years.....	Sister.....	T-L	Very bad	Sores and scabs all over body.
17	M	"	40	Near Gaza	6 years.....	None	T-L	Bad.....	Married outside and had a child of 5 who is well. Has been 4 years here and is married to a leper-woman (No. 20). No other in village.
18	M	"	45	Near Ramleh ...	8 years.....	Father	T-L	Indifferent	Single. Father died here 10 years ago: is of robust build. No other leper in his village.
19	M	"	30	Do.	4 years.....	None	N-L	Indifferent	Single. A well-marked case: voice much affected.
20	F	"	25	Do.	7 years.....	"	N-L	Bad	Married here to No. 17; no offspring. Great distortion of face and atrophy of hands, &c.
21	M	"	45	D. Tarif.....	25 years.....	"	N-L	Bad	Married here to No. 22, no children. Is miserably emaciated. Others in his village.
22	F	"	28	Near Ramleh ...	8 years.....	"	T-L	Indifferent	Married outside: two boys of 6 and 12, both alive and well. Married to No. 21 since coming here. No others in her village.
23	M	"	22	Near Gaza	8 years.....	Mother and sister	T-L	Bad	Mother and two sisters also leprosy; are not here: sisters dead, mother alive; form of disease same as here. Father alive and well. Is very pallid and cachectic.
24	F	"	30	Near Jaffa.....	6 years.....	None	T-L	Indifferent	Married to No. 25; not an advanced case. None else affected in her village.
25	M	"	50	D. Tarif.....	30 years.....	"	N-L	Bad	Married outside and had three children, all well, eldest now 29 years of age: married here to a leper-woman. A very marked case, in most indifferent condition, the hands being mere stumps. No offspring here.
26	M	"	35	Near Hebron ...	7 years.....	"	T-L	Bad	Single: an advanced case. Others in his village.

Two other residents had gone away to beg.

SUMMARY.—Of 26 individuals who were examined, 16 were females, 10 were males: their ages were under 20 years, thrice, 9 were 20 to 30, 8 were 30 to 40, 4 were 40 to 50, 2 were 50 years of age or upwards. Duration of disease was 2 years twice, 3 years once, 4 years twice, 5 years once, 6 years five times, 7 years three times, 8 years five times; 11, 12, 14, 15, 20, 20 and 30 years, once at each period. The form of disease was Nerve-lepra 11, Nodular-lepra 15 times. Family taint was admitted 12 times. Thus, in the low country of Judaea leprosy is of the milder form more often than in the table-land, it is therefore more prolonged in its duration; it affects more females than usual and taint is oftener acknowledged. In all these particulars there seems to be an approximation to experience in India. All these lepers were Mahomedans and peasants. December 1874.—H. V. C.

General Summary of Leper-statistics for Palestine.—Of 88 individuals 59 were males, 29 females: their combined ages were 20 years and under in 13, 30 years and under in 24, 40 years and under in 26, 50 years and under in 18, and 6 were over 50 years of age. The disease had lasted 1 year and under 6 times, 2 years and under 9 times, 3 years and under 11 times, 4 years and under 14 times, 5 years and under 8 times, 6 years and under 8 times, 7 years and under 4 times, 8 years and under 6 times, 9 years once, 10 years twice, 11 years once, 12 years thrice, 20 years four times and once it had lasted over 30 years. The milder form (N. L.) occurred 26 times; the severer (T. L.) 62 times. Family taint was acknowledged 25 times, and that not in the line commonest named by lepers in India: here, as there, it seems to be purposely denied sometimes, occasionally there is no note on this head. 73 lepers were Mussulmans and 15 were professors of the Greek form of Christianity. No Jewish leper was seen by me in Palestine, but I have heard of one instance at Jerusalem. Respecting this topic, I note that the great majority of the people in Syria are Mussulmans: the so-called Greek Christians are of Syrian extraction, and they have no connection by birth with the inhabitants of Greece. The Jews are few and may be compared to foreign visitors; they never live in the country, but only in certain towns of Palestine of which Jerusalem is the chief. I have formerly stated that the Jews of Western India seem to have very few known lepers amongst them, and it seems to be the same here; perhaps the sick are concealed.

Having lately found in Kattiawar, a highly significant disposition of leper-localities, I endeavoured to test the point here; and from a rough map which I have made, it appears to me not unlikely that in southern Palestine, too, affected localities are arranged in groups and lines connected together. For illustration:—there are 9 lepers from Nablus (Shechem) and its neighbourhood—an indication, surely, that this malady superabounds there: southwards towards Jerusalem, there are named Ain Sinai, Jifna, Beitin (Bethel), Bireh, Ramah, Beithanin, all more or less in a connected line, and branching coastward from near Bireh are the two villages of Ramallah (above described and whence 5 lepers) and Beitunia—an equally picturesque but insanitary Mussulman village, which has furnished no fewer than 7 lepers. These last-named places are situated in the edge of the mountain plateau, and in a similar position are Sifta, Soba, Bittir (4 lepers), seemingly on the road to Gaza. Selwan (Siloam) a dirty suburb of Jerusalem has several lepers, and from Isawiyeh and other like villages around that city, some half-dozen other subjects have come in. Inhabitants proper of Jerusalem do not, I have reason to believe, become affected with this disease. Inland from the capital, there are lepers from El Ghor (vale of the Jordan), Es Salt (Ramothe Gilead) and from places less defined 'as beyond Jordan' and the 'desert' (Bedawyin). Southward are known such localities as Beitjala (seen): Bethlehem, Merinna?, Hebron (2) and Dura on the road to Gaza.

Adverting to the coast-districts and beginning from the south, there are 4 lepers from Gaza (an old port) and others from Beitjibrin, Dubban, Bethatab (2), which seem to form a group on the road to the capital joining the Bittir series; then from Jaffa (port), Ramleh and neighbourhood (10 lepers), with Janin, Deir Tarif: and northwards, occur the names of

Mezrah?, Es. Sheik, Saidun (Sidon). There is one from Nazareth (inland); and another from Abyssinia (African lepers are found in Bombay), whence the idea of long conveyance of disease. A few localities I have not been able to identify, but, on the whole, I regard this evidence as pointing to the same conclusions as were derived from enquiry in Kattiawar; and I repeat, that such method of studying the range of the widespread leprosy disease is worthy of great attention. Any Government concerned might most fitly encourage the work, for the sake of its important social and national bearings.

To carry out, so far as is practicable, the comparison of Syrian with Indian leprosy, I would observe, first, that in Palestine whilst T. L. is in decided excess—a Norwegian characteristic; yet there is a very small proportion of females ($\frac{1}{3}$ of the whole) which is rather an Indian feature. Of 29 patients with A. L., 12 are females; thus indicating a special liability of the sex, which is noticeable in Kattiawar also: of 57 cases with T. L. only 15 were females. These data however being derived from asylums or refuges, may not entirely apply to disease at large, and possibly a number of less destitute leper-women may remain at home as, for example, I found at Beitjala: such, too, have not resorted to the comfortable yet more public leper-home at Jerusalem, so often as they do to the miserable but less observed accommodation at both Jerusalem and Ramleh. The poor creatures may be more timid, yet if wholly destitute, they will not—nay cannot—avoid the only places offered for shelter: and so I find it in Bombay, where notwithstanding their comparative numbers, in general, are much lower than of men, a great number of outcast women have availed themselves of a refuge. The instance I refer to, is the Jamsetjee Jejeebhai Dharmasala, where in February, 1875, there were 68 women and only 59 men: and if a similar reasoning apply to Palestine, we should expect to find there a very decided preponderance of male-lepers. There were no leper children seen, and but few are known in Norway; whilst in Western India, there are many to be found. On analysing the above lists, we note regarding the age at which disease began, that about 6 per cent. (chiefly T. L.) were attacked during childhood or before the age of ten years; 35 per cent. were affected between eleven and twenty years; 29 per cent. between twenty-one and thirty years; 20 per cent. between thirty-one and forty; and only 9 per cent. after forty-one years of age. The two chief forms of leprosy do not materially vary in this respect; only (as in India) we find a disproportionately large number of women with T. L. arising about the time of puberty; A. L. also may appear early in girls.

As to the influence of locality, or 'endemicism,' in Syrian leprosy, I have traced in Murray's map the birth-place or residence of 84 lepers; and find there are 12 villages with 27 affected persons, situated in the coast-area; and inland, 24 villages, &c., with 57 subjects. These figures show an apparent predominance of disease in the interior, but as normal data are wanting, no sure inference can yet be made. There seems to be more A. L. coastward than inland; also more women, and earlier disease, in the same maritime districts.

It is almost impossible to avoid comparing this small Syrian area, with the Concan and Deccan of Western India, or even with the coast and interior of S. E. Kattiawar: all three localities, indeed, furnish proof

sufficient that the limitation of leprosy in Norway to the coast-line only, is but an incidental local feature; and it can no longer be maintained that this disease is confined to, or even flourishes best in, sea-side localities, where fish-diet and superabundant moisture obtain. Nor can it be said with exactitude, that there are many common conditions attending the development of the malady; for all indications point to the fact that there is but one essential condition, which is, in great measure, independent of general influences, and which is comprised in the term—a proper or specific cause.

Lastly, as to the spread of leprosy in S. Palestine, I will only remark that my analysis of 83 cases gives the following result:—29 per cent. of lepers have been affected within the last five years; 44 per cent. between five and ten years; 21 per cent. between ten and fifteen years, and 6 per cent. subsequent to the last named date: in all, 73 per cent. of existing subjects have become diseased within the last 10 years, and does not this fact point to an active state of their malady? If so, again we witness an abiding, perhaps even an exacerbation, of suffering, which demands surely some attention.

P.S.—Some remarks penned as a preface to the Report of my earlier Tour, not having—doubtless by oversight—been included in the documents lately ordered to be printed in England by H. M.'s Secretary of State for India in Council, I avail myself of the present occasion to introduce them here; for they will form, I think, a not unfitting conclusion to the preceding records in the text.

I find that upwards of 200 cases of leprosy have come before me, from N. Italy, Spain, Malta, Asia Minor, Greece and Palestine; and notes of about 100 cases have been kept. Whenever closely scrutinised, this disease has invariably proved to possess the special characters which are now admitted for its Indian and Norwegian varieties: the likeness extends to minutest details; and, at present, it would be hard to indicate any constant difference of symptoms in any of the local forms now alluded to. From the time when observation became precise, two main forms of leprosy have been recognized: thus, the Norwegian observers began their writings with this fundamental distinction, and only the other day, I found in the village Beitjala near to Jerusalem and to sites renowned in ecclesiastical history, the same two forms pronounced with a distinctness never surpassed within the range of my experience. Nay, I became more puzzled than ever in thinking what must be the link which binds together nerve-lepra and nodular-lepra. Of late a disposition has become manifest (I refer to writings of Virchow and Hansen, &c.) to cut this knot by denying to pure nerve-disease the generic character of 'leprosy': this is a view not, to my mind, admissible. In such characters as pertain to *sex*, *age*, *form*, *duration*, *course* and *termination*, the leprosy disease has not manifested any essential variations in the countries I have above named. I saw, indeed, very few children lepers; a greater equality as regards sex; a predominance of the nodular form; a disposition in the skin-affection to assume characters which would approximate leprosy to syphilis—that is a spreading, ulcerating, suppurating tendency not commonly seen in India, also implications of the bones of the leg, &c.:

again, the hereditary taint seemed to run in the maternal line by preference, and in all these respects it seemed to me that a slight difference exists between the more western and more eastern manifestation of the disease, or perhaps I should say the tropical and the extra-tropical. With these cursory remarks, I dismiss this topic, but would recommend a reference to the cases already recorded in detail. By the use of the microscope, I was enabled to establish a common likeness in the characters of the living leprosy tubercle of Crete, Norway and India.

Nature and causes of leprosy.—No information of much value has been gathered on these subjects. I note that exceptional conditions of current food have everywhere been referred to as a cause of disease, *e.g.*, of fish in Norway, of oil in Crete, of lentils in Palestine, &c. But no physician I have met with, has regarded such popular notions as being well-founded. With regard to the water-supply, perhaps not enough is known of its possible connection with the spread of the leprosy pest. From observing the absence of disease in towns, and its prevalence in country villages (a pretty general experience), Dr. Chaplin suggests that in Palestine fouled well or spring water may produce leprosy. Drinking-water soiled by the excreta of animals or men—possibly of leprosy individuals—has been suggested also by others; but I have not found facts to correspond, so far as my enquiries go. The point may well be reserved for strict investigation. The origin of leprosy in atmospheric variations was referred to by Brunelli. The same kind of rock and soil is found in the Archipelago and in Palestine. Everywhere the people have a notion that the product of conception by a menstruous woman may be a leper; often bestiality and other abuses are named, and still oftener powerful mental emotions—particularly that of fear—as causes of the disease. As to contagion, it is believed in by the people and discredited by their physicians. I have learnt nothing in favour of the view that leprosy is commonly contagious, except the history of a few narrated cases; and I have seen much to confirm the opinion that the disease is not usually contagious (see especially notes made in Crete). But on the other hand, I have never had an opportunity of thoroughly sifting a single instance of seemingly spontaneous leprosy; and as single instances are alone amenable to complete scrutiny (and then not all of them), it is to such crucial testing, I opine, that we must look for a settlement of this vexed question. Regarding heredity—it is universally believed in, by both people and physicians. I have gained no new facts in its favour, but have, on the contrary, been much impressed by the experience acquired at Candia in Crete. Heredity may imply contagion, or stand for it; but sometimes this seems impossible. One or other of these influences is a stern reality: can they co-exist?

As to the maintenance and propagation of leprosy in the countries I have visited, I would first remark that no measures are taken to check its progress. The easy resource of driving off the leper does not, obviously, interfere with the continued production of the disease; it is merely an evasive practice and one in itself productive of much dissimulation and needless hardship. That the hygienic condition of the people generally is unfavourable to health, I have invariably had occasion to note; but as yet there has appeared no special condition, mode of life, kind of food, locality of residence or climate, which accounts for the maintenance or spread of leprosy; nay, further, in all these

respects the circumstances enveloping this disease are remarkably diverse, as witnessed in Norway, Turkey and India—with perhaps the single exception of want of personal and domestic cleanliness. I am aware that general remarks of this kind have really little valid weight; and I wish that it had been possible for me to pursue an enquiry *au fond*.

Of the increase or diminution of disease it will be seen that no definite information was ever to be gained: statistics do not exist, even in Italy, and I had to resort to the opinions of medical men as the only available guide. In Italy, leprosy is said to be on the decline; in the Archipelago and Palestine, its prevalence does not seem to be diminishing, but rather increasing, with respect to certain localities. I frequently longed for data somewhat comparable to the admirable Norwegian statistics.

As regards the distribution of the disease, it is noteworthy that in Greece, leprosy has disappeared from the continent (except perhaps in one or two littoral and mountain districts); but persists in the neighbouring islands.

The physical conditions presented by isolated land are not necessary to the perpetuation of leprosy; and one would, therefore, suppose that the malady persists and grows by 'being cooped up,' as it were, into a narrow sphere. It was by means of the sea that it was originally introduced into Greece; and hence, perhaps, its special site in sea-side localities. The circumstances, I may add, under which leprosy spreads through a country into which it has been recently introduced—as instanced in modern times, at Surinam, Honolulu, &c.—are highly significant; and one would ask *how* did it so rapidly permeate Europe in the era of the Crusades? On the other hand, the disease does not always so disperse itself, although facilities abound; and the apprehensions which have been expressed of a recurrence of the pest in Britain and Europe are doubtless imaginary.

Popular customs.—I remark that in the more tolerant, if not more civilised, countries as Norway and Italy, the leper is not actually driven out of his house and compelled to wander as a beggar: the afflicted have a great indisposition to quit home, and even when suitable hospitals are provided for them, they are slow to enter. In countries nearer the East, but still Christian, the leper is driven out of his village with as little compunction as in heathen lands; there is, however, this distinction, that in the former case some sort of 'refuge' is provided for him, while in the latter he may have none. Always, perhaps, the rich or well-to-do classes keep their lepers amongst themselves; but the majority of populations are unable to do this. Where, as in Palestine, the Christian element still exists, there are leper-refuges, but further East even such as these may not be found. I cannot say what becomes of the hundreds of wandering lepers in India itself: their fate is unknown to me, but it is not difficult to surmise. I have noticed that there are no poor-houses in Turkey; yet, as in India, there are few persons absolutely indigent or without resource. Charity abounds, and if only it could be rather more systematised, tolerable provision for the sick could be provided. At present, there are no public hospitals in many large provinces; yet very intelligent medical men, frequently educated in Italy or France, are to be met with where least expected, and the organization of medical charities would not be impracticable. Happily, the natural powers of the human system

itself, if only aided in some degree, are sufficient for the successful resistance to most diseases; but much needless suffering exists, and in such mass of physical evil, the position of the leper is pre-eminently conspicuous. His disease is loathsome by tradition and frightful in itself: it is probably the hugest affliction of the human frame and race.

Treatment.—With reference to this topic, it is, I conceive, of importance to obtain a correct view of the nature of leprosy. No physician I have met, seems to have regarded the disease as purely a '*mal de misère*,' *i. e.*, as a sequence of mere poverty or want: several were particular to indicate the correct distinction between occasional or exciting causes, and the latent predisposition, which on the hypothesis of hereditary transmission, all presumed to exist prior to outbreak of the complaint. Now, with respect to this tendency to disease (which is commonly presumed to be derived by heredity), it may be asked if it can be eradicated by medical treatment. The answers I have received reply in the negative. Supposing, then, the malady to be developed in the frame, can drugs of any kind arrest its progress, counteract its influence and restore the tissues to their normal state? Report was always in the negative; and, in short, neither Rimbaldi in Italy, nor Barbieri at Chio—Brunelli, Ittar or Gutofskiiv in Crete, or Chaplin at Jerusalem, ever supposed that they had by means of drugs 'cured' cases of leprosy. Such recommendations as some of these gentlemen were good enough to mention to me, are in nowise peculiar; and after previous experience in Norway, &c. (*vide* my work on *Lepra*), being not surprised or disheartened, I next turn to the subject of the *prophylaxis* of leprosy, or the *prevention* of the disease.

First, I should observe that the general treatment of this malady by means of suitable food, lodging and clothing, aided by palliative measures, may be regarded as a means both curative and prophylactic; and to a certain extent, this conjunction of preservative and restorative agencies, is what is aimed at in all comprehensive methods of dealing with leprosy. Lepers are sick men in theory, and this notion should not be lost sight of.

Of the efficacy of combating injurious occasional or exciting causes of the disease, no doubt exists; and hence the universal demand for proper sanitary, dietetic and general hygienic measures on behalf of the leper. These appliances, be it observed, may be better made in an asylum, than in the too often unhealthy residence of the peasant. That the various influences summed up in the term 'civilisation' would eventually check the progress of leprosy in an affected community, is possible enough; but the accuracy of the assertion has yet to be demonstrated, for the segregation of the leper is a universal practice adopted in even semi-barbarous communities. To my mind it would be a complete anomaly to find a civilized community affected with this disease, in which some means of isolating the leper was not practised; and I believe it to be quite needless to insist upon the desirability, nay the necessity, of segregating apart leprosy individuals.

Before alluding to the subject of asylums or refuges, I would remark that upon the view of the hereditary character of leprosy, some legal restriction of marriage between affected persons and others seem to be most desirable. Legislation of the kind now referred to, is not unknown in these days and will probably be extended. With reference to India and,

indeed, Norway and Turkey as well; the sense of the lower orders will never suffice to get rid of this practice of marrying and intermarrying of lepers. I could quote from Daniellssen evidence to this effect: and I know from personal enquiries and observations, that this remark is true for the other countries named. Nay, it seems to be always so; the tolerance of a complaint like the leprosy, in the midst of the bulk of the people, leads to the adoption of even more reprehensible practices: thus, to quote from a public journal—'not only do the leprosy people marry among themselves, but the feeling among the poor French in *Tracadie* (New Brunswick in the dominion of Canada) is such, that there is no repugnance in many cases among perfectly healthy people to taking lepers for husbands or wives.' This new and distant instance is mentioned in illustration of the wide prevalence of the custom here strongly deprecated. Medical men do their duty in exposing the horrors of such practice; and I need not further allude to this matter, except to suggest a reference to the mass of facts already collected.

Segregation of lepers.—From Mosaic times onwards have these afflicted people been wisely separated, and even from the first, some idea of eradicating their complaint seems to have prevailed. Owing perhaps to the experience not so very long before felt in Europe, or to strict religious notions, those European nations who formerly visited eastern parts, did not neglect to provide for the leper: thus, the Venetians and Genoese in the Archipelago and the Dutch in India (Cochin), have erected asylums for this class of sufferers. True, the successors of the former, namely the Turks, have not acted in the same humane manner; and one cannot say that the British administration of India has been hitherto duly considerate, but surely the time is at hand for entertaining this work of mere humanity and charity.

I have met with leper-asylums of three classes, which may be thus arranged; first, there are the spacious buildings and well-regulated establishments of Bergen (*e.g.*) and Sanremo, whose principal features I have endeavoured, now and before, to bring to notice. Laudatory comment of these admirable institutions would be simply out of place in these pages, but I would add a testimony (however humble) of deepest admiration for the founders of these leper-asylums, which are models hardly to be aspired to in the present temper of the times in India.

Next, the Refuge at Scio may be instanced as a sample of thoroughly serviceable institutions, where lepers are lodged, boarded and looked after; the sexes being separated and none but diseased people admitted. The example quoted is, in my humble opinion, worthy of much commendation, regard being paid to the circumstances of the case. One might, I think, suppose that the old 'lazarettos' established in Europe were similar to this; only the exclusion was doubtless of a harsher kind, being but a part of a system of dealing with the leper which has had no counterpart in the East. I need not dilate on this topic, but would remark that the dealings in Scio are not calculated to check, much less to eradicate, the pest they so mildly apply to.

The admirable leper-home at Jerusalem, is a charitable institution which belongs to the first class rather than the present one; but it is perhaps a hospital as much as an asylum, and it is not under special recognition of Government, being a private charity, and

therefore only to be instanced here as a noble example for others. The third class of leper-refuges might be termed communities or villages, or refuges for all who choose to live in them; that is to say, their population is not exclusively formed of lepers. Such are the places which I have described as now existing in Crete and Palestine. Except as convenient resorts where the leper man, woman and child may do as it pleases each, where no sense of repugnance to physical and moral evil exists, and where every feeling of a higher kind must inevitably be blunted for ever, these terrible leper-colonies claim no attention at the hands of those who are in search of encouragement and good example. I fully concur in modified approbation which Brunelli and others accord to these leper-refuges; but I do not think that because manifest evils result from these places of unrestrained licence, the principle of segregation is to be condemned; nor would I permit any leprosy person to be kept in a private house, notwithstanding the pain of separation from his friends, &c.

The several points regarding which the various classes of leper-asylums now cursorily described, resemble or differ in import, I need not here indicate; because I trust that the text itself will be perused.

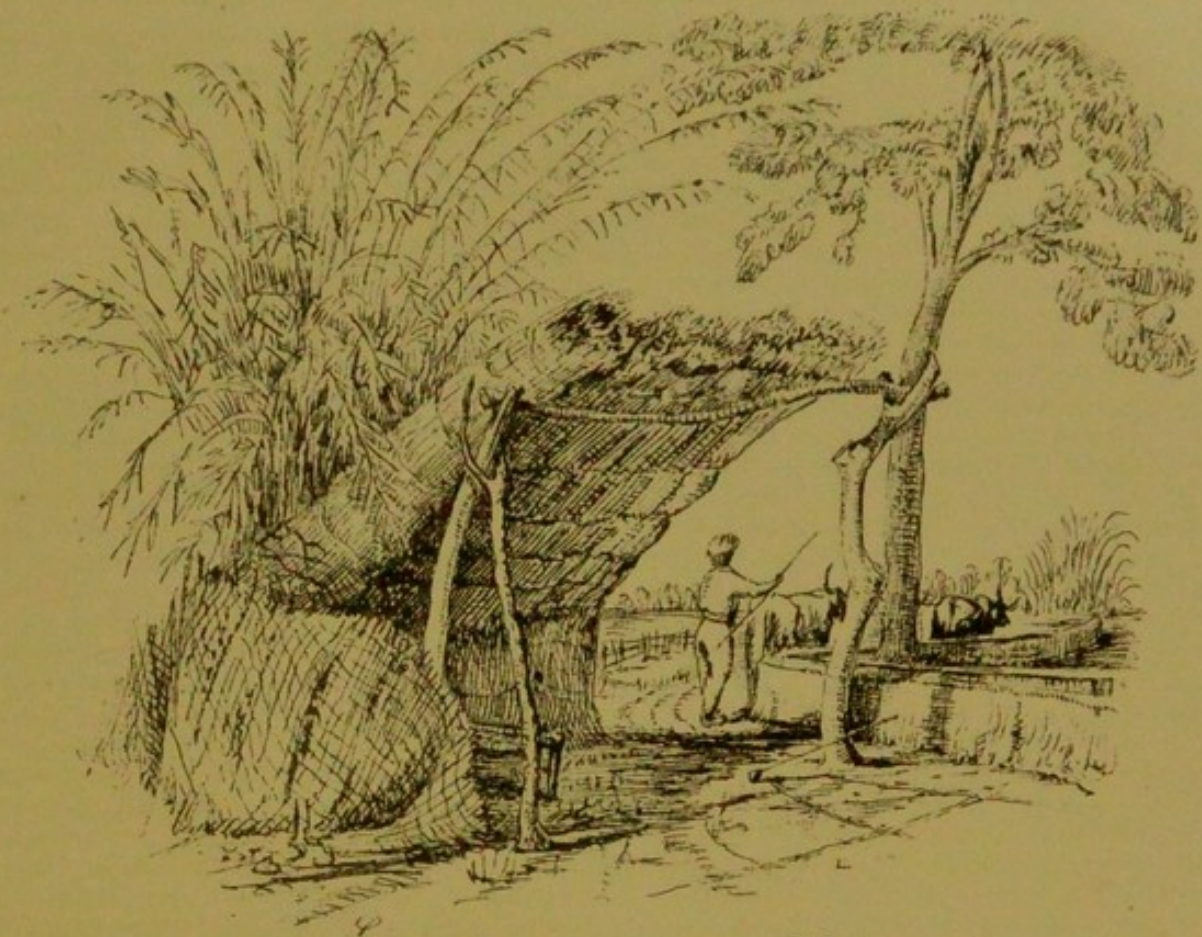
Respecting what may be termed 'mixed' asylums, it will be sufficient for me to remark that I have not met with a typical one in my travels; nor, I will add, do I hold it to be correct to mix the leper with other classes of sick.

I would again invite attention to the desirability of taking special charge of the children of lepers, with the object of checking the development of disease in them during after-years.

Finally, if the people are as divided and patriotism be as defective, in India as in Turkey, it does not, I imagine, follow that the ruling powers of the two countries should act alike; and if the Ottoman Government choose to neglect the sick and afflicted amongst its subjects (and the leper with the rest), the Englishman, and especially the physician, is thereby rendered more sensitive than ever to the reputation of his own country. It is solely because of a conviction that the subject calls for prompt notice, that I have been induced at some sacrifice of prospects and risk to health, to undertake the enquiries now concluded. And the additional experience thus acquired, serves but to confirm my impression that there is a just call upon Her Majesty's Government to intervene, in India, for the assuagement of the condition of the leper, and for the future benefit of the community at large.

With regard to this important subject, what is now being done in Norway stands as a model for imitation; and what is being left undone in Turkey may be regarded, with its results, as a note of warning of what to avoid.

My present 'notes' on the subject of leprosy would be little more than a collection of 'data,' were I to leave unindicated the lessons and examples which are the natural inferences resulting from their attentive consideration. Unless specially called upon (and I am still ready for the work), it seems not likely that I shall have future opportunity to pursue local enquiry, and to urge the much-needed sanitary improvements, which to the best of my ability have been above and previously indicated; but not the less do I commend the whole subject to enlightened men, as one eminently claiming their practical attention.



*Siper's abode. (V. Case N^o 1)
Formed of bundles of straw laid upon a frame of poles
Nesadi, near Kundla.*

12. 2. 76.



*Siper's hut at Methla near Datta
(V. Case N^o 6)*

H. B. ...

