AN EPIDEMIOLOGICAL INVESTIGATION OF LEPROSY IN THE MIYAGI PREFECTURE *

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A proper campaign against leprosy must take fully into account the conditions of the country and its people. In order that this may be done a thorough epidemiological investigation is necessary, at least in countries and regions where the disease more or less predominates.

Japanese experts have devoted themselves with zeal both to the scientific and therapeutic aspects of the leprosy problem, and the Ministry of the Interior has done much toward the prophylaxis of leprosy, especially since 1904, through the promulgation of laws, the taking of censuses of lepers and the establishment of leprosaria. On the other hand it seems that the epidemiological investigation of the disease in Japan had been more or less neglected.

There is no doubt that the number of lepers in Japan has decreased considerably as a result of the prophylactic measures taken. The authorities give the following figures for the five censuses made in this country, not including Formosa and Korea:

1904	30,357
1906	23,851
1919	16,261
1925	15,351
1930	14,741

According to the last census there are 2.28 cases for every 10,000 persons. More recently the authorities have declared this figure erro-

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neous on the basis of a more exact count made in Tochigi by T. Saito, director of the office of hygiene of that prefecture; the correct count in 1930 must have been 20 per cent higher. However, there are specialists who do not agree with this estimate. For example, Dr. M. Murata believes that there are about 40,000 cases in Japan, or 64 per 10,000, and Dr. T. Aoki thinks that the total number is certainly not less than 20,000.

After the return of one of us from the international leprosy conferences in Bangkok and Manila (in December, 1930, and January, 1931, respectively), where the importance of epidemiological investigations was strongly emphasized, he, together with the staff of the office of hygiene of Miyagi Prefecture, undertook investigations of such nature in certain districts of this prefecture. The results of the investigation, which are described in detail in the Japanese text, are given here in abridged form.

Number of villages examined and lepers found.—We examined 21 villages, some of which are north of the city of Sendai and some south of it. This is in one of the colder regions of Japan, the average temperature for the year being 11.3°, maximum 15.9°, minimum 6.6°. There is relatively little leprosy here, the official figure for the prefecture being only 1.52 per 10,000.

The villages examined can be divided into three categories: (a) Those in which there are more than 3 lepers according to the official census or the reports of physicians; of these there were 15. (b) Those which were rumored to be infected with leprosy; these were 5. (c) One village considered free of the disease, from both the census figures and hearsay.

The number of houses in these 21 villages totalled 1,707, and the inhabitants 11,427. According to the official figure there should be 30 lepers, or 2.65 per 10,000, and of them 20 should be males and 10 females. Actually, our count revealed 66 cases, or 5.78 per 10,000, the ratio of our figure to the official one being 2.2:1. Of these cases 36 were males and 30 females. The number of houses involved was 44. It is to be remarked that according to the findings of several investigators the number of male lepers in Japan is much greater than that of the female cases, by two to four times. This is not the case according to our statistics.

Attention must be drawn to the fact that suspicious cases are to be found in the neighborhood of lepers. We found 16 such suspects, the ratio to the definite cases being 0.24:1. We divide these suspects into two classes according to the degree of the suspicious signs. In the first class we count those in whom are found one or more spots without definite disturbance of sensitivity or diminution of the perception of warmth, or† those in which the ulnar or great auricular nerve is more or less swollen. In none of these 16 suspects could the leprosy bacillus be detected. Such persons require thorough examination.

Age and type of the disease.—Our classification of the type of the disease has been made according to the rules adopted by the Manila conference, in 1931. The 66 cases were divided as in the accompanying table.

TABLE 1.—*Type of the disease in the cases found.*

Patients	Type of case															
	N1	N2	N3	N1 C1	N1 C2	N1 C3	N2 C1	N2 C2	N2 C3	N3 C1	N3 C2	N3 C3	C1	C2	C3	Total
Male	7	4	3	8	0	0	2	6	1	0	1	0	1	2	1	36
Female	0	3	7	0	3	0	0	5	4	1	1	2	0	2	2	30
Total	7	7	10	8	3	0	2	11	5	1	2	2	1	4	3	66

The largest age-group of the patients was between 16 and 35 (with 27 cases), the second largest group being between 36 and 55 (with 19 cases). Few cases were found among children or the old. The older patients showed the N form, whereas the NC and the C forms were most frequent in the younger.

The most common findings in the C form of the disease were nodules and ulcers, the second most frequent signs being falling of the hair and macules. The N form was manifested by decrease or loss of sensitivity to heat or pain, by paresthesia, and by thickening of the peripheral nerves, especially of the ulnar and great auricular. Muscular atrophy, mutilations or blister formation were only seldom observed, and ichthyotic thickening of the skin never. Anemia, emaciation and edema were frequent in the advanced cases of the nervous type.

† Apparently referring to the second group, but not so stated.—EDITOR.

Onset of the disease.—We did not see the first signs of the disease in our cases. According to the statements of the patients these usually consisted of disturbances of sensation, rheumatoid pain or erythemas. The age periods in which the first symptoms appeared are as follows:

6 to 10 years	3 cases
11 to 15 years	10 cases
16 to 20 years	15 cases
21 to 25 years	8 cases
26 to 30 years	10 cases
31 to 35 years	5 cases
36 to 40 years	7 cases

The elapsed time between the beginning of the disease and the time of our investigation varied from 1 to 45 years, but the patients in whom this period was from 1 to 10 years were the most numerous. The 8 patients examined from 31 to 45 years after the beginning of the disease all had the N form.

It is generally believed by the layman that marriage causes the appearance of symptoms of (latent) leprosy. Though, according to the histories, the disease began after marriage in 72.5 per cent of our cases (one-half of them at 1 to 10 years after marriage), it would be unjustified to conclude from this fact that the sexual life had influenced the course of the disease.

Infection by long contact.—The cases examined by us must all have been infected by prolonged contact with lepers. It seemed that infection in 53 out of the 66 was from blood relations, in 5 it was between married couples, in 4 between parents-in-law and sons- or daughters-in-law, and only in 2 cases from neighbors. In the other 2 cases the mode of infection was not clear. The infection between blood relatives was most frequent between parents and children (34 cases); in 5 cases it was between sisters, in 4 cases between uncles or aunts and nephews or nieces, and in 10 cases between grandparents and grandchildren.

However, we found that the families in the places examined were very closely related to each other. Such relationships were found in 10.6 per cent of the homes or families. Of the 44 leprous families 43 were in some way related to another one.

With reference to the time interval between the beginning of the contact and the appearance of the disease, the shortest period was 3 and the longest 35 years, the most frequent being between 16 and 20 years. The period of incubation (or, rather, latency) is shortest in infections between parents and children, and between brothers and sisters; it is greater between grandparents and grandchildren, and between uncles or aunts and nephews or nieces. The infection between couples generally follows only a long time after marriage.

Homes and living conditions.—These conditions were investigated in 59 of the cases. The majority of them lived together in the same small houses with the non-leprous members of their families. Ten patients had their own rooms to which their food was brought by persons assigned to that duty. Only five patients lived in more or less isolated houses. The numbers of members of the families affected and the ways in which the patients lived are shown in Table 2.

TABLE 2.—*Manner of living of the patients, and number of members of the family of each.*

Condition of isolation	No. of patients	Members of family, per patient			
		3 to 5	6 to 8	9 or 10	11 or 12
Living together with non-lepers	44	13	20	4	7
Living in a separate room	10	6	2	2	0
Living separated from families	5	1	2	1	1
Totals	59	20	24	7	8

In general it can be said that, at least so far as our patients are concerned, leprosy occurs mostly among the poor. Their homes were damp and small, containing only two or three rooms. The yearly income of the families varied from 30 to 2,000 yen, the average being 745 yen. It is to be remarked that the average annual income of the families in the places that we investigated amounted to 740 yen.

Of our 66 patients 36 were completely incapable of earning their living. The other 30 worked with the non-leprous members of their families and frequently were essential for the support of the families. The patients with the C form of the disease were specially

capable of working, and also those with the CN form in whom the nerve symptoms were not advanced. Even quite advanced C patients were frequently active as farmers, fishermen, charcoal-burners or carters. Therefore, the lepers who are most capable of working are for the most part those who from the nature of their disease should first be isolated. Most of the patients had enjoyed elementary school education.

Bacteriological examination.—Acid-fast bacilli were found in the nasal secretion or in material scraped from the nasal mucosa in 24 of 62 patients examined, or 38.7 per cent. On the other hand, blood drops from the earlobes were found positive in only 11 out of 61 cases (17.2 per cent). Bacilli were not found in any of 1,125 non-lepers, including those living in houses with lepers and neighbors.

Other endemic diseases.—Trachoma and intestinal parasites (*Ankylostoma duodenale, Ascaris, Trichuris trichura,* etc.,) were very prevalent in the villages examined. Tuberculosis and syphilis, on the contrary, were scarcely observed.

Leprosy among the uncounted.—Those absent at the time of the counting required special attention as it might be believed that there might be many lepers among them. Out of the 359 persons absent 21, mostly from 16 to 40 years of age, were leper suspects.

Beginning of the endemic.—The beginning of the appearance of the disease in these villages occurred in some cases 60 years ago, in others 30 years. From 20 to 30 years after its entry comes the flourishing period, which lasts for 10 to 20 years and then begins to wane. With the passage of time the dominating type of the disease also changes, the C and CN forms being inclined to decrease and the N form to increase. —[AUTHORS' ABSTRACT]