CORRESPONDENCE

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LEPROSY AND CLIMATE IN CHINA

To the EDITOR:

In view of the remarks and additional data on leprosy incidence in China supplied by Dr. James L. Maxwell in the January-March issue of THE JOURNAL [**5** (1937) 92 and 95] it seems that further clarifying details should be given regarding the relation of the new data to climatic characteristics. Dr. Maxwell seems disinclined to attribute "any important influence to climatic causes," while at the same time he stresses the possible importance of nutritional factors in the epidemiology of the disease. But the basic thesis supported by all my human and animal findings is that climatic stimulation works directly through nutritional channels to alter the general characteristics of the living organisms.

Difficulty in losing heat, as in a hot moist environment, results in an automatic and marked suppression of body heat production within a few weeks, and with this suppression of internal combustion goes a slowing of growth, delay in development, lowered energy level, and lessened resistance to infectious invasions. These depressing effects of external heat act independently of dietary adequacy, for by no manner of dietary change can they be obviated. It is through this domination of basic heat production level that climate exerts its effects on man and animals. Dietary inadequacy through avitaminosis or deficiency (either in quality or quantity) of food intake, can produce similar changes in the nutritional state and affect resistance to infection. It was not at all my intention to belittle the importance of dietary factors in leprosy epidemiology, but rather to stress the much more generally acting and more dominant one of climatic stimulation. The dietary factor may indeed be the one that is producing the sharp leprosy differences in contiguous areas of China as described by Dr. Maxwell. For large areas and great population groups, however, it seems more likely that climatic dominance over nutritional state is the more basic factor. With great difficulty of body heat loss, dietary improvement can avail little.

Let us now look more closely into the relation of leprosy incidence to climatic characteristics in China. With the exception of the heavily infected area in Kiangsu and Shantung, and those in the far western mountain districts about which nothing definite is known, there is a clear decrease in leprosy incidence from south to north. The provinces lying partly within the tropics are most heavily infested, those north of the Great Wall are most free from the disease. Why then should the plains of the rich Yangtze valley be relatively free from leprosy and heavy incidence be found in parts of Shangtung and Kiangsu?

The answer, I believe, is to be found in seasonal wind directions and storm tracts that so largely influence the climate of these regions. During the protracted monsoon season, from mid-June to September, there is a steady inrush of humid tropical air from the southwest, up the China Sea, across the Yellow Sea and Gulf of Pechili toward the superheated reaches of the Desert of Gobi. Kiangsu and southeastern Shantung are most depressed by this protracted humid heat, while farther inland the winds are less depressing as their moisture is lost in passing over the low mountain ranges. Before reaching the Desert of Gobi, nearly all their moisture has been thus lost as rainfall. One arm of this tropical air stream turns northeastward across the southern half of Korea to the Sea of Japan and then inland across northern Manchuria. Across southern Korea it exerts its full depressing influence, but before reaching Manchuria it has lost much of its moisture content on the slopes of the coast range of mountains.

Here, then, is the climatic factor that serves as the dominant note for the people of Kiangsu, southeastern Shantung and southern Korea, imposing on them a three-month difficulty in body heat loss which is fully the equal of that experienced in the Southern tropical provinces. Lack of frequent, stimulating storm changes in the winter leaves this summer heat to set the year-round dominant metabolic note.

The plains of the Yangtze valley experience little or none of this summer inrush of tropical moist air toward the superheated reaches of Mongolia and Central Siberia. Only a small strip of coast territory is so involved in the middle latitudes of China. The Yangtze valley, in addition to missing the depressing effects of this tropical air stream, is subjected to more frequent storm stimulation and fluctuation in day-to-day temperature than any other region of China. Stimulating, cool, high-pressure air masses, originating in the high

Himalayas, travel down the Yangtze and out across the China Sea and southeastern parts of Japan. Their frequency is greatest in winter, but even in mid-summer they afford frequent breaks in the enervating warmth of that latitude. The vigor of this storm tract stimulation is much less than that of the North American storm belt, but it is the greatest the Orient has to offer.

One other factor of unknown but probably great importance in the picture of Oriental climate as it relates to leprosy is the tropical typhoon. From May to October these low pressure storms batter the Philippines and the coastal area of South China, adding their effects to those of the depressive heat in the coastal provinces of the south. And during the monsoon heat of July, August, and September they frequently sweep northward along the coast, across Kiangsu and the Shantung peninsula, or across the southern half of Korea and on up the Japan Sea. The result is that, whatever deleterious effects such tropical typhoons have, they are exerted mostly in the three areas of China where leprosy is most prevalent.

As to the reports of leprosy areas in the far western regions of China, little can yet be said. Whether the reports be true or not, and, if true, whether the basis of leprosy prevalence is malnutrition through dietary inadequacy or too severe climatic stress, or both together, cannot be determined without much more definite evidence. I quite agree with Dr. Maxwell in stressing the importance of epidemiologic studies along regional and nutritional lines, but I would insist that a major factor in the nutritional picture is climatic influence and dominance over the combustion processes of the body.

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