far from the various researches that have been made for the purpose of killing the bacillus *in situ*? Of late years, the efforts of many physicians have been directed to this object, and the treatment, whether by inhalations, by sulphuretted hydrogen injections, or by germicide medicines, has had the one principle of endeavouring to destroy the bacillus after its entrance into the lungs. I was myself at one time beguiled into making attempts in this direction, but I have long been convinced of the extreme improbability of our ever reaching the organisms in their hiding places in the lung.

Let us have "war to the bacillus," by all means, but it must be war carried on outside the body, and not within it. When once it is entrenched behind its barrier of exudative material, its individual existence, so far as we know, is safe against all our attacks.

2. What we have to do, after preventing reinforcements from being poured in from the outside, is to combat the irritation and inflammation caused by its presence by ordinary antiphlogistic measures, and then by all the means in our power so to strengthen the bodily forces as to enable them to deal with the invaders. If these receive no accession from without, and if they can be prevented from generating poisonous matters more powerful for evil than themselves, they will generally succumb, either by starvation or by being dried up, or got rid of by ordinary necrosis and suppuration.

3. At the same time I would by no means discourage attempts to preserve adjacent structures and the rest of the body from attack. Certain of the inhalations most commonly used, such as carbolic acid, creasote, eucalyptus, oil of pine, menthol, iodine, etc., are probably of service in this direction, and some of them serve to control excessive secretion, and to render the mucous surfaces generally more healthy.

At the Manchester Hospital for Consumption a series of observations have been carried on for some years upon the action of different drugs, such as iodoform, the hypophosphites, guaiacol, creasote, tannin, and latterly upon the inhalation of pure ozonised oxygen; but it has been somewhat difficult to discriminate between the action of these substances and the general good influence of the hospital itself. Other workers in this field have also contributed evidence on this subject, but it is scarcely within the scope of this inquiry to attempt to sum up the results of these observations.

It may, however, be of some service if I remark again upon the inhalation of ozonised oxygen, which, so far as I know, has only been used as yet in the Manchester Hospital, so far with encouraging results. It was first tried in consequence of the well-known beneficial action of pure mountain and sea air, and it was thought possible that some of this benefit might be due to the ozone contained in such air. After ascertaining that pure oxygen, when ozonised up to 9 or 11 per cent., might be inhaled in considerable quantities without exciting inflammatory action, it was administered regularly to fifteen patients in all stages of the complaint, and results were very marked in procuring improvement in general health, better appetite, sounder sleep, freedom from fever, and consequent gain in weight.⁷ And yet it certainly had no obvious germicidal action in many of the cases; though the amount of expectoration was diminished, there was but little difference to be noted in the number of bacilli on the microscopic slides.

4. So far as I know all the attempts that have been made hitherto, chiefly in France,⁸ to discover an antibacillary vaccine, with which to render the tissues antagonistic to the bacillus, have signally failed, and although I would not object to further researches in this direction, it appears to be hardly likely that they will be successful against a complaint in which one attack confers no immunity against a second.

5. Hitherto the best results that have been obtained in the case of consumption have been due to abundant supplies of fresh air and light,—to good food with a large allowance of fat in an easily assimilated condition, and to medicines that have assisted the general nutrition of the body.

But if the question were to be addressed to medical men as to what single measure has done most towards the cure of consumption, I believe the answer would be almost unanimous in favour of change of residence. In many instances, no doubt, the improvement would be ascribed to change of climate, and sometimes

Egypt or Algiers, sometimes Davos or Canada, or the Riviera would receive the praise. Much good must undoubtedly arise from the favourable conditions to be found in these places, but I venture to ascribe a large proportion of the cures to the simple fact of removal from an infected area to places where the air is free from active virus; and hence I am at one with those who believe that healthy homes for consumptives may be found in this country.

From a review of the course of the complaint in the past, and of its affinities with other preventable disorders; from our knowledge of its pathology, and of the influences most favourable to its spread; from our experience of its steady diminution in the last thirty years, and from the brief summary of the measures that may be taken to arrest its course—from all these points we may surely learn to regard it as a preventable disease, and may look forward to its further diminution, if not to its ultimate extinction as a cause of death.

NOTES

ON

LEPROSY IN VARIOUS COUNTRIES.

By JONATHAN HUTCHINSON, F.R.S., LL.D.,

President of the Royal College of Surgeons.

THE following fragments on the subject of leprosy are notes of conversations or extracts from letters (to myself) or in one or two instances from books. Most of them are of value, as proceeding from skilled observers who spoke or wrote from personal knowledge. In many instances information bearing upon the fish hypothesis had been especially asked for and is given. Important statements will also be found as to the real extent of the influence of caste rules as to diet upon the conduct of the different races inhabiting India. I have found it exceedingly difficult to get at the truth on this matter. Thus some non-believers in the fish hypothesis think it sufficient to assert that the disease prevails amongst those who are by their religion forbidden to eat flesh of any kind.¹ Others of equal experience have assured me that it does not necessarily follow that because fish is forbidden therefore none is eaten. I have not been careful either on this point or on others to conceal discrepancies in the statements of those who have kindly assisted me to obtain facts. It seems, indeed, most desirable to enforce caution in the reception of evidence on this matter. It is only when confirmed by the independent testimony of two or three witnesses that any statement contrary to ordinary experience should be received. Nothing is easier than to make mistakes, especially when, as must often be the case, we speak from memory, and with but imperfect information in the first instance. The love of being definite often leads minds of a certain class to credit their impressions far too implicitly, and to state them much too confidently.

An intelligent man, who had been giving me a good deal of information respecting a certain out-of-the-way district in which he had lived, and whom I had rather closely cross-questioned, concluded his answers by saying with emphasis: "And now the next man you talk to from — will very likely tell you something quite different from what I have done. Don't believe him." I replied that he might make himself easy, for that I had long ago adopted the rule to believe only what I thought likely to be true. It is more or less in this spirit that I venture to commend to the attention of the reader the following items of evidence.

I give the extracts for the present without comment. In some instances it will be seen that they seem to bear strongly against the fish hypothesis; more especially the last in my list is, if trustworthy, subversive of it. I reserve for another occasion my criticisms on this and other opposed statements, and still avow my firm conviction that in some way fish food, and especially

¹ I quote the following from a recent book of travel by Mr. W. S. Caine, M.P.: "Fish have a poor chance in this Buddhist country. A Cingalese won't take life so he never tastes butcher's meat; he has, however, no scruple to help a fish on to dry land and let him die if he can't get back to his native element, and by this amiable quibble he is able to add fish to his mess of rice without any breach of conscience. Your Buddhist is a true Pharisee."—Caine, p. 375.

⁷ See Reports in *Med. Chron.*, May, 1889.

See especially papers by Gosselin, Jeannel, Lavalanée, and Martin, in Verneuil's series of *Études Expérimentales sur la Tuberculose*.

when either salted or decomposed, either supplies the bacillus of leprosy, or, what perhaps is equally probable, stimulates into specificity a bacillus which is common both to tubercle and leprosy.

Leprosy in Madagascar.—I obtained from Mr. William Johnson, a missionary who had long resided in Madagascar, the following facts: Leprosy is exceedingly common, much more so, he believes, than is generally supposed. The people are great fish eaters, and even inland procure, in large quantities, a small gold fish from the streams that water the rice plantations. They also eat prawns and shrimps largely, and are very careless as to the quality of their fish and its state as to freshness. Mr. and Mrs. Henry Clark, intelligent missionaries, who had long resided at Antananarivo to whom I read Mr. Johnson's statement, said that they could fully confirm it and added they thought the fish hypothesis very probable as regards Madagascar.

Ceylon.—Dr. Haydon White writes me:—A man recently returned from Ceylon tells me that there the disease is generally ascribed to the eating of rotten fish, which the natives curry and eat freely. (See Mr. Caine's statement above).

Palestine and Syria.—The evidence respecting the Palestine district, given by Dr. Langerhaus, agrees well with that in the College of Physicians' report. The following items are taken from the latter. "The disease is evidently all but extinct in this region so poor in fish." Mr. Finn, Her Majesty's Consul at Jerusalem (not a medical man), reports that it is found only in the native population—Mahomedans—with rare exceptions. There was, at the time of his report, a single case, in which the subject was a Jew (a boy). He states that the leper huts accommodate about a dozen, and I gather, although it is not expressly stated so, that this number includes most of the lepers now in Jerusalem. A few lepers are stated to be found at Nablus and Jaffa.

Mr. Sandwith, vice-consul at Caiffa, reports that there have been within his knowledge but three cases of leprosy in his district, which includes the towns of Tiberias, Safed, and Nazareth. They all occurred in one family in Caiffa, and consisted of, first, a woman who died of the disease at 40 years of age; her brother, who is in a leper house in Damascus; and her son. Her husband and another son are healthy. No provision is made for the disease in that part of the country, since, adds Mr. Sandwith, "it is hardly known."

Australia (Sydney).—From a medical friend, resident in Sydney, I received (in 1877) a very alarmist letter, stating that leprosy was becoming common there, and that the fish theory would not hold as little or no fish was eaten. From his letter I quote the following:—"Can you give me any hints as to the treatment of leprosy? I am quite sure it is going to be a disease of this colony, though fish is never used as an article of food. I have seen half-a-dozen well-marked cases of leprosy in natives (i.e., whites born in the colony). I saw one this morning exactly like a woman you had under your care in Moorfields, in 1870, with both eyes affected. The severer forms of the disease are as yet rare, but none of my cases ever touch fish." Within a few hours of the receipt of his letter two very intelligent Sydney residents called on me, and from them I gleaned the following facts:—Mr. and Mrs. H. said that fish was fairly plentiful, but eaten almost solely by the better classes. Much of it was notoriously unwholesome, and they had known of many cases of fish poisoning. Decomposition changes set in very early, and unless cooked directly the fish soon became bad. Lobsters were especially liable to become poisonous, and many persons would not touch them. Salt fish (imported) was much used, but less than formerly. They had not heard of leprosy in Sydney, except in connection with the Chinese.—July, 1879.

I have quite recently (1890) been told by friend Dr. Maclaurin, late President of the Board of Health for New South Wales, that there has been no spreading whatever of the disease in Sydney. He reports at present twelve cases in Sydney: ten Chinese, one Japanese, and one Englishman. Thus it is clearly, as in so many other places, almost exclusively a disease of Chinamen.

Antigua: Facts supplied to me by Dr. Jenkins, who had long resided there.—The better classes almost always eat salt fish and egg sauce to breakfast. Fresh fish cannot be easily got, and is not much eaten to dinner; not more than in England. The poor eat salt fish very largely. All the salt fish is imported, chiefly from Newfoundland, salt mackerel and salt cod. The poor eat fresh fish more than the rich, but not very largely. Many fish are poisonous, and some are poisonous only at certain seasons. The baracouta is the fish principally eaten and is an excellent fish. It is unwholesome in certain places. Dr. Jenkins (my informant) be-

lieves that it rarely does more than disagree with the stomach and induce urticaria. The yellow-billed sprat and the toad fish are both virulently poisonous at times; the latter is never eaten. The yellow-billed sprat is as poisonous as prussic acid at certain times and at others a delicacy.

Nicaragua: Bogota.—The following facts were supplied to me by my late friend, Dr. Fergusson, of Clermont Square. Our conversation had begun by Dr. Fergusson telling me that there was leprosy at Bogota, although it was far above the sea and out of the way of sea fish. He had lived there some years. Bogota is the capital of New Granada, and is 8,000 feet above the level of the sea, three days' journey from the River Magdalena, on the banks of a small stream, Bogota; a large inland lake supplies fish in plenty. They eat a peculiar fish, "like an eel but swims as a fish," which is believed to be unwholesome. It tastes like an eel if fresh. They eat also largely salted "vagra," a large flat fish, very coarse; especially during Lent this is what they live on. There are a few cases of leprosy. Dr. Fergusson had seen "a few cases, perhaps half-a-dozen, during two years." The natives consider it hereditary. It is in a few families only. The population consists of Europeans (very few), descendants of the Spanish, once numerous occupiers of the country, and some of mixed race, Indian and Spanish. In one of the Spanish families leprosy occurs. There is no leper house. In Ambelama, on the banks of the river, a tropical climate, they eat immense quantities of fish, and leprosy is much more common.

Bahia, Brazil.—For the following items I was indebted to Dr. Paterson, who had lived in Bahia: In the Leper Hospital no case was known to have occurred from contagion. The populace believe it contagious. It is also believed to be due to fish too exclusively used. Salt codfish from Newfoundland is much used. Salt codfish and salt meat are almost the only kinds of flesh food. Fresh fish, from the sea, is also much eaten. In a great measure dependent on fish, Brazil is only populated along the coast. Fish will only keep a few hours; it is often stale before it can be got to the house. A kind of shark is much salted and eaten. Brazilians never eat tainted fish or highly kept articles of any description. Leprosy occurs inland somewhat. It is equally common in the wealthy and poor.

Brazil.—Facts communicated by Dr. Hall:—"London, April 19th, 1873. I have seen during many years' residence in the Brazil numerous cases of elephantiasis of the Greeks. It occurred in all ranks, at almost all ages, from childhood to old age, in both sexes, and in most of the races inhabiting that country, the aboriginal Indian, the African, the Brazilian-born black, the coloured or mulatto, and even in the Portuguese; so that neither sex, race, age, nor social status gave exemption from the disease. The Brazilians universally and very firmly believe that the disease is contagious, although to my mind there is not a vestige of scientific evidence to prove this—quite the reverse. My experience, however, makes me believe that this disease is hereditary. Of the causation of the disease it is difficult to speak, for the disease, as above stated, is known to attack all grades, all ages, and differing races—that is, its victims seemed to be placed in very different hygienic and dietetic conditions. Thus the diet of the lower orders consists chiefly of cassava flour (*Jatropha manioc*, I think); they often eat a species of shrimp or prawn, preserved by being dried in the sun, and which is highly indigestible; but they by no means live much on fish, which is rather dear and scarce; nor are any fests kept when only fish is eaten, except Passion Week. The Portuguese certainly use salt cod-fish freely as an article of diet, but they are by no means more attacked by the disease than others. The upper ranks have a diet somewhat similar to the European, using, as a rule, more spices and condiments with their food, which is true of everyone else in the Brazil, particularly red and black pepper; they use, also, sweet oil in their thickening more than is customary with us. Maranhão—of the inhabitants of which I speak—is a town in the north of Brazil, of 40,000 inhabitants, about 3° S. The city is clean, houses large, well built, and constant sea-breeze modifies the heat greatly; it is very healthy, escaping the epidemics that desolate the other Brazilian towns. The water drunk is excellent, few as soft and good, none perhaps better—at least, so have seafaring people, who have been to all parts of the world to water their ships, said to me. The extreme heat forces ventilation of the houses, and invites the frequent use of the cold bath; the few clothes used are frequently washed; the people, as a rule, never suffer the extreme wretchedness and privations so common in this country, and are sober, wages high, the few absolute necessities of life cheap; yet in Maranhão this disease is

common. It is true that, as far as I have been led to believe, the disease is more prevalent in Pará, the hygienic conditions of which are bad, and where they do use very deleterious fish as food, but about Pará I cannot speak from personal observation. It may be interesting to remark, when thinking of the curability of the disease, that one of my grandfathers, a very large slave-owner, a believer in the contagion of the disease, used to banish all slaves attacked to the heart of the forests, as far as possible, of course, from his plantations. After the lapse of many years, I believe that this leprosy colony was visited, and it was then found that some lepers had recovered, and also that there had been healthy progeny from leprosy parents. This was told me; I cannot, of course, vouch for its accuracy; there may have been sources of fallacy independent of wilful deception on the part of the person telling me, whose statement I could well believe. I think that I already spoke to you about my own idea that there was some connection between syphilis and this disease."

Brazil.—The following notes were kindly written out for me by Dr. J. L. Paterson, now of Edinburgh, who formerly resided in Brazil: "I am sorry all I can communicate is in itself so meagre, and mostly of a negative character. In tracing back the many cases I saw to their origin, the one only positive fact I could make out was the hereditary transmission of the disease, or, to speak more correctly, the greater liability of certain families to suffer from it. What I mean by this distinction will appear from the following history: There was in Bahia a household, all Portuguese by birth—two brothers, married to two sisters, their cousins. One of these sisters, after her marriage and long after having borne children, manifested symptoms of tubercular leprosy, returned to Portugal, and three years after died of the complaint. Two of her daughters from early girlhood suffered from the anæsthetic or musculo-atrophic form of the disease. The other sister never manifested any symptoms of the disease; and yet two of her daughters, from about ten years of age, began to suffer from the blotching of the skin that generally preludes the breaking out of the tubercular form, and, though sent at once to Portugal, the disease pursued in them a course as rapid as ever I have seen it do. Now, these children's mother had never manifested any symptoms of the disease, and their aunt—so I was even assured—was the first in their family, as far as they could trace it back, that had been afflicted with the malady. This family was healthy, living on the best of food and in the most hygienic surroundings. Knowing that in other countries the disease had been attributed to improper diet—abuse of fish, putrid fish, etc.—as also to filthiness of habits, I looked in vain for these as having any appreciable influence on this development in Brazil. It was certainly as common among the wealthy and well-fed as among the poor, as frequent inland as among the dwellers by the sea; and filthiness of habit is, as you know, unknown in Brazil. Clothing is of the scantiest—by the well-off changed every day, by the poorest twice a week—and no one, from the Emperor on the throne to the maid-servant that is behind the mill, is without at least one bath a day. I cannot suggest the slightest explanation of its origin in any given family. Thus, I know a Brazilian family consisting of one brother and four sisters, all married and all having large families. The brother was married to a Brazilian lady; of the four sisters, one was married to an Englishman, one to a Portuguese, and two to Germans, brothers. In none of all those families was there any antecedent history of leprosy, and yet one of the German children, two years after leaving Brazil and while studying in Hamburg, showed signs of the anæsthetic form of the disease, accompanied by wasting in the muscles of the hands. The disease was unrecognised in Europe, and the poor boy got many a flogging at school for want of tact in his hands. On his return to Brazil, when about 18, the case was at once recognised, with what horror to his family you may surmise, it having by this time passed into the tubercular form. I left him still suffering from the disease, in a gradually progressing degree, he alone of all his brothers, sisters, or cousins the one stricken. I have often sent children to Europe immediately on the first appearance of symptoms of the disease, but have never in any case seen the progress of the case in the slightest stayed by that measure. How different from beri-beri! I know of no remedy that has any permanent effect on the progress of the disease. I have never known a single case in which contagion could be supposed to have given rise to the disease. In the lazaret hospital at Bahia no attendant has ever caught the com-

plaint; nor the women who wash the linen of the patients. So far from the *libido inextinguibilis* spoken of by some, I have invariably found the sexual passion dulled or extinct. Such is all the information I at present remember."

India.—Dr. Chunder Roy, when in England, gave me the following facts: In Calcutta all classes of the population eat fish, but the Hindoos do not eat salted fish or fish in any way cooked or preserved by others. They will eat it fresh. Some portions of the Brahmin caste abstain absolutely from fish—the Mahratta Brahmins and the Brahmins of the North-Western Provinces. Dr. Roy added: Strange that among the Brahmins you scarcely can see a case of leprosy. The Bengal Brahmins will take fish. Dr. Roy told me that the worst cases of leprosy that he had seen were amongst the Naghpoor weavers, who, he said, eat fish largely.

India.—I received the letter, from which the following are extracts, from a very able surgeon in the Indian Civil Service about ten years ago. I omit his name only because I have no permission to print it. I shall have to dissent from some of his opinions, but at the same time I entertain the utmost respect for the intelligent zeal which characterises his letter:—"Dear Sir,—I have seen in the *Lancet* a report of your paper on a case of leprosy, read before the Royal Medical and Chirurgical Society. In it you express the view that a fish diet or a small quantity of fish eaten under certain conditions is sufficient to produce leprosy. I picked up the same idea myself some years ago, and had opportunities of investigating it. When Civil Surgeon of Etawah, in 1870, a station on the river Jumna, in the North-West Provinces, I had numerous cases of leprosy under observation, but in none of them could I trace the disease in any way to a fish diet. Two years afterwards I was in charge of a Central prison, where there were about twelve lepers always in confinement, but could get no proof to support the fish theory. I am now stationed in the Himalayas, in the district of Kinnaur, contiguous to Nepal, the country referred to by Dr. Macnamara, in the discussion on your paper. Leprosy is so prevalent in the district, that special leper hospitals have long been established for the reception of cases. These hospitals are at some distance from here, and are not under my charge, so that I cannot speak of the cases from my own experience, but I wrote to Sir Henry Ramsay on the subject. He has ruled the country for the past thirty years, and is personally acquainted with every soul in the places. He writes: 'I believe very few in the leper asylums have tasted fish a dozen times in their lives. Leprosy is hereditary beyond all doubt, and is accelerated or aggravated by poverty, and is clearly connected with syphilis. I have known it in men who never tasted fish or any other flesh in their lives, and who lived fairly well—high caste Brahmins.' In the course of my inquiries I found two things frequently present: a poor unvarying diet, almost invariably; a history of syphilis very commonly. The whole diet consisted, month by month, of the cheaper pulses, or a species of millet, if it happened to be cheaper than the pulse, little or no salt, no oils, and no vegetables. The class corresponding to the agricultural labourer at home is even, in the best of times, on the verge of starvation. Their one object in life is to fill their stomachs with some kind of food which does not affect their caste. Perhaps it may be that an unvarying diet containing only one constituent of the alimentary principles in sufficiency may produce the changes resulting in leprosy; that diet may be fish, pulses, or even one containing a preponderance of starch and a minimum of other constituents. Fisher people in Scotland nowadays don't live exclusively on fish; they, in fact, eat fish comparatively rarely; it pays them better to sell their fish and buy other food with the proceeds. In the olden times, when leprosy prevailed, there was no market for their fish, so they lived on the produce of the sea and a little oatmeal. The same is the case at the present day among the poor fisher people of Norway. The rich, there, you say, do not suffer. Do they in other countries, except by hereditary transmission from poor ancestors? I was struck with the resemblance that leprosy has, in certain of its stages, to syphilis. I have seen cases returned as syphilis which subsequently turned out to be leprosy. I do not think the fish diet theory is sufficient to account for the disease in all places. A fish diet may produce leprosy, but so may other diets."

Madeira.—"The exciting causes appear to be such as poverty and its attendant evils engender. There is at present one person labouring under the disease who is a clerk in a wine store. He is quite the aristocrat of leprosy here, and I have never heard of its occurrence in a more exalted situation; it seldom rises above the

CHRONOLOGICAL SCHEDULE RESPECTING THE PREVALENCE AND DECLINE OF LEPROSY IN EUROPE.

Date.	Facts as to Leprosy in Europe.	English Kings.	Contemporary Events.
10th Century. 950.	Leprosy had for long been prevalent throughout Europe and in England. Leper houses had existed in Palestine for nearly a thousand years. Leper houses had existed in Ireland for more than a century. Hoel Dha, Welsh King, made laws as to leprosy. An act passed making leprosy a valid cause for divorce.	Edward succeeded Alfred (901). Athelstan, Edmund, Edred. Edwy, Edgar, Edward II. Ethelred II.	The Normans were now established in France. The Danes in England. The more strict observance of fast days may have led to a great increase in the consumption of salted fish, especially in inland places.
11th Century. 1000.	Leprosy prevalent. Several English leper houses existed before the first Crusade. Lanfranc (who died 1089), had founded a leper house at Canterbury. (It is doubtful whether Lanfranc's hospital was exclusively for lepers.)	Ethelred King. Edmund Ironside. Canute (1017). Danish conquest. Harold. William the Conqueror. 1066. William II, 1067.	Time of Hildebrand, 1073-1085. More strict observance of catholic ritual. The first Crusade was begun by Peter the Hermit, 1095. Newcastle-on-Tyne was built by Malcolm Canmore, 1097. It must be remembered that it was at this time that the first hospitals and pest houses were also built. We must not assume that leper houses implied a new or even increasing disease.
12th Century. 1150.	Leprosy prevalent. A leper hospital established at Ripon, and another at York. The earliest mention of leper houses in Scotland. Leper hospital instituted at Sherburn, Durham, by Hugh Pudsey for 65 lepers. One also at Ilford. (1180-3). Baldwin IV, King of Jerusalem, himself became a leper, and ten years later resigned his crown, being disabled. The testament of Louis VIII mentions 2,000 leper houses in France.	Henry I, 1100. Stephen, 1135. Henry II, 1154. Richard, 1189. John, 1199.	The third Crusade, 1189, under Richard I.
13th Century. 1200.	Leprosy prevalent. It is supposed that there were more than a hundred well-endowed leper houses in England. Probably they were not exclusively for lepers. First mention of leper houses at Bergen in Norway. (1266).	John. Henry III, 1216. Edward I, 1272.	The Norwegians invaded Scotland (unsuccessfully), 1263. Death of Louis IX and end of last Crusade (1270). If the returning Crusaders did really cause increase of leprosy, it was probably by altered habits of diet, and not by contagion. Time of Dante.
14th Century. 1300.	Leprosy on the decline. 1346. Baldoek, Bishop of London, made rules for the Leper Hospital at Ilford, Essex. Edward III issued a proclamation that all lepers should leave London.	Edward I. Edward II, 1307. Edward III, 1327. Richard II, 1377. Henry IV, 1399.	Time of Wycliff and Chaucer. The real beginning of the Reformation. Gunpowder invented, 1320. Guy de Chauliac, Glanville, John of Gaddesden, Bernhard Gordon and Gilbert, wrote on Leprosy.
15th Century. 1400.	Numerous new leper houses provided in Switzerland. It was now almost extinct in Italy. Leper Hospital at Sherburn, Durham, in want of lepers, the foundation was reduced from 65 beds to 15, and of the latter two were to be kept for lepers, "if such can be found," and the rest used for other cases (1434).	Henry IV. Henry V, 1413. Henry VI, 1422. Edward IV, 1461. Richard III, 1483. Henry VII, 1485.	Discovery of America. It is not improbable that there was increasing laxity in the observance of fast days long before the Reformation was established. This would lead to disuse of salted fish. Henry VIII, on account of the rapidly declining use of fish, passed laws to compel householders to put it on their tables.
16th Century. 1500.	Leprosy houses were still being founded in the Netherlands and parts of Germany. A commission (Edward VI) reported most of the leper houses in England empty (1547). No lepers being forthcoming in Durham, the leper hospital at Sherburn was privily diverted from its original purpose and arrangements made to receive "old, blind, lame, and otherwise impotent" (1585). 1598, Edinburgh (Greenside) Hospital founded.	Henry VII. Henry VIII, 1509. Edward VI, 1547. Mary, 1553. Elizabeth, 1558.	Linacre died, 1524. Paracelsus died, 1541. Reformation begun in Germany by Luther, 1517. Reformation established in England, 1534. Potatoes introduced into England. There can be no doubt that leprosy declined very rapidly after the Reformation and the abolition of fast days.
17th Century. 1600.	1604. There was a leper in the leper house at Aberdeen, and one in that of Kingscase, at Ayr. 1652. An order made to dismantle the leper house at Greenside, Edinburgh.	Elizabeth. James I, 1603. Charles I, 1625. Commonwealth. Charles II, 1680. James II, 1685. William and Mary, 1689.	Shakespeare died, 1616. Harvey discovered the circulation of the blood, 1619. East India Company established. The English settle in Madras, 1690. First English settlement in West Indies and Barbadoes, 1625. Great Plague in London, 1665. The culture of potatoes common.

18th Century. 1700.	Still present at some places in France, (Upper Auvergne, Belle Isle au Mer still used as a refuge for lepers). Public thanksgiving in the Shetland Isles on account of the disappearance of leprosy. A few cases however still continued to appear, (1742). 1798. A man named John Berns, a leper, and descended from a family known to be leprosy, admitted into the Edinburgh Infirmary.	Anne, 1702. George I, 1714. George II, 1727. George III, 1760.	Time of Louis XIV, 1643-1715. French Revolution.
19th Century. 1800.	Not yet quite extinct in Germany. Still occurs in isolated places in Portugal, Spain, Italy, Sicily, and various other places on the Mediterranean. Prevalent in Crete. The Truro Infirmary received the revenues of the Leper Hospital, St. Laurence de Ponteboy, and bound itself to take in lepers about which he forthcoming. Unknown as an indigenous disease throughout the British Isles. Still very prevalent in Norway, India, China, and the West Indies. Of recent increase in the Sandwich Islands, Australia, and a few other places.	George III, 1820. George IV, 1820. William IV, 1830. Victoria, 1837.	Many lepers still in Norway and Iceland.

THE FOLLOWING NOTES RECORD SUCH FACTS AS WE POSSESS RESPECTING THE PREVALENCE OF LEPROSY IN TIMES EARLIER THAN THE TENTH CENTURY, AT WHICH THE ABOVE CHRONOLOGICAL SCHEME BEGINS.

It is highly probable that leprosy has prevailed extensively in Egypt, China, Japan, India, and in many other parts, from time immemorial. There are neither records nor traditions as to its commencement. The present inhabitants of Norway, Iceland, the Orkneys, etc., probably suffered from the time their settlement. That there was a definite increase of the disease over Europe during the first fifteen Christian centuries is highly probable, with some exacerbation during the eleventh and twelfth, and a steady decline in those parts during the last five.

Leprosy is mentioned in the Bible prior to the sojourn of the Israelites in Egypt.
The earlier Greek and Roman writers it was known as a disease endemic in Egypt, and possibly by the name also of the Phœnician disease.

lowest class of peasantry. With a predisposition to the disease, however acquired, poverty, insufficient shelter and clothing, spare, unwholesome diet, great and sudden alterations in temperature, and filth, in their various combination, appear to be necessary for its production. Separately, not one of these would produce it, nor the whole combined, unless co-operating with a predisposition, for they are combined in eight-tenths of the peasantry, and yet the lazaretto contains eighteen persons only out of a population of 100,000."

(I have unfortunately lost the reference for the above. It may be from conversation or it may be extracted from a printed work.)

Leprosy in Assam.—Surgeon-Major White, in a letter to Mr. James Startin, which has been kindly shown to me, states that he believes leprosy to be produced by improper and unwholesome food, and filthy habits generally. He says that in 1858 leprosy was common in Assam, "at least 5 per 1,000," now "not 1 per 1,000 could be found." This diminution he attributes to improved wages, etc. He asserts that the better class of Hindus in Assam eat fish once or twice a day, and that leprosy is rare amongst them. That the Miris, a nomadic hill race, now settled in the plains are, after the Duniis, the largest fish eaters. Leprosy is very common amongst them. The Duniis, or fishermen caste, live mainly on fish, and prefer it semi-putrid. He believes them more exempt from leprosy than other castes in Assam of the lower classes. That the Marwame traders in Assam are natives of central India, settled in Assam and belong to the very strictest sect of Hinduism. They do not take life, or eat anything that has lived. Yet he "has known many cases of leprosy" amongst them. They do not intermarry with other tribes, so that the leprosy is not so introduced. Leprosy is very common among the hill tribes bordering the Assam valley: notably the Khasias and Nagas, although they rarely if ever eat fish. He found many lepers amongst tribes in the hills, who being Ishmaelites as regards others, and always at war, "had no means of even occasionally obtaining fish."

The Punjab.—Dr. Burton Brown, writing from the Punjab, states that he sees but very few cases of the disease. It is evident from his remarks that leucoderma is often confused with it ("white patches without anesthesia"). He states that the genuine leprosy is considered hereditary, occurs very seldom amongst the rich, and is supposed to be connected with a poor diet. He adds in reply to a question that "though insufficient food predisposes to it, yet it can seldom be traced in the Punjab to a fish diet, since very few persons eat fish frequently, as it is scarce and dear."

Madras.—Dr. J. Garrett, a well-trained observer, who visited India in 1873, was

Lucretius writing B.C. 95, says "There is the disease called Elephas, which has its rise on the river Nile in the middle of Egypt, and in no other country." This remark illustrates Lucretius' ignorance of medical geography, for it had long prevailed in Palestine, India, China, and probably in many other places.

It became known in Italy in the last century B.C. Celsus speaks of it as "ignotus pene in Italia." In the seventh century the Hospital of St. John was founded, and in the eighth that of St. Lazarus at St. Gallen on Lake Constance.

In 759 an Act issued by Pepin provided that leprosy in a husband or wife should be cause of separation. Charlemagne in 789 re-enacted similar laws.

Rothar, King of the Lombards in the seventh century, made laws to prevent the marriage of lepers. The first law on the subject in England was in 950. There were leper houses in Ireland in 869.

good enough to send me notes of an inspection of the Leper Asylum at Royapostrum, Madras. I extract the following items as of interest:

"Notes of a Visit to the Leper Asylum, Royapostrum, Madras, on August 18th, 1873. J. Garrett.—There were about seventy in the asylum, men, women, and children; the youngest was about 10 years old. Some had been there ten years; in fact, they had a home for life if they liked to remain. There were no Europeans, but they usually had a few in the asylum. The patients stated that their diet had been chiefly curry and rice, with fish about once a week, and the attendant told me that they came chiefly from the sea coast, and that no case had occurred of any attendant catching leprosy from an inmate."

Japan.—"Fish, which figures next to rice on their diet list, becomes, under some circumstances, a fruitful source of disease. It is prepared too often so as to be unfit for the stomach, as the above-mentioned rice cake. And in some very poor communities the people eat it after it has become half decayed; nay, they scarcely can consume it at all except thus damaged, since their poverty does not permit them to purchase the more expensive fresh and sweet article. I am convinced that to it must be attributed in a great measure the production of so much leprosy found in those very places. In my inquiries after the existence of leprosy I could only learn of one, at Misco, the great city of Nippon, where the supreme Mikado resides. This institution is supported by the people, independent of the government. There the lepers receive medical treatment. These miserable beings are very numerous in Misco, very scarce in Nagasaki, but count largely again in Amakura, in Omara, and Ch'Kngo. In the latter place, built upon the low, marshy banks of a river, which, in its frequent inundations, leaves constant large pools of water standing between and underneath the houses, the people live on nothing else but this cheap, because damaged, dried fish, and hardly a single family can be found there free from leprosy. In Nagasaki leprosy is only sporadic; in all the other named places it is decidedly endemic."

Bombay.—From a Resident: "The Parsees, or Zoroastrians, both sexes alike, as a class are notorious fish consumers in the Bombay Presidency. They get the best fish in the market. I do not know whether they consume much salt fish. The people living in the Concan³ (Alibagh, Tanna, and Rutnagerry districts) eat great quantities of fish. The inhabitants are chiefly Hindus. The lower caste Hindus are not prohibited from

³ By H. Ernest Schmid, M.D., *Medical Record*, July 1st, 1889.

³ In the Concan leprosy is exceedingly prevalent.

eating animal food of any kind, but the women dine separately from the men and very often have to rest satisfied with whatever their lords and masters choose to leave them after satisfying their own appetites. The strictest observers of caste are perhaps the Janis or Baninas, and they rarely, if ever, touch animal food of any sort.

Return of Lepers in the Leper House of T-arn Taran, India.

SIR,—I beg to submit a statement showing the result of my inquiry. I have stated what has been ascertained from lepers present in the asylum at this date. I made an inquiry after the lepers residing in the city of T-arn Taran, and I found that altogether 88 lepers (52 Hindus, 25 Mohomedans, and 11 Sweepers) are residing there, but all of them have gone out to beg, excepting 4; 2 belonging to higher classes and 2 to lower classes. They allege to have never touched fish. With reference to the rest, 84, I cannot give any accurate data, whether they belong to higher classes or lower ones, and whether they used fish or not. There is no evidence to prove that leprosy is caused by fish-eating. Leprosy is most commonly met with in the lower classes of Hindus and Mohomedans, and among the Mehters (at an equal rate). Leprosy is seen particularly in persons who use unwholesome food and keep themselves dirty, hereditary taint being the principal cause, the details of which are not asked and need not be mentioned therefore.—Yours obediently, LACHMAN DOP, I.M.S., Assistant-Surgeon. March, 1875.

"Total number of lepers in the Leper Asylum at T-arn Taran, 113. Of those, 37 were Hindus, 67 Mohomedans, and 9 Sweepers; 30 belonged to the higher classes, 83 to the lower classes; 77 never used fish, 6 used fish but seldom, 30 often used fish."

Comments.—Mr. Dop's statistics, if trustworthy, are obviously conclusive against the fish theory. I am, inclined, however, after some experience of similar ones, to take them with much reservation. The patients told him that they had not eaten fish, so would, in an English hospital, most women suffering from alcoholism have assured him that they had never touched spirits. Religious character was to some extent at stake. I never heard anyone doubt that Indian natives, unless restrained by caste, would, if it could be got, eat fish. Mr. Dop's facts prove that in the district concerned fish was to be had. The Mohomedans would, of course, have no scruples, nor would most of the Hindus. I find, therefore, the statement that so large a proportion had abstained incredible, and must leave the matter for more critical investigation on the spot.

ON SOME FACTS AS TO THE HISTORY OF LEPROSY.

It becomes of much importance in the search after the cause of leprosy, to get correct impressions as to its history. I have therefore ventured to compile the appended schedule⁴ which comprises, in chronological order, some of the principal facts as to its prevalence in Europe during the Middle Ages, and its decline during the last five centuries. I have not gone further back than the tenth century, as our facts in earlier times are but few and vague.

We can state nothing with certainty as to the prevalence of leprosy in England during the Roman occupation or for some centuries later. The same remark applies to the nations who in succession immigrated to our land. Concerning the medico-social history of the Danes, Saxons, and Normans but little is known. It may be conjectured, however, that the evidence is simply wanting, and the probability is great that the disease existed amongst all these from the earliest times. In the tenth century it was a subject of legislative enactment in Wales, one of the laws of Hoel Dha providing that a wife might claim separation from a leprous husband. Such a fact makes it probable that the malady had long been known.

In England leper homes were founded in the tenth century, and from this date onwards their institution was frequent. Through the eleventh, twelfth, and thirteenth centuries the disease was certainly common, and with the end of the thirteenth there begin to appear signs of its decline. During the first half of the fifteenth it is recorded that various leper houses were in want of inmates, and in the middle of the sixteenth a commission appointed by Edward VI reported most of them empty. The decline began before Luther's Reformation, but appears to have been much accelerated by it.

In Scotland leper houses began to be instituted after many had

⁴ The schedule is arranged on a somewhat novel method, to which I give the name "space for time arrangement," and which is, I venture to think, a great improvement on the ordinary plan. To each century the same space is allotted so that the eye easily appreciates the periods of time which have passed.

been formed in England, and there are records of several new ones being formed at a date when those in England were ceasing to obtain inmates. These facts are probably to be explained in part by the slower progress of the custom of hospital building in the northern counties, and by the fact that leprosy prevailed there at a later period than England. It lingered last, as is well known, in the Shetland and Faroe Islands, and it was not till 1742 that the Shetlanders were able to hold a thanksgiving service for its final disappearance. It had lingered in Cornwall almost to the same date.

In England and Scotland leper houses were at one time abundant. They were found chiefly at seaports—King's Lynn and other Norfolk towns had many—but were also met with inland, as at Canterbury, York, St. Albans, Ilford, Northampton, and Ripon.⁵

I am indebted for many of the dates in the text and accompanying schedule to the admirable antiquarian articles on Leprosy, by Sir James Simpson, *Edinburgh Medical and Surgical Journal*, 1841.

Amongst the conclusions suggested by the historical facts are the following:—

Leprosy was probab'y indigenous or o. spontaneous origin in many parts.

No proof is forthcoming that the Roman armies spread it over Europe. The Roman arms never reached Sweden or Norway. It is certain that leprosy prevailed to a considerable extent over Europe and in the British Isles before the Crusades. There is no doubt that leper houses were founded in large numbers soon after the Crusades, but what relation they had to them is doubtful. But few hospitals or charitable institutions of any kind had existed earlier.

It is not improbable that leprosy increased with the spread of Christianity in Europe, and it certainly was at its height during the most flourishing period of mediæval Catholicism.

It began to decline in the fourteenth or fifteenth century, and its very rapid disappearance was coincident with the Lutheran Reformation.

Since it is certainly not contagious in any degree which would account for its spreading, and since it is also an utter mistake to believe that efficient segregation was practised, no explanation either of its increase or decline is forthcoming, unless we accept the hypothesis that the compulsory use of fish on ninety fast days in each year had something to do with it.

The effect of the compulsory fasts would be to send salted fish into inland districts and one of the very remarkable peculiarities of leprosy in the Middle Ages as contrasted with our own is that it occurred at a distance from the sea.

The development of agriculture, the increased supply of flesh food and of cereals were also coincident with the decrease of leprosy.

Henry VIII so far recognised the decline in fish eating that he passed a law in the interest of fishermen, to compel its more liberal use. This was precisely at the time that leprosy was vanishing.

That the leper houses did not effect segregation and were not indeed designed to do so, is shown by the fact that when lepers become scarce, other objects of charity were admitted in company with them.

(To be continued.)

⁵ In a map showing the position of leper houses in England, in the *JOURNAL*, March 1st, in connection with Dr. Ransome's lecture. It is desirable that I should state that the whole of my paper was in type before I saw Dr. Ransome's. As regards a possible relationship between leprosy and tubercle we have arrived at similar impressions.

NEW SERIES OF THE KLINISCHE VORTRAGE.—It is announced that the periodical which has earned for itself so honourable a reputation under the name of *Volkmann's Sammlung klinischer Vorträge*, will be continued under the editorship of Professors E. von Bergmann of Berlin, Erb of Heidelberg, and Winckel of Munich, representing the three great branches of the healing art. Professor Erb will have charge of the medical, Professor von Bergmann of the surgical, and Professor Winckel, of the obstetric and gynecological department. Six numbers are to be published in the course of the year; the first three will appear in May.

DR. P. SONNINO, well known for his valuable contributions to medical helminthology, some of which have appeared in our own columns, has recently been appointed as a teacher of parasitic diseases in the University of Pisa.