THE STRANGE CASE OF LEPROSY

By DR. EMMO GEHR AND DR. ELISABETH GEHR

There is no need to plead for the reader's interest in a subject such as leprosy. From time immemorial it has exercised a horror-filled fascination on the imagination of men. But it is only in recent years that strides have been made in the knowledge of this strange plague. Among the leading scientists in the field are the authors of our article.

Dr. Emmo Gehr has the rare distinction of having passed examinations both in medicine and in Oriental languages at the University of Berlin. Hence he possesses unusual qualifications for the study of medical problems in Asia. Though still quite young, he has made a name for himself in leprosy research and in 1932 was one of the founders of the Leprosy Study Group in the German Research Council. His wife, Dr. Elisabeth Gehr, received her medical degree at Hamburg University and practiced medicine in Berlin. After their marriage the Gehrs combined their forces in the struggle against leprosy and studied the disease in Rumania, Bulgaria, Turkey, Greece, Spain, and Portugal. Since spring 1941 they have been engaged in the study of it in the Orient and are at present living in Tokyo.—K.M.

LEPROSY is one of the oldest and most dreaded of all the diseases of mankind. There are few countries in the world which have been entirely spared by it; and there is scarcely a people which does not have legends built around it. We are reminded of the gruesome descriptions of the Middle Ages and of stories in the Bible (in the latter case mistakenly, for, according to recent discoveries by medical historians, the Zaarath of the Old Testament was not leprosy but the name given to several other relatively harmless skin diseases). The Japanese recall their Empress Komyo, who, like Saint Elizabeth, used to wash and nurse beggars and lepers. Indians can find a description of the scourge in the Rig Veda (1400 B.C.); and the oldest Chinese reports of it date back to legendary times. On the other hand, the remarks contained in the ancient Egyptian papyrus discovered by Ebers probably do not refer to leprosy, and the tourists in Angkor Wat who gaze in awestruck horror at the "roi lépreux" are deceived by the lichen and the weathered condition of the stone. Map I shows how we imagine the disease to have spread from its places of origin in India and China.

AGE-OLD SUPERSTITIONS

So man has had at least 3,500 years to become acquainted with leprosy, to study it, and to fight it. The result? Even today people still have a superstitious fear of leprosy such as they have of no other disease and which is scarcely justified. It is the remains of medieval religious ideas of divine punishment and branding. In sixteenth century China, for example, leprosy was called t'ien hsing (天星), meaning "punishment from heaven."

Tuberculosis is far more dangerous, and many more victims fall prey to it than to leprosy which, contrary to general opinion, is not very infectious. There are other incurable diseases which are more murderous, more painful, and more repulsive than leprosy, but none of them is surrounded by such an atmosphere of horror and despair.

The fate of the leper is no more pitiable than that of the mutilated, the crippled, or the incurably insane—unless the world makes it so. And
doctors, missionaries, and nurses who have devoted their lives to the care of lepers are neither martyrs nor heroes, but people who do their job like thousands of others who work in hospitals and sanatoriums. Many doctors and hospital employees have died of typhus, cholera, yellow fever, malaria, plague, and typhoid, but scarcely one has ever been infected with leprosy. Indeed, not even doctors who have inoculated themselves with leprous material have become infected.

LEPROSY’S STRANGE PREFERENCES

Diseases have their own laws, their own preferences and aversions. Some prefer the summer, such as dysentery and infantile paralysis; others, such as typhus, reach their peak in winter. Sleeping sickness depends on the tsetse fly; plague on rats and their fleas. Tsutsugamushi (Japanese river fever) follows rivers; while dengue prefers towns. So leprosy, too, has a number of peculiarities, many of which still seem strange and mysterious to us. It avoids towns and, in direct contrast to tuberculosis—whose bacillus under the microscope exactly resembles the leprosy bacillus—is not spread in the poor districts of large cities. In the slums of London, in Marseilles there are dozens, and in cities like Hongkong and Shanghai even hundreds of lepers, come there from other places, and yet—with very rare exceptions—the people around them do not become infected.

Leprosy is an infectious disease, and we believe that long and close contact with lepers is necessary for infection; but, in all leper countries, only two to six per cent of all healthy people married to lepers contract the disease. Among blood relations, on the other hand, that is, parents, children, brothers and sisters, nephews and nieces, cousins, etc., the percentage of infection is high—fifty to sixty per cent. Almost everywhere, for quite unknown reasons, twice as many men as women become leprous; only in a few small areas, such as Lithuania and the island of Oceal, is it otherwise. Before puberty and after the menopause, however, both sexes are equally liable to infection. The greatest discrepancy is to be

Map I. How Leprosy Has Spread
found between the ages of twenty-five and thirty-five. In the case of all infectious diseases a certain length of time passes—usually a fixed number of days or weeks—between the infection and the outbreak of the disease. In the case of leprosy that period is usually two to three years, often longer, and sometimes as much as thirty years!

**IS IT CLIMATE, IS IT FOOD?**

Map II shows the present extent of leprosy in the world. The total number of lepers is very variously estimated. Three million is certainly too low, ten million perhaps too high. In India and China alone there are most probably a million each. We notice at once that the main areas of leprosy are in the hot zones. But this was not always the case. The disease also raged for more than a thousand years in northern and central Europe, in England and in Scandinavia. In the Mediterranean countries and Portugal, in Iceland, Norway, the Baltic states, and Russia it is still endemic. In Europe today there are altogether fifteen to twenty thousand lepers. So it seems hopeless to try and explain the extent of leprosy by climatic conditions.

In central Europe the disease died out in the fifteenth and sixteenth centuries without any effective measures having been taken to fight it. Moreover, during the period of famine and poverty of the Thirty Years' War it did not flare up again. This fact speaks against any connection with undernourishment and lack of hygiene. Food conditions in northern Japan are less favorable than in the south and Formosa; yet the incidence of leprosy increases toward the south, while Hokkaido is almost entirely free of the disease. Conditions of hygiene are considerably better in Japan than in North China and Manchuria; yet the two latter regions are not disease-ridden in spite of the constant immigration of lepers. Among the Maoris of New Zealand leprosy disappeared in the second half of the last century, at a time when, through the settlement there of adventurers, whale catchers, and English deportees, alcohol, syphilis, starvation, filth, and misery were spread among the inhabitants.

**OR IS IT FISH?**

Hardly a single case is known of a European or American becoming infected in Japan or China. So the attempt was promptly made to link up the spread of leprosy with racial factors. Yet these same Europeans were not only affected during the Middle Ages but still contract leprosy today in South America, for example. The majority of the fifteen lepers now living in Germany and several thousand of the lepers on the Iberian peninsula became infected in Brazil. Frenchmen and Englishmen caught it in the colonies.

All theories seeking to explain the geographical extent of leprosy, whether founded on the resistance-lowering effect of other diseases, on lack of vitamins, or on animal carriers, have been exploded. At the beginning of this century a sensation was caused by the theory that the excessive consumption of either rotten or poorly prepared fish heightens the disposition to leprosy. But negro tribes in the interior of Africa, who eat no fish, are not free from leprosy; and even in a country that consumes as much fish as Japan, this staple forms only three to four per cent of the daily diet of the peasant population. And it is the peasant population which is most highly susceptible in every country.

**AN INDIAN REMEDY**

Medical knowledge has made great progress during the last half century, and effective preventive measures or encouraging methods of treatment have been discovered for a large number of diseases. Inoculations afford protection against cholera and typhoid fever. Malaria, syphilis, and, to a high degree, even tuberculosis, are curable today. Even the dreaded cancer is curable in eighty to ninety
per cent of all cases, if the patient does not consult the doctor too late.

For leprosy, thousands of methods and medicaments have been applied, starting with the Japanese treatment of baths and the ancient Chinese Moxa cauterization up to modern short-wave and hormone therapy. But science was always obliged to return to the old Indian folk remedy, the Chaulmoogra oil. This oil has been split up into its component parts and combined with other substances—yet the raw, untreated oil has remained the most effective. But unfortunately this effect is very limited. Although one can alleviate and halt the suffering of lepers, only a few incipient cases can be cured.

**IS ISOLATION EFFECTIVE?**

Someone once calculated that measles must disappear from the face of the earth if one could strictly isolate every case of measles for only fourteen days. But unfortunately this cannot be done. And it is equally impossible to get hold of and isolate every leper in a country. Peasants are used to scratches and sore places: how can they be expected to pay any attention to a little spot, lump, or rash, that does not even hurt! Usually several years pass before the sick person discovers his affliction. In its first stages, the disease is often hard to diagnose with certainty; individual cases in rarely affected districts can at first easily go unrecognized. And many a sick man, who is aware of his condition, keeps it secret out of fear of the unavoidable separation from family and home.

The strict measures of isolation which, for instance, the Americans have carried out in the Philippines for more than twenty years, at enormous cost and with much propaganda for their achievements, have not succeeded in reducing the figures for leprosy there. When the fight against the disease began, the number of lepers in the archipelago was estimated at about 8,000; now some 10,000 have been isolated, and at least another 25,000 have not yet been rounded up. The English leprosy researcher Maxwell thinks there are even 65,000 and draws the discouraging equation: 8,000 minus 10,000 equals 65,000! It is true that in Norway the number of lepers has been reduced through isolation from 2,833 cases in 1856 to 58 cases in 1932. Yet among the descendants of 160 Norwegian leper emigrants to North America the disease died out without any isolation at all!

**WHY NOT INOCULATION?**

Since leprosy, as we have said, is not very infectious—it attacks at the utmost ten to fifteen per cent of a population group, but usually only a few per mille—it represents for the state a problem more of finance than of hygiene. According to Maxwell’s calculation, the isolation of the lepers of China would require a starting capital of some two hundred million US dollars, and a minimum of ten million dollars to cover current expenses. To this must be added the loss in labor from a part of the population which is mainly composed of able-bodied men.

All this could be saved if there were some sort of inoculation. But the chances for the discovery of an effective serum are minuscule. The leprosy bacillus is only slightly toxic (which, of course, is shown by its low degree of infection), so that the disease is extremely chronic. Not only do years elapse before the actual outbreak, but even afterwards the disease develops only very gradually over a period of decades. Lepers can reach a great age; the affliction is not fatal, and complications such as tuberculosis, sepsis, or diseases of the kidneys are usually the cause of death. Hence it is not very probable that the body can produce antibodies strong enough to form the basis for a successful inoculation. The best methods of inoculation have been developed in the cases of diseases running a swift, violent course, such as smallpox, cholera, diphtheria, typhoid fever. Moreover, whom should one inoculate against leprosy? All the millions inhabiting the vast areas shown in Map II? In the case of smallpox the situation is quite different, for eighty per cent of the population
and more are threatened by this disease and can be protected by vaccination.

**MEASURES IN CHINA AND JAPAN**

In 1940 there were some fifty leprosaria in China, maintained by about twenty-five different (mostly American) mission societies. Only a few of them were run by provincial governments or medical institutions. All in all, 3,247 lepers were interned, that is to say, a little more than three per mille of the total number of lepers estimated at one million!

In Japan, on the other hand, there were, in 1941, sixteen institutions, six of them maintained by the state, five by provincial or civic, and only five private ones. In them there are slightly over 9,000 patients, only 658 of which are in the five private leprosaria. This number represents almost two thirds of the cases known to the Ministry of Public Welfare, a very creditable achievement. One need hardly add that the remaining third—mostly very light cases—are under constant medical surveillance. The total number of Japanese lepers is estimated at 20,000 to 40,000. Even if we assume it to be 50,000, it means that twenty per cent are isolated. This shows that an effective control of the disease is only possible in a state with a strong, united government and a disciplined population, to which must, of course, be added tireless scientific research and the corresponding training of doctors.

Although the Japanese leprosaria are not luxury institutions, they are roomy settlements, laid out with an eye to light and cleanliness, where the patient can feel comfortable under sympathetic care. Under medical observation he can do all kinds of work in the fields and gardens, in small workshops, or in the nursing of the seriously ill. In Japan there is one doctor for about every hundred patients—specialists for internal disorders, surgeons, gynecologists, ear, eye, and dental specialists—while in China some of the leprosaria have to get along without any doctor at all. Of course, the missions have done valuable though, seen as a whole, insufficient work, also in Japan before state control of leprosy began.

**A CHEERFUL REFUGE**

A model institution is to be found in the German leprosarium in Tungkun near Canton. It is run by the Rhenish Mission and has three hundred patients. Dr. Hueck, in charge of the institution, and Mr. W. Grundmann, the superintendent, have found an excellent solution in combining occupation and work therapy for the patients with a reduction of the maintenance costs. A modern little industrial plant with German machinery has been created, where lime is burnt in a kiln and pottery, especially flower pots and white and colored cement and terrazzo tiles, are produced in large quantities. The tiles, which are equal to the best imported quality, supply not only the leprosarium's own needs; for before the Japanese occupation there was an agreement with the Chinese municipal administration of Canton by which contractors were urged to place their orders with the asylum.
The buildings of the leprosarium, with their shining stone floors, their white or colored tiled walls, and the paths with their speckless, snow-white tiles beneath the trees, the flowers, and the cacti, offer a charming picture. The patients work enthusiastically at the beautifying of their quarters, and show off their machines and equipment to the visitor with pride.

RESEARCH IN GERMANY AND IN JAPAN

In spite of the lack of opportunity to study leprosy on a large scale ensuing from Germany's loss of colonies in the Great War, German medical science has not let itself be discouraged from devoting more and more attention to the problem. A German, Professor Klingmüller, has written the most comprehensive treatise on the disease, which is generally acknowledged to be the best on the subject (1930, with a supplementary volume in 1938).

The greatest obstacle which has hitherto stood in the way of research into the disease and which has made the solution of the problems mentioned before so difficult, is the impossibility of cultivating the leprosy bacillus or of inoculating animals with it. We owe our knowledge of such diseases as tuberculosis, syphilis, and diphtheria, as well as of the methods for their prevention and cure, to a large extent to these two processes of research. Professor Ota, a Japanese, has succeeded in carrying out a kind of culture through the inoculation of chickens; and Dr. Oberdörffer, a German, was the first to succeed in producing clinical leprosy in animals (monkeys) three years ago in Thailand. Dr. Oberdörffer has discovered a treatment with diphtheria antitoxin (Formoltoxoid) which promises success in some forms of leprosy. He has also given a stimulus to leprosy research by working out a new hypothesis. He is of the opinion that a person who has had prolonged contact with lepers can only be infected if, on the one hand, he has a constitutional susceptibility toward the disease, and on the other hand he has continually absorbed certain chemically well-defined harmful substances through his food. Incidentally, leprosy is not hereditary: children who are taken away from their parents at birth and are protected against infection always remain healthy; however, susceptibility is probably hereditary, as in the case of tuberculosis.

Even if Dr. Oberdörffer's hypothesis has by no means yet been proved, it nevertheless goes further than any other in solving the riddles of the disease. A special group in the German Research Association, composed of doctors and chemists, has been entrusted with the task of examining this question and finding new means of combating and curing the disease. Moreover, the famous Tropical Institute in Hamburg and the Skin Disease Clinic of the Hamburg University, besides other research workers in Germany, are giving special attention to the problem of leprosy. Japan, who, in addition to her excellent system of leprosy control, has also produced outstanding achievements in scientific research, and Germany are today leading in the field of leprosy research. May they succeed where previous attempts have failed.