

INTERNATIONAL JOURNAL OF LEPROSY

PUBLISHED AS THE OFFICIAL ORGAN OF THE
INTERNATIONAL LEPROSY ASSOCIATION
WITH THE AID OF THE LEONARD WOOD MEMORIAL

Postal Address: P. O. Box 606, Manila, Philippines
Office at the Institute of Hygiene and Public Health
Entered at the Post Office at Manila as second-class matter

Vol. 9

JULY-SEPTEMBER, 1941

No. 3

EDITORIALS

Editorials are written by members of the Editorial Board, and opinions expressed are those of the writers.

HEREDITY IN SUSCEPTIBILITY TO LEPROSY

From a point of view very different from that which was current in the earlier period of the study of leprosy, the factor of heredity in its etiology has recently been brought back into the picture. With recognition that leprosy is due to the bacillus that is constantly associated with it, the idea that the disease itself is hereditary went out. The present thesis, fundamental to which is the belief that specially high resistance exists in some peoples, which tends to protect them, or, on the other hand, that in other peoples the natural resistance is lower than normal, thus rendering them particularly susceptible to infection, is a very different matter.

Several years ago Molesworth¹ argued—as Living had some sixty years previously—that the principal reason that leprosy died out in Europe in the Middle Ages was probably that the susceptibles had been eliminated from the population. He regarded this as a process of natural selection. That idea was controverted by Muir,² who held that Europeans in leprosy coun-

¹MOLESWORTH, E. H. The evolution of racial resistance to leprosy and other diseases. (With special reference to "Leprosy" in "A System of Bacteriology" and to "Lepra" in "Handbuch der Pathogenen Mikro-organismen".) *Acta Dermat.-venereol.* 13 (1932) 201-223; The influence of natural selection in the incidence of leprosy. *Internat. Jour. Lep.* 1 (1933) 265-282.

²MUIR, E. Racial resistance to leprosy. (Comment on Molesworth's article.) *Acta Dermat.-venereol.* 13 (1932) 224-234.

tries showed no evidence of acquired racial resistance, but were just as liable to infection as the native inhabitants. Recently Hopkins³ has brought up again with this question of racial resistance, high acquired hereditary resistance in racial stocks of European origin, and lack of such resistance in peoples of regions where the disease is prevalent.

Another, more recent, contribution is that of Aycock,⁴ who on the other hand considers primarily the factor of familial susceptibility—which it might be but logical to extend to comprise entire racial groups. He took cognizance of the fact that, although leprosy has been introduced into all sections of the North American continent, it has not spread except in a few areas, and in those foci largely in certain racial stocks. Noting the situation among Scandinavians in Minnesota (among whom the disease did not disappear as promptly as is generally supposed), and a few cases among Icelanders immigrated to Manitoba and among the Dikhobors of Saskatchewan, he discussed briefly the evidence of familial relationships among cases in the well-known focus in New Brunswick and more fully that factor in Louisiana. He found indications that in each of the last two foci—and in both of them, since members of leprous Acadian families migrated to Louisiana—leprosy has tended to recur in successive generations in certain family lines in which intermarriage is common. He concluded that:

Collected studies covering several generations of family lines in which leprosy continues to occur in several localized areas indicate that hereditary susceptibility is a major factor in the propagation of leprosy on the North American continent.

Before this article had appeared Muir contributed to this periodical an editorial discussion of the evidence concerning racial susceptibility as he has found it in several countries.⁵ He still holds that the facts are against the idea that Europeans are less susceptible than the natives of Africa and India, but he agrees that there is evidence of racial differences with respect to the disease as represented by the fact that, among the Burmans and certain European peoples, it appears in its more severe form in

³HOPKINS, R. Heredity in leprosy. In *Tuberculosis and Leprosy; the Mycobacterial Diseases*. Symposium Series Vol. 1, American Association for the Advancement of Science. The Science Press Printing Co., Lancaster, Pa., 1938, pp. 112-118; reprinted in *Internat. Jour. Lep.* 8 (1940) 71-80, also in *Lep. in India* 12 (1940) 88-96.

⁴AYCOCK, W. L. Familial susceptibility as a factor in the propagation of leprosy in North America. *Internat. Jour. Lep.* 8 (1940) 137-150.

⁵THE JOURNAL 8 (1939) 361-366; editorial.

a much larger proportion of cases than among the peoples of India and Africa.

At about the same time Lowe also discussed the problem of predisposition to leprosy in an editorial note⁶ which is quoted *in extenso* here with a slight modification by him.

THE PREDISPOSING CAUSES OF LEPROSY

At different times and in different parts of the world, leprosy has been attributed to a great variety of causes. With the discovery of the bacillus many of the older ideas were abandoned, at any rate for a time. Later, however, it became clear that many people intimately exposed to infection did not develop the disease, while some people relatively little exposed did develop it, whereupon some of those ideas were resuscitated in modified forms. Since exposure alone would not always cause the disease, it was held that some secondary factor was also concerned.

One example of this trend was Sir Jonathan Hutchinson's theory which supported the old popular view that leprosy was connected with the eating of fish. Hutchinson maintained this idea actively over a number of years, and it is still common among the general public. Recently another theory based on food has been advanced, by Oberdoerffer. He thinks that the eating of *Colocasia antiquorum* acts as a potent predisposing cause. We consider that the evidence so far produced in support of this idea is far from being conclusive, and that some evidence is against it.

The old idea that one particular article of diet predisposes to leprosy has been largely replaced by the hypothesis that an inadequate and ill-balanced diet acts in this way. No scientific evidence has been produced to show clearly that in any area those persons who have leprosy have subsisted on a diet poorer than that of those of the same class who do not have it. A few diet surveys have been carried out, but they afford no conclusive evidence on this point.

Another old idea, that leprosy is etiologically related to other diseases, has also been revived in a modified form. The view that other diseases may serve to undermine the patient's resistance and prepare the soil for the leprosy bacillus has been widely taught and accepted during the last twenty years. As far as we know there has never been produced any accurate evidence to support this view or to contradict it. It may or may not be true. We can only cite certain personal observations and impressions.

Syphilis and malaria have frequently been referred to as predisposing to leprosy. If this is so, one might expect to find their incidence to be higher in lepers than in healthy persons living in similar conditions in the same area. As far as we know such evidence has never been produced. A clinical and serological study of several thousand cases of leprosy for evidence of syphilis, made years ago, gave no proof that its incidence was any higher among them than in the general population.

Regarding malaria in this connection, no accurate reports are available. There have, however, during recent years been several reports regarding the

⁶*Leprosy in India* 12 (1940) 75-76. This quotation is a condensation approved by the author.

incidence and distribution of leprosy and malaria in different parts of India, Burma and other countries. For example, Joseph observed that in the Madras Presidency a high incidence of both leprosy and malaria is never found in one area. Where leprosy is common, malaria is uncommon, and vice versa. We noted a similar thing in Burma, and Buker has reported comparable findings in the Shan States of that country. These reports do not prove that there is no connection between leprosy and malaria, but they do suggest that the conditions favorable to the one disease are less favorable to the other, and that the influence of one on the other may not be great.

We do know some parts of Bengal in which both leprosy and malaria are very common. One such area is Santalpur. There a high incidence of leprosy is found, but the disease is of a very mild type. It has even been suggested that the high incidence of malignant malaria, particularly in children, in this area may have something to do with the extreme mildness of the forms of leprosy, and that malaria acquired early in life may stimulate resistance to leprosy. This may or may not be so, but at any rate it is clear that if malaria were potent in predisposition to leprosy, and if it greatly aggravated that disease, as it is supposed to do, one would expect to find the latter in a severe form instead of the mild forms seen.

It will be gathered that we are far from being satisfied with the available evidence to support the view that bad diet and other diseases predispose to leprosy and aggravate it. Experience in diagnostic clinic work also makes one doubt the soundness of this view. One may see poorly fed persons suffering from other diseases and constantly exposed to leprosy infection, who either do not get the disease at all or get it in a mild form. One may see other persons, well nourished, of fine physique and free from other diseases, who get leprosy in a severe form from very limited or unknown contact.

It appears to us that by far the most important predisposing cause of leprosy is inherent individual susceptibility, and that with this factor present, plus infection, leprosy will often develop in the absence of any other factor. This question of individual susceptibility and how it arises is one about which little is known, but there is some evidence that it is found more commonly in certain racial and familial groups. Hopkins has recently reported a study of leprosy in different races in the American continent, certain findings of which are rather similar to those seen in different races in India.

In the summary of a recent paper by Lowe and Santra⁷ there appears the following statement:

The clinical and epidemiological variations of leprosy seen in different parts of the world are briefly discussed, and it is considered that the chief factor concerned in the production of these differences is that of race.

In a notice of this article in another periodical,⁸ the editor makes the following comment:

There can be no doubt of the importance of *race* as determining both

⁷LOWE, J. AND SANTRA, I. An epidemiological study of leprosy with special reference to the leprosy survey in Santalpur (North Bengal). *Lep. in India* 12 (1940) 43-54.

⁸*Leprosy Review* 11 (1940) 178.

the predominant type of leprosy and the seriousness of the disease as a health problem in any endemic area. But it is important to consider to what extent racial susceptibility is internal and physiological and to what extent it is environmental and dependent on social and economic factors.

In that connection, there is interest in an author's abstract (Cochrane) which appeared in the Current Literature section of a recent issue of *THE JOURNAL* [9 (1941) 145], which summarizes a report of the results of the past two years' work of the Saidapet clinic. The purposes of that clinic included the elucidation of the causes of the development of leprosy in children and of the factors which influence the type of the disease as it occurs in them. The following statements appear:

...the evidence is all against the idea that the poor dietetic condition of the people of the outcaste area predisposes to more widespread infection or results in a more serious type of leprosy.... [It is found] that the greatest individual cause of infection is close contact, and that this and the age of the individual play a far greater part in the epidemiology of leprosy than all the other factors frequently suggested.

An opinion in opposition to the views of Hopkins and of Aycock, one which upholds the importance of nonhereditary factors, has been registered by Read, head of the division of physiological sciences of the Henry Lester Institute for Medical Research, in Shanghai.⁹ Regarding Hopkins' conclusions that resistance or nonresistance must be an inherited characteristic, because leprosy is so rare in the United States that it cannot be due to acquired immunity—as is generally held to be the case with respect to tuberculosis—Read says:

Without presenting evidence of the existence of such an inherited immunity, i.e., the demonstration of immune bodies in the blood, this conclusion is no more rational than, say, the assumption that Gypsies inherit the propensity for horse stealing or that the aristocracy of England inherit a predisposition for the army and the church. Their family trees would be equally convincing.

He holds that if there is a hereditary constitutional weakness which predisposes to the infection, it is not necessarily due to lack of immunity in its specific sense but that it may be due to some other constitutional weakness of the tissue systems; that with the evidence available it cannot be said with certainty whether or not hereditary susceptibility to infection does exist, though that view has long been widely held; but that in the field of allergy there is evidence that suggests the inheritance of predisposition, and hence this theory cannot be dismissed,

⁹READ, B. E. The cause and transmission of leprosy. *Leper Quart.* 14 (1940) 117-123.

though more positive evidence is awaited. He evidently leans, however, to the side of acquired constitutional weakness, with special reference to malnutrition.

This problem, obviously, is one that cries aloud for experimental investigation. So far as the disease itself is concerned, that is as yet impossible. No laboratory animal has yet been found in which actual leprosy, as a progressive and serially transmissible disease, can be produced; hence it is not possible to compare different families or strains of any animal with regard to susceptibility, as has been done by Lurie in rabbits with respect to tuberculosis.¹⁰ The epidemiological study of leprosy in children would seem to be the only direct approach to this problem, but that is a long and difficult road. Evidence is not to be obtained from children born of leper parents in institutions, and it is of course not possible deliberately to expose children of different familial or racial strains to leprosy environments.

It is obviously a far cry from that to a study of skin reactions in animals to the introduction of the leprosy bacillus. However, inasmuch as resistance to the infection in man, in the absence of specific acquired immunity, must lie somehow in the reactivity of the tissues of the body to the causative agent, evidence of variations of reactivity in different families of animals may be at least suggestive. There may, therefore, be some interest in the observation, to be published by the writer in the next issue, of variations of reactivity in different groups of puppies that parallel those of their mothers. —H. W. WADE

¹⁰LURIE, M. B. Rôle of inherited natural resistance to tuberculosis. *Proc. Soc. Exper. Biol. & Med.* **39** (1938) 176-181; Nature of inherited natural resistance to tuberculosis. *Ibid.* **39** (1938) 181-187; The relation of hereditary constitution, allergic irritation, antibody production and the development of local immunity in resistance to tuberculosis. *Science* **92** (1940) 457 (abstract).